

# The Design System Modeling of Socolatte Supply Chain Management in Pidie Jaya Regency

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**Abstract:-** This study aims to design a Socolatte supply chain management system in Pidie Jaya to increase the capacity and profits for local cocoa farmers and the Socolatte company. The method used in this research was system dynamics by designing causal loop diagrams. CLD is a systems thinking-based modeling approach that uses feedback and delays to understand the dynamics of behavior that occurs in the Socolatte industrial supply chain. This research produces a supply chain management system design model that is able to follow any changes in market demand. The buyer sector is the driving force for other sectors. Every change in terms of orders and specifications in the form of demands for quality, quantity, delivery time, price and etc. must be responded to by all business actors involved in the supply chain network of the cocoa processing industry. Likewise, the adoption of the supply chain management system design model through causal loop diagrams can increase profits for the company and its partners.

**Keywords:-** Supply Chain Management, Causal Loop Diagram, Increase Profits.

## I. INTRODUCTION

The strong competition faced by companies in marketing their products requires companies to use supply chain management strategies. The importance of a company implementing supply chain management is because currently competition occurs not only between companies but between supply chain networks. Companies that have a good supply chain network will survive in the business world.

Supply chain management is seen as a method for producing and delivering products efficiently, integrating suppliers, factories, warehousing, and storage so that goods can be distributed properly (Simchi-Levi et al., 2000; Pujawan, 2005; Vorst et al, 2007; ).

A supply chain network occurs when three or more activities are directly involved, namely the flow of goods (products and services), financial flows and information flows (Mentzer, 2001). The business actors must at least pay attention to five main components in distributing their products to what consumers need, namely: quality, quantity, price, and the right time and place (Perdana, 2009).

The strategic goal of supply chain management is to win or at least survive the competition in the market.

Therefore, to win market competition, companies must be able to provide a wide range of products at low cost, high quality, and appropriate (Pujawan, 2005).

Pidie Jaya Regency is one of the regencies that is very thoughtful in cultivating cocoa plants, even the Pidie Jaya government has established cocoa as a superior crop along with rice and corn. Cocoa development in Pidie Jaya is inseparable from various problems faced in the upstream and downstream sectors. Some problems in the upstream sector are low cocoa productivity, while the problem in the downstream sector is the poor quality of beans because there are still many farmers who do not ferment cocoa beans.

Currently, especially in Pidie Jaya Regency, the cocoa processing is already has come to the transformation of the final product in the form of chocolate consumption of food and beverages. One of the local industries engaged in cocoa processing is Socolatte. The Socolatte Company is the first cocoa processing industry in Aceh whose process starts from cocoa beans. They receive the raw materials directly from local cocoa farmers. With the cocoa processing industry, it is expected to absorb local harvests.

The above conditions cause business actors such as Socolatte to be required to always adapt in order to be able to survive and compete with local and long distance chocolate industry players. The ability to deliver products with the right quality, quantity, and continuity according to consumer demand is a must in a business.

Based on the above phenomenon, the researcher raised several questions, namely: Can the adoption of the supply chain management design model meet the dynamics of market demand? In addition, is adopting a supply chain management model able to increase profits for business actors?

## II. RESEARCH METHODOLOGY

This study used a descriptive method with a qualitative approach. The aim of this research was to understand the phenomena and problems of the Socolatte supply chain management system design through the design of causal loop diagrams. The CLD model is a model that emphasizes its attention to causal relationships between system variables (components) which are depicted in a diagram in the form of a curved line ending with an arrow that connects a system component to other components.

Respondents in this study were selected purposively based on decision makers in each supply chain network. The characteristics of the respondents are the owner and manager of the Socolatte company who doubles as the manager of production, marketing, and finance, owner and manager of the fostered garden (farmers).

There are three types of data used in supply chain system management modeling using a system dynamics models approach, namely numerical data, written data and mental models (Towill, 1996). Numerical data and mental models were obtained from interviews with respondents who had been determined in this study. In addition, in this study, in-depth observations were made of the business and management processes that occur in the Socolatte supply chain system under study. Furthermore, the secondary data were collected from studying documentation of journals, books and research reports.

### III. RESULTS AND DISCUSSIONS

#### 1.1 General Model of Socolatte Cocoa Industry Supply Chain Network

Socolatte is a local company engaged in processing cocoa products into chocolate that is ready for consumption. In running a business in the field of processing, it is very important to pay attention to raw materials for business consistency. Suppliers (suppliers) who are local farmers in

Pidie Jaya Regency and are members of a cooperative are engaged in cultivating cocoa plants, starting from land clearing, seeds, fertilizers, medicine, labour, harvesting, post-harvest, and fermentation carried out by farmers.

The main raw material in making chocolate used by the Socolatte company is fermented cocoa beans. This fermentation process aims to create a unique chocolate taste, the colour of the chocolate and the pieces of the seeds are hollow and reduce the bitter and astringent taste, as well as a bright and clean chocolate colour so as to produce beans with good quality and aroma. Cocoa beans that are fermented properly have a high selling price compared to cocoa beans that are not fermented. Under normal conditions Socolatte buys fermented cocoa beans for 40,000/Idr,- and if the market situation is not normal, the selling price will be 55,000/Idr – 60,000/Idr,

Figure 1 shows the supply chain network of the Socolatte cocoa processing industry which is divided into 3 sectors. The sectors are the cocoa plantation sector, the cocoa processing factory sector and the distribution centre sector. Within the company there is a product flow (fermented cocoa beans, chocolate products) and the role of management in linking one sector to another. Management decisions are the management of the flow of information needed to control the flow of products through effective and efficient business processes.

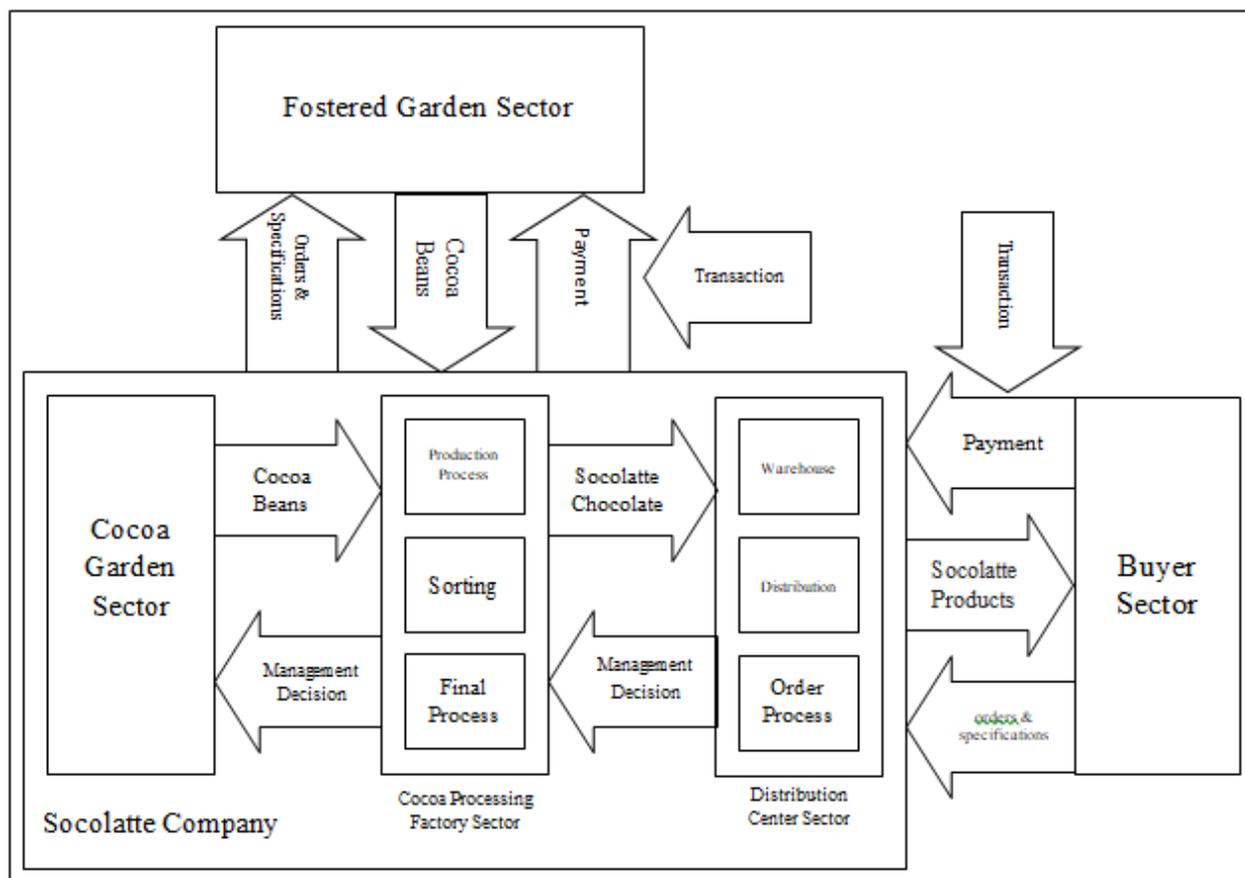


Figure 1. General Model of the Socolatte Cocoa Industry Supply Chain

The Relationships between organizations include the flow of goods, the flow of orders and specifications, and the flow of payments. The Socolatte Company manages the order flow process and specifications as well as payments to cocoa farm partners who supply beans to specified orders and specifications. Meanwhile, buyers (buyers) submit orders and specifications of the desired chocolate product and pay for the order.

Based on the intra and inter-organizational interactions described above, it is explicitly illustrated that there are feedback loops in the supply chain management of the cocoa processing industry. The buyer sector is a driving force for other sectors. Every change in terms of orders and specifications in the form of demands for quality, quantity, delivery time, price and others must be responded to by all business actors involved in the supply chain network of the cocoa processing industry.

**1.2 Causal Loop Diagram of Socolatte Industrial Supply Chain Design**

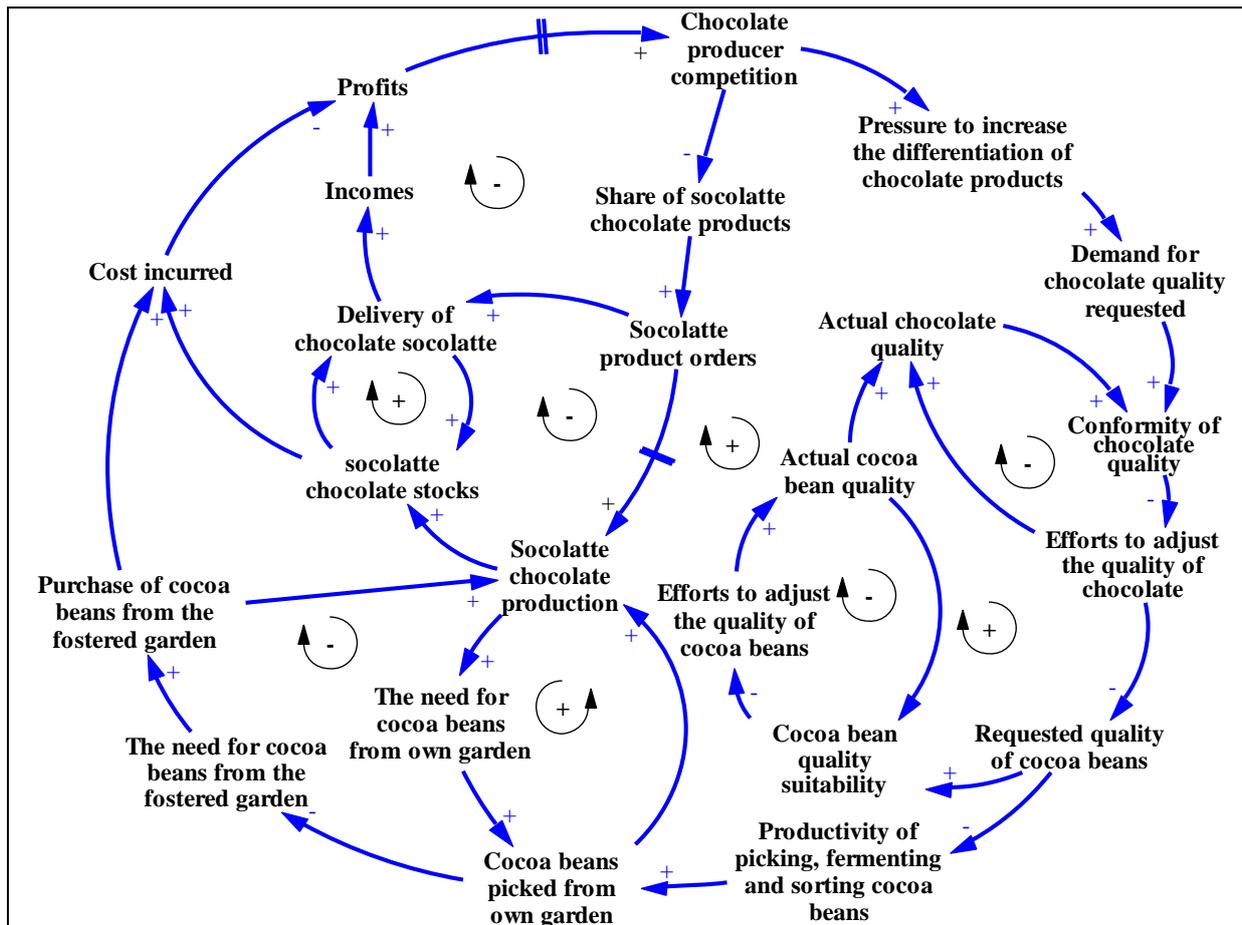


Figure 2. Causal Loop Diagram of Socolatte Industrial Supply Chain Design

According to figure 2, the increasing competitors of cocoa processing producers in the global market will increase the pressure on cocoa processing industry actors to improve the differentiation of chocolate quality. Differentiation of product quality is needed so that cocoa processing industry actors get a better selling price. If there is no differentiation in product quality, there will be pressure to lower the selling price to companies/cooperatives.

The greater the pressure to increase the quality differentiation of eating chocolate products, the higher the demand for chocolate quality demanded by buyers. The increasing demand for quality demands a quick response from cocoa processing producers.

The demand for the quality of the chocolate that is asked to determine the quality suitability of the chocolate produced by the Socolatte company. The higher the demand for quality chocolate, the higher will be the suitability of the quality of the chocolate. The suitability of chocolate quality is the key to the success of the business processes carried out by the Socolatte company and shows the level of market acceptance of the products produced. In other words, consistent quality conformity is an important indicator of a company listening and responding to customers.

The evaluation of the conformity of the resulting quality with quality demands from consumers will result in the level of quality gaps. Furthermore, the higher the suitability of the quality of the chocolate produced with the quality demands of consumers, the lower the effort to adjust the quality of Socolatte chocolate that must be done.

The higher the effort to adjust the quality of the chocolate, the higher the actual quality of the chocolate produced by the Socolatte company. Quality adjustment efforts are carried out by improving the quality of fermented beans which are used as raw materials. The more the actual quality of chocolate increases, the better the suitability of the quality of chocolate produced with the quality demands demanded by consumers. The interaction of quality engineering, namely, the variables of the requested quality of chocolate, the suitability of the quality of chocolate, efforts to adjust the quality of chocolate and the quality of the actual chocolate form a negative feedback loop, which means that every engineering of chocolate quality will lead to a balance to meet consumer demand.

Furthermore, the higher the quality of cocoa beans demanded will increase the suitability of the quality of cocoa beans. The suitability of cocoa bean quality is the gap between the quality of cocoa beans demanded and the quality of actual cocoa beans. The suitability of the quality of cocoa beans determines efforts to adjust the quality of cocoa beans. The higher the suitability of the quality of cocoa beans will reduce the effort to adjust the quality of cocoa beans.

Efforts to adjust cocoa beans are carried out by providing picking directions to the pickers so that the types of cocoa beans produced are better. Every effort to adjust the quality of cocoa beans will improve the quality of the actual cocoa beans produced.

The interaction of cacao bean quality engineering, namely: the requested cocoa bean quality variable, the suitability of the cacao bean quality, efforts to adjust the cacao bean quality, the actual cacao bean quality form a negative feedback loop. From the abovementioned statements, it means that every bean of cocoa quality engineering will lead to a balance to meet the demands of the processing plant management in response to consumer demands.

Two interacting negative feedback loops form an interdependence. Those are the feedback loop of chocolate quality engineering and cocoa bean quality engineering forms a positive feedback loop that results in growth or strengthening behavior. The higher the chocolate quality engineering efforts carried out will encourage the quality engineering of cocoa beans and vice versa.

In the supply chain system of the cocoa processing industry, quality engineering of chocolate and cocoa beans does not stand alone but interacts with other variables and feedback loops. The higher the quality of the cocoa beans demanded, the lower the productivity of picking, fermenting cocoa beans and sorting. This happens because efforts to improve the quality of cocoa beans require accuracy and a longer time so that the productivity of picking, fermenting and sorting cocoa beans per day will be reduced.

In line with the increase in the productivity of picking, fermenting and sorting cocoa beans, the number of cocoa

beans picked in their own garden will decrease. Cocoa beans picked in the garden itself will determine the amount of chocolate production. This happens because the more cocoa beans are picked, the more cocoa beans are processed in the factory. This will increase the production of Socolatte chocolate will increase.

The amount of Socolatte chocolate produced will determine two supply chain activities, namely the procurement of raw materials for cocoa beans from the fostered gardens and the processing of cocoa supplies. The more Socolatte chocolate production is carried out, the more supply of cocoa beans will be used. In meeting the supply of raw materials, the Socolatte company obtains raw materials from its own plantations and fostered gardens under the cooperative body.

In line with this, the more production of Socolatte chocolate products, the higher the yield of cocoa pods picked in the garden itself, so this will result in a shortage of harvested produce from the plantation itself. Thus, the Socolatte company's decision to partner with assisted farmers who own cocoa plantations is the right decision. The Socolatte company also maintains commitment and continuity with partners by means of regular purchases.

The interaction relationship between Socolatte chocolate production variables, the need for cocoa beans from their own gardens, and the purchase of cocoa beans from the fostered gardens forms a negative feedback loop. This means that the partnership system for purchasing cocoa beans from the fostered gardens carried out by the company/cooperative shapes behavior towards a balance to fulfil Socolatte's chocolate production capacity.

Furthermore, the increase in the number of production will lead to an increase in the amount of Socolatte chocolate stock in the distribution centre. As supplies increase, Socolatte chocolate shipments will increase as well. On the other hand, the supply of Socolatte chocolate will decrease. Based on this, the interaction of inventory management and delivery in the Socolatte industry shows behavior that leads to or towards balance. This condition occurs because the interaction between the two sides forms a negative feedback loop.

In addition, an increase in cocoa shipments in large quantities will increase revenues, so that the profits obtained by companies/cooperatives will also increase. Profits come from reduced income from the cost of purchasing cocoa beans, inventory costs and production costs. Within a certain period of time (delay), the higher the company's profit, the more business actors working in the chocolate industry and the more competitive it is. Increased competition will reduce the market share of Socolatte chocolate products managed by the Socolatte company. As a result, the market share of regulated products will increase and the company will receive more orders for Socolatte chocolate products. On the other hand, as the market share of managed Socolatte chocolate products decreases, the orders for Socolatte chocolate received by the company will also decrease.

Furthermore, the increase in the share of Socolatte chocolate products managed will increase the number of orders for Socolatte chocolate products received by the company. Companies must be able to follow the dynamics of changing market orders from a quantity and quality perspective. The company's inability to keep up with market changes can cause consumers to switch to buying chocolate products from other companies.

Socolatte chocolate product orders will determine the number of chocolate products to be shipped from the company. The more orders for Socolatte chocolate products, the more deliveries of Socolatte chocolate products made. Companies must be precise in deciding the delivery of Socolatte chocolate products according to the quantity and quality required by consumers. This decision can be reached because of the final processing treatment in the form of mixing (blending) and packaging (packing) that is tailored to the needs of consumers. Before the final process is carried out, the factory manager sends a sample of the chocolate product to the distribution centre for quality match testing. If the quality is in accordance with consumer requirements, then the final processing is carried out at the factory.

The production system is formed due to negative feedback which is the result of the interaction of the variables of chocolate producers' competitors, the share of Socolatte chocolate products, product orders, Socolatte chocolate production, chocolate inventory, chocolate delivery, revenue and profits of Socolatte chocolate. The production system will behave towards equilibrium to fulfill consumer orders.

#### IV. CONCLUSION

1. The supply chain management system design model is able to keep up with any changes in market demand. The buyer sector is the driving force for other sectors. Every change in terms of orders and specifications in the form of demands for quality, quantity, delivery time, price and others must be responded to by all business actors involved in the supply chain network of the cocoa processing industry.
2. The adoption of a supply chain management system design model through causal loop diagrams can increase profits for the company and its partners.

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