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Performance of the Shallot Supply Chain in Kerinci Regency Jambi Province

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Abstract

This research aims to: (1) analyze the performance of shallot farming, (2) analyze the condition of the shallot supply chain using the FSCN (Food Supply Chain Network) discussion framework, (3) measure the performance of the shallot supply chain using the rating scale method and the assessment indicators adapted from SCOR (Supply Chain Operations Reference) model, and (4) formulate efforts to improve shallot supply chain performance by carrying out gap analysis and problem analysis first. The sampling method used was Simple Random Sampling and the next sample of supply chain actors was determined using a snowball sampling technique. The analysis method used is FSCN and the rating scale method with performance assessment indicators from the SCOR model. The results of the research show that the performance of shallot farming has followed good cultivation SOPs based on good cultivation norms (GAP), although not all activities have been carried out. The average area of shallot harvested land is 1.48 hectares. The varieties of shallots planted, brebes variety, thailan variety, indian variety peking variety, beko variety. shallot productivity is 20 tons per hectare with an average price of IDR 10,000/kg. Supply chain actors consist of farmer producers, village collectors, district collectors, wholesalers and retailers in stalls and local traditional markets. The performance of the shallot supply chain during in season is greater (score 3.57) than during off season (score 3.28). Efforts to improve the performance of the shallot supply chain by building an appropriate supply system, building partnerships, coordination and collaboration among supply chain actors as well as strengthening farmer institutions, overcoming the low availability of shallots, especially during the off season, increasing the availability of market information, and overcoming problems regarding mechanisms. distribution.

Keywords: Shallots, Supply Chain, Performance, Business Process, FSCN, SCOR Model

Introduction

Shallots are a strategic commodity because they are the commodity most consumed by the public and there are no substitutes or substitutes for them. Shallots are included as a basic and important commodity, like other commodities, including red chilies, cayenne peppers, eggs and tomatoes, which play a role in contributing to inflation. Shallots are a public need, which has quite a big impact on changes in quantity, quality and price. And the shallot commodity has a significant contribution to the formation of National Gross Domestic Product from the food commodity group (Departemen of Agriculture, 2023). Red onion production in Indonesia, in 2021, will be 2,004.59 thousand tons. An increase of 10.42% compared to 2020 (1,815.44 thousand tons).

Meanwhile in 2017, shallot production was only 1,470.15 thousand tons (BPS, 2023). Shallot production in Indonesia is spread across 6 provinces, namely Central Java Province (28.15%), East Java Province (24.99%), West Nusa Tenggara Province (11.11%), West Sumatra Province (10.00%), South Sulawesi Province (9.14%) and West Java Province (8.51%), and other provinces 8.10%. The total amount is 91.90%. While fulfilling the need for onions is seasonal, outside of the harvest season there is the potential for community needs not to be met (BPS, 2023).

The Indonesian Central Statistics Agency reported that the export value of Indonesian shallots reached US$ 13.74 million in 2020. This figure increased 29.8% compared to the previous year which amounted to US$ 10.58 million. The export value of shallots has shown a fluctuating trend since 2016. At that time, shallot exports amounted to US$ 404 thousand. The value soared to 9.53 million in 2017. In the following year, the export value of shallots fell to US$ 6.99 million. However, the export value of shallots increased again in 2019 and 2020. Thailand became the main destination country for Indonesian shallot exports, namely US$ 9.3 million in 2020. After that there was Singapore with the export value of shallots reaching US$ 2.55 million. . Meanwhile, the value of Indonesian shallot imports was recorded at US$ 1.36 million in 2020. This amount jumped 148.9% compared to the previous year which was US$ 545 thousand (BPS, 2023).

The supply of agricultural commodities is greatly influenced by the amount of production (Susanawati and A Pertiw, 2024, Novrirani et al. 2024 and Thakkar, at al. 2009). If red onion production is greater than consumption, then the red onion production area is said to be a surplus area. The impact will be that supply exceeds market demand for shallots and prices will become cheaper. And if shallot production is less than consumption, it is said to be a deficit. A deficit condition will cause prices to increase. The problem of surplus and deficit can be overcome by managing the shallot supply chain. Supply chain activities also occur if a region cannot fulfill all the food commodities consumed by its people (Darwis, et al. 2004, Bhagwat and Sharma, 2007, and Dinata, et al. 2014). Deficit areas can carry out supply activities from surplus areas to shallot deficit areas to form a supply chain from producers to final consumers. Supply chains can form the longest patterns or the shortest patterns. Does this phenomenon still benefit all supply chain actors? Therefore, it is necessary to conduct research on the performance of the shallot commodity supply chain.

Shallot production in Jambi Province in 2021 will experience a deficit. However, some household consumption needs can be met. Data from Horticultural Statistics, in Jambi Province in 2021, shallot production was 13.26 thousand tonnes and consumption by the Jambi community was 15.23 thousand tonnes, resulting in a deficit of 1.97 thousand tonnes. The areas for purchasing and supplying shallots from outside the province come from West Sumatra Province, Bengkulu Province and Central Java Province and sales of shallots from Jambi Province are carried out outside, namely to West Sumatra Province and Bengkulu Province (BPS, 2021).

The distribution pattern for shallots can be a long pattern or a short pattern. The long pattern involves more actors in the longest supply chain, namely shallot producers, collectors, wholesalers, retailers and consumers. The shortest distribution pattern involves fewer supply chain actors, namely shallot farmers, retailers and final consumers. Each region has a different

distribution pattern from other regions. So research on supply chains is needed. The survey results show that the 2021 shallot supply chain pattern nationally is producers – collectors – retail traders – final consumers. The large number of supply chain actors involved makes it inefficient and has an impact on increasing prices at the final consumer level (BPS, 2022 and Ministry of Agriculture. 2017).

Judging from the performance of shallot farming (on-farm), it is suspected that Kerinci Regency, from production and productivity aspects, has adequate potential. It is suspected that the problem is in terms of distribution or supply chain and in the activities of the farming production process. This can be seen from the fairly high price disparity between prices at the farmer (producer) level of shallots and prices at the consumer level (intermediate consumers and final consumers). This price difference is also thought to be the length of the distribution supply chain for angry onions and the number of supply chain actors in the market. To find out a further picture, it is necessary to explore and research shallot farming activities, harvest and post-harvest handling and distribution from upstream to downstream and vice versa.

The planting season for shallots (in season) is generally carried out in the dry season, while in the rainy season (off season), farmers rarely plant shallots due to high disease attacks. During the rainy season, seed prices are also relatively high due to decreased seed availability, production becomes fluctuating and this results in price fluctuations due to the perishable nature of shallot products. Based on this phenomenon, researchers are interested in studying the Performance of the Shallot Supply Chain in Kerinci Regency, Jambi Province. The objectives of this research are: (1) To examine the performance of shallot farming in Kerinci Regency, Jambi Province, (2) To describe the description of the shallot supply chain in Kerinci Regency through the use of the FSCN (Food Supply Chain Network) model, (3) To examine the performance of the chain supply shallots in Kerinci Regency using the SCOR (Supply Chain Operations Reference) model in Kerinci Regency and (4) Formulate efforts to improve the performance of the shallot supply chain in terms of Product Flow, Money Flow and Information Flow.

Literature Review

Business Performance

Business performance or work achievement is the overall result or level of success of an entrepreneur during a certain period in terms of quality, quantity and continuity. Business performance is often associated with indicators of the success of a business in achieving its business goals. Katarzyna, et Al. (2023) and Kinding, et al. (2019), believes that the factors for assessing entrepreneurial performance include: production, turnover and business profits. Nurasa and Darwis, 2007, Setiawan, et al. 2011 and Putrasamedja, 2010) states that assessment variables that can be used to measure business performance include business growth and business revenue. Meanwhile, added that the performance of a business can be seen from efficiency, profit, productivity, growth and product prices. The factors used to assess business performance are expanding marketing areas and increasing income.

This is the same as that used by Wahyuni, et. Al. (2015) but adds the sales volume factor to assess the performance of a business. Apart from that, Wahyuni, et al. (2018) added indicators of

competitive advantage as indicators of business performance assessment Wahyuni, et al. (2017). Meanwhile, according to Nofitasari (2015), a business's performance can be seen whether its performance is good or not from the analysis of several factors, including: business activity, business productivity analysis, revenue analysis, cost analysis, profitability analysis, business growth analysis, and loan effectiveness. According to Thakkar, et al., (2009), and Van (2006) to measure the success of small businesses, several measures are used, including net profit, sales profit, profit after tax, market share, sales profit achievement, and net profit achievement. Apart from that, performance can also be measured using indicators of increasing income, sales, output (products produced), productivity, costs, service acceptance, speed of reaction or change, achievement of quality standards or customer reactions (Asmara and Ardhiani, 2010).

Supply Chain

Supply chain management has become a very popular topic discussed in modern business research. The supply chain is a system whose constituents include materials, production facilities, distribution services and customers who are connected by forward flow, feedback information (Chistophe, 2011, Fan, et al. 2013). The supply chain can be analogous to a form of industrial organization where buyers and sellers separated by time and space can progressively add and accumulate value, in line with the movement of a product from one chain link to another (Hugles, 1994, Fearne, 1996, Handfield & Nicholas, 1999). The supply chain basically accommodates: (a) the movement of products from producers to consumers, (b) the movement of payments, credit and working capital from consumers to producers (Adiyoga, et al. 2010).

The agricultural supply chain is also an economic system that distributes benefits and risks between participants. Thus, the supply chain encourages internal treatment and develops incentives along the chain to ensure on-time production schedules and delivery commitments (Iyer and Bergen, 1997, Lambert and Cooper, 200). To survive in conditions of tight competition, an agribusiness unit must strive to have an efficient supply chain, in order to reduce uncertainty factors and provide customer service. Individual suppliers, producers and marketers associated through a supply chain will coordinate the accumulated value to be greater than if each link in the chain operated independently.

Supply chains can create synergy because: (a) the chain expands traditional markets beyond its original boundaries, thus increasing the sales volume of each participant who joins, (b) the chain reduces product delivery costs to lower/smaller compared to competitors' supply chains, so that it can increase the net margin for working capital spent by supply chain actors, and (c) the supply chain targets certain market segments with specific products, as well as differentiates services, specific product quality, and differentiates services, product quality or brand reputation for these market segments, so that they can improve consumer perceptions of the product and enable supply chain actors to charge high prices (Yadav, et al., 2022, Paul, 2014, Setiawan, et al. 2011 and Agustin et al. 2019)

The contribution of the supply chain in the development of agribusiness commodities is reflected in its potential which: (a) can provide a combination and reference in allocating resources to increase production value and consumer satisfaction, and (b) encourage growth through promoting technological innovation and increasing supply and demand for agribusiness products

(Nagurney, at al. 2024). This potential cannot be separated from the price level created as a meeting point for market participants' responses to supply and demand. Basically, product prices are a summary of a number of information regarding resource availability, production possibilities and consumer preferences (Buccola, 1989). Especially for agricultural products that are relatively perishable, knowledge and understanding of the situation, nature and behavior of the supply chain is very necessary for all supply chain actors.

In the shallot supply chain, especially in Kerinci Regency, price determination is carried out by bargaining by considering prices at the seller's level. The element of monopoly or monopsony is not identified in the shallot commodity market structure (IPB, 1996). However, in the marketing of shallots, there is a tendency: (a) Difficulty for farmers to sell their products directly to collecting markets, (b) large traders in the main markets (Sari Maren Market and Angso Duo Market, Talang Gulo Market) do not provide freedom for other large traders to carry out marketing activities in the same market, and (c) bias towards farmers or large traders. Implicitly, this research identifies the need to improve existing supply chains. Supply Chain is farming decisions and physical activities related to materials and information, or the flow of money and property rights. That to study the potential or supply chain, a framework is needed to explain the supply chain (Van Der Vorst, 2006). The Supply Chain Framework can be seen in the following image. The Supply Chain Framework can be seen in Figure 1.

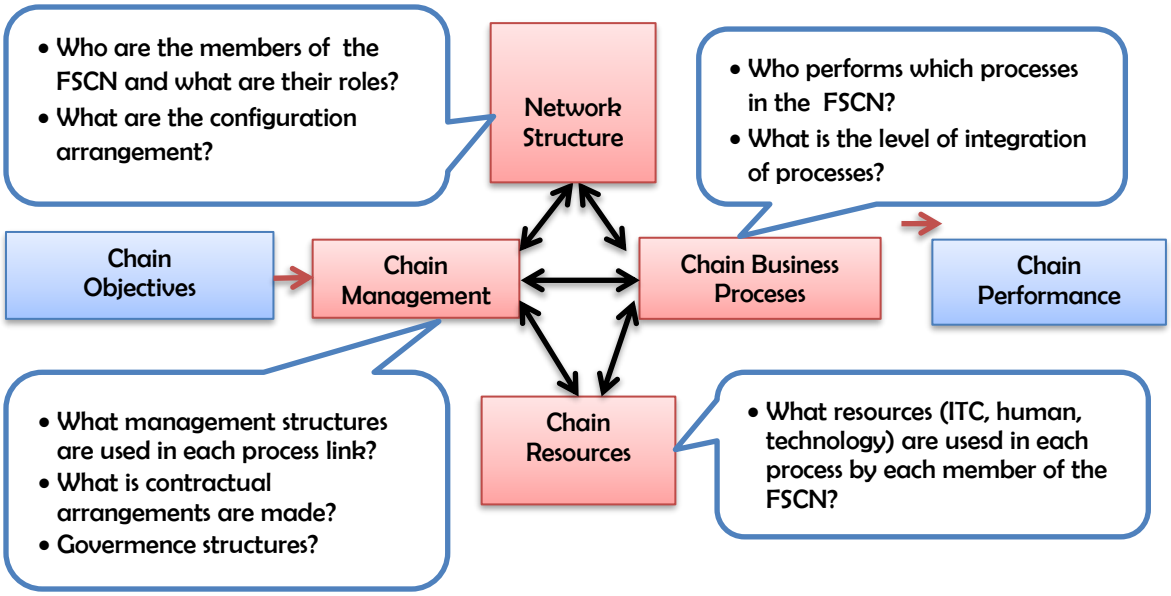

Figure 1. Food Supply Chain Network (FSCN) Framework
Source: Van Der Vorst (2006)

The elements in the supply chain referred to are: (1) Supply chain elements, which result in business activities, (2) Output produced by systematic supply chain activities, (3) Forms of coordination and management structure in networks that carry out farming decision activities. is a description of the supply chain, (4) Transformation of supply chain resources can produce products and return them to consumers where the supply chain includes physical resources, technology, human resources and investment. The supply chain is a series of processes

consisting of the flow of goods, information and money aimed at fulfilling customer desires, which occur within and between different stages in a chain from production to final consumers.

Meanwhile, the definition of supply chain management is the integration of planning, implementation, coordination and control of all business processes and important activities in producing and delivering a product as efficiently as possible so as to satisfy customer needs (Van der Vorst 2006). Supply chain management for agricultural products represents the management of the entire production process consisting of processing, distribution, marketing activities until the desired product reaches consumers (Marimin and Maghfiroh 2010). The supply chain for agricultural products is different from the supply chain for manufactured products. The Supply Chain Framework can be seen in the following image.

The fundamental difference between the agricultural product supply chain and other supply chains is the continuous changes in the quality of agricultural products throughout the supply chain as a whole (Nagurney et al. 2013). Van der Vorst (2006), divides the supply chain for agricultural products (basic ingredients for vegetables or animals) into two types, namely: (1) Fresh agricultural products such as fresh vegetables, flowers, fruit. This supply chain structure consists of farmers, auctioneers, intermediaries/wholesalers, importers and exporters, retailers/retail traders, and specialty shops that sell the product. Processes that occur in this chain: material handling, storage conditions, packaging, transportation, and trade and (2) Products to be processed (such as meat, snacks, juices, desserts, canned foods). In this chain, agricultural products are used as raw materials for making products that have added value.

Supply Chain Performance Measurement

Performance measurement in the supply chain is an overall performance measure that is based on the performance of each chain along the supply chain (Aramyan, 2007). According to Pujawan (2005), a performance measurement system is used to: (1) Monitor and control, (2) Communicate organizational goals to functions in the supply chain, (3) Know the position of an organization/company relative to competitors and to existing goals. to be achieved and (4) Determine the direction of improvement to create competitive advantage. Performance measurement is an important element in decision making in planning work effectiveness (Bhagwat and Sharma 2007). An organization or company should implement one type of measurement system that best suits the characteristics of the organization or company (Chan, 2003).

Thakkar et al. (2009), stated that measuring supply chain performance must be understood by all members of the supply chain. Company performance studies and models must be created so that company goals and achievements can be measured so that the effectiveness of the strategies or techniques implemented can be implemented. Supply chain performance is defined as the degree/level to which a supply chain can meet the needs of consumers and stakeholders regarding key performance indicators at each point. The purpose of performance measurement is to support the achievement of goals, evaluate performance, and determine future strategic, tactical and operational actions. To achieve goals, process output must be measured and compared with standard measures (Van der Vorst 2006). Aramyan et al. (2006), presented several methods that can be used to measure supply chain performance, including the Supply Chain model.

Research Methods

Research Scope

Kerinci Regency, Jambi Province is a research location that was chosen purposively, taking into account the area with the highest production of shallots in Jambi Province. This research was conducted in 3 (three) sub-districts, namely Kayu Aro District, Kayu Aro Barat District and Gunung Tujuh District. One village was chosen for each sub-district, Sangir Tengah Village (Kayu Aro District), Giri Mulyo Village (West Kayu Aro District) and Sungai Sikai Village (Gunung Tujuh District). Research objects and variables: (1) Characteristics of shallot farmers, including age, farming experience, education, number of household members, land area and land ownership status), (2) Performance of shallot farming, (3) Shallot supply chain and end consumers of Kerinci shallots, (4) Actors in the flow of products, flow of funds and flow of information from upstream to downstream and vice versa from downstream to upstream of the shallot supply chain, (5) Problems faced by farmers and supply chain actors as well as final consumers of shallots and challenges and efforts to improve chain performance supply. The selection of villages is the one with the most shallot farmers producing per year. Sampling of supply chain actors based on side snowball. The sampling method for shallot farmers is the Simple Random Sampling Method.

Data Analysis

The first objective is to examine the performance of shallot farming by describing farmers' shallot farming regarding shallot cultivation technology in the planting season (rainy season and dry season) in the last year, namely 2022, the use of chemical pesticides/integrated pest control, and chemical fertilizers and recommendations fertilizer, use of quality seeds and seeds, planting season and harvest season for shallots, recommended technology for shallot farming and shallot production as well as shallot productivity and compared with the results of previous research and secondary data. The second objective, to analyze the performance conditions of the onion supply chain, is analyzed descriptively by describing supply chain actors following the FSCN (Food Supply Chain Network) framework (Van der Vorst, 2006), both the flow of onion commodity products from upstream to downstream, regarding suppliers, wholesalers , retail traders and final consumers. Flow of funds from shallot business actors from downstream to upstream, sources of funds, income and expenditure of funds/money. Information flow from upstream to downstream and vice versa from downstream to upstream of the shallot supply chain in Kerinci Regency, Jambi Province. Information about the location of the source of shallot commodity products, price decisions, post-harvest handling decisions (drying, storage), inventory decisions and forecasts of demand for shallots. Objective three, to assess the performance conditions of shallot supply chain actors.

The analytical method used is FSCN and the rating scale method with performance assessment indicators from the SCOR (Supply Chain Operations Reference) model. Performance assessment is carried out in three stages: (1) Selection of performance matrices using the SCOR Model, (2) Weighting of performance matrices, obtained from experienced supply chain actors by providing weightings from a list of questions asked and addressed. to each actor and (3) Calculation of

performance, namely performance from the lowest to the highest level (Paul, 2014). Objective four, examine efforts to improve the performance of supply chain actors. First, the factors causing existing problems are collected from the research results, then efforts are made to solve the problems and efforts are made to improve supply chain performance. Contributing factors include quite high price differences between producers and final consumers, prices fluctuate very sharply, shallot inventory levels outside the rainy season or planting season, the absence of an appropriate inventory system among supply chain actors, distribution of shallot products not yet running well. as well as price information and other information which is still limited.

Foundation of Thought

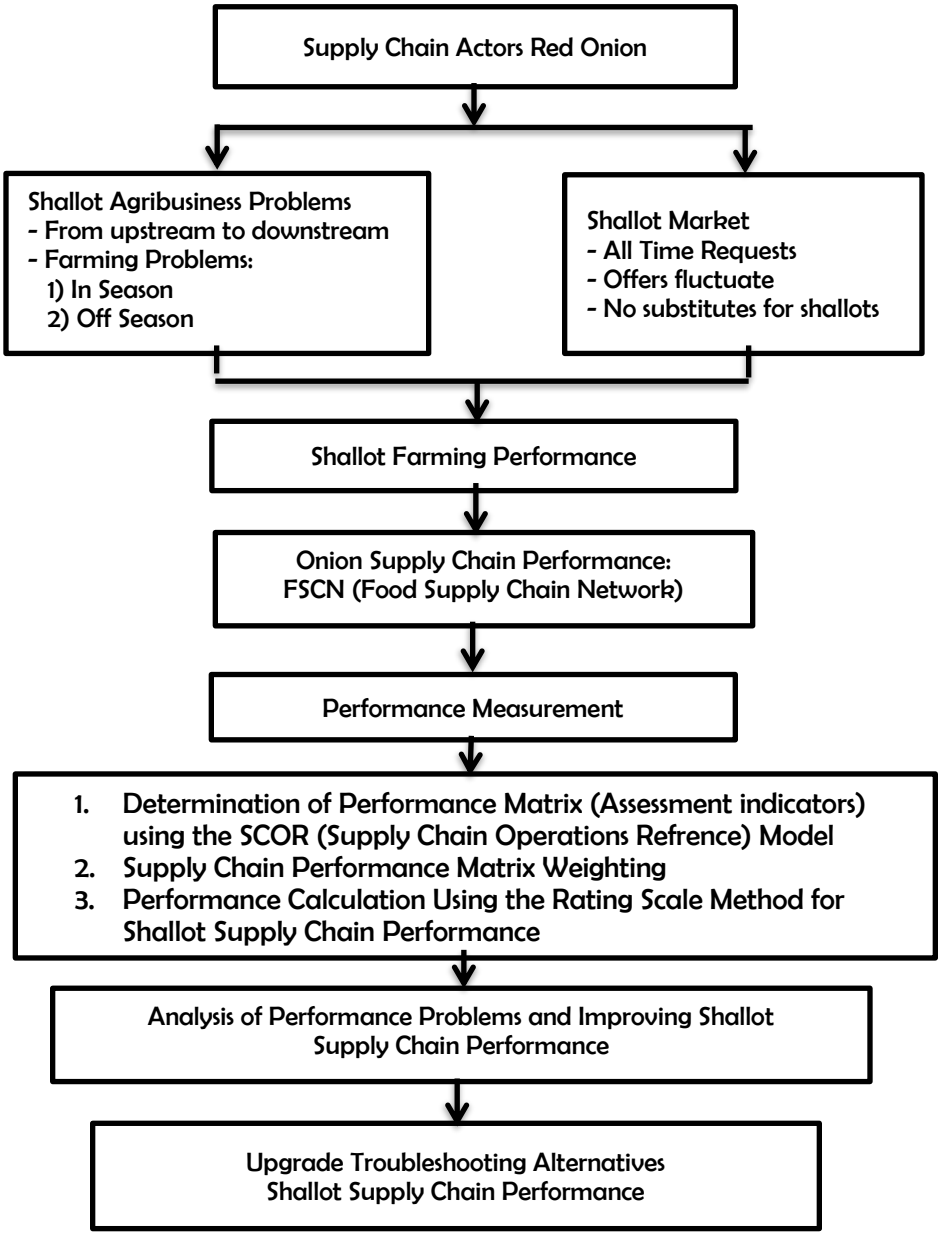

Figure 2. Study of Farming Performance and Supply Chain Performance Improvement

Red Onion

The passage outlines a research approach aimed at improving the shallot (red onion) supply chain in Kerinci Regency, Indonesia, which is one of the country's largest shallot producers. Despite its importance as a high-value commodity, the shallot supply chain faces multiple challenges in meeting the demand consistently. To overcome these obstacles and enhance supply chain performance, a structured study is proposed using established frameworks and methodologies.
Let's break down the key elements:

1. Challenges in Shallot Cultivation

- **Obstacles in Meeting Demand**: Shallot farming is essential, but it is often hindered by challenges that affect the ability to meet consumer demand consistently. The challenges could be related to crop yield, transportation, or market fluctuations, among others.
- **Profit Targets of Business Actors**: The efficiency of the supply chain is critical for the stakeholders, as the ability to meet demand directly impacts their profitability. Failure to meet consumer demand may lead to missed profit opportunities.

2. Strategic Location: Kerinci Regency

- **Kerinci Regency's Role**: This region is identified as the largest shallot producer in Indonesia, making it an ideal case study for understanding the intricacies of the shallot supply chain. Any improvements here could have broader implications for the entire shallot industry in the country.
- **Need for Performance Improvement**: With the strategic importance of this region, there is an urgency to analyze and improve the performance of the shallot supply chain to ensure long-term sustainability and profitability.

3. Assessment Framework: FSCN

- **FSCN Framework (Van der Vorst, 2006)**: This framework provides a comprehensive approach to studying and analyzing supply chain conditions. The FSCN (which likely stands for a framework related to supply chain network design and management) helps clarify the current state of the shallot supply chain by examining its structure, processes, and stakeholders.
- **Purpose**: The goal of using the FSCN framework is to understand the operational and structural conditions of the shallot supply chain, which will be used as the foundation for measuring its performance and identifying areas for improvement.

4. Performance Measurement: SCOR Model Adaptation

- **SCOR Model**: The SCOR (Supply Chain Operations Reference) model is a widely used tool for measuring and improving supply chain performance. It focuses on five core processes:
    - **Plan**: Demand forecasting, production planning, and resource allocation.
    - **Source**: Procurement of raw materials and suppliers.
    - **Make**: Manufacturing and processing of products.
    - **Deliver**: Distribution, logistics, and customer service.
    - **Return**: Handling returns and post-sales support.

- **Performance Metrics**: Performance indicators (metrics) will be adapted from the SCOR model to evaluate the current performance of the shallot supply chain. These indicators provide a standardized way of assessing efficiency, cost-effectiveness, responsiveness, and flexibility.
- **Rating Scale Method**: A rating scale will be used to quantify performance based on the SCOR model's metrics, allowing for a clear comparison between the current and expected performance levels.

5. Gap Analysis and Problem Identification

- **Gap Analysis**: A crucial part of the study is to identify the gap between the current performance of the shallot supply chain and the desired performance. This gap could be due to inefficiencies, delays, or underperformance in various supply chain processes.
- **Problem Analysis**: The study will also analyze the specific issues affecting the shallot supply chain. These issues could range from production inefficiencies, logistical challenges, poor demand forecasting, or inadequate supply chain coordination among stakeholders.

6. Recommendations for Improvement

- **Formulating Recommendations**: Based on the findings from the gap analysis and problem identification, recommendations will be proposed to improve the performance of the shallot supply chain. These recommendations might involve:
    - **Process Optimization**: Streamlining processes such as sourcing, production, and delivery.
    - **Technology Adoption**: Implementing digital tools for better supply chain management (e.g., inventory tracking, demand forecasting).
    - **Collaboration and Coordination**: Encouraging better cooperation among farmers, suppliers, distributors, and retailers to synchronize the entire supply chain.
    - **Training and Capacity Building**: Educating stakeholders on best practices for efficient shallot production and supply chain management.

7. Expected Outcomes

- **Improved Supply Chain Performance**: The primary goal is to enhance the efficiency and responsiveness of the shallot supply chain, leading to better alignment with consumer demand and increased profitability for business actors.
- **Sustainability**: By improving the supply chain processes, the study also aims to promote sustainable practices in shallot farming and distribution, reducing waste and increasing the long-term viability of the industry.

The study seeks to comprehensively assess and improve the performance of the shallot supply chain in Kerinci Regency. By using the FSCN framework for supply chain analysis and adapting the SCOR model for performance measurement, it aims to identify key issues, analyze performance gaps, and propose actionable recommendations for supply chain improvement. This could lead to more efficient shallot farming, better market responsiveness, and increased profitability for stakeholders involved in the shallot supply chain.

Shallot cultivation, even though it is a superior commodity, often faces various obstacles in meeting demand that occurs all the time. Consumer demand must be met so that business actors' profit targets can be achieved. Therefore, efforts to improve the performance of the shallot supply chain are very necessary. Kerinci Regency, as the largest producer of shallots in Indonesia, is a very strategic location to study to find efforts to improve the performance of the shallot supply chain. In order to formulate efforts to improve the performance of the shallot supply chain, it is necessary to first study the condition of the shallot supply chain. The assessment of the condition of the shallot supply chain in Kerinci Regency refers to the FSCN discussion framework developed by Van der Vorst (2006).

It is hoped that the use of this discussion framework will clarify the condition of the supply chain, the results of which will be used as input in measuring supply chain performance. Performance measurement is carried out using the rating scale method. Performance assessment indicators (metrics) are adapted from the SCOR model. To formulate efforts to improve performance, a gap analysis is first carried out between the current supply chain performance and the expected supply chain performance and an analysis of shallot supply chain problems. Next, recommendations for efforts to improve the performance of the shallot supply chain are formulated.

Data Analysis

Condition of the Shallot Supply Chain

The conditions of the overall supply chain are discussed descriptively following the FSCN (Food Supply Chain Network) discussion framework developed by Van der Vorst (2006). The discussion framework includes aspects of supply chain structure, supply chain management, supply chain resources, and supply chain business processes. Data and information were obtained using questionnaires and in-depth interviews. The selection of respondents in this analysis was carried out using a snowball sampling technique, namely by tracing the shallot supply chain channels at the research location based on information obtained from relevant stakeholders.

The supply chain actors consist of shallot farmers, collectors, wholesalers, retailers, household consumers, Farmers' Groups, Gapoktan, transport and transport service providers, the Indonesian Red Onion Traders Association (ABMI), the Kerinci Regency Food Crops and Horticulture Service, Jambi Province Food Crops, Horticulture and Livestock Services and other related agencies. The condition of the shallot supply chain is discussed descriptively following the FSCN (Food Supply Chain Network) discussion framework developed by Van der Vorst (2006). The discussion framework includes aspects of supply chain structure, supply chain management, supply chain resources, and supply chain business processes.

Measuring Shallot Supply Chain Performance

Determination of Performance Metrics

The assessment indicator metrics used to measure shallot supply chain performance are adapted from the SCOR (Supply Chain Operations Reference) model. The SCOR model includes 134

indicators or assessment metrics that measure supply chain process performance (Paul, 2014). Performance metrics are determined by analyzing the results of observations and in-depth interviews with relevant stakeholders. Performance Metric Weighting Performance metric weighting is carried out using the fuzzy AHP method. The steps for weighting metrics are comparing scores with triangular fuzzy numbers, creating a matrix, solving eigenfuzzy values, and calculating CR (Consistency Ratio) values (Marimim et al., 2013).

Performance metric weighting is carried out using a questionnaire aimed at supply chain actors who have experience in the shallot business. Performance Calculations The weights of each metric obtained from the fuzzy AHP method are used in calculating the performance of the shallot supply chain. Calculation of the total performance of the shallot supply chain is carried out by calculating the performance metric values from the lowest level, namely level three. Level three metric values are obtained from the assessment results using the rating scale method. A multilevel scale is an observation measuring tool that contains a list of questions in the form of a rating scale.

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Determining respondents in measuring the performance of the shallot supply chain uses a purposive sampling technique, namely sampling based on certain considerations such as the diversity of research objects and limited funds, time and energy. The number of respondents taken as samples for measuring the performance of the shallot supply chain consisted of three wholesalers, three collecting traders and three farmers.

Formulation of Efforts to Improve Shallot Supply Chain Performance

Efforts to improve the performance of the shallot supply chain are formulated by: (1) Analysis of the gap between actual performance and expected performance, (2) Analysis of problems using the Root Cause Analysis method, and (3) Developing efforts to improve the performance of the shallot supply chain. Gap analysis is carried out using questionnaires for supply chain actors

(whose performance has been measured) while problem analysis is carried out using field observations and brainstorming with relevant stakeholders. The preparation of efforts to improve the performance of the shallot supply chain was carried out based on an analysis of gaps and problems as well as literature studies and in-depth interviews with experts in the field of shallot supply chains.

Result and Discussion

Demonstration of Shallot Farming in Kerinci Regency

Shallots are a type of annual plant that is harvested all at once, the harvest is immediately dismantled. Various shallot farming patterns in the research area. Monoculture planting, intercropping in separate plots of land and intercropping on one land. Shallots are planted with potatoes, cabbage, carrots, chilies, cauliflower, spring onions, broccoli, chayote, Chinese cabbage and tomatoes. In one year, farmers plant shallots two to three times a year because the harvest time is short, namely 55 to 60 days or two to three months. Shallots are planted in three locations, namely in Kayu Aro District, Kayu Aro Barat District and Gunung Tujuh District in Kerinci Regency. Much research is carried out in highland areas. Kayu Aro Regency, a sub-district in Kerinci Regency, Jambi which is at an altitude of 1,400-1,950 meters above sea level (mpdl). According to Putrasamedja (2010), the ideal height of the shallot planting location ranges from 4-300 meters above sea level. At this height, the resulting production can be optimal and the harvest is quicker. In West Kayu Aro District, shallot cultivation is carried out not only in lowland areas but also in highland areas. In the highlands, the harvest time for shallots is longer, namely 90 days. Farmers in the highlands cultivate shallots only once a year. This is because farmers also grow other vegetables such as cabbage, spring onions, chilies, and so on.

West Kayu Aro District has greater shallot productivity (9.08 tons per hectare) compared to Gunung Tujuh District (8.34 tons per hectare) and Kayu Aro District (6.34 tons per ha) in 2020 (BPS, 2022). Kayu Aro District has the lowest shallot productivity compared to other districts. Shallot productivity in Gunung Tujuh District ranges from 11.3-14.1 tonnes per hectare. The productivity of shallots in Kayu Aro District ranges from 8.2-8.8 tons per hectare, while in Kayu Aro Barat District the productivity is higher, namely between 8.7-9.8 tons per hectare. The high intensity of shallot planting on the same land causes land fertility to decrease because shallot cultivation is also intensive in the use of fertilizers and chemical drugs.

The seeds used are shallot bulbs that have been stored for two months. Farmers need an average of 1.64 tons of shallot seeds per hectare. According to the Department of Agriculture, Food Crops and Horticulture, Kerinci Regency (2011), the amount of shallots needed per hectare reaches 1.5 tons. The amount of seed needed varies depending on the size of the shallot bulbs used for seeds. Shallot farmers in Kerinci Regency use seeds from local varieties and imported seeds. Farmers use local seeds of the Brebes, India, Thailand and Beko varieties. The Brebes variety is relatively more widely used by farmers than the tray shallot variety. Meanwhile, the imported seeds used by farmers are Thai varieties and Indian varieties.

The use of imported seeds is currently very rare for farmers in Kerinci Regency who use imported seeds because the availability of imported seeds is limited and their marketing is also

limited. Apart from that, farmers also prefer local shallots over imported ones because local shallots are easier to market and are preferred by the public because they have a better aroma and taste than imported shallots. This is in line with the results of research by Basuki (2009), which states that in terms of yield, number of tillers, tuber shape, tuber size, tuber color and aroma, local varieties of brebes and tray varieties are more preferred by farmers than imported varieties.

Apart from that, local varieties are easier to sell or market, can be re-seeded, and can be planted in the dry and rainy seasons. The source of local variety seeds used by farmers mostly comes from seeds produced by farmers themselves from previous plantings. There are also some farmers who buy from other farmers. According to Basuki (2010), the quality of the seeds produced by farmers is quite good, which is reflected in the growth capacity (99.1%), the level of infection by seed-borne diseases (1.7%), and the percentage of varietal purity (99.3%). The large number of farmers who produce their own shallot seeds is due to the very expensive price of seeds, making seeds is not difficult and the production is not much different from new seeds (Darwis et al 2004).

Farmers use organic and chemical fertilizers in cultivating shallots. The organic fertilizer used by farmers comes from manufactured organic fertilizer. The average use of organic fertilizer is 1.3 tons per hectare. Farmers use manufactured organic fertilizer more than manure. This is due to the ease of obtaining organic fertilizer. Organic fertilizer is very easy to obtain because it is available at fertilizer stalls. The use of chemical fertilizers in shallot cultivation in the three research locations is also quite diverse. According to the Department of Agriculture, Food Crops and Horticulture, Kayu Aro District (2011), the cultivation of shallots requires fertilizer including SP36/TSP 300 kg per hectare, KCl 120 kg per hectare, Urea 120 kg per hectare, ZA 220 kg per hectare, Kamas 120 kg per hectare, and NPK DAP is 200 kg per hectare. Farmers use more urea, KCl and NPK DAP fertilizers than recommended. Meanwhile, farmers use SP36/TSP, ZA and Kamas fertilizers which are still below the recommended doses according to the Kayu Aro District Food Crops and Horticulture Agriculture Service (2011).

Pesticides used by farmers consist of insecticides, fungicides and herbicides. Insecticides are widely used in the dry season because in this season there are relatively more attacks by pests such as caterpillars. The use of insecticides in shallot farming is still carried out intensively in the three research locations. Insecticide spraying begins 10 days after planting with a spraying frequency of every two or three days. Spraying will continue until the shallots approach harvest. This is done by farmers to prevent attacks by leaf caterpillars which often attack shallot plants. This intensive use of insecticides was triggered by resistance to caterpillar pests that attack shallots, resulting in excessive use of insecticides (Wahyuni, et al., 2015, Roosganda Elizabeth and Iwan Setiajie Anugrah. 2020**).** Apart from that, according to Basuki (2009), shallot farmers also have limited knowledge in recognizing appropriate pesticides for controlling caterpillar pests, so the use of pesticides is very diverse.

Shallot cultivation still requires a lot of human labor from land processing to harvesting. This labor requirement is obtained from labor within the family and labor outside the family. Labor in the family is used in maintenance activities such as spraying, weeding, watering, and fertilizing. Meanwhile, workers for land processing, planting and harvesting activities mostly use external workers. Land processing activities until they are ready for planting are carried out using a daily

wage system or piece rate system. The average wage for male workers is IDR 50,000 per day, while for female workers it is IDR 30,000 per day. Farmers usually also incur consumption costs for labor of IDR 5,000 per person per day. In West Kayu Aro District, labor wages for lowland agricultural laborers are different from those for agricultural laborers in the highlands. Wages for agricultural laborers in highland areas are relatively cheaper. Farm labor wages for lowland areas average IDR 45,000-50,000 per day for men and IDR 30,000-35,000 per day for women. Meanwhile, wages for agricultural workers in the highland areas average IDR 20,000 - 25,000 per day for men and IDR 15,000 - 20,000 per day for women.

The characteristics of shallots that are ready to be harvested are that if you hold them at the base of the leaves they are limp, the leaves are 70 to 80 percent light yellow, the bulbs are full, and some of the bulbs are visible on the surface of the farming area with a purple or dark red color depending on the variety and have a distinctive onion smell. red, 80 percent of the leaves have fallen to the ground. Farmers in Kerinci Regency do not handle the harvest, causing the red onions produced to be very high and rot easily compared to onions from other production areas, both in Sumatra and outside Sumatra. After the onions are harvested by cutting the leaves on the farming land at harvest time, they are immediately put into sacks with a weight of 50 to 100 kg per sack.

Profitability of Shallot Farming

Two important components in calculating the profitability of shallot farming are revenues and costs of shallot farming. The costs of shallot farming are divided into three, namely: (a) costs of production facilities, (b) labor costs and (c) other costs. The costs of production facilities consist of costs for purchasing seeds, fertilizer and medicines. Labor costs are the amount of wages paid for the use of labor outside the family, either in cash or in kind. Other costs include irrigation fees, fuel costs, pump machines, land rental costs, land taxes and other related costs. The average farming costs incurred are IDR 71,134,283 per hectare.

The average farming costs incurred in Kayu Aro District are IDR 56,918,272 per hectare and in Kayu Aro Barat District it is IDR 55,675,310 per hectare. One of the reasons for the high costs of farming in Gunung Tujuh District is the high price of shallot seeds. The price of shallot seeds in Gunung Tujuh District is relatively more expensive compared to Kayu Aro District. The average price of shallot seeds in Gunung Tujuh District is IDR 18,750 per kg, in Kayu Aro District IDR 16,020 per kg and in Kayu Aro Barat District IDR 17,019 per kg.

The largest expenditure on shallot farming in Gunung Tujuh District occurs in the second dry season. This is because expenses for labor outside the family and fuel costs for pump irrigation are higher compared to other seasons. Meanwhile, in Kayu Aro District, the largest farming expenditure occurs during the rainy season. This could happen because in these two locations expenditure on seeds in the rainy season tends to be greater than in other seasons. Seed prices in the dry season tend to be more expensive compared to other seasons.

Apart from that, the need for workers outside the family is also increasing, especially for maintenance activities, so that expenditure on labor is relatively large. The largest expenditure component in shallot farming is for production facilities, ranging between 51.19-63.80 percent.

Of the components of the costs of production facilities, purchasing seeds is the largest expenditure component. Judging from total expenditure, expenditure on seeds ranges from 27.46 to 44.36 percent with an average of 37.80 percent. Apart from the cost of purchasing seeds, labor wages are also the largest expenditure component in shallot farming.

Expenditures on labor wages range between 31.75-41.91 percent with an average of 35.55 percent. The results of this research show the same pattern as previous research which states that the largest expenditure in shallot farming is used for seeds and labor (Wahyuni, et al., 2020., Nurasa and Darwis 2007; Asih 2009; Mayowani and Darwis 2010; Purmiyati 2002). Differences in cost structures indicate differences in the use of agricultural production facilities, differences in input prices and differences in wage levels between locations. Natural condition factors such as the intensity of pest and disease attacks or drought also influence farming expenses. However, the pattern of expenditure proportions in the three locations is relatively the same, namely the largest proportion is for production facilities, the second is for labor and the third is other costs

Revenue from shallot farming in this study is the product of the number of shallots sold by farmers and the prevailing price received by farmers. Some of the shallots produced by farmers are set aside for seeds. Therefore, in calculating revenue, shallot output is the number of shallots sold by farmers. The largest income from shallot farming is in Gunung Tujuh District with an average income of IDR 104,444,826 per hectare. The highest farming income was achieved in the second dry season, where in this season relatively more production was sold and the selling price was relatively higher compared to other seasons.

Revenue from shallot farming in this study is the product of the number of shallots sold by farmers and the prevailing price received by farmers. Some of the shallots produced by farmers are set aside for seeds. Therefore, in calculating revenue, shallot output is the number of shallots sold by farmers. Farming income in Kayu Aro Barat District is the second largest with an average income of IDR 82,339,174 per hectare. The highest farming income is achieved in the rainy season, where in this season relatively less production is sold compared to other seasons but the selling price is much higher. Kayu Aro District has a lower average revenue compared to Gunung Tujuh and Kayu Aro Barat Districts. The average income from farming in Brebes is IDR 71,887,966 per hectare. The low income obtained by farmers in Kayu Aro District is because the production sold is relatively less when compared to Gunung Tujuh and Tegal Districts.

The highest farming income was achieved in the first dry season, where in this season relatively more production was sold compared to other seasons and the selling price was also quite high. The average farming profit obtained by farmers in Gunung Tujuh District is greater than in Kayu Aro and Kayu Aro Barat Districts. The average profit from farming in Gunung Tujuh Regency is IDR 33,310,543 per hectare, in Kayu Aro Barat District IDR 26,663,864 per hectare and in Kayu Aro District IDR 14,595,694 per hectare. The difference in profits in each region is due to variations in productivity levels, product prices and farming costs in each region. Shallot farming in the rainy season, dry season I and dry season II is generally profitable. The three locations have different patterns. The largest farming profits were achieved in the second dry season for Gunung Tujuh District, the first dry season for Kayu Aro District, and the rainy season for West Kayu Aro District. Trends in several other areas show that the greatest profits from shallot farming are achieved in the dry season.

The research results of Widyantara and Yasa (2013) show that the net income of shallot farmers in Kintamani, Bali, during the rainy season (IDR 11,557,860.39 per hectare) is smaller than the dry season (IDR 61,571,696.07 per hectare). However, the level of risk faced by farmers in the dry season is greater than in the rainy season. The same thing was also shown by Rachman et al (2004), namely that the highest profits from shallot farming in Indramayu and Majalengka were achieved in the second dry season because the average production and price of shallots in the second dry season was higher than in other seasons. Shallot farming is financially feasible and profitable to carry out in every season. The R/C value obtained in each season shows more than one, which means the revenue obtained is greater than the costs incurred. However, the R/C values obtained at the three research locations were still close to one. This indicates that fluctuations in price changes, both output prices and input prices, will greatly influence the farming income of shallot farmers. Farmers are vulnerable to losses if there is a spike in input prices or a decline in output prices.

Overview of the Shallot Supply Chain

The shallot supply chain does not only involve one supply chain actor but includes various shallot agribusiness actors from the most upstream to the final shallot consumer. The description of the shallot agribusiness supply chain is increasing productivity. The structure of the shallot supply chain found in Kerinci Regency with various market destinations can be seen in Figure 3.

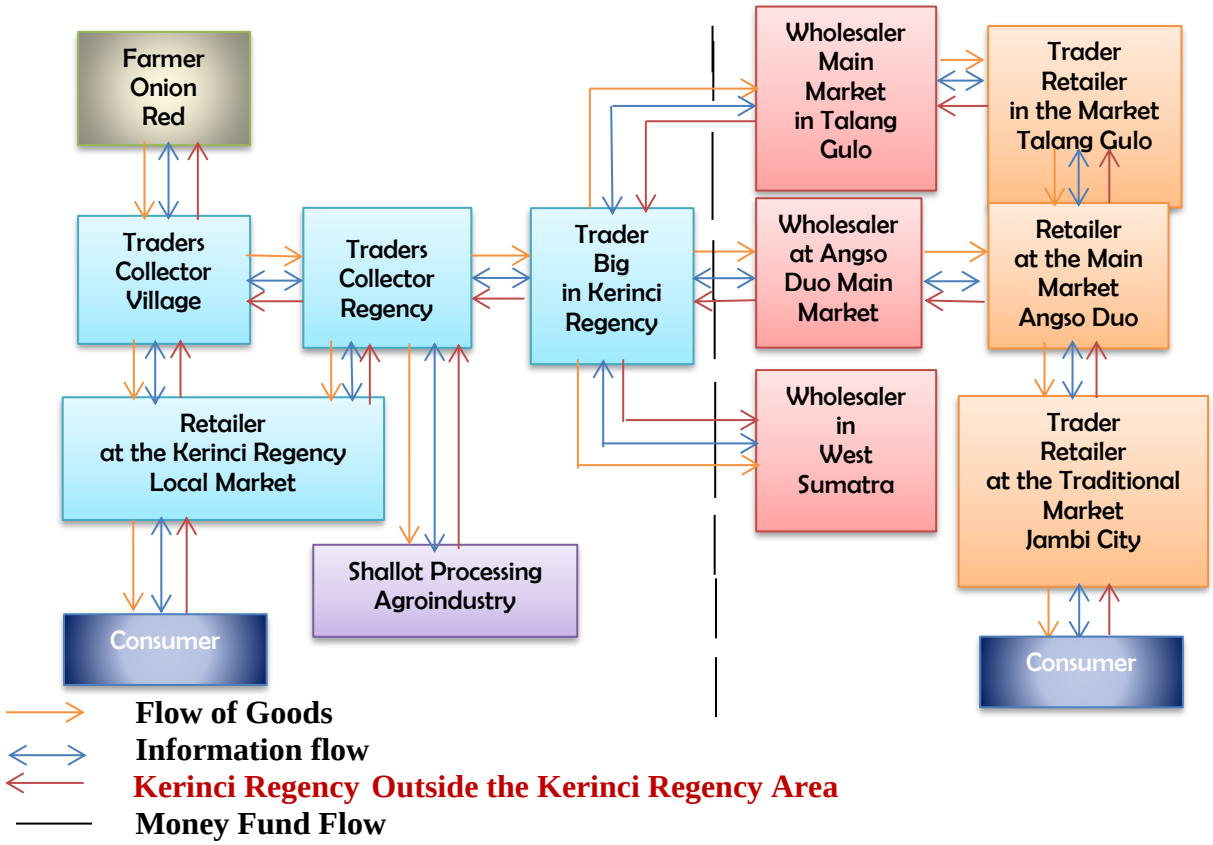

Figure 3. Shallot Supply Chain in Kerinci Regency

The actors in the shallot supply chain in Kerinci Regency only consist of farmers, collecting traders, wholesalers, and local retailers or local traditional market traders. The shallot supply chain structure also shows the diversity of shallot supply channel patterns. The shallot supply chain in Kerinci Regency with the aim of final consumers can be identified into 12 channels. The pattern of goods flow that is formed has generally been running for a long period of time and is formed naturally.

In the shallot supply chain in Kerinci Regency, supply chain actors do not coordinate both vertically (different levels) and horizontally (at the same level) regarding production planning, distribution or marketing planning. Apart from that, there were no partnerships and collaborations between supply chain actors or between organizations. This shows that integration in the shallot supply chain in Kerinci Regency is still weak. The process of cooperation can be found between supply chain actors in the activity of transporting/delivering shallots from Kerinci to the main market. In sending shallots to various regions in Indonesia, traders who have large enough capital can send it themselves, while supply chain actors who have little capital can join other traders. Partnership patterns can be found in the large-scale food industry with shallot suppliers acting as collecting traders.

Initially the partnership was carried out with Farmer Groups, but this partnership did not go well. This happened because an agreement regarding the price of shallots was not formed. Physical resources that support the shallot supply chain in Kerinci Regency include cultivation land, water reservoirs (embungs), infrastructure/facilities, transportation facilities, drying stalls, special markets for buying and selling shallots and storage warehouses. There are nine storage warehouses built by the government for the purpose of storing agricultural commodities including shallots, but the current condition of these warehouses is not functioning properly because they are not managed properly. Only one warehouse is functioning, namely the warehouse at the Larangan Agribusiness Sub Terminal (STA). The ability of supply chain actors in the business (production, distribution, marketing) of shallots is based on capital capabilities. Supply chain actors, especially farmers, will supply shallots according to the capital they have. Supply chain players who have large capital are able to meet market demand.

Shallot Supply Chain Performance

Measuring the performance of the shallot supply chain using the SCOR (Supply Chain Operations Reference) model in Kerinci Regency, the weighting of performance metrics and performance measurements of supply chain actors and the performance values of shallot supply chain actors in Kerinci Regency are shown in Table 1.

Table 1. Performance Assessment of Shallot Farmer Supply Chain Actors

Weighting and Assessment of Shallot Farmer Performance						
Nu.	**Description of Supply Chain Actor Activities**	**Weight**	**Score**		**Weighted Score**	
			In the Harves	**Outside of**	**In the Harves**	**Outside of**

			t Season	Harvest Season	t Season	Harvest Season
1.	**Reabilititas**					
RB. 1	Perfect fulfillment of red onion orders	0,39	3,61	3,72	4,00	3,45
RB. 2	The red onion order was delivered in full	0,96	3,85	3,78	4,35	3,40
RB. 3	Accuracy of the type/variety of shallots sent	0,78	4,00	4,00	3,85	3,77
RB. 4	The accuracy of the number of onions sent	0,64	4,54	2,54	3,72	3,83
RB. 5	The quality of shallots is perfect	0,46	3,77	3,78	3,77	3,34
RB. 6	Percentage of free rot, defects, damage and loss of shallots	0,52	3,54	2,88	3,55	3,66
RB. 7	Percentage of conformity with quality standards for Kerinci shallots	0,91	3,88	3,54	3,67	3,68
2.	**Responsivitas**					
RS.1	Onion order fulfillment time	0,34	3,44	3,45	3,47	3,56
RS.2	Time to procure shallots	0,56	3,49	3,48	3,30	3,57
RS.3	Land preparation time for shallot farming	0,63	3,88	3,89	3,97	3,77
RS.4	Farming input inventory time	0,41	4,00	3,92	3,99	3,98
RS.5	Onion seeding time	0,50	3,30	3,55	3,58	3,79
RS.6	Onion production time	0,86	3,86	3,77	3,58	3,66
RS.7	Onion cultivation time	0,74	3,54	3,66	3,86	3,82
RS.8	Onion harvest time	0,38	4,00	3,64	3,68	3,83
RS.9	Post-harvest time for shallots	0,51	3,54	3,81	3,84	3,85
3.	**Fleksibelitas**					
FL.1	Cash cycle time	0,31	4,00	4,00	4,00	2,93
FL.2	Debt repayment range	0,46	4,00	2,88	3,77	3,79
FL.3	Accounts receivable payment range	0,96	4,00	3,10	3,78	3,79
4.	**Activity Costs**					
BK. 1	Total service cost	0,52	3,99	3,99	3,74	3,54
BK. 2	Cost of procuring shallots	0,54	3,59	3,66	3,79	3,62
BK. 3	Cost of production facilities for shallot farming	0,47	3,54	3,54	3,84	3,86
BK. 4	Onion seeding costs	0,72	3,88	3,54	3,84	3,86
BK5	Cost of land for shallot farming	0,44	3,88	3,66	3,89	3,69
BK.	Costs of eradicating pests and	0,96	3,57	3,57	3,35	2,96

6	diseases					
BK. 7	Farming production process costs	0,68	3,21	2,88	3,78	3,77
BK. 8	Harvest and post-harvest costs	0,64	3,54	3,84	3,64	3,76
5.	**Aset**					
AS.1	Fund inflow cycle time	0,58	3,71	3,78	3,14	3,24
AS.2	Shallot business debt payment range	0,37	3,11	3,22	3,79	3,75
AS.3	Payment range for shallot business receivables	0,95	3,31	3,32	3,88	3,87
Average Score		**0,65**	**3,64**	**3,55**	**3,60**	**3,40**

Based on Table 1, it can be seen that the level one performance metric, namely cash cycle time (on the asset management attribute) has the highest weight value for all supply chain actors (wholesalers, collectors and farmers). The second position is occupied by the total service cost metric (cost attribute). Cash cycle time (as an asset management attribute) is a very important aspect and is taken into consideration because supply chain actors need money as capital to carry out their activities. The need for money is very urgent because the capital they have is very minimal so the ability to manage cash flow is very important and needed. The total service cost metric (in the supply chain cost attribute) is ranked second in the level of importance of the shallot supply chain because total service cost is one of the determining factors for shallot prices. The total service cost metric includes procurement costs (raw materials), production costs, and shipping costs.

The measurement results at the reliability level show high values during the season, the dry season, and low values during the off-season, the rainy season. The abundant availability of shallots during in season causes the reliability performance of supply chain actors to increase. This condition is also the reason for the high performance value of responsiveness and flexibility among collector traders and wholesalers. Farmers' responsive performance during the off season is generally higher than during the in season except for post-harvest time metrics (Table 2). This is because during the off season there is rainwater which helps speed up the land preparation and cultivation process.

On the other hand, post-harvest time has low performance because during the rainy season there is little heat which is useful for drying shallots. Preparing saprotan does not require a long time because saprotan can be purchased and obtained directly and can be stored for a long period of time. Farmers do not have a value on the top supply chain flexibility metric because farmers are unable to meet demand from consumers if there is an unplanned increase in demand capacity. The asset management attribute described by the cash cycle time metric shows the ability of supply chain actors to manage their finances in a balanced manner between consumers, suppliers and internally. The asset management performance of wholesalers shows a higher value than farmers and collectors. This happens because large traders have a strong bargaining position in the eyes of both suppliers and consumers. The bargaining position of large traders cannot be separated from their large capital ownership and the strength of the network that has been formed.

Formulation of Efforts to Improve Shallot Supply Chain Performance

Gap Analysis In efforts to improve the performance of the shallot supply chain, there are terms actual performance (current performance) and target performance (measure of improvement goals). The difference in scores in these two conditions illustrates the gap between actual performance and target performance. The gap value is an indicator of the magnitude of improvement efforts that need to be made to processes in the supply chain related to the performance metrics used. Apart from that, this performance gap can be used as evaluation material to plan the performance improvement process so that future performance improvements can be achieved. Based on gap analysis in the performance of shallot supply chain actors in Kerinci Regency, metrics that have a gap between current conditions and expected conditions (targets to be achieved) can be seen in Table 3. Analysis of Red Onion Supply Chain Problems Based on the results of condition and measurement analysis supply chain performance and gap analysis, there are several problems in the shallot supply chain in Kerinci Regency.

Formulation of Efforts to Improve Shallot Supply Chain Performance

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The difference between prices at the producer level and prices at the consumer level

The very large difference between prices at the producer market level and prices at the consumer market level has formed quite dynamic marketing margins. Most of the prices of shallots are still enjoyed by traders. The large difference between prices at the producer level and prices at the consumer level reflects that price transformation tends to only be in the hands of market players (Winarso, 2003). Based on research conducted by Rosyadi (2014), the marketing margin for shallots among farmers with the aim of marketing to retailers has a high value, reaching 50-60%. Nurasa and Darwis (2007) also stated that the largest marketing margins were obtained by retailers and modern markets.

Shallot cultivation in Kerinci Regency involves many actors, such as village collecting traders, sorting and cleaning services, sub-district/district collecting traders, goods delivery services, transportation services (expeditions), wholesalers, traditional market traders and retail traders. Each of these actors causes additional costs to the selling price of shallots. Therefore, the price of shallots has become very high. The long distance between producers and final consumers both physically and geographically requires intermediary services, causing the marketing chain to become longer. The bulky nature of shallots which quickly spoil and rot as well as the urgent economic needs of the household means that producer farmers do not have a strong bargaining position. Especially if the sale of shallots is carried out using a slash system. These things cause

the gap between shallot prices at the producer level and prices at the consumer level to widen (Winarso, 2003).

The limited availability of market information, one of the factors that influences the smoothness of the shallot supply chain is the flow of precise and accurate information from downstream to upstream or vice versa. Market information is an important requirement in marketing development according to the dynamics of very rapid market changes. Therefore, the need and demand for market information is increasing, namely quality, fast, precise, accurate and accountable market information. However, current conditions indicate that the availability of up-to-date, real-time and comprehensive market information is still limited.

According to Winarso (2003), control of information tends to be owned by only a few parties, such as traders in large markets. This is because market players always follow developments in market dynamics, both regarding the size of supply and increasing demand, which can fluctuate at any time. Meanwhile, farmers have not fully followed developments in information on the market.

A farming system that does not yet refer to market needs, as well as information that is sometimes biased at the farmer level, means that the price of onions at the farmer level remains low. Distribution has not gone well, the red onion commodity is really needed by the Indonesian people. However, not all regions in Indonesia can produce shallots. To reach consumers, shallots need a good distribution mechanism from production centers to consumer areas. A good distribution mechanism is able to move commodities from producers to consumers at the lowest possible cost and is able to provide a fair distribution of the overall price paid by consumers to all parties involved in it. The current condition of red onion distribution is not going well. Some of the obstacles include distribution facilities and infrastructure that are not yet supportive (this is related to the perishable and bulky characteristics of shallots, the distance from the production center to the consumer is too far, the marketing chain outside the production center is too long, and weak supervision during distribution.

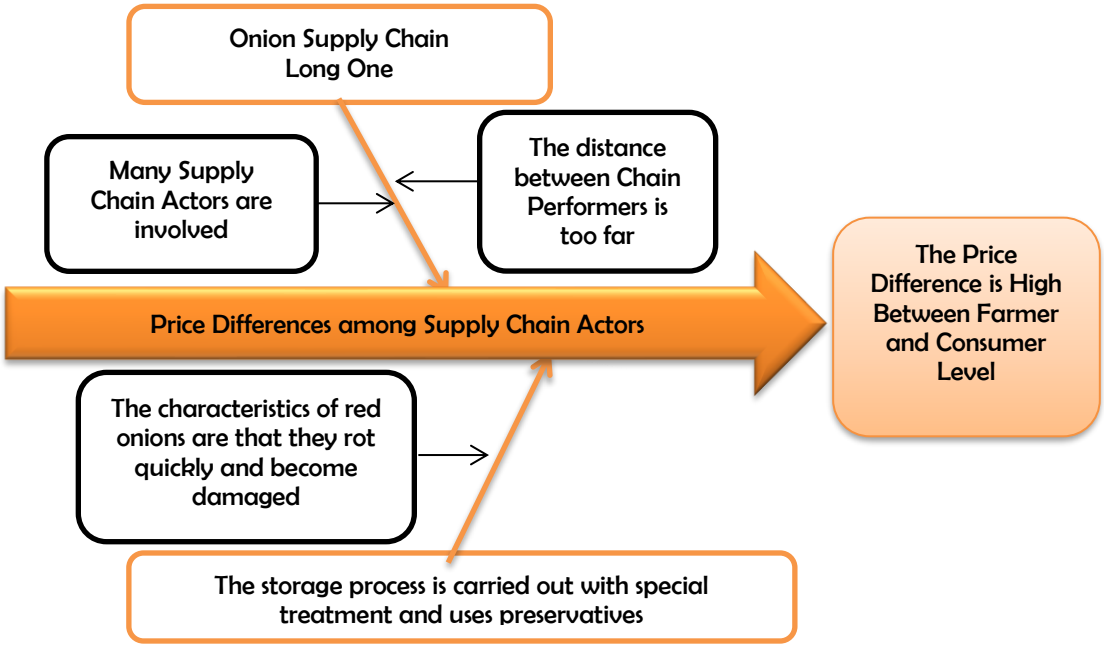

Figure 4. Differences in Shallot Prices Among Supply Chain Actors

Shallot cultivation in Kerinci Regency involves many actors such as brokers (village collecting traders), sorting/cleaning services, sub-district/district collecting traders, couriers (goods delivery services), transportation services, wholesalers, traditional market traders and retailers. Each of these actors causes additional costs to the selling price of shallots. Therefore, the price of shallots has become very high. The long distance between producers and final consumers both physically and geographically requires intermediary services, causing the marketing chain to become longer. The bulky nature of shallots and quickly damaged/rotted as well as the urgent economic needs of the household means that producer farmers do not have a strong bargaining position. Especially if the sale of shallots is carried out using a slash system. These things cause the gap between shallot prices at the producer level and prices at the consumer level to widen (Winarso, 2003).

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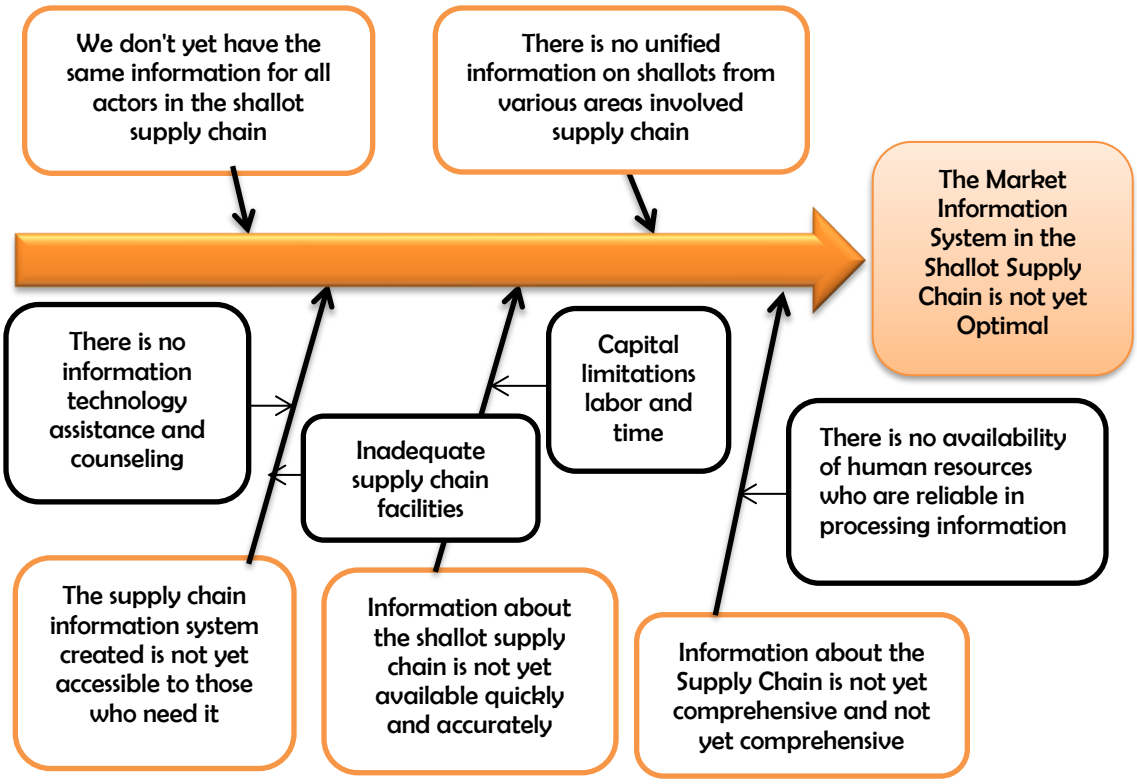

Figure 5. Fishbone Diagram of Causes of Information Systems in the Supply Chain Shallots are not yet Optimal

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After knowing the factors causing the onion supply chain to be less effective and efficient, weighting was carried out using fuzzy AHP. Weighting is carried out to see the causal factors that require priority handling/management. The weighting results can be seen in Table 2.

Table 2. Results of weighting factors that cause the shallot supply chain to not be effective and efficient

Priority	Causative Factor	Weight
1	There is no proper supply system yet	0,3838
2	The difference between prices at the producer level and prices at the consumer level is very large	0,1802
3	The availability of shallots during the off season is low	0,1704
4	Distribution has not gone well	0,1545
5	Limited availability of market information	0,1112

Based on Table 2, the most dominant problem affecting the effectiveness and efficiency of the shallot supply chain is the lack of an appropriate inventory system followed by the very large price difference between prices at the producer level and prices at the consumer level. The next priority for handling is the low availability of shallots during the off season, distribution systems and information systems.

Efforts to Improve Shallot Supply Chain Performance

Based on the results of the gap analysis and problem analysis which refers to the results of the condition analysis and performance measurement of the shallot supply chain in Kerinci Regency, efforts have been developed to meet the goal of improving the performance of the shallot supply chain in Kerinci Regency. These efforts include:

1. Build a proper inventory system Steps to realize this business include: a. Facilitation of equipment and storage technology, b. Counseling regarding technology adoption, c. Revitalization and optimization of existing storage warehouses, d. Development of research on shallot supply systems e. Development of climate-resistant and pest-resistant seed technology, f. Utilization and access to the Warehouse Receipt System (SRG) program. Reducing the very large price differences between prices at the producer level and prices at the consumer level Steps that can be taken include: a. Building partnerships, coordination and collaboration among chain members, and b. Strengthening farmer institutions

2. Overcoming the low availability of shallots, especially during the off season. Efforts that can be taken include: a. Making a drainage system on shallot cultivation land, b. Use of mulch on shallot planting land, c. Development of pest control techniques d. Creating integrated planting patterns between commodities and between regions, e. More intensive counseling and assistance as well as demonstration plots, f. Use of organic fertilizer, g. Improvements to the shallot packaging used, h. Development of seed storage techniques, i. Counseling and assistance and facilitation of post-harvest equipment, j. There is a policy from the Government in determining seed prices, k. Providing Farmer Cards to small farmers, l. There

are regulations governing transactions (place, volume and quality) and payment methods, as well as other regulations.

3. Increase the availability of market information. Efforts that can be made include raising community involvement in providing information, as well as developing and applying information system technology that covers all aspects of the supply chain (price, quantity supplied, demand, etc.) as well as adopting information technology.

4. Overcoming problems regarding distribution mechanisms. Efforts that can be made are by using effective and efficient means of transportation. The relationship between problems, basic causes and efforts to improve the performance of the shallot supply chain in Kerinci

Conclusion

Land control for shallot farming in Kerinci Regency is still below 0.5 hectares, consisting of both own land and rented land. The production costs of shallot farming per planting season in Gunung Tujuh District are relatively higher compared to Kayu Aro and Kayu Aro Barat Districts. The average farming costs incurred are IDR 71,134,283 per hectare. Kayu Aro District is IDR 56,918,272 per hectare and Kayu Aro Barat District is IDR 55,675,310 per hectare. The biggest production costs for shallot farming are the purchase of seeds (31 percent) and labor wages (27 percent). Profits from shallot farming per planting season in Gunung Tujuh District are IDR 33,310,543 per hectare, Kayu Aro Barat District is IDR 26,663,864 per hectare and in Kayu Aro District IDR 14,595,694 per hectare. Shallot farming in the three research locations is financially feasible and profitable to cultivate in each planting season because the R/C value obtained in each planting season shows an R/C value greater than one. This value is influenced by the selling price of shallots, production costs (seeds, labor, pesticides, herbicides), agricultural technology, farmer skills and environmental conditions.

The onion supply chain from producers to final consumers has a long flow and various channels. The actors in the shallot supply chain in Kerinci Regency consist of farmers, collecting traders, wholesalers, and local retailers or local traditional market traders. The supply channel patterns that are formed have generally been running for a long period of time and are formed naturally. The condition of physical resources, especially storage warehouses, is not functioning as it should. The ability of chain members in the shallot business (production, distribution, marketing) is determined by capital. Shallot supply chain actors, especially farmers, will supply shallots according to the amount of capital they have. Actors who have large capital are able to meet market demand.

The involvement of farmers in the supply chain structure is very limited, the role of traders is very dominant, there is a lack of integration between farmers, traders and consumers. Long delivery time 4 days. Logistics costs are high at 25 percent of the selling price. 28 percent of supply losses due to product loss 85 percent product quality meets standards, 92 percent product availability meets demand, consumer satisfaction is 85 percent satisfied. Inhibiting factors: inadequate infrastructure, limited processing and packaging technology, lack of coordination between stakeholders and changes in weather and natural conditions.

To improve the performance of the shallot supply chain, efforts can be made: (a) Improving operational activities, including developing shallot processing technology; (b) From the management activities of shallot production, processors and consumers; (c) From agricultural technology activities, including developing supply chain technology; (d) From institutional activities, including building farming institutions, farmer institutions and other formal and informal institutions; (e) From marketing activities, including developing an effective shallot marketing strategy.

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