The Change of Fruit Supply Chain in Response to Covid-19 Pandemic in West Java, Indonesia (Case Study of Anto Wijaya Fruit)

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Abstract. Indonesia is the heaven of tropical fruits. However, as tropical fruits are perishable, the specific supply chain is needed to ensure the fruits are able to reach the customers in good condition. West Java Province is one of fruits producing centers in Indonesia. Anto Wijaya Fruit is a prominent company of fruits supply, especially for mango, in West Java. This study aims to (1) identify fruit supply chain management before the pandemic, (2) analyze the emerging challenges due to the outbreak, and (3) propose a scheme of fruits supply chain in response to the Covid-19 pandemic in the case of Anto Wijaya Fruit. This study was conducted from January to May 2020. Several key persons were interviewed along the chain from the producers up to the end customers. Qualitative analysis was employed in the framework of Food Supply Chain Networking (FSCN). The results showed that, firstly, Anto Wijaya Fruit mango supply chain has not been implemented optimally. This is seen from the supply chain business process flow that has not been integrated as a whole, in supply chain management contractual agreements have not yet been made between farmers and company, Anto wijaya fruits mango supply chain has not been implemented optimally. This is seen from the supply chain business process flow that has not been integrated as a whole, in supply chain management contractual agreements have not yet been made between farmers and company, then the supply chain resources in cultivation activities until distribution is still done simply. Companies need to optimize the use of technology for supply chain effectiveness and improve company management systems to make planning and control. Secondly, there were several challenges such as movement restrictions, shorter operating time of the markets and sales are made online that affected the supply chain management of the company. Lastly, in response to these challenges, a scheme using internet and communication technology (ICT) is proposed. Key words: Food Supply Chain Networking (FSCN), Internet and Communication Technology (ICT), mango, tropical fruits

1. Introduction
One of the leading fruit commodities in Indonesia is mango (Mangifera Indica L). Mango has economic and strategic value. In addition, mangoes are included in the program of developing Indonesia's leading fruit production centers (Ministry of Agriculture 2013). Java Island is included in the region with a contributor to national fruit production. In 2018 BPS data showed that Java Island occupies 72.6 percent of the total national production of mangoes or equal to 1 907 355 tons and another 27.4 percent is produced by Sulawesi Island, Kalimantan Island and Sumatra Island. This shows that the population of mango plants is widely spread in Java and the cultivation rate is very
large. Mango is one of the leading horticultural commodities in West Java Province with a total production of 404,542 tons in 2018 (BPS 2018). Mango is known as The Best Loved Tropical Fruit, an exotic fruit, which is a typical tropical fruit that is expensive and has a lot of interest in foreign markets besides bananas (Eryani 2009). So that the cultivation of mangoes has considerable investment opportunities.

Table 1. Fruit production in Indonesia year 2018

| No | Buah     | Produksi (Ton) |
|----|----------|----------------|
| 1. | Banana   | 7,264.379      |
| 2. | Mango    | 2,624.783      |
| 3. | Orange   | 2,510.420      |
| 4. | Pineapple| 1,805.499      |
| 5. | Durian   | 1,142.094      |
| 6. | Salak    | 896.504        |
| 7. | Papaya   | 887.580        |
| 8. | Jackfruit| 775.475        |
| 9. | Rambutan | 715.924        |

Source: Badan Pusat Statistik 2018 (Diolah)

The development of mango cultivation is not without problems. One of the problems horticultural commodities is related to supply chain management. The management of agricultural commodity supply chains is different from the management of non-agricultural commodity supply chains. This is related to perishable agricultural products, the process of planting, growth and harvesting depending on the climate and season, as well as yields that have varying shapes and sizes. In addition, factors handling post-harvest products that need to be considered so that the quality of the product is maintained. All of these factors must be considered in the management of agricultural commodity supply chains in order to obtain a comprehensive, effective, efficient, responsive and sustainable supply chain system (Furqon, 2015).

In addition problems related to supply chain management, the world has recently been rocked by a virus. The virus is Corona. Corona virus infection or called COVID-19 (Corona Virus Disease 2019) was first discovered in the city of Wuhan, China at the end of December 2019. This virus is transmitted very quickly and has spread to almost all countries in just a few months, including Indonesia. Corona is a virus that can infect the respiratory system and can attack anyone. According to data released by the Republic of Indonesia Task Force for the Acceleration of Handling COVID-19, the number of positive confirmed cases up to June 26, 2020 was 50,187 people with 2,620 deaths. The case fatality rate due to COVID-19 is around 5.2%. This makes the country implement a policy to impose a lockdown in order to prevent the spread of the Corona virus. Indonesia is implementing a Large-Scale Social Restrictions (PSBB) policy to reduce the spread of the Corona virus. This policy causes the company to experience movement restrictions and affect the level of sales.

One of the business people engaged in horticultural commodities and is closely related to supply chains is Anto Wijaya Fruit. Anto Wijaya Fruit is a business actor in the field of horticultural commodities, namely mango cultivation. Anto Wijaya Fruit was established in 2002 in Munjul Village, Astanajapura District, Cirebon Regency. Currently it has ± 50 hectares of land. Aside from conducting his own cultivation, Anto Wijaya Fruit is a mango collectors trader from several farmers in Cirebon Regency and also as a retail trader. Like other horticultural commodities, Anto Wijaya Fruit experiences problems in the weak interconnection between subsystems, namely in the production, distribution and marketing processes. Mango production is mostly done by simple or conventional processing, this is one of the causes of mango quality is less than optimal and in the
mango production process often occurs overproduction. The marketing done by the company has not been maximally carried out so there are still many mangoes that are not sold during the harvest season. The distribution and marketing department is currently constrained in relation to regulations concerning the Large Scale Social Restrictions (PSBB) which cause companies to experience border movements.

This study aims to (1) identify fruit supply chain management before the pandemic, (2) analyze the emerging challenges due to the outbreak, and (3) propose a scheme of fruits supply chain in response to the Covid-19 pandemic study case Anto Wijaya Fruit.

2. Materials and Methods
Site selection is done deliberately (purposive method). Purposive Method is the selection of research sites that have been determined in advance. Data collected in this study include primary data and secondary data. This study was conducted from January to May 2020. Several key persons were interviewed along the chain from the producers up to the end customers. Qualitative analysis was employed in the framework of the Food Supply Chain Networking (FSCN).

Supply chain management uses the Food Supply Chain Network (FSCN) covering supply chain structure, supply chain business processes, supply chain management and supply chain resources. Vorst (2006) defines the Food Supply Chain Network is a series of activities (physical and decision making) that are connected by goods and information channels and are related to cash flows and property rights that are contrary to organizational boundaries.

3. Results
Anto Wijaya Fruit (AWF) is a mango cultivation business that has been running for 18 years with an area of land currently owned for cultivation of ± 50 hectares. Mangoes produced are harumanis, gedong, grasping, elephants mango, Manalagi and there are several others type of mangoes. The harvest is marketed through retail stores spread across the Jakarta and Tangerang areas with nineteen outlets, retailers and three supermarkets. Nineteen outlets scattered are one ownership with AWF.

3.1 Mango Supply Chain Structure
The structure of the chain serves to describe the prevailing chain structure and explain the differences between member actors involved in the supply chain. The members of the Anto Wijaya Fruit mango supply chain are actors belonging to the product flow, financial flow, and information flow. The members consist of partner farmers, Anto Wijaya Fruit (farmers, collectors, retailers) and the end consumers. The structure of the AWF mango supply chain can be seen in picture 1.

![Figure 1. The structure of the AWF](image)

3.2 Supply Chain Business Processes
Supply chain business processes explain the series of processes that occur along the mango supply chain. This process must be integrated with each other so that each member can run well.
• **Product Flow**
  Products that are distributed in the supply chain are mangoes. Fresh mangoes are the final product that is received by end consumers. The product flow starts from mango farmers and AWF for mango cultivation. Mangoes that are ready for harvest are harvested by farmers. Farmers and AWF after harvesting then store some mango boxes. Mango is a horticultural product that is perishable and not durable. For this reason, an alternative strategy is needed to steal the number of damaged mangoes. Farmers then sell mangoes to AWF collectors. Mango product flow has not been well integrated, this can be seen from the quantity of mangoes that will be distributed is not well predicted and there is no definite cycle. Moreover, in the current epidemic situation, marketing is limited to only a few outlets, sending mangoes to the mall can not be done in a few weeks, outlets in the market have decreased operating hours which have an impact on sales.

• **Financial Flow**
  The financial flow in the AWF mango supply chain is in the form of payment for products sold, namely mangoes to members of the supply chain. This payment will be used as capital to make production so that it can form a cycle. This financial flow starts from consumers to members of the farmers chain. Payments made can be in cash, in advance, or spread done after mangoes are sold. Cash payment systems are made by consumers to retailers and supermarket retailers to collectors because their purchasing system is sell-out. Advance payments are made by collectors to several farmers, AWF retailers to collectors, retailers to collectors and the rest will be paid after the mango is sold.

• **Risk Flow**
  Mango is a product that is prone to damage, post-harvest handling is needed so that the product can last a long time. Anto Wijaya itself has not yet implemented post-penen handling on its products. The most important point that is very influential in a company is about the mechanism of product marketing. Outlets inside the market cannot operate as usual, there is a border during market hours, which is 07.00 AM to 02.00 PM. Consumers experienced a decline due to the enactment of the PSBB regulations and consumers preferred to make purchases online to avoid the crowd. Anto Wijaya Fruit is not ready to make changes to online sales. In addition, the company's operational activities are constrained, especially for transportation in shipping goods. A SKIM permit is required in order to pass the police inspection on duty.

3.3 **Supply Chain Management**
Supply chain management is a planning, organizing, implementing, and evaluating jointly conducted by supply chain members. Some things that were studied in the management of the mango supply chain include the selection of partners, contractual agreements, and government support.

• **Partner Selection**
  Partner selection is the process of choosing partners to be able to work together in a business. Partner selection is one of the factors that support the success of the supply chain in order to create a mutually beneficial and long term partnership. Anto Wijaya Fruit mango farmers do not have specific criteria in the selection of partners. The criteria are set only at the time of product shipment, which is concerned about the quality of the mango. Supporting factors for establishing good relations with farmers is the establishment of a long-standing sense of trust. The trust that is built up will then create a sense of mutual need and benefit. Farmers will contact AWF when they will pick mangoes and send them.

• **Contractual Agreement**
  In a business, there are members who are related to one another. A contractual agreement is a contract regarding matters that have been agreed between the parties who are cooperating in a formal or informal way. Contractual agreements provide an overview of the responsibilities and limitations that must be imposed by the partner and can function within the agreed timeframe. The agreements established between the supply chain actors studied, namely farmers, collectors, retailers do not use formal agreements but only through verbal agreements.
The agreement between mango farmers and AWF collector traders has not used formal and written cooperation. Both agreements were made regarding the number of mangoes sold, and the time of payment. Prices of mango at the partner farmer's level are determined by collectors. Pricing at the level of farmers, retailers, and refers to the prices prevailing in the market. The price of the mango is also adjusted to the grade of the mango. In determining prices, looking at the prices prevailing in the market, and usually for retail, take a profit of Rp. 2,000 - Rp. 5,000 from mangoes purchased from farmers.

- Government Support

   One of the potentials of Cirebon Regency is mango horticulture commodity, especially for gedong gincang mango. As said by the Regent of Cirebon, Mr. Imron Rosyadi. That the Gedong Gincu Mango is one of the mainstay commodities in Cirebon Regency. Based on the results of interviews, government support in improving the management of the mango supply chain has been given in the form of cultivation and post-harvest training and capital assistance in the form of KUR loans. Starting in 2020 there will be UPLAND activities with funding from ISDB and IFAD. It aims to increase production by developing the area of mangoes (Mr. Ali, Head of Agriculture Office of Cirebon Regency). But because of Corona's constraints, the activity hasn't been able to happen.

3.4 Supply Chain Resources

   Resources in the supply chain are needed to support, develop, and streamline all activities that take place in the Anto Wijaya Fruit mango supply chain. Resources that are owned by members of the supply chain and play a role in the development of all activities carried out by the members of the supply chain. Supply chain resources discussed in this study are physical resources, technological resources, and capital resources.

- Physical Resources

   The physical resources owned by Anto Wijaya Fruit are 50 hectares of land, mango warehouse, agricultural equipment and company distribution facilities. Land is the main capital and long-term investment owned by AWF. In 1 hectare there are 100 mango trees of different ages. The Anto Wijaya Fruit mango harvest is taken to a mango warehouse for sorting. The type of mango planted is Mango Harumanis, Mango Gedong, Mango Cengkir, Mango Manalagi and Mango elephant.

- Technological Resources

   The cultivation carried out by Anto Wijaya Fruit still uses traditional methods and its post-harvest activities still use traditional methods. So that Anto Wijaya Fruit does not have the technology to extend the shelf life of mangoes so that the product is not easily damaged. The technology used at the time of distribution, Anto Wijaya Fruit, used cars and motorbikes as a means of transportation. Sorting and grading activities are also still used manually, which is based on the quality of mangoes carried out by humans.

- Human Resources

   Anto Wijaya Fruit has a workforce of 85-100 people divided into mango cultivation on land, in warehouses, and at Anto Wijaya Fruit outlets. Work is carried out starting from land management, maintenance, harvesting and distribution. The workers come from families and communities around the company. In the implementation all workers do the work according to what the owner of the company ordered. There are no specific job specifications that must be done by employees and there are no operating hours set by the company.

4. Discussion

   The company requires acceptance approval from partner farmers. This is because it must be avoided because over production at harvest and the product does not require a buildup because it is not sold due to a decrease in the number of consumers, mango from private land is sufficient to meet
market demand. Companies that require special handling during treatment and post harvest so that the quality of mangoes can be maximized.

The current supply chain that the company can do is Anto Wijaya Buah internal supply chn, i.e.:

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   AWF  Ritel  Customer
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The company needs to implement Good Agricultural Process (GAP) and Good Manufacturing Process (GMP) and in marketing it requires changes to go online and the company makes plans and transports about mangoes to be marketed. By convincing an internal company to make changes, the company can move and follow the changes that are happening right now.

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