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# Supply chain analysis of papaya in Central Market, Medan Tuntungan Subdistrict, Medan City

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**Abstract.** The supply chain is important for every business activity. One of the supply chains that is required to be examined is papaya supply chain in Central Market due to its high demand while the supply is still limited. This study aimed to analyse the distribution flow of papaya fruit supply chain in Central Market. The used method was surveyed using questionnaires to papaya fruit producers, brokers, distributors, and retailers. Descriptive analysis was used to explain the distribution flow of papaya fruit supply chain in Central Market. Results showed that there were two models of papaya fruit supply chain in Central Market, namely Batang Kuis model and Aceh area model. The model of Batang Kuis area had 7 (seven) chains, while the model of Aceh area had 6 (six) chains. The supply chain management of papaya fruit in Central Market had not been efficient due to the length of the distribution channel.

## 1. Introduction

Papaya is a fruit plant in the form of herbs from the Carecaceae family which has a high economic value and is profitable to be cultivated. Papaya contains the papain enzyme, which is very active and has the ability to accelerate the digestive process, also protein, carbohydrate, and lipid content which are needed by the human body. Papaya can also be used as traditional medicine, beauty cosmetics, and also animal feed. Moreover, papaya can be processed into various forms of food and beverage such as pasta, sweets, and juices. Even the seeds can be processed into oil [1]. The demand for papaya has been doubled during 2013-2017. The demand for papaya increases continuously because of the benefits and population growth. The demand for papaya in North Sumatra also increased, especially in Medan City. Papaya in Medan City comes from surrounding area such as Batang Kuis dan Aceh. From the central market in Tuntungan, papaya marketed to smaller market around the city.

**Table 1.** Papaya consumption per capita (2013-2017)

Year	Consumption per Capita/Week (Kg)	Consumption per Capita/Year (Kg)
2013	0.035	1.825
2014	0.040	2.086
2015	0.043	2.242
2016	0.055	2.868
2017	0.102	5.319

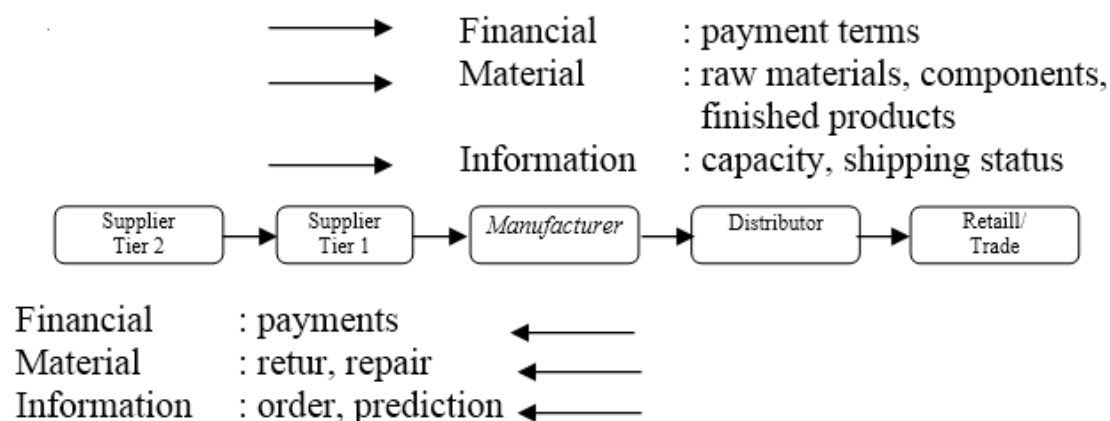
Source: [2]



The supply chain of papaya in the Medan has never been studied. The supply chain is important for every business activity as well as the supply chain of papaya, due to its high demand while the supply is still limited.

There are three elements of supply chain products (Figure 1), namely the material components which consist of the goods flow from the suppliers to consumers, the information components which consist of transportations orders and review of transportation status, and the financial components which consists of credit limit, payment and payment schedule, and delivery accuracy and identity of the owner [3].

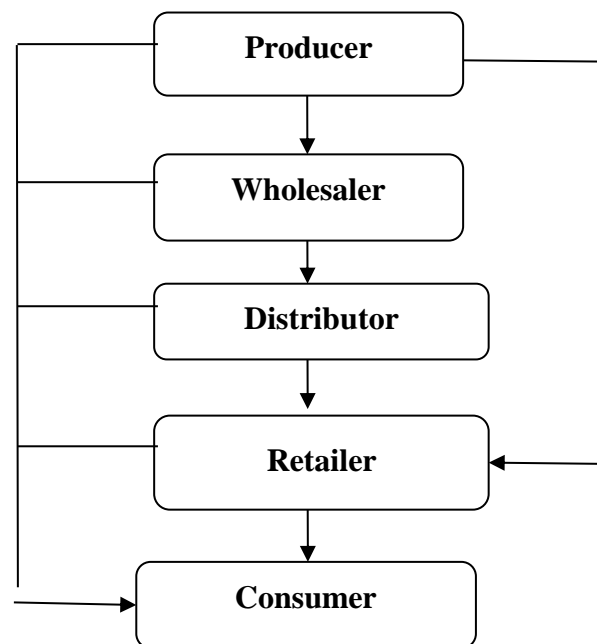
Based on the supply chain model according to [3], a supply chain has 3 types of flows that must be managed. The products flow that flows from the upstream to the downstream, for example, the sent raw materials from suppliers to factories. After the product is finished, continue with the transportation process to the distributor then to the retailer and finally to the end user. The money or financial flow that flows from the downstream to the upstream. The information flow that could occur from the upstream to the downstream, or vice versa.



**Figure 1.** Model of supply chain

The chain sequence as above does not always picture the supply chain structure of agricultural products. It is because, according to [4], the supply chain structure of agricultural products is unique. The agricultural products can be sold directly to the consumer by the producer. The producer cut the channel and sell directly to the final consumer, manufacturers, or distributors in order to reduce the margin cost and to increase the revenue. Final consumers in the supply chain structure of agricultural products are usually large consumers, such as restaurants or food seller, hotels, and hospitals. Figure 2 shows the of the supply chain structure of agricultural products.

This case can also draw the papaya supply in Central Market. A long papaya supply chain could hamper the distribution and causes the consumers to receive a high price. Consequently, the supply chain cut in order to reduce the papaya price, to supply the commodities at Central Market on time, and to eliminate the commodity scarcity is required. This study aimed to analyse the papaya fruit supply chain distribution flow in Central Market.



**Figure 2.** Supply chain structure of agricultural products

## 2. Methods

### 2.1. Research location

This research was carried out purposively in Central Market of Medan Tuntungan Subdistrict, and this market was the largest central market in North Sumatra.

The chain samples starting with the farmers were determined by the Snowball sampling method. The Snowball sampling method is done by firstly specifying the key person, followed by selecting the next sample which depends on the information obtained from the first informant, and so on, which will roll as well as a snowball [5]. Therefore, the papaya fruit supply chain in the central market was expected could be identified using this method.

For the farmer samples, there were 2 groups of papaya fruit farmers in Batang Kuis Subdistrict. On the other hand, there were 5 farmer groups in Aceh area, which was the main supplier of papaya in Central Market. Based on the Snowball sampling technique, a total of 10 samples of producers (farmers) were obtained to become the interviewees who had high papaya productivity that scattered in several areas.

### 2.2. Data analysis

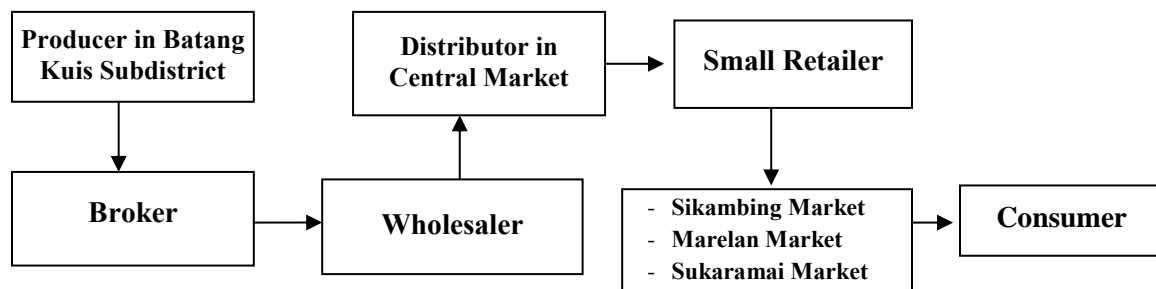
There are two types of data obtained by the sources, which are the primary data and the secondary data. The primary data were obtained from field observation, the documentation, the survey, and the questionnaire. The secondary data collecting method is by obtained the data from the agencies or institutions related to the study. The sources from these secondary data were the Department of Agriculture and the BPS-Statistics of Sumatera Utara Province in Medan. The data obtained were all data related to this study, such as the number and location of the producers, the distributors, the markets, and the consumers, the general condition of the study area, the number of traders, distributors, as well as the other data needed.

The data analysis method was the qualitative descriptive. This method used to describe the papaya fruit supply chain distribution channel in Central Market. Moreover, this method could also describe the application of papaya fruit supply chain in Central Market.

### 3. Results and discussion

The results showed the models of the papaya supply chain. There were two models of papaya supply chain based on the area in Central Market. The models were papaya fruit supply chain from Batang Kuis and papaya fruit supply chain from Aceh. Based on its producer area, the papaya fruit supply chain could be derived. The study results of the papaya fruit supply chain model were drawn as follows:

#### 3.1. Supply chain model of papaya from Batang Kuis Subdistrict

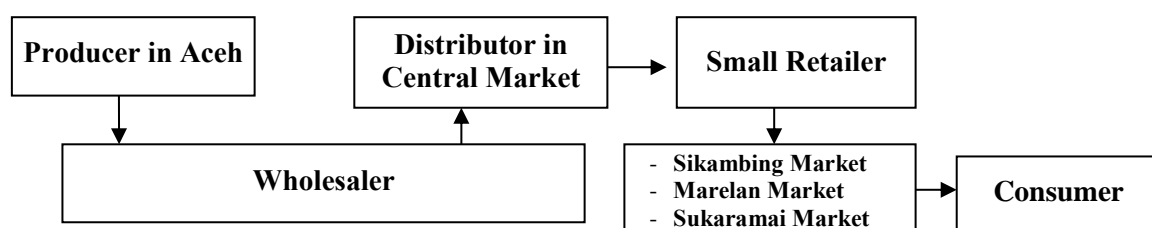


**Figure 3.** Supply chain model of papaya from Batang Kuis

The primary data of supply chain actors and the comparison study [6] showed that the actors of papaya supply chain from Batang Kuis Subdistrict had 7 (seven) chains. The first was the producers in Batang Kuis, while the second was the small brokers, then the third was the large brokers, the fourth was the distributors in Central Market, the fifth was the small retailers, the sixth was Sikambing, Marelan, and Sukaramai Markets, and the last was the consumers.

It is showed that the papaya fruit supply chain from producers in Batang Kuis Subdistrict had not been profitable due to the long chain in the papaya fruit supply chain model. It was the same as the [3] theory that the higher the spent costs, the more inefficient the supply chain. The higher spent costs are due to the length of the supply chain.

#### 3.2. Supply chain model of papaya from Aceh



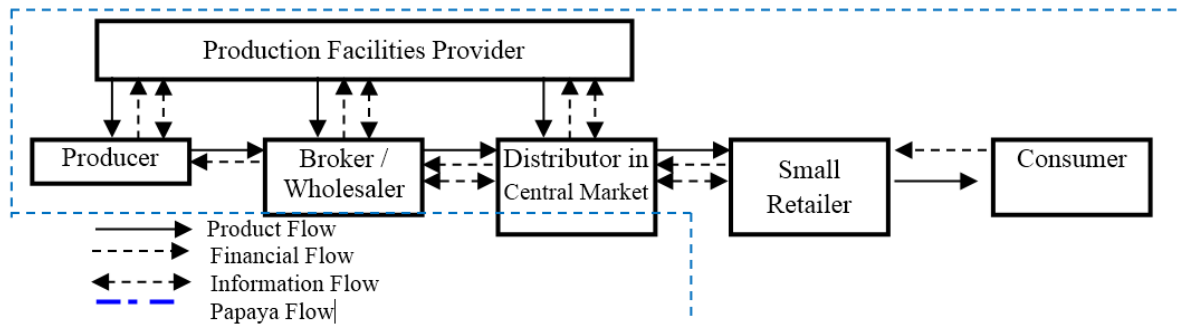
**Figure 4.** Model of papaya supply chain from Aceh which entered Central Market

The primary data of supply chain actors and the comparison study [6] showed that the papaya fruit supply chain from Aceh producers had 6 (six) chains. The first was the producers in Aceh, while the second was the small brokers, then the third was the Central Market distributors, the fourth was the small retailers, the fifth was Sikambing, Marelan, and Sukaramai Markets, and the last was the consumers.

It is showed that the papaya fruit supply chain from producers in Aceh had not been profitable due to the long chain in the papaya fruit supply chain model and it was also the same as the [3] theory.

Based on the [3] theory, an overview of the flows in the papaya fruit supply chain in the Central Market could be drawn. The picture was drawn based on the results obtained by interviewing the

respondents and then compare it with the [3] theory. Figure 5 showed the flow in the papaya supply chain in Central Market.



**Figure 5.** Flows in papaya supply chain in Central Market

#### 4. Conclusions and suggestions

The results showed that the distribution flow of papaya fruit supply chain in Central Market had not been profitable, due to the length of the supply chain from producers to consumers. The distribution flow of the papaya fruit supply chain was as follows: The distribution pattern of papaya fruit supply chain from Batang Kuis. Producers in Batang Kuis → Small Brokers → Large Brokers → Distributors → Retailers → Consumers. The distribution pattern of papaya fruit supply chain from Aceh region. Producers in Aceh → Large Brokers → Distributors → Retailers → Consumers.

The government support related to the access and facilities, market supervision, and technology development is required to increase the productivity, quality, and quantity of papaya fruit. In addition to the supporting technology development, the government also needs to conduct several training programs for papaya fruit farmers related to the innovations which could add the selling price of papaya fruit such as papaya fruit processing.

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