

## **SUPPLY CHAIN MANAGEMENT MODEL AT PUMPKIN PRODUCTION CENTER IN EAST JAVA**

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### **ABSTRACT**

This study is based on the need to make pumpkin as an alternative in food diversification through the role of business people. The initial strategy was to approach mapping the actors in the pumpkin agriculture sector from upstream to downstream. The aim of this research was to map the supply chain management of pumpkin in pumpkin production centers in East Java. This research used qualitative methods and participatory approaches. Data collection was done through in-depth interviews, observation, and study of documents and data. The results showed that the management of pumpkin supply chain in East Java had a structure, mechanism, and institutional pattern. The existing structure was formed through the role of 9 (nine) business operators in the pumpkin agriculture sector. Information flow occurs in two directions in the form of information on the quality and quantity of pumpkin harvested, the market price of pumpkin, previous collaboration experience, products that have been produced from pumpkin, pumpkin distribution schedule, and product innovations that have been produced from pumpkin harvest. Financial flow was carried out in the form of cash and credit between business actors. The product flow is in the form of fresh pumpkin products to semi-processed products such as pumpkin chips and pumpkin flour. Based on the supply chain flow patterns, the interwoven relationships that occur are vertical/horizontal as well as trade and partnership patterns.

**Keywords:** food diversification; pumpkin; supply chain management

### **INTRODUCTION**

The era of globalization demands accelerated performance and increased competitiveness in all lines, including in the context of trade and meeting market demand. One of its efforts is by increasing competitiveness through supply chain management mapping. Supply chain management itself is a series of systems that involve the process of production, shipment, storage, distribution, and sale of commodities from start to finish in the hands of consumers (Wuwung, 2013; Pongoh, 2016). This includes production patterns, transportation systems, communication models, storage warehouses, marketing and distribution centers, to the classification of wholesalers to retail. One of the main objectives is to see whether the current pattern is efficient or not so that it has implications for improving and enhancing the competitiveness of economic performance.

One of the efforts to improve and increase the competitiveness of economic performance through supply chain management is applied to pumpkin which incidentally is one of the potentials in East Java. In 2018, it was recorded that the production figure reached 259 tons (Director General of Horticulture, Ministry of Agriculture, 2019). Pumpkin itself is not the main food staple commodity that is often used as a superior or national benchmark in price fluctuations of staple food crops of tubers or

secondary crops, considering that there are still rice (with various variants), flour, and corn. However, it must be understood that some of these superior commodities often experience sharp price fluctuations at certain times, especially before certain holidays or crises, and on this basis, pumpkin is one of the commodities that has not received price protection from the government and is still based on supply from farmers so that at a certain time the price decreases to its lowest point. Even though it needs to be remembered that there is a demand for pumpkin almost every day which requires ensuring the availability of both quantity and quality, but if the availability of pumpkin exceeds the amount of demand, it will also result in a relative price decline according to the law of demand.

Pumpkin production rate in Indonesia is greater than its consumption level. However, it must be noted that this is due to people's ignorance of the benefits of its nutritional value (Wahyuni, Ansharullah, and Faradilla, 2018); people's dependent on rice as a staple food (Julianto & Sumiati, 2017); or even the absence of regional proportionality calculation regarding the balance of the supply chain for pumpkin demand with production figures. East Java basically has several areas with pumpkin farming potential, such as Banyuwangi, Ngawi, Malang, Magetan, Madiun, Bojonegoro, Jombang, and Lumajang and has the potential to diversify alternative foods besides rice in East Java. This is because East Java contributes approximately 35% of the total national rice demand, while other problems occur in the form of population growth and shrinkage of staple food agricultural land. The need for mapping the supply chain management of pumpkin production itself is to project a market plan in each pumpkin producing region. In addition, it also aims to contribute to more modern (food) product governance and emphasize the competitive advantage of products (Fawcett, Ellram and Ogden, 2007; Jayaratne, Styger, and Perera, 2012; Sherlywati, 2017). Associated with potential value benefits, market projections (profit margins), and being able to fill food diversification in each region, it is important that this research was carried out. For the data searches, we did through the google scholar search engine, but there was no research on the pumpkin supply chain pattern. The implication of research on supply chain management was to provide practical contributions to food alternatives in the form of pumpkin. As for the theoretical implications, our main contribution is to add alternative studies around the supply chain, especially in the pumpkin agricultural sector.

## **MATERIALS AND METHODS**

This research was conducted to design a pumpkin production management model in an effort to calculate the availability of pumpkin supply and increase the bargaining power of farmers. For the scope of research, namely all subsystems in the pumpkin production planning system, it includes: agro-input procurement, production processes, processing industries, and marketing. Subsequent research examined the orientation of demand, analysis of pumpkin market potential, and feasibility studies of pumpkin farming. This study determined the success of pumpkin production planning system. The current research was carried out in pumpkin production centers in East Java, which have a climate and agricultural land that supports the food crop sub-sector, especially pumpkin commodity, those are in Banyuwangi, Bojonegoro, Jombang, Lumajang, Madiun, Magetan, Malang, Ngawi, and Sumenep. In this case, a pumpkin production planning model was designed by using a system dynamics approach, so that it is expected that it can be applied in the production center in East Java.

This research was conducted from July 2019 to March 2020. The subject of this research was pumpkin production management modeling in pumpkin production centers, including in Banyuwangi, Ngawi, Malang, Magetan, Madiun, Bojonegoro, Jombang, and Lumajang. The respondents involved in this study was from various related businesses in the management of pumpkin production which is interrelated, supporting, or the like. The unit of research analysis consisted of pumpkin farmers in East Java Province which is the center of pumpkin production (the main analysis unit), and; traders/collectors, farmer associations and pumpkin businesses, as well as pumpkin suppliers (supporting analysis unit).

The method employed in this research was descriptive qualitative through documentary study, observation, and informants as the interviewee. The author used this method on the basis of data needs and in-depth research results from the research object. Another theoretical background that we used was that qualitative descriptive research is able to understand the research object and various reasons behind the actions of the research object (Starr, 2014; Creswell and Creswell, 2017). Data were collected through field observations, in-depth interviews, and documentation review. The data analysis was carried out through triangulation technique. The main sources of this research included farmers, collectors, representatives of farmer associations, and pumpkin suppliers, totaling 15 people at the base of pumpkin producer locations. The criteria for information retrieval reach the final when the data is saturated or the results of field research reach the point of information with linear explanations between the informants.

## RESULTS AND DISCUSSION

### Pumpkin production figures in East Java and potential areas

East Java Province has 38 districts/cities, some of which have the potential to become pumpkin producing areas. As one of the highest producing provinces in Indonesia, East Java has several key locations for pumpkin agricultural products and processed pumpkin products. For its own development, pumpkin in East Java basically consists of several types of cultivated variants such as the local type of pumpkin (some regions call it pumpkin or gourd) which is generally the most pumpkin variant in East Java, and other certain variants such as Honey gourds or bottle gourds that are widely available in Kediri District and kabocha or golden mama gourds (Japanese gourds) that are found in Magetan District. The local type of pumpkin itself is widely cultivated by farming communities in East Java either as the main crop or intercropping (interlude) for other crops.

Table 1. Indicators of harvested area, production, and productivity of pumpkin cultivation in East Java 2016-2018 (local type/bokor/parang)

East Java	Unit	Years			Potential Location
		2016	2017	2018	
Harvested Area	Ha	801	329	365	Banyuwangi, Bojonegoro, Jombang, Lumajang, Madiun, Magetan, Malang, Ngawi, dan Sumenep
Production	Ton	210.674	230.063	259.018	
Productivity	Ku/Ha	201	701	710	

Source: Director-General of Horticulture, Ministry of Republic of Indonesia (2019); media center Bojonegoro (2016); Safuan (2019); Sukmana (2017); Ren and Esha (2012)

Data from the Directorate General of Horticulture of the Indonesian Ministry of Agriculture regarding the production of pumpkin in East Java in 2018 noted that the production figure reached 259,018 tons. This figure is a collection of several potential areas including Banyuwangi District, Bojonegoro District, Jombang District, Lumajang District, Madiun District, Magetan District, Malang District, Ngawi District, and Sumenep District as well as several other areas. A source we reported from Antara, East Java, noted that the price of local pumpkin per kilo is IDR 250.00 for direct purchases to local farmers in East Java (Siswowidodo, 2020). If you use this benchmark, the potential for harvest in 2018 is Rp. 647,545,000.00 for the income of local farmers in East Java. In the same year, the production rate for pumpkin commodities (which reached 259,018 tons) was still much lower than that of similar food crop commodities such as cassava, amounting to 2,551,840 tons, but slightly higher than sweet potato with 257,414 tons in East Java (Ministry of Agriculture, 2020). This means that pumpkin in East Java has a great opportunity to fill one of the components in the diversification of staple food crops.



Figure 1. Co-authoring with informants (farmers, collectors, suppliers, etc.) Source. Field documentation (2019-2020)

Potential areas mapping is related to calculating the quantity of pumpkin agricultural products as raw materials for developing and knowing the flow of the supply chain. Understanding the supply chain flow in East Java also aims to see where the efficiency is in the supply of pumpkin in East Java. The actors of the pumpkin supply chain system activities consist of two supply chain systems, namely the supply chain system for food commodities and raw materials for the chemical/pharmaceutical industry. For the perpetrators and the criteria themselves, in general, they consist of:

Table 2. Business Actors in Pumpkin Supply Chain in East Java

No	Criteria / Characteristics	Criteria / Characteristics
1	Pumpkin Farmers (Waluh)	<ul style="list-style-type: none"> <li>a. Local people in the local area, with average farming experience (especially pumpkin) over 8 years;</li> <li>b. The average age of the pumpkin farming community is 45 years;</li> <li>c. Have an average number of 4-6 family members under one roof;</li> <li>d. The average level of education is high school graduates;</li> <li>e. The main work is farming and breeding livestock (buffalo, cow, and goat).</li> </ul>
2	Traders/Collectors, and;	<ul style="list-style-type: none"> <li>a. Local people in the local area, with an average pumpkin business experience of over 10 years;</li> <li>b. Varied age (&gt; 35 years);</li> <li>c. Has an average number of 6 people members under one roof;</li> <li>d. The average level of education is high school graduates;</li> <li>e. The main job is having an agricultural business and a farmer.</li> </ul>
3	Farmers Association/Pumpkin Business (Waluh)	<ul style="list-style-type: none"> <li>a. Communities outside the local area;</li> <li>b. Has business experience as a distributor of agricultural products (varied) for more than 15 years;</li> <li>c. Very experienced age in the business world (&gt; 50 years);</li> <li>d. Have business access either outside the city, outside the region, or abroad.</li> </ul>

Source. Primary Data (2019-2020)

### Pumpkin supply chain flow

The supply chain system governance of pumpkin production in East Java is implemented to create an efficient supply chain system. This governance forms a pattern in the flow of product, information, and finance in the pumpkin supply chain. Garside and Asjari (2015) explained that the supply chain is business actor involved in a series of supply business systems. Governance by farmer groups and other actors in the chain will result in the institutional mechanisms and patterns chosen by actors in the pumpkin supply chain system in East Java. There are 9 (nine) members of the chain involved in the pumpkin supply chain in East Java;

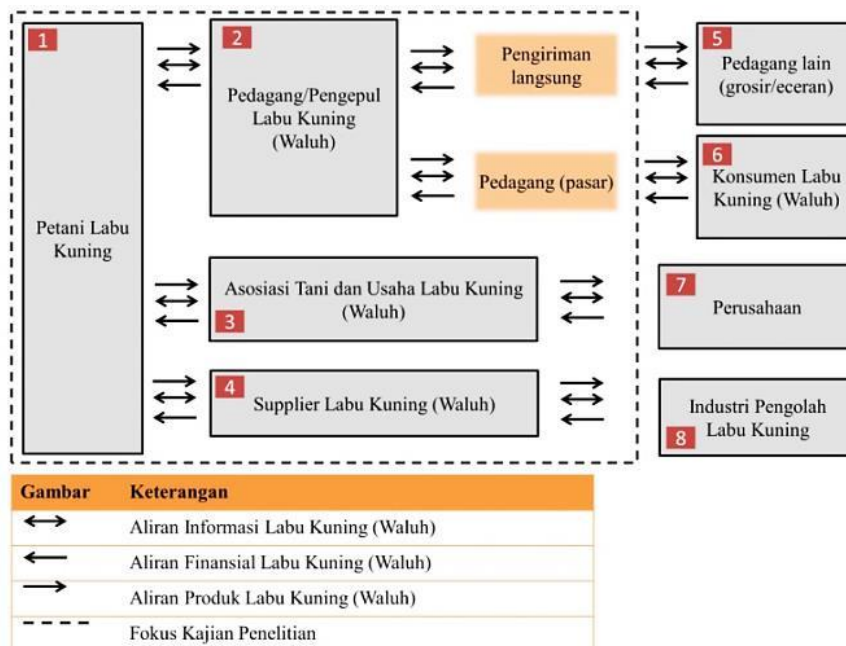


Figure 2. Flow of pumpkin (pumpkin) supply chain (Source: Analysis and observation, 2019-2020)

The flow of information that occurs in the agricultural supply chain and pumpkin products is divided into two, namely internal and external. Internal information flow occurs within the scope of fellow pumpkin farmers who are the members of pumpkin farmer groups in the form of:

- a. Information and sharing of superior seeds;
- b. Soil processing and treatment;
- c. Selection of superior plant seeds;
- d. Pumpkin cultivation techniques and methods, and;
- e. Pest management strategies and increasing crop productivity (Observation, 2020);

Meanwhile, the external information flow is divided into 7 streams of information but in this study, it is limited to 3 information flows, namely;

- a. Farmers with pumpkin traders/collectors (waluh), direct senders, and traders (markets). The information flow contains the quality and quantity of pumpkin harvested and the market price of pumpkin. Farmers and pumpkin traders/collectors (waluh), direct senders, and traders (markets) communicate and share information through direct interaction or with the help of telecommunications facilities (cell phones and social media);
- b. Farmers with farmer associations/pumpkin business (waluh) and companies. The information flow contains about the quality and quantity of pumpkin harvested, the market price of pumpkin, previous cooperation experiences, and the products that have been produced from harvested pumpkins. Farmers and their association of pumpkin/pumpkin businesses (waluh) communicate and share information through direct interaction or with the help of telecommunications facilities (cell phones and social media);
- c. Farmers with pumpkin suppliers (pumpkin) and the pumpkin processing industry. The information flow contains the quality and quantity of pumpkin harvested, the amount of supply, the pumpkin distribution schedule, the market price of the pumpkin, previous collaborative experiences, and the innovations of products that have been produced from the pumpkin produced during the harvest. Farmers and their suppliers of pumpkin (waluh) and pumpkin processing industries communicate and share information through direct interaction or with the help of telecommunications facilities (cell phones and social media);

The interaction with the provision of information, cooperation, and the faster interaction between actors in pumpkin supply chain management has a very significant urgency, especially in the context of smooth supply and demand. This is because supply chain performance is basically very dependent on the aspects of information sharing and collaboration between actors in supply chain management (Montoya-Torres & Ortiz-Vargas, 2014; Wu et al., 2014). The use of telecommunication facilities and online media also greatly impacts the circulation of information, indicating the existence of a coordination role mechanism, the effectiveness of material, information, and financial circulation (Sahin & Robinson, 2007). Several other studies also stated that information technology has the carrying capacity in terms of the basis of making sales decisions and increasing the competitive value of products (Husni, 2011; Suhari, 2011). In other words, if farmers and other business actors in the supply chain mechanism want success in the smooth supply and demand, then they must improve the components of information, collaboration, and information circulation systems.

The distribution flow of pumpkin products is carried out in fresh conditions. After the pumpkin farmers harvest the product, the pumpkin is then distributed to several groups and institutions that market the pumpkin, such as pumpkin traders/collectors, pumpkin farmer/business association, and pumpkin supplier. For pumpkin traders/collectors, marketing is carried out through 2 channels, namely: a) direct delivery to other traders (wholesale/retail), and; b) through market traders and then to the final consumer. The farmer associations/pumpkins then sorted and sent the pumpkin to the factory which has been packed in a certain size and using trucks with a minimum capacity of 5 tons. For the pumpkin supplier, the product goes into the pumpkin processing industry as food ingredient and so on. The pumpkin then sorted or turns into chips (chips) or flour to be processed into other products.

Table 3. Financial flows of pumpkin supply

No	Financial Flow	Transaction / Payment	
		Credit	Cash
1	Pumpkin traders/collectors (waluh) → Pumpkin farmers (waluh)	✓	-
2	Pumpkin farmer association/business (waluh) Pumpkin farmer (waluh)	✓	-
3	Pumpkin supplier (waluh) → Pumpkin farmer (waluh)	-	✓
4	Other traders (wholesale/retail) → Pumpkin (waluh) traders/collectors	-	✓
5	Traders (markets) → Pumpkin traders/collectors (waluh)	-	✓
6	Pumpkin consumers (waluh) → Traders (market)	-	✓

Table 3. Financial flows of pumpkin supply

No	Financial Flow	Transaction / Payment	
		Credit	Cash
7	Company → Farmers association/pumpkin business (waluh)	✓	-
8	Pumpkin processing industry → Pumpkin (pumpkin) supplier	✓	-

Source: Field results and observations (primary data, 2019-2020)

The financial flow consists of components of cost and profit margins received by each actor in the supply chain circle involved. Financial flows are in rupiah currency from downstream to upstream of the pumpkin supply chain.

The pumpkin supply chain mechanism in East Java is classified as a modern mechanism. This can be seen through the existence of partnership formed through a farmer association/pumpkin business which is then continued to the company. Another modern mechanism can also be seen through partnerships between farmers and pumpkin suppliers, which then proceed to the pumpkin processing industry. The two partnerships are a form of farmers' efforts in the supply chain cycle that have an impact on increasing bargaining power. Indirectly, pumpkin farmers have a competitive advantage related to their product, namely pumpkin. In this context, there are 2 cycles, namely: a) share role, in the form of the role of producing products carried out by pumpkin farmers and the role of marketing, distribution and vertical market mapping carried out by the farmer association/pumpkin business actors, and suppliers to companies and industries, and; b) sharing of commodity benefit and value in the form of material benefits obtained by all actors and networks that have long-term investment value for pumpkin business people.

Apart from the vertical supply of pumpkins, the braid is also carried out horizontally. Horizontal links in the supply of pumpkin are carried out between pumpkin farmers and other traders or collectors then proceed to other traders (through direct delivery) and consumers (through market traders). For the price of pumpkin, farmers and other actors adjust the price according to market mechanisms as well as the expenditure costs of each actor. Today, pumpkin produced in East Java has entered other provinces (such as Central Java and Bali Island) or has supplied the area around the pumpkin producing areas.

Based on the two links formed, the institutional scheme in pumpkin supply chain is divided into 2 patterns, namely:

- a. Trading patterns in general, involving farmers and traders, occur in the form of debt bondage or become regular customers. In this pattern, there is no written contract and it relies on mutual trust. This also affirms the study which stated that trust is an urgent factor in the supply chain governance process (Sidharan and Simatupang, 2013), and;
- b. Partnership patterns occurs between farmers and farmer associations/pumpkin business actors, and suppliers by using a contract mechanism and written agreement and applying certain periods in the process of payment, supply and demand. The partnership pattern itself has a strong role and position between providers (suppliers) and partners (Srinivasan, Mukherjee and Gaur, 2011).

## CONCLUSIONS AND SUGGESTION

The management of pumpkin supply chain in East Java has the form of an institutional structure, mechanism, and pattern. The existing structure is formed through the roles of 9 (nine) business actors in the field of pumpkin farming, including pumpkin farmers, pumpkin traders/collectors, pumpkin farmer/business associations, pumpkin suppliers, pumpkin processing industry, companies, other traders (wholesale and retail), to consumers. Information flow occurs in two directions, which are in the form of information on the quality and quantity of pumpkin harvested, the market price of pumpkin, previous collaboration experiences, products that have been produced from pumpkin, pumpkin distribution schedule, and product innovations that have been produced from harvested pumpkins. Financial flows are made in cash and credit. For product flow, it is in the form of fresh pumpkin products to semi-finished processed products such as pumpkin chips and pumpkin flour. Based on the flow pattern of the supply chain, the relationships that occur are vertical/horizontal as well as trade and partnership patterns. The novelty of this research is the existence of an academic study of the first supply chain, especially for pumpkin agricultural products in East Java. This is obtained from tracing carried out on the google scholar site through 2 keywords in the form of "pumpkin supply chain in East Java" and "pumpkin supply chain management in East Java". This further shows that there is no research related to pumpkin supply chain in East Java. This research has implications for filling the gap in pumpkin supply chain in East Java.

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