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COST STRUCTURE, LAND PRODUCTIVITY, AND PRICE EFFICIENCY IN SHALLOT FARMERS' INCOME IN BREBES

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Abstract

This study explored how cost structure, land productivity, and price efficiency shape the income of micro scale shallot farmers in Brebes Regency based on farmers' reported financial experiences and informants' financial narratives. Using an exploratory qualitative approach, data were collected from five shallot farmers, one agricultural extension officer, and one farmer group leader through semi-structured interviews, non-participant observation, and documentation. The data were analyzed through thematic analysis supported by source and technique triangulation. The findings show that reported income is highly vulnerable to variable production costs, particularly labor, seed, and pesticides. Land productivity is closely related to land ownership status and farming scale, while price efficiency is constrained by farmers' weak bargaining position and dependence on intermediaries. Farmers apply adaptive strategies such as delaying sales, drying harvested shallots, and converting part of the harvest into seed stock. However, these strategies are limited by liquidity needs, storage capacity, product quality, and market uncertainty. The study concludes that improving farmers' income stability requires integrated cost control, asset productivity, price information access, post-harvest support, and stronger farmer institutions.

Keywords: *Cost Structure; Land Productivity; Price Efficiency; Shallot Farmers; Small Enterprises*

1. INTRODUCTION

Shallot is one of Indonesia's strategic horticultural commodities because of its economic value, broad consumption, and contribution to food price dynamics. National production reached 2.08 million tons in 2024, with Central Java contributing 29.15% as the largest producing province (Secretariat General of the Ministry of Agriculture, 2025). Brebes Regency is central in this production structure, and local government data also record shallot harvested area, production, and productivity as key agricultural indicators for 2024 (Dinas Pertanian dan Ketahanan Pangan Kabupaten Brebes, 2025). However, the strong production position of Brebes does not automatically ensure stable income for micro-scale farmers because shallot farming remains exposed to limited capital, small farm scale, inefficient marketing, and high price fluctuations (Saptana et al., 2021).

Farmers' income is shaped not only by harvested output but also by how farmers manage production costs, land assets, selling prices, and uncertainty across planting and marketing cycles. Previous studies in Brebes show that land area, productivity, total costs, risk awareness, production risks, market risks, and financial feasibility influence shallot farming income (Juwanda et al., 2025; Roessali et al., 2024). These findings indicate that shallot farmers should be understood as micro-scale financial decision-makers who allocate capital, manage productive assets, respond to price changes, and develop strategies to maintain income stability.

Three determinants are especially relevant to this financial perspective. First, cost structure reflects the burden of variable inputs such as seed, fertilizer, pesticides, and labor; studies show that production costs, land area, and market prices influence shallot farmers' income, while seed-related decisions are central because bulb seed absorbs a large share of production costs (Fadzil et al., 2022; Hardyaningtyas & Hernawati, 2023; Mamahit et al., 2022). Second, land productivity reflects how land ownership status, cultivated area, technical management, and production risks shape income opportunities (Sahara et al., 2025). Third, price efficiency reflects farmers' bargaining position in intermediary-based marketing channels, price volatility, and limited access to post-harvest facilities and market information (Bhinadi & Simatupang, 2025; Nurunisa et al., 2024; Rahmi et al., 2025).

Although existing studies have measured the numerical relationships among land area, production costs, productivity, prices, competitiveness, and income, they have not sufficiently explained how micro-scale shallot farmers interpret financial pressures and translate them into daily decisions on input use, land management, selling time, and post-harvest adaptation. Thus, the research gap does not lie merely in the variables studied, but in the limited qualitative understanding of farmers' lived financial practices at the micro-enterprise level.

This study addresses that gap by using an exploratory qualitative approach to examine how cost structure, land productivity, and price efficiency shape shallot farmers' income in Brebes Regency based on informants' financial narratives. The novelty of this study lies in positioning farmers as micro-scale financial decision-makers rather than only as producers. It interprets cost structure as cost-control practice, land productivity as productive asset use, price efficiency as market-risk management, and institutional capacity as a potential mechanism for strengthening farmers' economic resilience.

2. RESEARCH METHOD

This study employed an exploratory qualitative approach to understand how micro-scale farmers interpreted and managed the financial determinants of their income. A qualitative design was considered appropriate because the study focused not only on measuring income, costs, land area, and selling prices, but also on exploring farmers' experiences, perceptions, decision-making processes, and adaptive strategies in managing

cost pressure, land productivity, and price uncertainty. Exploratory qualitative inquiry is suitable for examining phenomena that require contextual understanding and in-depth interpretation rather than statistical generalization (Creswell and Poth 2018) .

The research was conducted in Brebes Regency, Central Java, from October 2025 to January 2026. Brebes was selected because it is one of Indonesia's major shallot-producing regions and provides a relevant context for examining the relationship between high agricultural production and the income vulnerability of micro-scale farmers. The research location also offered variations in land ownership status, farming scale, production capital, and marketing practices, which enabled the study to capture diverse financial experiences among shallot farmers.

The informants were selected using snowball sampling. This technique was used because the study required access to farmers and local agricultural actors who had direct experience with shallot farming, input cost management, land utilization, and selling-price decisions. Snowball sampling is relevant in qualitative research because it allows the researcher to reach information-rich participants through social and professional networks (Noy, 2008). The final informants consisted of seven participants: five shallot farmers, one agricultural extension officer, and one farmer group leader. The farmer informants were coded as P1, P2, P3, P4, and P5, while the institutional informants were coded as PPL for the agricultural extension officer and KKT for the farmer group leader. These codes were used to maintain informant anonymity and to support systematic data analysis.

The use of seven informants was justified by the exploratory qualitative design and the information-rich character of the participants. Each informant had direct knowledge of shallot farming, input-cost management, land-use decisions, selling-price practices, or farmer-group coordination. Data collection was considered sufficient when information from farmers, the extension officer, and the farmer group leader began to repeat and no substantially new themes emerged regarding cost structure, land productivity, price efficiency, and adaptive financial strategies.

Data were collected through semi-structured in-depth interviews, non-participant observation, and documentation. The interviews explored farmers' production costs, land ownership status, land productivity, marketing channels, price-setting practices, income patterns, and adaptive strategies during periods of high input costs or low selling prices. Semi-structured interviews allowed the researcher to follow a set of guiding themes while still providing flexibility for informants to explain their experiences in their own terms. Non-participant observation was conducted to understand the natural context of shallot farming activities, including land preparation, input use, labor involvement, and post-harvest practices. Documentation was used to support the interview and observation data, including field notes, production-cost records when available, photographs of farming activities, and secondary data related to shallot farming in Brebes.

The data were analyzed using thematic analysis. The analysis process began with transcribing interview recordings, reviewing field notes, and organizing documentation data. The data were then anonymized using informant codes before coding. First-cycle coding was conducted by identifying descriptive and in-vivo codes related to production costs, seed and pesticide price increases, labor expenses, land ownership, land productivity, dependence on intermediaries, price-taking behavior , delayed selling, seed conversion, product quality, pests, and natural disasters. Second-cycle coding was then applied to group the initial codes into broader categories, including cost structure, land productivity, price efficiency, adaptive financial strategies, and strengthening or weakening factors of income. These categories were developed into the main themes used in the results and discussion section. The coding and theme-development process followed the logic of thematic analysis, which emphasizes pattern identification, meaning interpretation, and conceptual coherence across qualitative data (Braun and Clarke 2022; Miles, Huberman, and Saldaña 2020) .

To improve analytical transparency, the study applied data display and verification procedures. The findings were organized into thematic matrices, selected verbatim excerpts, and an integrative thematic network to show the relationship between cost structure, land productivity, price efficiency, adaptive strategies, and farmers' income. This process was supported by a qualitative analysis logic that moves from data management to actionable findings through systematic coding, memoing , categorization, and interpretation (Bingham 2023) . The conclusions were drawn gradually by comparing evidence across informants and checking whether the emerging themes were consistent with interview data, field observations, and documentation.

Trustworthiness was ensured through credibility, transferability, dependability, and confirmability criteria (Lincoln and Guba 1985; Nowell et al. 2017) . Credibility was strengthened through source triangulation by comparing information from farmers, the agricultural extension officer, and the farmer group leader. Triangulation technique was applied by comparing data from interviews, observation, and documentation. Member checking was conducted by confirming key summaries and interpretations with selected informants, while peer debriefing was used to discuss coding decisions, themes, and interpretations with academic supervisors. Transferability was supported through thick description of the research context, informant characteristics, land ownership variation, and marketing conditions. Dependability and confirmability were maintained through an audit trail, including documentation of data collection, coding decisions, theme development, field notes, and analytical memos. Ethical considerations were applied by obtaining informants' consent, protecting their identities through coding, and using the data only for academic purposes.

3. RESULTS AND DISCUSSION

3.1 Informant Characteristics and Farming Scale

The farmer informants represented different land ownership statuses, farming scales, production capital, and income levels. This variation is important because the study does not treat farmers as a homogeneous group. Instead, differences in land status, cultivated area, and production capital are used to understand how cost structure, land productivity, and market position affect income formation at the micro-farming level. The key characteristics of the farmer informants are shown in Table 1.

Table 1 Characteristics of Farmer Informants and Farming Scale

No.	Informant Code	Land Status	Land Area (ha)	Production Capital (IDR)	Income (IDR)
1	P1	Owned land	0.25	21,000,000	40,000,000
2	P2	Rented land	0.25	15,000,000	20,000,000
3	P3	Owned land	0.25	15,000,000	30,000,000
4	P4	Owned land	0.50	30,000,000	50,000,000
5	P5	Rented land	0.25	20,000,000	30,000,000

Source: Primary interview data, 2026.

Table 1 shows that three farmers cultivated owned land, while two farmers cultivated rented land. Most farmers cultivated 0.25 ha, except P4, who cultivated 0.50 ha. This variation suggests that land ownership and farming scale are important contexts for understanding income differences. Farmers with owned land do not carry the same rental burden as farmers with rented land, while farmers with larger cultivated areas may have greater production capacity. However, income differences cannot be explained by land area alone because cost burden, input price volatility, product quality, selling time, and market access also shape final income outcomes.

The data also shows that higher production capital does not automatically produce proportionally higher income. For example, P5 spent IDR 20,000,000 and obtained IDR 30,000,000, while P3 spent IDR 15,000,000 and obtained IDR 30,000,000. This indicates that income formation involves more than total production capital. It depends on how capital is allocated, whether land is rented or owned, how effectively inputs are used, and how farmers sell their harvest under market-price uncertainty. This finding is consistent with Roessali et al. (2024) , who emphasized that land area, productivity, total costs, and risk awareness influence shallot farming income in Wanasari District, Brebes Regency.

3.2 Cost Structure and Income Vulnerability

The findings show that the cost structure of micro-scale shallot farming in Brebes is dominated by variable costs, particularly labor, seeds, and pesticides. This pattern was consistently expressed by the informants. The agricultural extension officer stated, "Labor is the biggest. Then, the second is the price of seeds. The third is pesticides" (PPL). A farmer

also emphasized the volatility of input prices: "It depends on the price of onion seeds and pesticides. For example, if onion seeds are expensive, the costs increase, and pesticides, whose prices continue to rise, are sometimes difficult to obtain" (P2). These statements indicate that farmers' production costs are highly sensitive to market conditions in the input sector. Since most costs must be paid before harvest, farmers face financial pressure long before they receive revenue from selling their crops.

This finding is consistent with previous studies showing that production costs significantly influence farming income. Mamahit et al. (2022) found that cost components play an important role in determining the income of shallot farmers, while Hardyaningtyas & Hernawati (2023)showed that production costs, land area, and market prices affect farmers' income in Central Java. The present qualitative finding extends those studies by showing that farmers experience cost structure not only as an income determinant but also as a liquidity pressure before harvest. In Brebes, high variable costs reduce profit margins, limit farmers' capacity to absorb input price increases, and increase vulnerability when selling prices decline at harvest time.

Seed cost deserves particular attention because cultivation commonly relies on bulb seed, which requires large initial expenditure. Fadzil et al. (2022) explained that bulb seeds can account for a large share of large production costs, making seed-related decisions central to production efficiency and farmers' income. This supports the field finding that farmers perceive seed price fluctuations as one of the most burdensome cost pressures. In practical terms, seed is not merely an input; it represents a major financial commitment that influences working capital, risk exposure, and the ability of farmers to continue cultivation in the next planting season.

From a micro-enterprise financial management perspective, the dominance of variable costs shows that farmers' income vulnerability is rooted in weak cost-control capacity. Farmers generally purchase inputs individually from local suppliers, which limits their bargaining power and prevents them from obtaining lower prices through bulk purchasing. The absence of collective input procurement also means that each farmer bears price risk separately. This condition weakens the possibility of achieving economies of scale in input purchasing and increases farmers' dependence on fluctuating local input markets. Therefore, cost structure should be understood not only as a technical production issue but also as a financial management problem that affects liquidity, profitability, and income stability.

3.3 Land Productivity and Ownership Status as Financial Assets

Land productivity emerged as the second important determinant of income. Interviews indicate that farmers understand land not only as a physical space for cultivation but also as an asset that shapes cost burden and income opportunity. A farmer with owned land stated, "The land area is 0.25 hectares. Own land? Own land" (P1). Another farmer emphasized the advantage of owned land and wider scale: "The land productivity strategy is

to have your own land if possible so there are no rental costs, and also the larger the land, the greater the income" (P4). These statements suggest that farmers associate land ownership with lower cost burden and land expansion with higher income potential.

The data in Table 1 supports this interpretation. P4, who cultivated 0.50 ha of owned land, recorded the highest income among the farmer informants. However, the relationship between land area and income is not linear because cost efficiency, input use, product quality, pest management, and selling price also affect net income. Farmers who cultivate rent land face additional fixed obligations, which reduce flexibility when harvest results are poor or prices decline. In this sense, land ownership status becomes a financial factor because it determines whether farmers must allocate part of their production capital to rental expenses before earning revenue.

Previous studies support the importance of land area and productivity in shallot farming income. Roessali et al. (2024) found that land area and productivity were among the determinants of shallot farming income in Brebes, while Hardyaningtyas and Hernawati (2023) showed that land area, production costs, and market prices influence shallot farmers' income in Central Java. The present study confirms those findings but adds a qualitative explanation: farmers interpret land not only as an agronomic input, but also as a financial asset that reduces rental burden, shapes production scale, determines risk exposure, and influences income opportunity.

Land productivity is also shaped by broader production conditions. Sahara et al. (2025) showed that the sustainability of shallot farming systems in lowland Central Java is influenced by productivity, water availability, pest and disease control, weather conditions, and farmers' knowledge. This is consistent with the informants' statements that productivity can be weakened by floods, pest attacks, and inappropriate pesticide use. Therefore, improving land productivity requires more than expanding cultivated area. It requires integrated support for technical management, water access, pest control, input quality, and farmer knowledge.

3.4 Price Efficiency and Farmers' Bargaining Position

The third determinant is price efficiency. The findings show that farmers generally sell their harvest through traders, collectors, or village-level mediators. The farmer group leader stated, "Yes, through middlemen. At most, there will be a mediator in each village who will oversee and bridge the gap between farmers and middlemen" (KKT). A farmer also explained, "Because we can't set prices directly, we have no choice but to sell to the market if prices drop" (P4). These statements show that farmers have limited power to determine selling prices and tend to operate as price takers.

The role of intermediaries has direct implications for price efficiency and income distribution. Nurunisa et al. (2024), in a supply chain study of shallot in Brebes District,

found that multiple marketing channels and intermediary layers influence marketing margins and farmers' shares. The present finding is consistent with that study, but it further shows how intermediary dependence is experienced by farmers as weak bargaining power and limited control over selling time and price formation. When farmers cannot access wider market channels or negotiate collectively, the selling price they receive may not fully reflect production costs, product quality, or final-market value.

Seasonality further weakens price efficiency. The agricultural extension officer explained, "When there is a big harvest because stocks are abundant, prices will automatically fall" (PPL). This indicates that price declines during peak harvest are not only perceived by farmers but also recognized by institutional actors. Price volatility has been widely documented in all markets. Rahmi et al. (2025) found that overall prices at the producer level are highly volatile due to seasonality, farmers' position as price takers, weak institutions, and limited post-harvest facilities. Bhinadi and Simatupang (2025) also explained that widespread price volatility in Java requires downstream strategies to improve price stability. In addition, Putri, Fariyanti, and Harmini (2023) showed that volatility transmission in shallot prices reflects the interconnectedness of market levels, while Alfiyah and Sugiarti (2023) highlighted the instability of shallot prices in relation to market shocks and changing demand conditions.

These findings suggest that price inefficiency should be interpreted as both a market problem and a financial-risk problem. When farmers cannot influence prices, they cannot easily plan revenue, calculate expected margins, or determine the best selling time. This uncertainty weakens cash-flow stability and affects farmers' ability to finance the next planting season. Therefore, improving price efficiency requires not only better market information but also collective marketing, post-harvest facilities, and stronger farmer institutions that can reduce dependence on intermediaries.

3.5 Adaptive Financial Strategies and Income Risk

Farmers do not respond passively to high input costs and price uncertainty. The findings show that micro-scale shallot farmers in Brebes develop several adaptive financial strategies to maintain income and reduce losses. These strategies include delaying sales, drying harvested shallots, converting part of the harvest into seed stock, and choosing selling time based on price conditions. One farmer explained, "I usually sell the harvest to middlemen when the price rises. If there are no middlemen willing, I usually sell it directly to the market. Sometimes I also store it after harvest to sell it dry and as seeds, which can be expensive" (P2). The farmer group leader also stated, "For example, if the price of onions drops, we advise them to dry them first. Then, selling them through seeds will increase the price " (KKT).

These strategies indicate that farmers attempt to manage income risk by adjusting post-harvest decisions. Delayed selling allows farmers to avoid selling immediately during low-price periods, while drying and seed conversion create opportunities to increase product

value. This finding complements Fadzil et al. (2022), who emphasized the income implications of seed-related decisions, by showing that seed conversion is also used by farmers as a micro-level financial strategy. Reserving part of the harvest as seed can reduce future seed costs and mitigate risk when seed prices rise in the following planting season.

However, the effectiveness of these strategies is constrained by liquidity needs, storage capacity, product quality, and technical knowledge. Delaying sales requires farmers to have sufficient cash reserves to meet household and production expenses while waiting for better prices. Drying and storing shallots also involves the risk of quality deterioration if farmers lack proper facilities or handling techniques. This means that adaptive strategies are not equally accessible to all farmers. Farmers with stronger financial reserves and better storage capacity are more able to delay sales, while farmers who urgently need cash may be forced to sell immediately even when prices are low.

The findings also show that product quality functions as a strengthening factor for income. One farmer stated, "The main factor is the quality of the onions. If the onions are good, many middlemen will want us to set their own prices. If the quality is good, our income will also increase" (P1). This suggests that high-quality shallots can improve farmers' bargaining position, although only within certain limits because the market structure is still dominated by intermediaries. In contrast, natural disasters, pests, and plant diseases weaken income stability. A farmer explained, "If there is a flood, the crop will fail and the onions will be damaged so they won't sell. There are also many pests and diseases; if the pesticide is wrong, the onion yield will be damaged" (P1). The agricultural extension officer also emphasized that floods and other natural disasters can cause severe losses.

These strengthening and weakening factors reveal that farmers' income is shaped by both controllable and uncontrollable risks. Product quality, seed management, and selling-time decisions are factors that farmers can partially manage through experience and technical knowledge. Meanwhile, floods, pest outbreaks, disease attacks, and sudden market-price declines are risks that require broader support systems. Thus, adaptive financial strategies at the farmer level need to be supported by institutional mechanisms such as price information access, storage facilities, technical assistance, collective marketing, and risk-sharing arrangements through farmer groups.

Table 2 Thematic Coding Matrix of Shallot Farmers' Income Determinants

Selected Verbatim Excerpt	Initial Code	Category	Theme
"Labor is the biggest. Then, the second is the price of seeds. The third is pesticides." (PPL)	Dominant production costs	Variable input costs	Cost structure

"Pesticides whose prices keep rising are sometimes hard to get" (P2)	Input price volatility	Cost pressure and scarcity	Cost structure
"The best strategy for land productivity is to have your own land if possible so there are no rental costs" (P4)	Owned land advantage	Land ownership and cost burden	Land productivity
"Yes, through middlemen. At most, there are mediators in each village" (KKT)	Intermediary dependence	Marketing channels and bargaining positions	Price efficiency
"Because we can't set the price directly" (P4)	Unable to set price	Price-taking behavior	Price efficiency
"Store it first after harvest so that it can be sold when dry and become seeds" (P2)	Delayed selling and seed conversion	Post-harvest adaptation	Adaptive financial strategy
"If there is a flood, the crops will fail to harvest" (P1)	Flood and crop failure	Production risk	Weakening factor

Source: Processed primary interview data, 2026.

3.6 Cross-Source Triangulation and Integrative Thematic Network

To strengthen the credibility of the findings, the study applied cross-source triangulation by comparing the perspectives of farmers, the agricultural extension officer, and the farmer group leader. The triangulation shows that the main findings were not based on one informant group only. Instead, the core issues appear consistently across actors, although each actor portrays different aspects of the problem. Farmers tended to highlight direct financial pressures, the agricultural extension officer explained technical and systemic risks, and the farmer group leader explained institutional and marketing mechanisms. The triangulated findings are summarized in Table 3.

Table 3 Cross-Source Triangulation of Key Findings

Theme	Farmers' Perspective	Agricultural Extension Officer's Perspective	Farmer Group Leader's Perspective	Analytical Interpretation
Cost structure	Seeds, pesticides, and labor are expensive and often increase before harvest.	Labor, seeds, and pesticides are the dominant cost components.	Collective input procurement has not functioned effectively.	Income vulnerability is rooted in high variable costs and weak collective purchasing power.
Land productivity	Owned land reduces rental burden; Wider land is expected to increase income.	Productivity depends on technical management, input quality, and production risks.	Land access differs across farmers and affects farming scale.	Land functions as both production factor and financial asset.
Price efficiency	Farmers cannot set prices and often sell through traders or local markets.	Prices decline during peak harvest because supply increases.	Village-level mediators connect farmers with traders or collectors.	Farmers operate as price takers in an intermediary-dominated market.
Adaptive strategies	Farmers delay selling, dry shallots, or convert harvest into seed stock.	Seed conversion and post-harvest handling can reduce losses when prices are low.	Farmer groups suggest drying and selling as seed when consumption prices fall.	Adaptive strategies exist but depend on liquidity, storage capacity, and technical capability.
Strengthening and weakening factors	Good product quality increases buyer interest; floods and	Natural disasters and pests can multiply losses and reduce harvest quality.	Market access and group capacity influence	Income is shaped by controllable factors such as quality and uncontrollable

	pests cause losses.	farmers' income resilience.	risks such as weather and price shocks.

Source: Triangulated interview, observation, and documentation data, 2026.

Table 3 indicates that the three informant groups agreed on the main determinants of income, but they viewed the issues from different positions. Farmers stressed direct cash-flow pressure, such as high input costs, inability to set prices, and risks of crop failure. The agricultural extension officer provided a broader technical and structural explanation, especially regarding dominant cost components, seasonality, pest and disease risks, and price decline during peak harvest. The farmer group leader highlighted the institutional dimension, including the role of mediators, the limited function of farmer groups in collective procurement, and the potential of group-based post-harvest strategies. This triangulation strengthens the credibility of the analysis because the same core issues were confirmed across different actor perspectives.

The findings indicate that cost structure, land productivity, and price efficiency do not operate separately. Instead, they form an interconnected financial mechanism that determines the income stability of micro-scale farmers in Brebes . High input costs reduce farmers' margins and limit available capital for the next planting season. Limited capital restricts farmers' ability to improve land productivity, invest in better inputs, or expand cultivated land. Small farming scale then limits production volume and weakens farmers' bargaining position in the output market. Weak bargaining power increases dependence on traders and intermediaries, which contributes to price inefficiency and income instability.

This pattern reflects a cycle of financial vulnerability. When seed, labor, and pesticide costs increase, farmers must allocate more working capital before harvest. If the selling price decreases during harvest season, the profit margin becomes thinner or even negative. Farmers with rented land face additional pressure because rental costs must be paid regardless of production results. At the same time, farmers with limited access to market information and storage facilities have fewer options to delay selling or reach alternative buyers. Therefore, low income is not caused by one single determinant, but by the cumulative interaction between cost burden, land constraints, and market-price inefficiency.

The integrative pattern identified in this study is consistent with broader competitiveness issues in Indonesian shallot farming. Saptana et al. (2021) explained that shallot farming in Indonesia faces technical, economic, and policy-related constraints, including small farm scale, limited capital, inefficient marketing, weak institutional development, and high price fluctuations. The present study links those structural constraints to farmers' financial practices by showing how high input costs, limited land capacity, weak bargaining power, and intermediary-based marketing reinforce one another at the micro-

enterprise level. Thus, the income problem of shallot farmers in Brebes should be understood as both a household-level financial issue and a broader agribusiness-system issue.

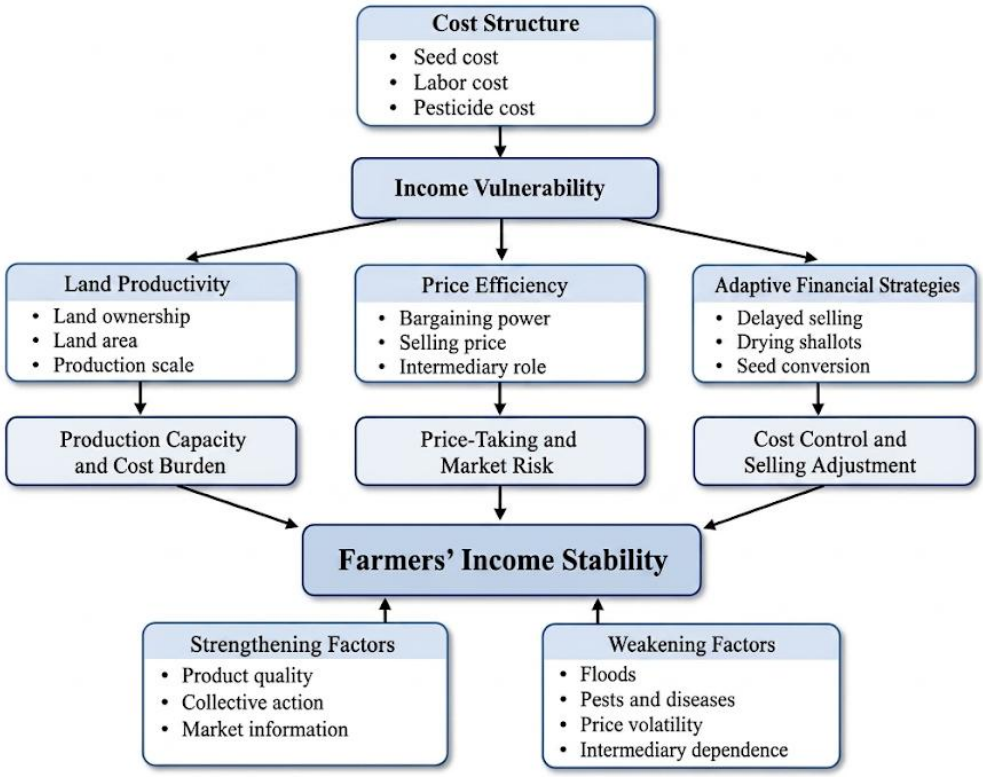
Adaptive financial strategies can reduce vulnerability, but they are not sufficient if they remain individual and informal. Farmers' strategies such as seed conversion, delayed selling, and drying harvested shallots show practical efforts to manage costs and price risks. However, these strategies require liquidity, storage facilities, technical capability, and access to market information. Without collective support, only a few farmers can implement them effectively. This explains why farmer groups have a strategic role in transforming individual coping strategies into collective economic strategies.

From an institutional perspective, strengthening farmer groups should not be limited to administrative coordination or access to government programs. Farmer groups need to function as economic institutions that facilitate collective input procurement, shared storage, market information exchange, post-harvest coordination, and collective selling. Sjafrina et al. (2023) emphasizes that downstream development of the shallot agroindustry requires institutional synergy, collaboration among actors, supply-chain coordination, and technology diffusion. This perspective strengthens the argument that farmer institutions in Brebes should be developed not only as social organizations but also as collective platforms for value creation and bargaining-power improvement.

The thematic network developed from the findings illustrates this relationship. Cost structure affects income vulnerability through input-cost pressure. Land productivity affects income through production capacity, land ownership status, and cost burden. Price affects income efficiency through selling prices, market access, and bargaining power. Adaptive financial strategies mediate these pressures by allowing farmers to control costs, delay selling, convert harvests into seeds, and improve post-harvest value. Strengthening factors such as product quality and collective action can increase farmers' income potential, while weakening factors such as pests, floods, price volatility, and intermediary dependence reduce income stability. This network shows that improving farmers' income requires integrated intervention, not isolated solutions.

The integrative thematic network in Figure 1 summarizes the relationship among cost structure, land productivity, price efficiency, adaptive financial strategies, and the strengthening and weakening factors that shape farmers' income stability in Brebes Regency.

Figure 1 Thematic Network of Shallot Farmers' Income Determinants



Source: Data Processed, 2026.

Figure 1 shows that farmers' income stability is influenced by three core determinants, namely cost structure, land productivity, and price efficiency. These determinants interact with farmers' adaptive financial strategies and are further shaped by strengthening factors such as product quality, collective action, and market information, as well as weakening factors such as floods, pests and diseases, price volatility, and intermediary dependence.

Therefore, the practical implication of this study is that income improvement should combine production, financial, market, and institutional strategies. Cost reduction can be pursued through collective procurement of seeds, fertilizer, and pesticides. Land productivity can be improved through better technical assistance and asset-use planning. Price efficiency can be strengthened through access to market information, collective selling, and alternative marketing channels. Adaptive strategies can be made more effective through post-harvest facilities, storage support, and farmer-group-based risk sharing. In this way, farmer groups can become an important mechanism for breaking the cycle of high costs, weak bargaining power, and unstable income.

4. CONCLUSION

Main findings. This study concludes that the income of micro-scale shallot farmers in Brebes Regency, as reflected in farmers' reported financial experiences, is shaped by the interaction of cost structure, land productivity, and price efficiency. Production costs are dominated by variable components, particularly labor, seed, and pesticides, making farmers vulnerable to input price fluctuations. Land productivity affects income through land ownership status and farming scale, while price efficiency is constrained by farmers' dependence on traders, collectors, and village-level intermediaries.

Practical implications. Income improvement should not rely only on increasing production. It also requires stronger farmer institutions that can support collective input procurement, collective marketing, price information access, post-harvest handling, storage capacity, and broader market channels. Adaptive strategies such as delayed selling, drying harvested shallots, and converting part of the harvest into seed stock can be more effective when supported by group-based facilities and market coordination.

Limitations and future research. This study is limited by the small number of informants, its specific location in Brebes Regency, and the absence of direct interviews with traders or collectors. Future research should involve broader value-chain actors and examine how collective procurement, collective selling, storage support, and post-harvest innovation affect farmers' income stability over time.

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