SUPPLY CHAIN ANALYSIS OF TOFU PRODUCTS IN THE FR TOFU AGROINDUSTRY SEPANDE VILLAGE

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ABSTRACT

A supply chain is a network of companies that work together to make and deliver products to end consumers. Specific market segments consume agricultural products and have a supply chain structure consisting of individuals based on trust between actors. Most companies in Indonesia have implemented supply chain management, but many have not maximized it, so it runs less effectively and efficiently. The problem in the FR tofu agroindustry is the incompatibility of the delivery schedule of soybean raw materials. This is due to climate change, poor weather conditions, and trade policies between countries that impact imported soybean production, which will hamper the production process in the FR tofu agroindustry. This study analyzes the supply chain flow of tofu products in the FR tofu agroindustry. The research was conducted at the FR tofu agroindustry in Sepande Village, Candi District, Sidoarjo Regency, from February to March 2024. The analytical method used in this research is descriptive qualitative analysis. This study's informants were six: 1 owner of FR tofu agroindustry, two people in tofu production, one soybean supplier, one cooperative employee, and one tofu retailer trader. The results showed that the supply chain flow of tofu products in the FR tofu agroindustry consisted of three flows, namely the flow of product (upstream to downstream), the flow of financial (downstream to upstream), and the flow of information (upstream to downstream and vice versa) The parties involved in the supply chain of tofu products are CV Rahardjo Indobees, KOPTI “Karya Mulya” FR tofu agroindustry, and retail traders. This research suggests that the FR tofu agroindustry needs to build stronger relationships with local and imported soybean suppliers.

Keywords: agroindustry; supply chain; tofu.

INTRODUCTION

Soybean is an agricultural commodity originating from Indonesia. The community recognizes that soy has many nutrients that benefit health, so various processed soy products have been developed, including tofu. Tofu is a food product made from soybeans, widely produced and consumed in Indonesia. Tofu products have an economical price in the market and have good nutritional content, which contains vegetable protein that is good for the body. Vegetable protein, owned by tofu, is often the staple side dish in the community's diet. (Fitriani, 2019). Soybean production in East Java Province fluctuates but tends to decline, influenced by demand and supply factors. In 2018, soybean production was recorded at 217,264 tonnes.

Furthermore, in 2020 soybean production only showed a figure of 57,235 tonnes and was recorded as the lowest soybean production over the past few years. (BPS, 2022). The decline impacts the supply of soya raw materials in East Java.

Tofu agroindustry is a home industry that processes soya beans through various production processes to produce output in the form of tofu. Tofu agroindustry can add value to soya raw materials. Added value can provide income for the agroindustry itself. The tofu agroindustry is critical for increasing the value of soya raw materials, creating jobs, and stimulating local economic...
development. The tofu agroindustry is expected to continue to benefit the community and contribute to sustainable economic development (Rosita et al., 2019).

Sidoarjo has a diverse range of tofu producers, from small to large. The number of tofu producers in the region continues to grow as product demand increases (Abdian, 2021). Known as one of the tofu production centers in Sidoarjo, the industry has grown rapidly over the past few years. One of the tofu industries in Sidoarjo is the FR tofu agroindustry, which holds significant importance in the community’s daily life. Not only does the tofu industry have a significant economic and social impact, but it also involves complex and structured supply chain flows. Comprehending the flow of the supply chain is crucial for enhancing the industry’s efficiency and sustainability.

A supply chain comprises companies collaborating to produce and deliver goods to final consumers. Specialized market segments consume agricultural products and have supply chains of individuals based on trusting each other (Fadhilullah et al., 2018). According to Pahlepi et al. (2022), the supply chain typically involves the distribution and transformation process of goods and services from raw material suppliers to end consumers. According to Setiawan et al. (2020), the supply chain is a system where organizations channel the production of production goods and services to customers. The supply chain in the tofu agroindustry encompasses several stages, from sourcing raw materials to distributing the finished product to consumers.

Supply chain management is an integrated set of activities ranging from procuring materials and services to converting them into semi-finished and finished goods and distributing them to consumers (Heizer & Render, 2011). The concept emphasizes the importance of effective coordination in all process stages to achieve optimal efficiency and customer satisfaction. Current conditions require a company to compete to meet consumers’ increasing needs and demands. When viewed from the side of consumers who always want products with good quality and affordable prices. Most companies in Indonesia have implemented supply chain management, but many have not maximised the supply chain, so business activities run less effectively and efficiently. Supply chains are needed to fulfill consumer needs and provide benefits for the links involved (Roifah et al., 2020).

The FR tofu agroindustry faces significant challenges in the soya raw material supply chain. This is due to climate change, poor weather conditions, and trade policies between countries that impact the production of imported soybeans and hamper the production process in the FR tofu agroindustry. Changes in soybean criteria that do not follow orders can affect productivity in tofu production because if the soybeans sent are smaller than the specified criteria, the results of tofu products are not so good. As consumer demand for tofu increases, agroindustry must navigate complex decision-making processes involving multiple stakeholders. This is in line with the research of (Aprilia et al., 2021), which suggests that decisions that move on the process of raw materials and processed products are entirely designed in a supply chain system.

Research conducted by Nuraenah et al. (2022) and Fadhilullah et al. (2018) focused on soybean raw materials. His research shows that the flow of information between producers, retailers, and consumers has not run smoothly. This is due to the lack of communication and information between producers, retailers, and end consumers. While research conducted by (2022) focuses on the tofu supply chain mechanism, this research uses product, financial, and information flow.

The consumption of tofu products continues to increase, making the demand for tofu from consumers grow. However, imperfections in the supply chain of soya raw materials affect the overall production performance, which makes the agroindustry unable to meet market demand adequately, which can result in financial losses. Supply chain management is essential to fulfill consumer demand. It is essential to consider the number of links involved in the supply chain of tofu products. The supply chain flow in tofu products includes product flow, money flow, and information flow, which are interrelated. This study aims to analyze the product, money, and information flow in the tofu product supply chain of the FR tofu agroindustry. The results of this study are expected to provide solutions for the FR tofu agroindustry to conduct a comprehensive evaluation of its supply chain, which aims to achieve optimal operational efficiency.

MATERIALS AND METHODS

The research was conducted at FR Tofu Agroindustry, located in Jl. Raya Sepande No. 33, Sepande Village, Candi District, Sidoarjo Regency, East Java. The analysis was conducted for one month, from February 2024 - March 2024. The research location was in Sepande Village, Candi District, Sidoarjo Regency. The location selection was carried out intentionally or purposively with the consideration that Sepande Village is an area that has a tofu agroindustry with the highest producer in Candi District, Sidoarjo Regency. The selection of FR tofu agroindustry as a research location is
because the agroindustry produces tofu continuously or continuously with a large enough quantity of soybean raw material usage among other tofu agroindustries.

The method of determining informants used in this research is purposive sampling. Sugiyono (2013) states that purposive sampling is a data source selection technique based on specific criteria. These criteria can be in the form of choosing individuals with the most knowledge about the subject matter or significant influence, making it easier for researchers to explore the object or social situation being studied. This approach ensures that the collected data is of high quality. Per specific criteria or considerations per the research objectives, the informants are the owners of FR tofu agroindustry, two people in tofu production, one soybean supplier, one cooperative employee, and one tofu retailer trader.

The data used in this study are divided into two data sources, namely primary data and secondary data. Primary data was collected by conducting direct observations and interviews with resource persons involved in the FR tofu agroindustry supply chain. Primary data collection was carried out in several ways, namely interviews, observation, and documentation. Meanwhile, secondary data were obtained from government agencies, official websites, journals, or books on the problem under study.

The analytical method used in this research is qualitative descriptive analysis. Qualitative descriptive analysis to describe the market situation, supply chain flow, and problems of the FR tofu agroindustry supply chain. The following is the flow of product, the flow of money, and the flow of information, which is described below.

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\text{Product Flow: Raw materials, components, finished products}
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\text{Money Flow: Payment}
\]

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\text{Information Flow: Capacity, Delivery Status}
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**RESULTS AND DISCUSSION**

**Identification of the Product Flow, Financial Flow, and Information Flow in the FR Tofu Agroindustry**

The supply chain is a series of productive processes that are interrelated with each other in industrial activities to form a continuous value chain (Noviantari et al., 2015). The supply chain is a network of collaborating companies that jointly produce and distribute products to final consumers. The supply chain is a working system comprising various interrelated elements and activities to meet customer demand. The supply chain involves many parties, ranging from producers, distributors, and suppliers to end consumers. The supply chain includes many processes, such as production planning, raw material procurement, inventory management, logistics, and delivery. The supply chain encompasses all the interconnected flows of products, financial (including returns and recycling), and information exchange among various actors such as suppliers, manufacturers, distributors, warehouses, retailers, and consumers. This network starts from the suppliers of raw materials and components (upstream) to the delivery of products to retail outlets (downstream). Supply chain activities involve transforming natural resources, raw materials, and essential components into final products for end consumers (Miansyah et al., 2023). In the supply chain, three types of flows require management. The first is the movement of products from upstream to downstream, the second is the financial flow that flows from downstream to upstream, and the flow of information moves both upstream to downstream and downstream to upstream (Negara et al., 2017). Product, information, and financial flow are interconnected parts of the supply chain structure (Olad et al., 2023). Here is an overview of the supply chain process within the FR tofu agroindustry. The parties involved in the supply chain flow of tofu products consist of one supply chain flow pattern: the supply chain of one supplier, cooperatives, FR tofu agroindustry, and retailers. This is different from the research of Leppe & Karuntu (2019) in that in the results of this study, the flow pattern consists of one flow pattern with the actors involved, namely farmers, suppliers, tofu home industry producers, retailers, and final consumers. This research underlines the importance of a well-integrated supply chain management system in the tofu agroindustry.

**Product Flow**

Product flow in the supply chain provides an accurate and comprehensive depiction of the entire process from suppliers to end consumers. Each chain segment relies on the others to ensure smooth product movement (Harsasi, 2018). In the FR tofu agroindustry supply chain, four parties are involved, namely CV. Rahardjo Indobean is the supplier, KOPTI Karya Mulya is the distributor, FR tofu agroindustry is the manufacturer, and retail traders are the buyers or end consumers. Meanwhile,
research by Pricilla et al. (2022) shows that four parties are involved: soybean importers, distributors, tofu processing industries, wholesalers, retailers, and end consumers. Product flow flows from upstream to downstream. The following is a pattern of goods flow in the tofu product supply chain.

![Figure 1. Product flow the FR Tofu agroindustry supply chain. Source: Primary Data Processed (2024).](image)

Product flow in the FR tofu agroindustry supply chain, highlighting its complexity and efficiency. CV Rahardjo Indobean is a supplier that delivers raw materials for imported soybeans to KOPTI Karya Mulya. KOPTI Karya Mulya is a cooperative that stores raw materials and is a soybean distributor around Sepande Village. FR tofu agroindustry is a manufacturing company that processes soybeans and converts them into tofu products. Retailers buy tofu products from the FR tofu agroindustry and supply the tofu to several markets in Sidoarjo Regency.

The product flow starts with CV Rahardjo Indobean, which imports soybeans from the United States, specifically the Sintanola, Hiu, and Bola brands. These soybeans arrive at Tanjung Perak Port in Surabaya and are transported by truck to the supplier's warehouse. Each container truck can carry 19-20 tonnes of soybeans; additional trucks are used if shipments exceed this capacity. KOPTI Karya Mulya, a cooperative that has partnered with CV Rahardjo Indobean for ±26 years. This is what gives the cooperative and the company a high level of trust. This follows Mukhsin's (2017) opinion that trust between each other can impact the level of supply chain performance. Because of the trust that has been established, Karya Mulya Cooperative does not need to spend money to find and evaluate new partners. Although there is no written contract, KOPTI Karya Mulya still has quality standards for soybean quality. Suppose the soybeans sent by CV Rahardjo Indobean do not meet the quality standards, such as the size being too small and the shape of the soybeans not being perfectly round, which is far from the standard. In that case, the consequence received by CV Rahardjo Indobean is the return of soybean raw materials to KOPTI Karya Mulya because they do not meet the quality standards agreed upon by both parties. CV Rahardjo Indobean uses a truck to deliver soybean raw materials. After KOPTI Karya Mulya receives the raw materials, the next step is to check the amount and quality of the soybeans before distributing them to each tofu and tempah producer in Sepande Village. The raw soybean materials ordered by KOPTI Karya Mulya amount to 9 tonnes every two months, according to the cooperative's warehouse stock packed in 50 kg sacks.

FR tofu agroindustry obtains imported soya raw materials from KOPTI Karya Mulya. According to a statement submitted by Mr. Muhammad Farid, who is the owner of the agroindustry, there is no written contract between FR tofu Agroindustry and KOPTI Karya Mulya because the owner of the agroindustry is a member of KOPTI Karya Mulya. Agroindustry tahu FR has been working with KOPTI Karya Mulya for about 25 years. Although there is no written agreement, the FR agroindustry always orders and buys soybeans with a unique brand for tofu production, namely the "Hiu" brand. If the stock of shark brand soybeans in the cooperative runs out, the FR tofu agroindustry will not buy other brands. The "Hiu" brand soybean raw materials purchase is 500 kg every two days. Soybean deliveries are made using a private vehicle in the form of a motorbike because the distance between the cooperative and the FR tofu agroindustry is around 200 meters. Soybean deliveries are made three times repeatedly.

After the tofu production process is completed in the FR tofu agroindustry, the flow of goods begins with retail traders buying tofu products. Retailers act as the end of the supply chain of tofu products from the FR tofu agroindustry. As one of the retailers, Mr Heri has been working with the FR tofu agroindustry for 18 years as a buyer of tofu products. Retailers take 650 pieces of tofu every day. After being cut into small pieces, the packaging of tofu products is then packed in tofu boxes and transported using a pick-up car, which will be sold to markets, stalls, and catering services.

According to Pujiawan (2005), all companies involved in the supply chain have the same goal: to provide the best product for their customers. In the context of the flow of goods, tofu products have achieved good quality standards because customers are satisfied with the products. Based on an interview with Mr Heri, a buyer of tofu products, there were no complaints about the quality of the products received. This shows that CV Rahardjo Indobean, KOPTI Karya Mulya, and FR tofu agroindustry have established practical cooperation in producing good-quality products.

The supply chain of tofu products starts from the procurement of raw materials by CV Rahardjo Indobean, then KOPTI Karya Mulya, and then FR tofu agroindustry for manufacturing.
After the manufacturing process, tofu products are distributed to the last consumer, retailers. Throughout this process, the movement of products spans from sourcing raw materials to retailers purchasing tofu items. This ensures a seamless operation across the supply chain, guaranteeing that high-quality tofu products are consistently available to consumers.

The study identified that, despite effective collaboration among supply chain participants, there are sometimes delays in the delivery of soybeans from suppliers to KOPTI Karya Mulya. These delays are caused by the long distance between the import location and the supplier, which can cause disruptions in the delivery process. The overall product flow from raw material procurement to final product distribution shows a well-coordinated and efficient supply chain. This research highlights the successful implementation of the "Just In Time" principle in the tofu supply chain, ensuring the timely arrival of raw materials and fulfilling agreements between FR tofu agroindustries and retailers. The research offers a comprehensive view of the supply chain process, which addresses the interconnected flow of products, finances, and information. The research recognizes the important role of trust and long-term partnerships in maintaining supply chain performance, as seen between KOPTI Karya Mulya and CV Rahardjo Indobeans. Although there are limitations, such as delivery delays, it provides recommendations to improve supply chain management.

Financial Flow

The financial flow is a distribution of value in the form of rupiah. The financial flow consists of cost components and profits each link receives (Irayana et al., 2023). According to (Siswandi et al., 2019), the financial flow in the supply chain of tofu products is the payment process for products sold by each actor in the supply chain. This money flow moves unidirectionally, from the buyer who pays for the product he buys through various stages in the supply chain until the producer finally receives it as payment for the product produced. Financial flow ends with the producer and supplier payment for raw materials. In other words, the money flow includes the cost components and payment methods each actor applies in the supply chain. In the tofu product supply chain, financial flows from upstream to downstream. The following is a description of the financial flow of the tofu product supply chain.

Figure 2. Financial flow in the FR Tofu agroindustry supply chain
Source: Primary Data Processed (2024)

Financial flow in the supply chain takes place in a unidirectional manner, starting from the end consumer, namely the retailer, and then flows through each stage in the supply chain until it reaches the producer as a production cost. According to (Aninas et al., 2018), the financial flow cycle should not be interrupted because if one chain breaks the money cycle, it can cause losses that can be experienced by the actors and can stop the buying and selling process. There are two payment systems in the tofu product supply chain: the cash payment system.

Retailers pay FR tofu agroindustry to purchase tofu products using a delayed payment system. In this system, the retailer takes the tofu product first and pays the next day in cash for the number of pieces of tofu taken by the retailer. Retailers purchase tofu products at IDR 1,200 per piece. Thus, the money flow starts from the retailer and ends at the FR tofu agroindustry as income from selling products.

FR tofu agroindustry obtains soybean raw materials from KOPTI Karya Mulya for IDR 10,450 per kilogram. For the delivery of raw soybean materials, a fee of IDR 25,000 is charged for three deliveries, which includes the cost of the driver and petrol. Payment is made after the soybeans arrive at the production site.

KOPTI Karya Mulya purchases soybean raw materials from CV Rahardjo Indobeans for IDR 9,800/kg for the sintanola brand, IDR 9,750/kg for the shark brand, and IDR 9,600/kg for the bola brand. Soybean pricing is agreed upon through a negotiation process between the two companies, considering the quality of the soybeans and the quantity of soybeans purchased as the basis for setting the price. The cost of shipping soybeans from the supplier's warehouse to the cooperative is IDR 720,000 for the sintanola brand, IDR 765,000 for the shark brand, and IDR 810,000 for the bola brand for one shipment, which is charged on a piece rate basis and includes the cost of diesel and driver fees. The shipping price of the soya brand differs because of the CV. Rahardjo Indobeans warehouse is in a different location. The payment system for raw materials has a DP of 50% of the transaction value. If KOPTI Karya Mulya has paid the DP, the order will be processed by CV.
Rahardjo Indobeans. The remaining payment is made after the soybean raw material arrives at KOPTI Karya Mulya and has been checked for quality by bank transfer payment. The payment system for shipping costs is carried out when the soybean raw materials have arrived at the location of KOPTI Karya Mulya.

The supply chain flow of tofu products has a structured financial flow and follows the direction of the movement of goods. This aligns with the supply chain flow theory, which asserts that the movement of financial resources mirrors the flow of products from producers (upstream) to consumers (downstream). FR tofu agroindustry (downstream) buys soybeans from KOPTI Karya Mulya (upstream), and then KOPTI Karya Mulya buys soybeans from suppliers (furthest upstream). Payment in the tofu supply chain is made after the goods are received. This aims to ensure the quality of the goods and minimize the risk of fraud. The FR tofu agroindustry only pays KOPTI Karya Mulya after the soybeans are received at the production site, and KOPTI Karya Mulya only pays the supplier after the soybeans are received at their warehouse. Payment for each link in the chain uses the cash payment method. This is in line with the research of Pangestuti et al. (2019), which shows that payment is made in cash after making a purchase.

**Information Flow**

Information flow is the communication process among the various interconnected entities in the supply chain (Devyana et al., 2023). In the flow of information through the communication process between each actor in the supply chain of tofu products. According to (Bangun et al., 2023), good distribution among actors in the flow of raw materials and information can create a good and transparent relationship to increase trust and commitment in cooperative relationships. The flow of information flows reciprocally to each actor in each supply chain of tofu products, starting from supplier information upstream to information from retailers as final buyers downstream of the tofu product supply chain.

![Diagram of information flow in the FR Tofu agroindustry supply chain](image)

*Figure 3. Information flow in the FR Tofu agroindustry supply chain
Source: Primary Data Processed (2024)*

Information flow is an essential component that must be considered in a product supply chain, where in this information flow, there is an exchange of information between actors in the supply chain of a product (Lailah et al., 2023). The flow of information in the tofu product supply chain flows from upstream to downstream and from downstream to upstream. This follows Sulianto’s (2010) statement that the information flow in all channels flows both ways from downstream to upstream and upstream to downstream. The flow of information between soybean marketing institutions includes information on the price of raw materials, seed types, the demand for raw materials, the amount of soybean raw materials available, and the status of soybean collection and delivery.

Efficient information distribution plays a vital role in achieving supply chain goals. Good distribution between raw material and information flow actors can create a good and transparent relationship to increase trust and commitment in cooperative relationships. The flow of information between raw material and information flow actors must be appropriately managed together (Nuraenah et al., 2022). This is in line with the research of Irayana et al. (2023), where research suggests that the flow of information between actors must be appropriately managed simultaneously to avoid asymmetric information.

The information flow between CV Rahardjo Indobeans and KOPTI Karya Mulya is two-way. The information flow includes details such as the quantity of raw materials, availability, quality, brand, condition, price, and delivery status of soybean raw materials. Information flowing from KOPTI Karya Mulya to CV Rahardjo Indobeans is the amount of raw material requested, the brand of soybean raw material, the quality of raw materials, the quality of raw materials, and the status of raw materials accepted or rejected. The flow of information between CV Rahardjo Indobeans and KOPTI Karya Mulya goes well because of the long-standing relationship. The information exchange activity between the two companies is negotiation. Negotiation is when two or more parties try to agree on the exchange rate (Robbins and Judge, 2016). The soybean price negotiation process is conducted via mobile phone between the supplier and KOPTI Karya Mulya. The price negotiation process considers the soybean brand. If the soybean brand is small, KOPTI Karya Mulya will ask to reduce the price. Soybean price negotiations are conducted before the soybeans are delivered from the supplier. The
negotiation process is through mobile phones using the WhatsApp application to exchange information. After both parties agree on the price, the soybeans will be sent to KOPTI Karya Mulya.

The subsequent information flow, namely KOPTI Karya Mulya with FR tofu agroindustry, occurs in two directions. Information flowing from KOPTI Karya Mulya is in the form of information on raw material prices, brands, quantities, availability, and delivery status. The form of information flowing from the FR tofu agroindustry with KOPTI Karya Mulya is a request for the amount of raw materials and the brand of soybean raw materials. Information flowing from KOPTI Karya Mulya with FR tofu agroindustry runs smoothly due to a long relationship. The price negotiation process takes into account the brand of soybeans. If the soybean brand is small, the FR tofu agroindustry will ask to reduce the price. Negotiations on the price of soybeans are carried out before the soybeans are sent from the cooperative. The negotiation process is through mobile phones using the WhatsApp application to exchange information. The negotiation process through mobile phones using the WhatsApp application is used to communicate before a meeting so that information can be conveyed quickly and accurately. After both parties agree on the price, the soybeans will be sent to the production site.

The flow of information between the FR tofu agroindustry and retail traders occurs in two directions. Information flowing from the FR tofu agroindustry is the number of tofu products and the price of tofu products. Information flowing from retailers with the FR tofu agroindustry is in the form of product requests. The flow of information between the FR tofu agroindustry and retail traders runs smoothly. Retailers contact the FR tofu agroindustry admin, Mrs Siti Masnunah, to place orders for tofu products. In addition, retail traders also come directly to the tofu production site to place orders for tofu products.

The advantage of this supply chain flow is that the information-sharing process occurs directly without intermediaries, thus minimizing changes in the information conveyed. This follows the opinion of Fachrizal and Setya (2017), stating that good and direct communication without intermediaries impacts supply chain performance so that information distortion does not occur.

CONCLUSIONS AND SUGGESTION

Based on the results of the study, it is concluded that there are three flows in the supply chain of tofu products: product flow, financial flow, and information flow. Four components are involved in the flow: CV Raharjo Indobean, KOPTI “Karya Mulya” FR tofu agroindustry, and retail traders. The suggestion from this research is that the FR tofu agroindustry needs to build stronger relationships with soybean suppliers, both local and imported

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