

Value Chain Analysis of Cassava (*Manihot Esculeta*) in Toba Samosir Regency, North Sumatera, Indonesia

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Abstract

*The purpose of this study is to map out the value chain of cassava (*Manihot esculenta*) and to measure the extent to which the cassava commodity in Toba Samosir Regency, North Sumatera, Indonesia, could affect the economics of the relevant stakeholders. This study employed the value chain mapping analysis method to map out the existing supply chain models. Data and information have been collected using semi-structured interviews to selected sample that represent the stakeholders' population along the cassava supply chain in Toba Samosir Regency. The stakeholders have been identified using snowball technique. SWOT analysis was employed to deploy policy strategy in improving the cassava benefit for the stakeholders. From the study, we obtain three models of supply chain of cassava, namely: (i) direct sale of cassava root to consumer model, (ii) cassava-based food model, and (iii) tapioca starch model. The margins of each node for each supply chain were estimated. The value chain map reveals that the value engineering of cassava commodities is not optimal, in which the final products produced by all models of supply chain are far below the potential possible value. We finally recommended some value-added improvement strategy; for example, diversifying the product of cassava derivative that is more valuable that is higher-grade tapioca flour and modification of cassava flour.*

Keywords: Value Chain Analysis, Cassava, North Sumatera.

I. INTRODUCTION

Toba Samosir is one of the Regencies in North Sumatra Province with. Toba Samosir Regency has an area of 2,021 km² and is located between 2°03' and 2°40' North latitude and between 98°56' and 99°40' East longitude. To date, total population of Toba Samosir is 173,571 inhabitants. Agriculture is the mainstay sector in Toba Samosir economy, and therefore, vast majority of Toba Samosir population depends on this sector. Roughly 35% of Toba Samosir Gross Regional Domestic Product (GRDP) comes from agricultural sector (BPS, 2018).

Main crops cultivated in Toba Samosir are rice, corn, cassava. The production of cassava in Toba Samosir increases over the last decade. Three years data indicate that the production of cassava in Toba Samosir has positive trend and move exponentially (BPS, 2018). The rising interest of the Toba Samosir community in cultivating cassava is triggered by the establishment of a tapioca factory in this regency in

2010 with a capacity to absorb 4,000-5,000 tons of cassava per month (Situmorang & Manik, 2018; Tampubolon & Manik, 2018). However, Toba Samosir is only capable to supply around 50% of this demand. The rest came from other regencies.

Compared to other regencies in North Sumatra Province, the production of cassava in Toba Samosir is only ranked sixth. On the other hand, the potential for cassava production still has a great opportunity to be improved, one of which is due to the still vast area available in this district, which is suitable for cultivating cassava. At the moment, the potential land for the cultivation of cassava reaches 33,000 Ha BPS, 2018 Based on our literature review, we have not found yet any comprehensive study about cassava supply chain in this area. Similar studies that have been conducted elsewhere is, however, geographical specific and, therefore, lack of generalizability (Mumbeya, 2012; Nugrahaeni, 2014; Obina 2015; Puspito, Kusnandar, & Setyowati 2016).

Noting that the demand for cassava continues to increase and the land use suitable for cassava production in Toba Samosir is still not optimal and can be improved, the study of cassava supply chain management is very important. This study aims to map out the value chain of cassava in Toba Samosir and to assess the extent to which the cassava commodity could affect the economics of the relevant stakeholders. In order to reach the objective, it is important to first identify the stakeholders and to analyze their role in along the value chain. At the end, the policy strategy in improving the benefit of cassava for the stakeholders that will be useful for policy makers will be deployed.

II. MATERIALS AND METHODS

This study employed the value chain analysis method to map out the existing supply chain models (Chopra & Meindl, 2001). Value chain analysis refers to a series of activities required to present a product or service starting from a conceptual stage, followed by several stages of production, to delivery to end-consumers and destruction after their use (Porter, 1985; Kalpinsky & Morris, 2000; Lu, 2011). Data and information for this analysis were collected using semi-structured interviews to selected sample that represent the stakeholder's population along the cassava supply chain in Toba Samosir Regency. The stakeholders were identified using snowball technique. Based on snowball technique, 48 respondents were obtained, consisting of 30 farmers, 10 middlemen, 7 retail traders and 1 tapioca industry. The interviews were conducted between February and July 2018.

Prior to conducting the value chain analysis, an in-depth analysis of stakeholders was first carried out. This stakeholder analysis is a systematic process in collecting and analyzing qualitative information aiming to determine who must be taken into account when developing and or implementing a policy or program (Golder & Gawler, 2005). Through this analysis, the identified stakeholders would then be classified into four groups based on their importance and influence in the value chain, namely key player, subject, context setter, and the crowd (Schmeer, 1999). SWOT analysis was employed to deploy managerial strategy in improving the cassava benefit for the stakeholders. Through SWOT analysis, internal factors such as strength and weakness and external factors such as opportunity and threat that influence the cassava supply chain were analyzed.

III. RESULTS AND DISCUSSIONS

Detail information regarding the manuscript

preparation is presented below.

A. Stakeholder Identification

Stakeholders are all the individuals or bodies inside or outside the cassava value chain in Toba Samosir, which directly affects the value chain's action. The first step in the stakeholder analysis is to identify entities that could have an interest and power in influencing the cassava value chain. Based on observations and interviews that have been conducted on the entire cassava value chain actors in Toba Samosir, stakeholders were identified and described in Error! Reference source not found.. The main actors are: (a) Farmers; these are the cultivator of cassava. Based upon the contribution of cassava production to their household income, farmers can be divided into two types: those who plant cassava as a main crop and those who grow cassava as a side crop. Most of the farmers fall into the latter type. (b) Middlemen; they are the intermediaries between farmers and retailer or consumer. The middlemen usually collect cassava root to the farmers and then bring it to market. (c) Retailer; they are the distributor of cassava to the end user, usually in in relatively small quantities for use or consumption rather than for resale. The cassava is supplied to retailer by middlemen. (d) The tapioca industry; PT Hutahaeen is the only one tapioca industry that absorbs cassava from Toba Samosir. (e) Consumers; the end users of cassava. (f) Government; in this case is the Regency Government of Toba Samosir. (g) Workers; Those who work along the supply chain, e.g. tapioca factory workers and farming casual daily labors. (h) Suppliers; those who supply the materials needed for farming, mainly fertilizer. (i) Financing institution; those who provide financial services for farmers.

After identifying the stakeholders and their characteristics in terms of role, motivation, nature, interest and power of the stakeholders, the identified stakeholders are classified into four groups, namely key players, subject, context setter, and the crowds. Key players are those became or are a part of the context and can significantly influence the value chain. Subjects are those who are interested in current and future supply chain's actions—hence they will intend to influence it—nevertheless, they cannot gain a sufficient influence. Context setters are independent players who can significantly influence the context in which the strategy has to function, and yet they do not have a material interest in the supply chain. The crowds are bystanders who are not anyhow important for stakeholder analysis. The stakeholders classified as follow:

(1) Key players; : the tapioca industry (i.e. PT Hutahaeen), cassava farmers; (2) Subject: government

(i.e. Toba Samosir regency), tapioca consumers;

(3) Context setter: middlemen, suppliers, financial institutions;

(4) The crowds: retailers, cassava consumers, workers.

B. Value Chain Mapping

Based on observations and interviews with cassava value chain actors, three models of supply chains

were obtained. The three models of supply chain of cassava are (i) direct sale of cassava root to consumer model, (ii) cassava-based food model, and (iii) tapioca starch model. Figure. 1 depicts the schematic diagrams for the three models.

The simplest supply chain model is (i) direct sale of cassava root to consumer model. This model involves of three nodes namely farmers, retailers and consumers. Small traders act as intermediaries between farmers and consumers. In this supply chain model, cassava has a low final economic value. This is because the cassava does not undergo further transformation and is only used as human consumption or animal feed. It is estimated that around 2% of cassava supply in Toba Samosir regency goes into this model.

The next supply chain model is (ii) cassava-based food model. This model involves four nodes, namely farmers as suppliers of raw materials, middlemen as collectors of cassava from various farmers, confectioners whose role is to process into processed food who also act as food vendor for processed cassava products to consumers, and consumers act as users of the final product. In this supply chain there is a slight increase in the economic value of cassava, because it has undergone further processing. Around 6% of cassava supply in Toba Samosir falls under this Model.

The last existing model is (iii) tapioca starch model. This model is the most complex supply chain of all existing supply chains. There are eight nodes involved in this model, namely farmers, middlemen, tapioca pant, distributors, industries with tapioca flour raw materials, retailers and consumers. In this supply chain model, cassava undergoes the highest transformation of economic value compared to the previous supply chain model. Around 92% of cassava supply in Toba Samosir falls under this Model.

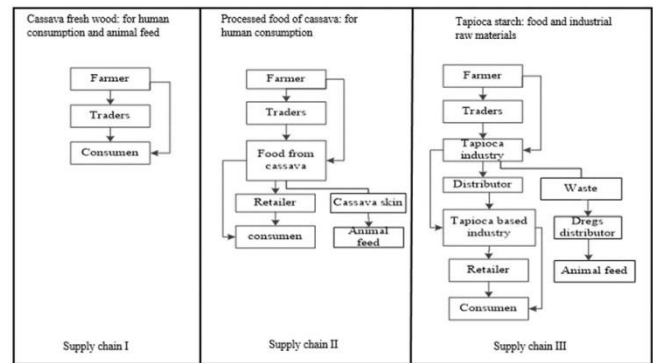


Figure 1. Models of Cassava Supply Chain in Toba Samosir.

C. Return Cost Ratios

In order to quantify the change in value experienced by cassava at each node in each supply chain model and from there added value will be calculated, the estimation process has been carried out with data obtained through interviews with each relevant stakeholder. Hayami method was employed as the methodology used in quantifying the value added (Hayami et al., 1986). Tables of value added analysis for each Model are provided as Supplemental Document. The practical indicator commonly used to see the feasibility or efficiency of an agribusiness is the analysis of return cost ratio or R/C ratio (Herdiyandi, Rusman, & Yusuf, 2016) R/C ratio is simply the ratio between total revenue and total cost. R/C greater than 1 implies that the agribusiness is efficient and feasible to run; otherwise it is neither efficient nor feasible. The R/C values of each node for the three supply chain models are depicted in Figure. 2.

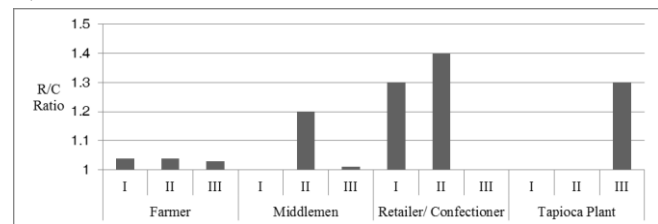


Figure 2. R/C Ratios for Actor in Cassava Supply Chain in Toba Samosir

It can be seen from Figure 2 that in Model I, the R/C ratio for cassava farmers is 1.04 and that for retailers is 1.10. The R/C ratio values for the two nodes are all greater than 1 so it can be concluded that agribusiness in model I is equally feasible for farmers and retailers. However, retailers get a greater margin than farmers. In Model II, the R/C ratio for cassava farmers is 1.04, for middlemen is 1.20, and that for confectioners is 1.4. The R/C ratio values for the three nodes are all greater than 1 so it can be concluded that agribusiness in model II is equally feasible for farmers and retailers. However, confectioners get the greatest margin while farmers get

the least. In Model III, the R/C ratio for cassava farmers is 1.03, for middlemen is 1.01, and that for tapioca plant is 1.3. The R/C ratio values for the three nodes are all greater than 1 so it can be concluded that agribusiness in model II is equally feasible for farmers and retailers. However, the tapioca plant gets the greatest margin while middlemen get the least.

D. Analysis

1) Implication of the Value Added to Value Chain

The implications of the cassava value chain on the stakeholders involved will be discussed in this section. Compared to the three existing Models, farmers obtain the greatest added value in Models I and II. This is due to the absence of an intermediary actor who connects farmers and consumers. The issue for the farmers is that the absorption rates of Models I and II are much smaller than Model III. Based on interviews conducted with farmers, in Models I and II they can only sell around 100-200 kg in one transaction. Instead, farmers can sell on a large scale in one transaction, around 1-10 tons, to middlemen for further supply to tapioca industry. On the other hand, the durability of cassava is very low, which can only survive for 4 days in a fresh condition, making it difficult to make a supply system.

Middlemen are found in Models II and III. In Model II, middlemen bridges demand from confectioner with supplies from farmers, while in Model III they bridge demand from tapioca factories with supplies from farmers. Middlemen enjoy higher margin in Model II rather than Model III. However, the market size of Model II is far below Model III. Middlemen will distribute cassava produced by farmers to large industries to take advantage of price differences. For this, farmers will sell lower prices to middlemen than market prices. The role of middlemen is needed by farmers because tapioca factories do not buy cassava in small volumes.

Retailers are only found in Models I and II. The added value obtained by retailers is far greater than the added value obtained by farmers. The target of buyers from retail traders is the people who shop in traditional markets. The added value obtained by retail traders is indeed higher when compared to other nodes, but the problem is that retail traders cannot sell on a large scale because of the small market absorption. Retailers must bear the risk of loss due to unsold cassava on the market, if stored for a long time cassava or cassava products will be damaged due to expiration.

The tapioca industry is the node in the supply chain that enjoys the highest added value. This happened due to the significant transformation of the value of cassava through the tapioca production process. The obstacle in developing the tapioca

industry in Toba Samosir today is the quality of flour produced cannot compete with imported flour due to the capability of the factory.

2) SWOT Analysis

In order to deploy policy strategy in improving the cassava benefit for the stakeholders, a SWOT analysis was conducted. The first step in conducting this SWOT is to gather all factors that have potential influence the value chain both internal and external through a focused group discussion with stakeholders. The strengths are land availability, market demand, processing plant availability, farmers institutions, local labour availability, and land ownership. The weaknesses are capital limitation of farmers, low technology, weak business partnership, lack of technology expertise, land tenure system, low educational level of workers, remote area, and short expiration time of cassava. The opportunities are improving farmers income, business and job opportunities, accessible suppliers, rapid technological progress, support from local government, increasing demand, divers product opportunities, demand from tapioca market. The threats are volatile cassava prices, poor agricultural tools and system, substitute product, consumer behaviour, fluctuated market absorption, competition to other agricultural products, and unpredictable weather.

IV. CONCLUSIONS

Based on the data and analysis, conclusions that can be drawn are:

1. Stakeholders of cassava value chain in Toba Samosir and their characteristics in terms of role, motivation, nature, interest and power have been identified and, therefore, are classified into four groups, namely key players, subject, context setter, and the crowds.
2. Models of cassava supply chain in Toba Samosir have been obtained and grouped into three models: (i) direct sale of cassava root to consumer model, (ii) cassava-based food model, and (iii) tapioca starch model.
3. Efficiency and feasibility of every node for each model of the cassava supply chain have been presented using return cost ratio or R/C ratio.
4. Policy strategy in improving the benefit of cassava for the stakeholders which will be useful for policy makers has been deployed using SWOT analysis.

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