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FOOD SUPPLY CHAIN NETWORK AND MARKET ANALYSIS OF SHALLOT IN INDONESIA (CASE STUDY: BREBES DISTRICT)

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Abstract

Background: Brebes District, recognized as the largest shallot producer in Indonesia, continues to face challenges in ensuring the welfare of its shallot farmers. This situation emerged from a complex network of stakeholders involved in shallot agribusiness in the Brebes District, characterized by a significant presence of intermediaries.
Purpose: This research aims to i) analyze the shallot supply chain in the Brebes District by applying the Food Supply Chain Network (FSCN) approach and ii) examine its performance through marketing margin and farmer share.
Design/methodology/approach: Data was gathered through interviews with 83 shallot farmers and 12 marketing actors in the Brebes District. Additionally, a Focus Group Discussion (FGD) was conducted to gather strategic insights from all stakeholders involved in the shallot agribusiness in the Brebes District. The research used a qualitative approach to answer the FSCN analysis and a quantitative approach to measure the supply chain performance.
Findings/Result: This study identified that the supply chain had clear objectives and structured relationships between actors. However, it was not optimized because the business process was not integrated into the long term. The supply chain involved multiple marketing channels, where each level of intermediary had involvement and impact on farmer share and margins. More direct marketing channels, such as Marketing Channel I, where farmers sell directly to village traders, offer the highest farmer share (89%) due to the absence of intermediaries like wholesalers. In contrast, channels involving more intermediaries, such as wholesalers in Channels III and V, result in higher total margins but a lower farmer share (81%).
Conclusion: The FSCN analysis of shallots in the Brebes District reveals a complex marketing system with various channels. Direct marketing channels give farmers the highest share by removing intermediaries, while those with more intermediaries offer higher total margins but lower farmer shares. Reducing intermediaries is recommended to boost farmer incomes. Additionally, inefficiencies like poor coordination and limited access to market information hinder overall performance.
Originality/value (State of the art): This study introduces a novel application of the FSCN approach to comprehensively analyze the shallot supply chain in Brebes District, Indonesia. The FSCN offers insights into the complex relationships between farmers, traders, and other actors, their challenges, and the potential for improving the system's efficiency.

Keywords: shallot, information sharing, marketing actors, marketing channels, supply chain efficiency

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INTRODUCTION

Shallots are a strategic commodity with high consumption rates and are categorized as an essential staple food with a high economic and strategic value (Laksono and Yuliawati, 2021; BPS, 2022). Shallots are crucial to various Indonesian cuisines and are majorly used as an industrial material (Salmiah et al. 2020; Taufiq, Rahmanta, and Ayu, 2021). In 2020, National shallot production reached 1,580,247 tons, while domestic consumption was 739,880 tons (Kemendag RI, 2020). In 2021, Indonesia's shallot production increased by 10.42% compared to 2020, reaching 2.01 million tons (BPS, 2022).

Six provinces become the major shallot producers in Indonesia, namely Central Java (28.15%), East Java (24.99%), West Nusa Tenggara (11.11%), West Sumatra (10%), South Sulawesi (9.14%), and West Java (8.51%) (BPS, 2022). From the demand side, the shallots consumption in Indonesia reached 2.49 kg/ capita, totaling approximately 790.63 thousand tons in aggregate (BPS, 2022). Brebes District in Central Java province contributes 68.94% to the province shallot production or 9.35% to the National level (Kementrian Pertanian, 2023). This number makes Brebes District a strategic player representing shallot agribusiness in Indonesia.

Given Brebes District's role as a significant shallot producer, it presents a valuable case study for understanding the dynamics of the shallot industry and the factors influencing supply and demand in the market (Fajar et al. 2019; Laksono and Yuliawati, 2021). Previous research conducted in Brebes District found that several problems occurred, such as the limited access to market information by farmers, the lack of organization among farmers, and the presence of intermediaries that often reduce the bargaining power of farmers (Susanawati & Fauzan, 2019; Rusadi, 2018; Rasoki, 2016).

The shallot supply chain faces additional complexities. Price fluctuations at both the farmer and consumer levels indicate uncertainty in the selling price farmers receive (Kementrian Pertanian, 2023). Shallots' seasonal nature and perishability result in production and price fluctuations throughout the year, pressuring farmers to sell their harvests quickly to avoid spoilage (Basuki et al. 2021). Consequently, price volatility, quality issues, and potential partnership complications pose significant risks to the shallot supply chain in Brebes (Susanawati and Fauzan, 2019; Basuki et al. 2021).

Furthermore, the shallot supply chain in Brebes involves many intermediaries, including farmers, collectors, wholesalers, retailers, and consumers. Each actor plays a role, which might lead to high marketing costs (Rachma et al. 2017). The market complexity of shallots requires a more profound understanding to address the industry's challenges, which leads to more effective and efficient supply chain management (Rasoki, 2016; Prabawati et al. 2018; Susanawati and Fauzan, 2019). The supply chain encompasses the alignment of activities related to material procurement, production, and product delivery, with the involvement of suppliers and distributors. In agribusiness, the supply chain includes strategically managing a network to meet customer demands and achieve efficiency and competitive advantage (Pratiwi et al. 2019).

The Food Supply Chain Network (FSCN) framework describes supply chains, including the participants, processes, products, resources, management, and the relationships among these elements (Van Der Vorst, 2000, 2006). In Brebes's shallot supply chain, various actors perform distinct roles that must be identified and examined. Technological advancements allow farmers to be no longer limited to being just producers. They have the potential to connect directly to market access and valuable information, which can diminish the need for traditional intermediaries. As the market becomes more complex and demanding, supply chain objectives can offer good quality products and must be directed to deliver superior value to consumers. As the largest producer, Brebes District plays a significant part in distributing the best quality along the supply chain.

Although the FSCN framework has been applied in analyzing supply chains for other strategic commodities in Indonesia such as cocoa seeds (Usman et al. 2023), CPO (Matondang et al. 2020), fruits (Widi, Sari and Jahroh, 2021), red chili (Susanawati and Pertiwi, 2024), organic rice (Sari, 2012) a comprehensive supply chain analysis specifically for shallots in the central production area, particularly Brebes, remains limited. The current state of shallot supply chain development calls for a focused and updated examination, as existing studies have not fully addressed the emerging challenges posed by market dynamics and technological advancements within this region. Therefore, this study aims to fill this

research gap by i) analyzing the shallot supply chain in the Brebes District by applying the Food Supply Chain Network (FSCN) approach and ii) examining its performance through marketing margin and farmer share.

METHODS

This research was conducted from April to December 2023 in Brebes District, Central Java Province. It used primary and secondary data. The primary data used in this study included primary data collected in Wanasari and Larangan village, Brebes District, Central Java.

Primary data were collected through direct interviews using questionnaires involving 83 shallot farmers from Wanasari and Larangan villages. Secondary data in this research included various reports officially launched by government institutions such as the Indonesia Statistics Bureau (BPS), the Ministry of Agriculture, and other institutions. Data processing and analysis were performed using both qualitative and quantitative descriptive methods.

Wanasari and Larangan villages are selected purposively due to their large contribution to shallot production in Brebes District. Furthermore, interviews with shallot traders were conducted using questionnaires by applying snowball sampling techniques. Additionally, Focus Group Discussions (FGD) were conducted, engaging various supply chain actors including farmers, traders, wholesalers, shallot processors, and government to gain in-depth insights into the shallot supply chain.

Qualitative descriptive analysis was used to describe the shallot supply chain using the FSCN approach, while quantitative analysis assessed supply chain performance, measured by marketing margins and farmer's share. Figure 1 illustrates the framework of this research. As elaborated in the previous section, the shallot supply chain in Brebes District indicates a complex web of shallot networks. Farmers are in a position of low bargaining power within the whole chain. The FSCN analysis allows us to analyze the current state of the shallot supply chain.

The FSCN framework developed by J.G.A.J Van der Vorst (Van Der Vorst, 2006) examines the shallot supply chain through four elements that can be used to explain, analyze, and develop the supply chain specifically. The four elements are i) network structure, ii) chain business process, iii) chain management, and iv) chain resources. In developing the supply chain, it is also essential to analyze the chain objectives that occur and are expected by all actors in the shallot supply chain and then determine the resulting chain performance. Van Der Vorst (2006) describes the four elements of FSCN as follows:

1. The network structure of a supply chain outlines its boundaries and describes the key participants and their roles within the network. At this stage, the members essential to the supply chain's success and alignment with its objectives are identified.
2. Chain business processes are organized, measurable sets of activities aimed at producing a specified output, which consists of various physical products, services, and information tailored for a particular customer or market. In addition to logistical processes within the supply chain such as operations and distribution business processes like new product development, marketing, finance, and customer relationship management are also identified.
3. Chain management pertains to the structures and coordination mechanisms within a network that enable participants to initiate and execute processes. This involves utilizing the resources of the chain to achieve the performance objectives defined by the Supply Chain Network (FSCN). Notably, managerial and behavioral aspects are recognized as significant challenges to Supply Chain Management (SCM), as they can obstruct the development of trust, commitment, and openness among supply chain members.
4. Chain resources are utilized to produce and deliver products to customers, often referred to as transforming resources. These enablers include personnel, machinery, and information and communication technology (ICT), which encompasses information systems and infrastructures.

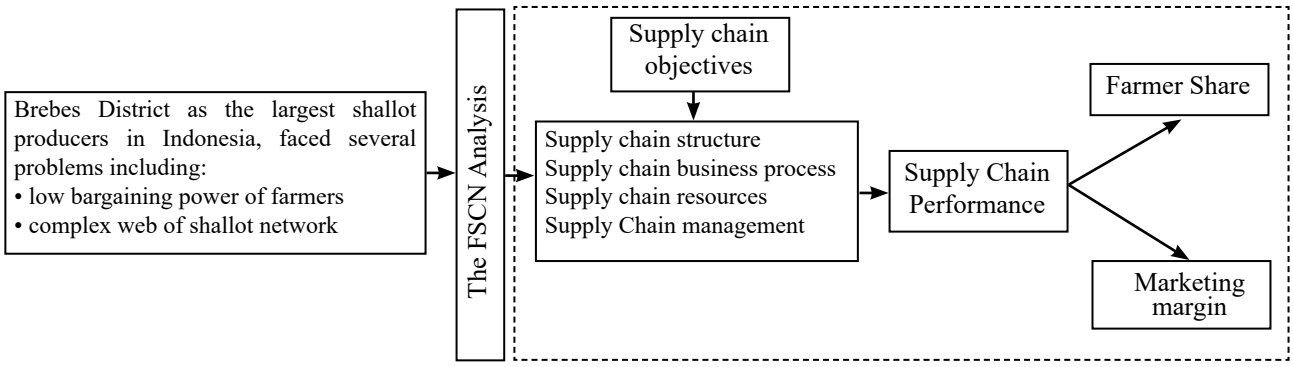

Figure 1. Research Framework

Each element of the framework aims to achieve the chain objectives. Supply chain objectives can be generated using three generic value propositions, which can be identified separately or in combination: network differentiation and market segmentation, integrated quality, and network optimization (Van Der Vorst, 2006). Furthermore, the objectives are realized via the supply chain's output performance. Figure 2 illustrates the relationships between chain objective, the four elements of FSCN, and chain performance.

Marketing efficiency analysis was conducted to answer the second research objective related to supply chain performance. The analysis used in this study is marketing margin and farmer's share. Marketing margin is the price of all utility and function-addition activities by food product marketing companies. This price includes costs incurred in marketing functions and the profits obtained by food product marketing companies (Kohls and Uhl, 2007). The marketing margin can be calculated using the following formula (i) and (ii).

$$Mi = Pji - Pbi \ldots\ldots (i)$$
$$Mj = Ci + \pi i \quad \ldots\ldots (ii)$$
$$Pji - Pbi = Ci + \pi i \ldots\ldots (i) \text{ and } (ii)$$

Description: Mi (Marketing margin at the i institution level (Rp/Kg)); Pji (Selling price for the i marketing actor (Rp/Kg)); Pbi (Purchase price for the i marketing actor (Rp/Kg)); Ci (Cost of the i marketing actor (Rp/Kg)); πi (Profit of the i marketing actor (Rp/Kg)); MT (Total marketing margin); i (1, 2, 3, …, n).

Farmer's share is the percentage of the price received by farmers from the price paid by consumers as compensation for the farming services carried out in producing products. The formula (iii) is used to calculate the farmer's share (Hammond JW, 1977).

$$Fs=Pf/Pr \times 100\% \ldots\ldots (iii)$$

Description: Fs (Farmer's share);Pf (farmer's price); Pr (consumer's price).

RESULTS

Brebes District is known as a center for shallot production, with productivity increasing along with rising production costs. Production costs continue to increase from BEP of IDR12,900 per kilogram in 2019 to IDR15,000–IDR18,000 in 2021 (Based on the FGD results conducted with the Brebes Agricultural Bearau). Wansari village and Larangan village are the two largest villages regarding shallot production area in Brebes (BPS, 2023). There were 83 farmers interviewed; the characteristics of the farmers are explained in Table 1. Shallot farmers in the two villages are dominated by productive-age farmers, most of whom have experienced farming practices for at least 3 years. However, with a lengthy technical background, most farmers only have a formal education up to the elementary school level. Membership in farmer groups is also minimal, where 72.50% of farmers are not members of farmer groups. Involvement in farmer groups can positively impact farmers by providing a forum for sharing information and experiences, improving bargaining position andmarket access, and improving the quality of decision-making (Rahmadanih et al. 2018; Bizikova et al. 2020).

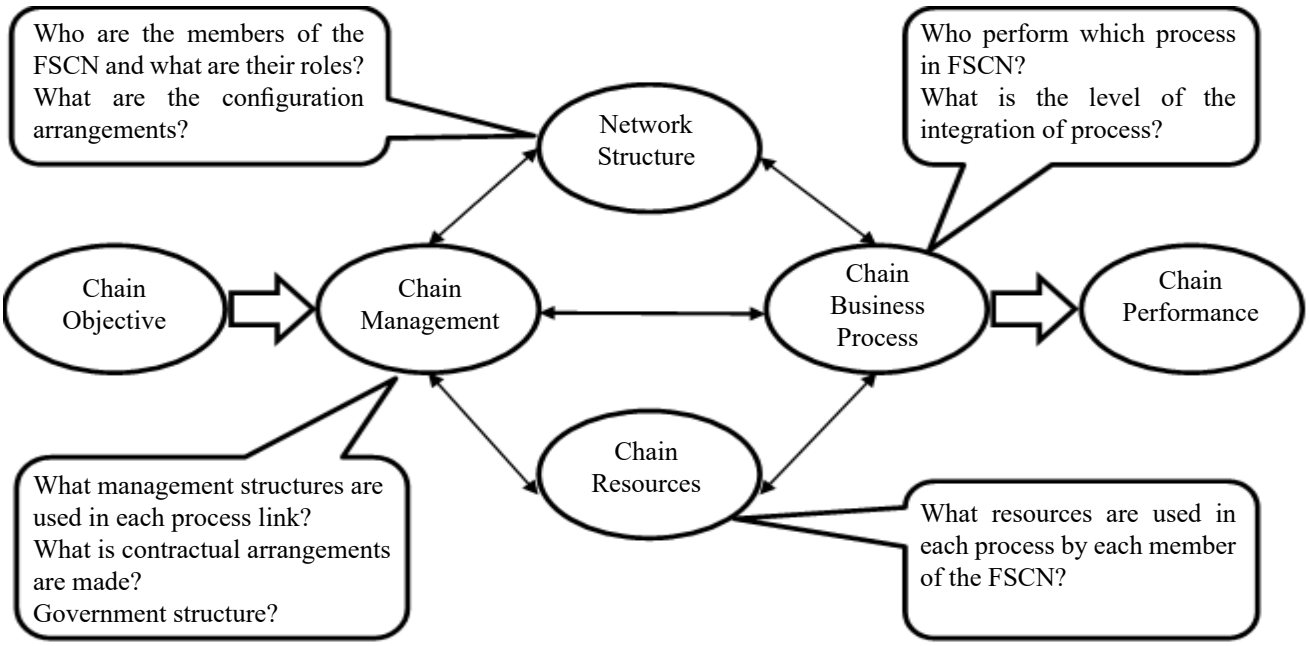

Figure 2. Framework of FSCN (Van Der Vorst, 2006)

Table 1. Characteristics of shallot farmer and traders' respondents in Brebes District

Characteristics	Numbers of Farmers	Percentage	Numbers of Traders	Percentage
Age (Year Old)				
28 - 37	15	18.75	1	8.33
38 - 47	26	32.50	6	50
48 - 57	28	35.00	4	33.33
58 - 67	11	13.75	1	8.33
Farming experience (year)				
3 - 10	23	28.75	6	50
11 - 18	12	15.00	1	8.33
19 - 26	22	28.00	2	16.67
27 - 34	11	13.75	3	25
35 - 42	11	13.75		
42 - 49	1	1.25	7	58.33
Formal education				
Elementary School	41	51.25	1	8.33
Junior High School	17	21.25	3	25
Senior High School	18	22.50	0	0
University	1	1.25	1	8.33
No information	3	3.75	0	0
Sex				
Women	16	20.00	2	16.67
Men	64	80.00	10	83.33
Farmer group membership				
Member of a farmer group	22	27.50	-	-
Not a member of a farmer group	58	72.50	-	-
Marketing level				
Wholesaler	-	-	3	25.00
Collector at village level	-	-	6	50.00
Regional distributor	-	-	1	8.33
Collector at district level	-	-	1	8.33
Retailer	-	-	1	8.33

The 12 traders who responded to this study were wholesale traders, collectors, and retailers. Most traders were in a productive age, with the most extended trading period being 3-10 years. Like farmers, most traders only completed their formal education at elementary school. Most of the traders interviewed were collectors at the village level.

Food Supply Chain Network of Shallot in Brebes District

Network Structure

The shallot supply chain in Brebes District involves several marketing channels from farmers to end consumers. Five shallot supply chains have been discovered, involving farmers, village-level traders, wholesale traders, and retailers. Figure 3 illustrates the structure of the shallot supply chain in Brebes District, especially in Larangan and Wanasari sub-districts.

1. Marketing Channel I
   Farmer → Village-level trader → Consumer
2. Marketing Channel II
   Farmer → Village-level trader → Subdistrict-level trader →Consumer
3. Marketing Channel III
   Farmer → Village-level trader → Wholesale traders → Consumer
4. Marketing Channel IV
   Farmer → Subdistrict-level trader → Consumer
5. Marketing Channel V
   Farmer → Wholesale traders → Consumer

In marketing channel I, the marketing actors involved are farmers, village-level traders, and consumers. Marketing Channel 1 illustrates how farmers sell fresh shallots to village-level traders, who sell them to local consumers. Village-level traders typically directly purchase the shallots using the Tebasan system. This method of buying and selling is still commonly practiced in Brebes Regency (Based on the FGD results conducted with the Brebes Agricultural Bearau). The "*tebasan*" system, where village-level traders buy shallots early and take over harvesting and post-harvest activities, is widely adopted by farmers to avoid additional costs, despite receiving significantly lower prices compared to direct selling (Astuti and Lusia, 2019; Immanuella and Tinaprilla, 2023; Mariyah et al. 2023). While this system helps reduce product shrinkage and stabilize income amid unpredictable prices, it also weakens farmers' bargaining power due to limited market access. It creates a dependency on traders who bear the risks of physical costs and product damage (Astuti and Lusia, 2019).

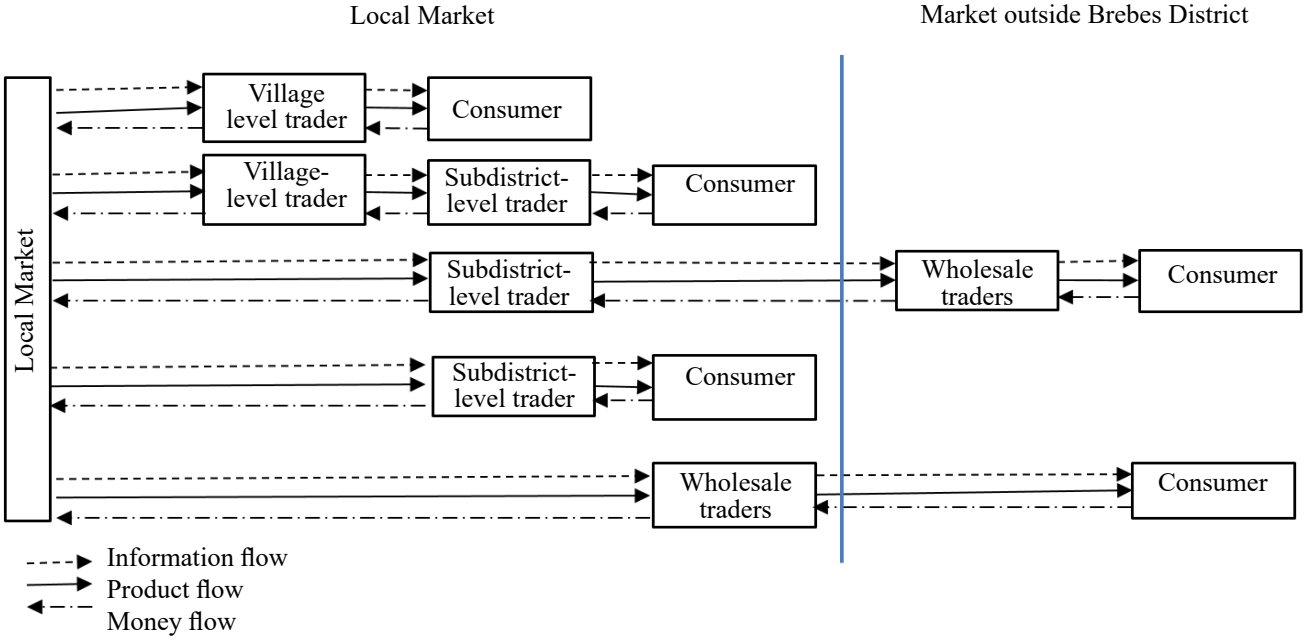

Figure 3. Structure of the shallot supply chain in Brebes District

In marketing channel II, subdistrict-level traders get their supply of shallots from village-level traders. Village-level traders clean fresh shallots, adding value to the products sold. In this supply chain, subdistrict-level traders focus solely on packaging and transporting the shallots to the next actors in the market. In Marketing Channel III, village-level traders distribute the shallots to wholesaler traders, aiming for distribution across various cities and districts. Marketing Channel IV illustrates how larger farmers sell their shallots directly to subdistrict-level traders; these farmers can supply larger quantities of shallots. Marketing Channel V shows how farmers in Brebes District can also sell their shallots directly to wholesale traders. This is typically done by larger farmers or farmer groups that engage in collective action to market their produce.

Furthermore, each marketing actor carries out different marketing functions (Table 2). The marketing trade function includes exchange, physical, and support functions(Asmarantaka et al. 2017) The analysis of marketing functions shows specific roles contributing to the smooth distribution and quality of shallot products from each marketing level. At the farmer level, the marketing function is limited to direct sales to the next marketing actor without further processing, which indicates low added value generated by farmers. However, farmers are still involved in supporting functions such as financing and crop failure risk management.

At the higher level of the supply chain, the village level trader, the marketing function is more developed with exchange, physical, and supporting functions, including packaging, transportation, and sorting, which add value to the product before it is sold to wholesalers. At the sub-district level, traders carry out similar functions but focus more on distribution and packaging. Wholesalers carry out broader exchange and physical functions, taking products from various sources, such as farmers and traders, and distributing them to end consumers.

Chain business process

Business processes within a supply chain involve coordinated activities by various marketing actors within a marketing channel. These processes are interconnected through the flow of goods, resources, information, finances, and control, forming a directed network where each activity follows precedence relationships to efficiently deliver products to customers (Van Der Vorst, 2006). The supply chain business process encompasses all processes in the supply chain to assess the established integration among members (Aramyan et al. 2007; Van Der Vorst, 2006, 2000).

The shallot supply chain in Brebes District involves multiple stages and interactions, starting from farmers and ending with distribution to consumers through various marketing institutions and traders. Farmers in the Brebes District grow shallots, and collectors or traders typically determine the price of shallots. Shallot production is influenced by the planting season, with farmers usually planting shallots twice a year, in between planting other crops such as rice and secondary crops. Farmers can sell shallots in wet or dry form when it is time to harvest, depending on market conditions and their needs.

Table 2. Marketing functions of shallots marketing actors in Brebes District

Marketing Function		Marketing actors			
		Farmer	Village level trader	Sub-district level trader	Wholesaler
Exchange function	Buying	√	√	√	√
	Selling	√	√	√	√
Physical function	Collection		√	√	√
	Distribution		√	√	√
	Transportation		√	√	√
	Packaging			√	√
Supporting function	Financing	√	√	√	
	Risk coverage	√	√	√	
	Grading		√		
	Sortation		√		

Farmers in Brebes often apply the Tebasan system to obtain capital, such as fertilizer, and pay it back after the harvest. However, in this system, farmers have little bargaining power, especially during the main harvest season when the supply is high, and prices tend to drop. After harvest, traders typically buy shallots directly from farmers. These traders play a crucial role in collecting products from small farmers and connecting them to larger markets. Brokers, who act as intermediaries, connect farmers with wholesalers or markets and receive commissions from farmers and traders. They are essential because they have crucial market information and relationships with wholesalers in the primary market.

Wholesalers collect shallots from brokers and sell them to traders in the market. Shallots are sorted and grouped based on quality, such as size, at this stage. Wholesalers significantly influence the price of shallots at the market level because they control the distribution of large quantities to various consumption areas. From the market, shallots are distributed to small traders or retailers who sell the product to end consumers. These small traders sell shallots in traditional markets, wholesale shops, or through modern channels such as supermarkets. The price of shallots at this stage reflects the quality of the product, the margins added along the supply chain, and other factors such as market conditions and the availability of shallots.

Consumers buy shallots from small traders or retailers through various distribution channels. At this stage, the price of shallots is influenced by the quality and condition of the product, as well as market dynamics that occur along the supply chain. Payment at the retailer level is usually made in cash, and the price risk is mainly borne by the trader, especially when supply is high, and prices tend to fall. The number of shallot orders at the consumer level depends on demand from consumer orders.

The shallot supply chain in Brebes faces several significant challenges, including farmers' dependence on the Tebasan system, which reduces their bargaining power, and substantial price fluctuations due to excess supply during the main harvest. On the other hand, technological advances, such as social media and access to market information, are starting to open up opportunities for farmers to obtain more transparent price information, threatening the sustainability of the Tebasan system.

Trust in the shallot supply chain is built through product quality and market certainty. The speed of information flow, especially regarding price and quality, is running well, while logistics and distribution problems often hamper the flow of goods. Market risk, especially price decline during the peak harvest, is the leading risk that must be faced by all actors in the supply chain. Small traders represent a particularly vulnerable group when confronted with risks related to shallot quality degradation and low sales performance (Murtonoet al. 2019).

Chain management

Some things to consider in supply chain management include partner selection, retail selection, contractual agreements, transaction systems, government support, and collaboration between supply chain members. In the shallot supply chain in Brebes District, the criteria for selecting partner farmers in sales do not have many requirements; the main criteria are that the farmers chosen are easy to access and have cooperation. Meanwhile, almost all supply chains do not have their standards for retail selection. In carrying out cooperation between supply chain members, there is also no agreement in the form of a contract, and the contract system is run informally. Some points of agreement in the informal contract are related to the price and the sale and purchase transaction agreement. The transaction system is carried out by looking at the condition of the goods first. Bargaining is carried out between the seller and the buyer, then payment is made in cash with a total cash payment, or a 50% DP is made according to the agreement between the two parties. Supply chain members, when carrying out cooperation, also have good collaboration or coordination with other supply chain members, one of which is by exchanging information. Management and supply chain networks had not gone well; that was a contractual agreement between marketing institutions that was not written.

Chain resources

Supply chain resources affect support, development, efficiency, and activity factors. Supply chain resources include physical, infrastructure, technology, human, and capital resources. In the Brebes District, farmers have physical resources like land and equipment that support their agricultural activities. In other supply chains, namely traders, some physical resources are owned: stalls, fleets, transportation, and other furniture.

Infrastructure support at the business location is in the form of a strategic location for selling shallots. Supply chain actors generally use manual information technology to support their business information needs. This is done by exchanging information directly with other supply chain actors. The use of human resources in business implementation has been sufficient, but some supply chain actors still experience obstacles in the form of insufficient human resources. Then, related to the capital resources used by each actor of the supply chain, in general, it is their capital. However, some are also assisted by capital loans from formal financial institutions or partners.

Supply chain objective

Supply chain objectives are the goals that supply chain actors want to achieve. Supply chain objectives determine the success of a supply chain. The goal of the shallot supply chain in Brebes District is to meet domestic needs. The characteristics of shallot products are generally grouped into grades: grade one is super quality shallot, namely super large, clean, and red; grade two shallots with medium and general size characteristics; and grade three shallots with small sizes. The market or buyers who consume shallots create and categorize these grades. Generally, the market or buyers want good quality shallots, namely clean, at a low price; creating this grade will make it easier for them to choose shallots. To meet the demand of the target market, which is carried out with partners in the supply chain, including stabilizing prices and selling quality shallots. The target targeted by all members of the supply chain is to expand the market.

Chain performance

The food supply chain performance can be conducted through margin and farmer share conditions. Margins reflect the price difference between buying and selling prices at each stage of the supply chain. Based on Table 3 regarding the shallot supply chain performance, marketing channel 3 indicates the highest marketing margin, while marketing channel 1 indicates the lowest margin. Furthermore, the margin percentage was also observed, illustrating the proportion of the final consumer price taken up by the intermediaries, where channels 3 and 5 have the highest margin percentage. Meanwhile, the farmer's share represents the percentage of the final consumer price received by the farmer. Across the different channels, the farmer's share decreases as more intermediaries (traders, wholesalers) are involved. Marketing channel 1 resulting the highest farmer shares about 89%.

Table 3 indicates the channel complexity of shallots in the Brebes district. The simpler the supply chain (fewer intermediaries), the higher the farmer's share. For example, Channel 1, which only involves village traders, provides the highest farmer share (89%) and the lowest margin (11%) as more intermediaries are added (e.g., the farmer's share decreases, and the total margin increases. Channels that involve wholesalers (Channels 3 and 5) result in the highest margins (IDR3,400) and the lowest farmer shares (81%). This suggests that wholesalers add significant costs to the consumer price without proportionally benefiting the farmers. Direct channels, such as Channel 1 (farmer to village trader to consumer), are the most efficient from the farmer's perspective, as they retain the highest share of the consumer price. In conclusion, the involvement of additional intermediaries in the marketing channels increases the overall margin. It decreases the farmer's share, suggesting that simpler supply chains may benefit farmers regarding revenue retention.

The Transaction Cost Economic (TCE) mentioned that supply chain participants incur costs related to exchanging goods, including search, bargaining, monitoring, and enforcement costs (Baumol, 2016). In the case of the shallot supply chain, the involvement of multiple intermediaries (village traders, sub-district traders, wholesalers) introduces additional transaction costs, which are reflected in the margin. The data from Brebes District shows that the farmer's share decreases as more intermediaries are involved, aligning with studies that have observed similar trends (Rasoki, 2016; Immanuella and Tinaprilla, 2023). Reducing the number of intermediaries can improve the economic outcomes for producers by increasing their share of the final price (Kaplinsky and Morris, 2002). This has been observed in various agricultural markets where direct marketing initiatives (e.g., farmer cooperatives or market linkages) have empowered producers to capture a more significant portion of the value chain.

Table 3. Shallot Supply Chain Performance

Actors	Marketing Channel				
	1	2	3	4	5
Farmer					
Selling price (IDR)	14,300	14,300	14,300	14,300	14,300
Village trader					
Buying price (IDR)	14,300	14,300	14,300	0	0
Selling price (IDR)	16,000	16,000	16,000	0	0
Margin (IDR)	1,700	1,700	1,700	0	0
Sub-district trader					
Buying price (IDR)	0	16000	0	14,300	0
Selling price (IDR)	0	17000	0	17,000	0
Margin (IDR)	0	1000	0	2,700	0
Wholesale					
Buying price (IDR)	0	0	16,000		14,300
Selling price (IDR)	0	0	17,700		17,700
Margin (IDR)	0	0	1,700		3,400
Consumer					
Buying price (IDR)	16,000	17,000	17,700	17,000	17,700
Total Margin (IDR)	1,700	2,700	3,400	2,700	3,400
Farmer Share	89%	84%	81%	84%	81%
Margin percentage	11%	16%	19%	16%	19%

Managerial Implications

The analysis of the shallot supply chain in Brebes District suggests several managerial implications for enhancing efficiency and equity, particularly for farmers. First, optimizing marketing channels could increase farmer income. Encouraging farmers to utilize shorter channels such as direct sales to village traders can reduce dependency on intermediaries and improve their share of profits. When intermediaries like wholesalers are essential, promoting transparency and fair pricing, strategies can help prevent excessive margins that detract from farmer earnings.

Improving infrastructure and logistics is another critical area. Investment in transportation and storage facilities, including cold chains, can help preserve shallot quality during distribution, reduce post-harvest losses, and enhance stakeholder profitability. Access to market information is equally important. Partnerships with local authorities can help ensure that reliable market data is accessible, address information asymmetries, and improve farmers' negotiating power.

Moreover, promoting transparent and formalized relationships within the supply chain is essential. Regulating intermediaries' activities can foster a more equitable supply chain. Formal contracts defining the roles, responsibilities, and fair payment structures among actors will help reduce exploitation risks and build trust. Government support is also vital in sustaining an equitable supply chain. These managerial strategies can enhance the supply chain's efficiency and transparency, contributing to a more profitable and sustainable agricultural economy in the Brebes District.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This research showed that the supply chain had clear objectives and structured relationships between actors. However, it was not optimized because the business process was not integrated into the long term. The supply chain involved multiple marketing channels, where each level of intermediary had involvement and impact on farmer share and margins. More straightforward marketing channels, such as Marketing Channel I, where farmers sell directly to village traders, offer

the highest farmer share (89%) due to the absence of intermediaries like wholesalers. In contrast, channels involving more intermediaries, such as wholesalers in Channels III and V, result in higher total margins but a lower farmer share (81%). The findings suggest that reducing the number of intermediaries could improve farmer income by increasing their share of the final price. Additionally, inefficiencies within the supply chain, such as poor coordination and limited access to market information, reduce overall performance.

Recommendations

The study recommends pushing efforts to reduce the number of intermediaries that could improve farmer income by increasing their share of the final price. Additionally, inefficiencies within the supply chain, such as poor coordination and limited access to market information, reduce overall performance. Infrastructure improvement, enhancing farmers' access to market information, promoting more transparent roles of intermediaries, and formalizing supply chain contractual relationships are essentials to be encouraged. Government intervention is critical in providing financial support and facilitating formal contracts to ensure a more equitable distribution of profits and a more sustainable shallot supply chain in the Brebes District.

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