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The Supply Chain Management of Sambas Citrus

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Abstract

Citrus is one of the agricultural commodities which exposed to agricultural risk. The purpose of this research was to determine the citrus supply chain or citrus farming network from seed supply, citrus production at the farmer level, to it's reaching the consumers in an area, so that an effective and efficient supply chain can be arranged. This citrus supply chain management analysis in Sambas District used a qualitative descriptive analysis framework using the supply chain development method proposed by the Asian Productivity Organization which consisted of chain objectives, network structure, chain management, chain resources, and chain performance. The research results show the target of the Sambas citrus supply chain is the domestic market with supply chain actors consisting of citrus farmers, traders, retailers, wholesalers, and consumers. Citrus supply chain performance in Sambas District has not been good because the existing performance as many as 7 criteria with 41.2% , does not exist performance as many as 4 criteria with 23.5%, and in progress performance as many as 6 criteria with 35.3%. Strategies to minimize the citrus farming risks in Sambas District was to encourage the growth of citrus processing units to reduce losses during the postharvest period and provide added value through processing.

Keywords: - supply chain management, citrus farmers, risk farming

1. Introduction

There have been 4 national citrus centers in Indonesia. One of them is in Sambas District, the main citrus producer area in West Kalimantan Province. Sambas District had had 9,364.38 ha for Siam Sambas citrus, which had produced 92,418.80 tons in 2015.

Generally, agriculture has high potential, but it also has high risk. Citrus is one of the agricultural commodities which exposed to agricultural risks. Besides maintaining and increasing the citrus quantity, the main problem of farmers was also improving it's quality. Therefore, farming activities start from land preparation, seedlings, planting, caring, and harvesting to post-harvest handling had been concerned by the Sambas District government to maintain and increase competition value both in terms of quantity and quality.

Based on the opinion of the respondent farmers in Sambas District, production risk was the most influential risk followed by marketing risk, financial risk, human risk and social and institutional risk. The risks most often faced by farmers are production risks, especially from pests and plant diseases and climate or season such as rain and dry season. Marketing risk was also a dominant risk, which caused by product prices that often change and expensive commodity distribution due to inadequate infrastructure, and are often also monopolized by large entrepreneurs. Financial risk was dominated by farmers with lacking capital and weak access to farmers capital.

Marketing risk especially product prices has been one of the main problems. Farmers was unable or did not have the power to determine the price of citrus. To overcome this, farmers generally followed the development of citrus prices on the market through information obtained from collectors and retailers. To offset the income of farmers if they did not get adequate results or prices in citrus cultivation, the farmers diversified their bussiness activity, especially in other horticultural crops. Increasing farmers' incomes and maintaining selling prices, some farmers joint farmer groups and entered into business agreements with entrepreneurs or sold products directly to consumers by opening trade stalls along the main road.

In an effort to reduce the risk of farming, especially in marketing activities, it was necessary to conduct research to determine the supply chain or citrus farming network from seed supply / seedlings, citrus production at the farm level, to citrus fruits distribution to consumers in an area so that supply / supply chains can be arranged effective and efficient chain.

2. Literature Review

Various types of agricultural risks must be addressed and managed by farmers. This risk is further exacerbated by factors such as yield and price uncertainty, weak rural infrastructure,

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imperfect markets, climate change, natural disasters and the lack of risk prevention instruments such as credit and insurance.

Market risks largely focus on uncertainty with prices, costs, and market access. Sources of volatility in agricultural commodity prices include weather shocks and their effects on yields, energy price shocks and asymmetric access to information are additional sources of market risk. Other sources of market risk include international trade, liberalization, and protectionism as they can increase or decrease market access across multiple spatial scales. Farmers' decision making evolves in a context in which multiple risks occur simultaneously, such as weather variability and price spikes or reduced market access (Holden and Shiferaw, 2004; Harvey et al., 2014 and Lazzaroni and Wagner, 2016).

Having mapped the supply chain processes it is important to assign measures to these processes to evaluate changes and to assess the performance of the complete supply chain as well as of the individual processes. Thereby it is crucial not to measure "something", but to find the most relevant metrics. These not only need to be aligned with the supply chain strategy, but also need to reflect important goals in the scope and within the influence of the part of the organization responsible for the individual process under consideration. Furthermore the identification of changes in the structure or the type of the supply chain has to be supported.

3. Methodology

Data collected in this study were primary and secondary data. Primary data were obtained directly from respondents through semi-interviews and Focus Group Discussions (FGD). The semi-structured interview is adopted as data collection technique so as to answer the research questions. In the case study research, the interviews are a most suitable method for data collection. The semi structured interview also provides the solutions are aroused by the participants and proper answers also given. Further, additional details are taken from follow-up questions (Raghavarapu, 2016).

Respondents identified in this study included citrus farmers in some sub-regencies such as Tebas, Sambas, Sebawi, and Semparuk; collecting traders (collector agents); retailers; large traders; and consumers. These respondents were actors who involved in the supply chain of citrus farming in Sambas District that were 5 farmers, 5 collectors, 5 retailers, 2 large traders, and 5 consumers. The method of determining respondents used the purposive sampling method, which was the sampling technique with certain considerations so that the data obtained was more representative (Sugiyono, 2008). While the determination of

respondents for 5 consumers using the accidental sampling method by determining the sample technique by selecting respondents whom the researchers found (Fatimah, 2011).

This citrus supply chain management analysis in Sambas District used a qualitative descriptive analysis framework using the supply chain development method proposed by the Asian Productivity Organization (APO) which has been modified by Vost (2006) in Marimin and Maghfiroh (2010), which consisted of chain objectives, network structure, chain management, chain resources, and chain performance (Marimin and Maghfiroh, 2010).

4. Finding and Analysis

4.1 Supply Chain Management

Supply Chain Management is the management of a business cycle starting from the preparation of raw materials, production activities / business operations to distribution to consumers. Supply chain management is a series of approaches applied to integrate suppliers, entrepreneurs, warehouses, and other storage areas efficiently. The results of the Study of Supply Chain Management in Decreasing Citrus Farming Risk in Sambas District using a supply chain framework that was modified by Vost (2006) in Marimin and Maghfiroh (2010) were consisted of:

a. The purpose of the supply chain

The purpose of the supply chain explained how the model of an citrus supply chain went on the product being marketed. In addition, these market objectives explained who the customer was, what they wanted and needed from the product. The purpose of the citrus supply chain that occured in Sambas District was domestic. Harvested citrus were sorted and graded by traders basing on size and level of maturity.

b. The network structure

The network structure described the members involved in the supply chain and explained the role of each member and the flow of citrus commodities. Supply chain actors were included supply chain products, markets, stakeholders and supporting situations were called as supply chain elements. They were, in Sambas District, consisted of citrus farmers, collectors, retailers, large traders and consumers.

Citrus farmers harvested citrus manually and were transported to collectors by bicycles, motocycles, and cars which provided by the collector if the harvest volume was great. The collecting traders sorted and graded the citrus based

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on size and quality, and process the payment to farmers based on the weight of each fruit size that has been sorted. Then the collecting traders distributed to large traders or retailers who distributed and sold the citrus.

c. Chain Management

The aim of chain management is to find out who acts as the main regulator and actor in the supply chain. The supply chain management consists of selecting contractual agreement partners, transaction systems, production planning, business networks and policy support. This chain management is more focused on explaining the supply chain structure model that has a large share in increasing the income of citrus farmers, and the system of transactions conducted between farmers and traders as well as the form of partnerships that exist between supply chain members (Marimin and Maghfiroh 2010).

Citrus supply chain management in Sambas District consisted of partner selection and transaction / payment systems. Partner selection system in the citrus supply chain system aimed to establish cooperation between the two parties who were equally benefiting. They were included citrus farmers (suppliers), collectors and retailers, and large traders. The most dominant party in the supply chain system was the citrus farmer, because this party was in charge as a supplier, but the price was dominated by traders.

The form of cooperation carried out in the form of buying and selling system and was done verbally not in writing. The form of cooperation was that farmers sold citrus to collectors and they sold them to retailers and large traders. The system of transactions or payments made was a cash or cash system because it was done at that time.

d. Chain of Resources

The chain of resources in supply management explained the potentials were supporting the supply chain development effort. Resources assessed including physical resources such as the quality of citrus for export purposes, technologies such as sorting and transportation units involved in the post-harvest handling process and productivity of citrus production, human resources and capital. Chain resources in this citrus supply chain process in Sambas District consisted of physical resources, technological resources, human resources, and capital resources.

Physical resources in the citrus supply chain were bamboo and plastic baskets as containers for harvesting. These physical resources partly belonged to the collectors' traders and others were the private ownership of the farmers. The

sustainability of the citrus supply chain in Sambas District was inseparable from the availability of facilities and infrastructure. The facilities and infrastructure in the supply chain activities consisted of harvesting equipment, transportation modes for transporting harvests from the garden to the collecting traders, as well as from the collecting traders to retailers and large traders.

The technological resources used in the citrus supply chain process consisted of how to handle citrus yields, namely initially using bamboo baskets, but slowly switching to using plastic baskets that have a smoother surface than bamboo baskets. The use of this plastic basket can reduce damage to citrus due to contact with the surface of the basket. Unfortunately there was no technology for processing citrus into derivative products that were applied in Sambas District in that if the price of citrus got a drastic decline or the number of products was off-grade, farmers would not get added value.

The human resources available in the citrus supply chain process in Sambas District was consisted of citrus farmers and traders. Citrus farmers in Sambas District had have a concern in developing Sambas Siam citrus, so they were trying to optimize the yield of Sambas Siam citrus. The relationship established between farmers and traders in the form of cooperative relations, farmers sold citrus harvests to traders at a price that had been determined by the traders. Farmers also had the opportunity to sell directly to retailers or to consumers while the capital resources available in the citrus supply chain process in Sambas District were consisted of own capital. Farmers in the business of citrus relied on their own capital, so did the traders and retailers. Some collection traders obtained capital from large traders that made the results of citrus which have been sorted directly distributed to those large traders.

e. Chain business process

Chain business processes describe the processes that occur in a chain supply, parties involved, and the level of integrity of existing processes in the supply chain. Business processes between members of the supply chain explain how the business mechanism that occurs in the supply chain (Marimin and Maghfiroh 2010), it is important to know about the interrelationships that occur between them, as well as their influence on business processes.

The relationship between supply chain actors in business activities is a relationship that unites between suppliers, distributors, retailers, companies, retailers to end consumers in the flow of a supply chain to be able to produce a Sambas siam citrus product and distribute products with the right amount, the right time, good quality, and cost-

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efficient to meet needs. The business relationship between the citrus supply chain actors is a good business relationship between the chain actors. This relationship can occur, because there is a demand and supply process from producers to consumers (Nurani et al., 2013).

In addition to the relationship between supply chain actors, in the business process occured product flow patterns. Supply chain management explains, that the pattern of product flow is the flow of goods ranging from production, distribution, to finished products must reach the hands of consumers (Marimin and Maghfiroh 2010).

Other relationship and distribution patterns, there was a information flow. Information flow according to Maulida (2014) is an important component in achieving supply chain objectives. Good information between each supply chain actors can achieve good and transparent relations, so as to increase trust and commitment in establishing cooperative relations. Information flow was a flow that moves from two directions, namely from upstream to downstream and downstream to upstream. This is in accordance with the statement of Suliyanto (2010) stated that the flow of information that occurs in all channels goes in two directions from downstream to upstream and upstream to downstream. The information flow between the citrus supply chain actors was included information about the price, the number of requests for citrus, the number of citrus available, to the status of citrus collection and delivery.

The informations flow of the citrus supply chain in Sambas District was consisted of market information which was obtained from collectors, wholesalers, and retailers and consumers. The market informations could describe which products were being desired by consumers. It obtained from collectors could be used by retailers to sell products that consumers want. The flow of information on the citrus supply chain in Sambas District, which was intertwined between supply chain actors, provided information to each other, and generally the information flow had gone well. The information flow started from the citrus farmers informing the collecting traders about the harvest of the citrus, then the collecting traders provided information to the big traders, and the retailers got information from consumers about the products the market wanted at that time.

4.2 Identification of Actors Involved in Each Chain

The supply chain approach did not only look at the activities carried out by one business. This approach actually covers all relationships until the raw material for production finally reaches the final consumer. In the Sambas District supply chain, several Sambas District stakeholders are involved, who contribute in providing their respective functions so that a product can have added value. The actors involved were consumers who consume citrus, collectors, retailers, wholesalers who market the products of citrus and farmers who supply citrus. The more detailed description of the characteristics of each actor (stakeholder), namely:

a. Consumer

Consumers who consume citrus consisted of children, adolescents, adults, even the elderly. In addition, conjoined citrus were used as a beverage ingredient in cafes or restaurants. Consumers could buy citrus in the market immediately, as well as at the nearest kiosks.

b. Collector Trader

Collector traders in this study were citrus collector agents which were usually found in every village producing conjoined citrus. Citrus collected in these traders were distributed to large traders, then the product for direct consumption, restaurants, hotels, and other was bought by consumers.

c. Retailer

Retailers were traders who bought citrus from collectors or bought directly from farmers to resell them. Citrus from collectors as well as from farmers were brought and transported to the market by pick-up car and packed in 50-60 kg bamboo baskets / basket, then by retailers, citrus were sold to consumers in retail form.

Payments made by retailers and collectors was made in cash. Likewise, payments that occured between retailers and end customers were cash directly. Retailers sold citrus at prices ranging from Rp. 5,000 / kg - Rp. 6000 / kg and it really depended on the season. The prices that applied at each retailer vary depending on the quality and quantity of the product being sold.

4.3 Siam Citrus Supply Chain Flow Sambas District

Based on the results of research in the field, that the commodity of citrus in Sambas District had three supply chain paths to go to the final consumer, which originated from the farmer / producer as a source of raw material suppliers to the distributor as a distributor of citrus (Figure 1). This was consistent with the results of Hidayat (2017) research that the product flow from upstream to downstream. The three grooves were detailed as follows:
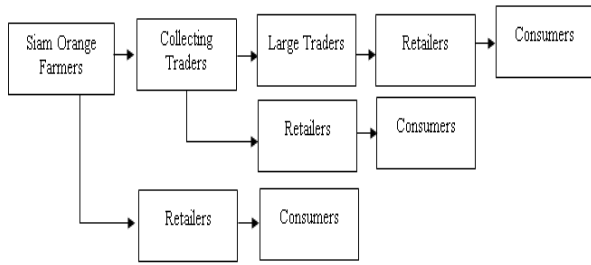
Figure 1: Citrus supply chain flow in Sambas district

a. First

Farmers sold the production of siam citrus to the traders, at the level of citrus collectors sorted by quality and size so as to get added value. Furthermore, siam citrus were weighed and packaged to order using either bamboo baskets, wooden boxes, or plastic crates so that they did not get breakage during the trip to large traders. Once in a large trader, siam citrus were sold to retailers with prices varying based on quality and size. At retailers new consumers could buy citrus at various prices based on quality and quantity.

b. Second

Farmers as suppliers of raw materials sold siam citrus to collectors, collectors sorted by quality and quantity. In this supply chain channel, traders gathered in partnership with retailers who would sell siam citrus to consumers.

c. Third

Farmers could sell citrus directly to retailers, retailers had profitable agreements with farmers. After that retailers sold directly to consumers with prices varying based on quality and quantity.

4.4 Actor Activities

As for the activities carried out by each of the actors who contributed in increasing the additional value as shown in Table 1. In Table 1 it can be seen that the activities carried out by consumers are only limited to consuming citrus. The activities carried out by retailers were only on sales and packaging, while the activities carried out by large traders started from repacking from collectors, distributing to other regions, and selling to retailers in areas outside Sambas District. Activities in collecting traders, namely collecting agents, were transportation, sorting, welding, packing, and distribution to wholesalers and retailers. Activities carried out by farmers as the first supplier were harvesting citrus from the garden and transporting them to the collection place (collection agent) for further sorting and welding processes.

Table 1: Activities carried out by each actor in the Sambas Siam citrus supply chain.

No.	Activity	C	R	LT	CT	CF
1	Harvesting					√
2	Transportation			√	√	
3	Sorting				√	
4	Grading				√	
5	Packing			√	√	
6	Distributing				√	
7	Selling		√	√		
8	Packaging		√			
9	Consumption	√				

Legend: √ = Do Activities, C = Consumers,
R = Retailers, LT = Large Traders,
CT = Collecting Traders, CF = Citrus Farming

4.5 Chain Performance

Chain performance in a supply chain could determine how big a chain is in a supply chain. According to Maulida (2014) supply chain performance measurement can be measured by qualitative assessment accompanied by a check list method. Through this checklist table, it can be seen from what is good enough and what needs to be improved. This measurement used 17 predetermined criteria (Table 2).

Table 2: Assessment of supply chain performance.

No	Description	Information		
		E	DE	IP
1	Identification of citrus market destinations	√		
2	Identification of actors in the supply chain	√		
3	Communication between actors at every level of the supply chain has been going well	√		
4	A market survey has been conducted to find out consumers' desires for the quality of the products produced			√
5	Actors in the supply chain each has received a appropriate price		√	
6	The payment system in the supply chain is running well	√		
7	The flow of product / market information has gone well in the supply chain			√
8	Facilities and infrastructure are adequate			√
9	The process of product distribution to consumers is going well			√
10	Implement citrus cultivation activities in accordance with regulations			√
11	Availability of citrus farmer human resources	√		
12	Transportation infrastructure			√
13	Electricity network infrastructure	√		
14	Availability of Village Cooperative Unit		√	
15	Availability of market information systems		√	
16	Supporting local socio-cultural wisdom	√		
17	Environmental safety system		√	

Legend: E = Exist, DE = Doesn't Exist, IP = In the Process

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Based on Table 2 the performance evaluation of the citrus supply chain in Sambas District, which had been modified from Maulida (2014), that the performance of the citrus supply chain in Sambas District with 17 criteria, it was known that there were 7 existing and running performance criteria with a percentage of 41.2%, the performance was doesn't exist performance as many as 4 criteria with a percentage of 23.5%, and performance in the process of 6 criteria with a percentage of 35.3% (Table 4). In general, the performance of the citrus supply chain in Sambas District was still relatively poor, so it needed to be encouraged in order to increase the performance of the citrus supply chain by 100%, because with an increase of 100%, the citrus supply chain system in Sambas District would run well.

Table 3: Performance of the citrus supply chain in sambas district.

Level of Performance	Criteria Amount	Persentage (%)
Existing	7	41.2
Doesn't exist	4	23.5
In the process	6	35.3
Total	**17**	**100**

4.6 Strategies To Reduce The Risk of Citrus Farming Through Supply Chain Management

Based on the performance of the citrus supply chain in Sambas District which was still classified as having poor performance, it was necessary to make a decision to improve the supply chain performance to reduce the risk of farming, especially in marketing aspects. If the supply chain performance increased (reaches 100%), the success of the supply chain would be able to create value for consumers, while increasing profitability in each supply chain or actor but all decisions in order to reduce the risk of farming had an impact and consequences. The more complex the risk of farming, the harder it was for farmers to make decisions, so farmers as decision makers needed accurate information and data.

Every supply chain process that had the potential to create risks must have preventative measures. According to Speirer et al. (2011), the purpose of designing supply chains is to expand supply chain security, risk dimensions and sustainability. Choosing the right supply chain strategy would avoid disruption to the supply chain, so it was important to understand the type of product demand and the characteristics required from supply to maintain effective activities.

The characteristics of Sambas citrus as a fresh agricultural commodity were its perishable nature, short shelf life, seasonal nature so it was difficult to find if it was out of season. The biggest losses to citrus farming occurred during the postharvest period due to lack of proper postharvest handling and lack of processing effort. That factor the most influential was the presence of microorganism damage, the harvest time improper, and inappropriate storage facilities. Citrus, which were seasonal fruit, are difficult to find at certain times so that they cannot meet consumers' needs for citrus outside the citrus season. During the harvest season, the selling price of citrus is relatively down and the price of citrus will rise if it is outside the harvest season. During the great harvest period many fruits were wasted (losses) up to 30% as a result of poor distribution.

The high nutritional value and distinctive taste of citrus caused citrus not only to be used as fresh fruit, but also as additional ingredients in the product preparations such as milk, ice cream, fruit salads or snacks. The processing of citrus into various kinds of products such as juice, fruit juice, and essence made the citrus store longer and their marketing reached more extensive so that they could provide added value. This technology was also possible when the season for fruit taste was not in accordance with the taste of fresh fruit can still be enjoyed. Considering the importance of processing technology in providing added value to citrus farming, it was necessary to arrange Sambas citrus supply chain which involves citrus processing units. The results of the preparation of Sambas citrus supply chain by involving the processing unit are as follows (Figure 2).
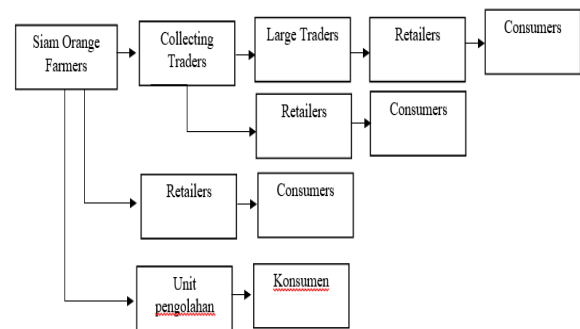

Figure 2: Citrus supply chain plans in Sambas district

5. Conclusion

The research results show the target of the Sambas citrus supply chain is the domestic market with supply chain actors consisting of citrus farmers, traders, retailers, wholesalers, and consumers. Citrus supply chain performance in Sambas District has not been good because the existing performance as many as 7 criteria with 41.2%, does not exist performance as many as 4 criteria with 23.5%, and in progress performance as many as 6 criteria with 35.3%. Strategies to minimize the citrus farming risks in Sambas District was to encourage the

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growth of citrus processing units to reduce losses during the postharvest period and provide added value through processing.

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