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STRATEGY FOR DEVELOPING THE ECONOMY OF FARMERS THROUGH NON-SEED WATERMELON CULTIVATION IN MEUE VILLAGE, PIDIE JAYA REGENCY

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Abstract

Seedless watermelon cultivation in Gampong Meue, Pidie Jaya Regency, holds significant economic promise due to its profitable market price and short cultivation cycle, establishing it as a crucial source of supplementary income following the rice harvest season. However, despite this potential, farmers encounter challenges, including the risks of price fluctuations and high input costs. This qualitative research, employing a case study approach, will be conducted from March to April 2025, engaging the entire population of 30 seedless watermelon farmers in Gampong Meue as the study sample. Analysis using the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices indicates that the business's strategic position is within the aggressive growth quadrant, signifying robust internal strength to capitalize on external opportunities. Consequently, a market penetration strategy achieved through increased production, product diversification, and expansion of distribution networks is strongly recommended to optimize its economic potential. Operationally, developing this agribusiness necessitates an integrated approach built on three primary pillars: (1) intensification and expansion of sustainable land use employing environmental modification technologies, such as drip irrigation; (2) enhancement of farmer capacity through training and the adoption of superior crop varieties; and (3) reinforcement of institutions and value chains by ensuring the consistent availability of inputs and establishing sustainable market partnerships to stabilize agricultural income and enhance competitiveness.

Keywords: Farmer Economy; Seedless Watermelon; Development Strategy; Agricultural Empowerment; Agribusiness Sustainability.



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1. INTRODUCTION

Indonesia is recognized as an agrarian nation, where a significant portion of its population depends on the agricultural sector for their livelihood. This sector plays a vital role in national economic development by ensuring food security, providing employment, supplying raw materials for industry, and contributing to the Gross Domestic Product (GDP) and foreign exchange earnings (Dewi et al., 2022). Consequently, economic growth in rural areas is highly dependent on the performance of this sector (Pardin, 2023).

In efforts to enhance community welfare, particularly in rural areas, the horticulture sub-sector has emerged as a primary focus. Horticultural commodities, such as fruits, are cultivated to increase farmers' incomes due to their high economic value. Indonesia's favorable climate and abundant natural resources strongly support the cultivation of horticultural crops, including watermelon (*Citrullus lanatus*). Among these, seedless watermelon varieties show particularly promising prospects. This commodity is in high demand and possesses significant economic value, with farm-

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gate prices ranging from IDR 5,000 to IDR 7,000 per kilogram. Another advantage is its relatively short growing period of 55-60 days and adaptable cultivation requirements, making it an attractive option for farmers.

Despite its high economic potential, watermelon cultivation entails substantial risks. Research by Hidayat et al. (2021) highlights that watermelon farmers face challenges such as high input costs and price volatility. The Trienggadeng sub-district in Pidie Jaya Regency is one area with significant potential for watermelon agribusiness. This study focuses on Gampong Meue, a primary center for seedless watermelon production within the sub-district. Planting typically occurs after the rice harvest, utilizing existing land to generate substantial supplementary income for farmers.

However, watermelon cultivation in Gampong Meue faces fundamental challenges. The primary issue is sharp price fluctuation. During a simultaneous harvest with other regions, market oversupply causes prices to plummet, often falling to IDR 3,000 per kilogram. This situation positions farmers as price-takers and exposes them to high income uncertainty, indicating weak bargaining power and inadequate risk management at the farmer level. This problem suggests that the challenges extend beyond on-farm production factors (e.g., seeds, fertilizers, pesticides) to include critical post-harvest and marketing (off-farm) aspects. These extreme price fluctuations reveal weaknesses in the existing supply chain and marketing strategies.

Various studies in other regions have emphasized the importance of strategies to mitigate price risks, such as through partnership models (Setiawan et al., 2022) or marketing channel diversification (Rizki et al., 2023). However, no specific study has yet developed an effective and contextual model for the economic development of seedless watermelon farmers in Gampong Meue, Trienggadeng District. Based on this background and identified research gap, this study is essential to formulate a community economic development strategy through seedless watermelon cultivation in Gampong Meue.

2. Methods

2.1. Research Design, Location, and Time

This study employs a qualitative descriptive approach with a case study design. This approach was selected to explore existing problems in depth and formulate appropriate development strategies for the research location. The study will be conducted in Gampong Meue, Trienggadeng District, Pidie Jaya Regency. The location was chosen purposively, considering that Gampong Meue is a production center for seedless watermelons and faces issues highly relevant to the research topic. The research will be carried out from March to April 2025.

2.2. Population and Sample

The population of this study comprises all seedless watermelon farmers in Gampong Meue, Trienggadeng District, Pidie Jaya Regency, totaling 30 individuals. The sampling technique used is total sampling (census method). According to Sugiyono (2019), this technique is appropriate when the population size is relatively small, and all members of the population are selected as research samples. Employing this technique aims to gather more comprehensive and representative data.

2.3. Data Analysis Method

To address the research questions, a descriptive qualitative-quantitative strategy analysis will be utilized. This analysis is based on Fred R. David's (2011) comprehensive strategy formulation framework, which consists of three main stages: the Input Stage, the Matching Stage, and the Decision Stage.

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3. Result And Discussion

3.1. Overview

Pidie Jaya Regency is an area undergoing continuous recovery following a major earthquake several years ago. The region's economic revitalization is supported by various sectors, particularly agriculture, micro, small, and medium enterprises (MSMEs), and government-led empowerment programs. However, poverty, often driven by low income and limited access to capital, remains a persistent challenge in several localities. Gampong Meue in Trienggadeng District, the site of this study, is an area with significant agricultural potential. Geographically, Gampong Meue features lowland topography with loose, nutrient-rich soil, making it highly fertile and suitable for horticultural development, especially watermelons.

Within Gampong Meue, seedless watermelon cultivation is a primary focus for agricultural development. This commodity is the preferred choice for local farmers due to its promising economic prospects. Based on in-depth interviews with farmers at the location, seedless watermelons possess high market value with a tendency for annual price increases. However, this high potential is not supported by adequate risk management. As identified in the background, farmers remain highly vulnerable to sharp price declines, particularly during harvest seasons that coincide with other regions. This indicates structural problems in marketing and farmers' bargaining power, which are the central focus of the strategic analysis (SWOT) in this study.

3.2. Strategy Formulation

The formulation of a strategy for developing the farming community's economy through seedless watermelon cultivation in Gampong Meue consists of several stages. The initial stage involves identifying internal and external factors influencing the business scope, which is essential for strategy formulation. The second stage entails matching the internal and external analysis data, culminating in a SWOT analysis. The final stage is decision-making, which involves evaluating strategies based on the SWOT analysis to determine priority strategies for economic development through seedless watermelon cultivation.

3.2.1. Stage 1: Evaluation of Strategic Factors (Input Stage)

a) Internal Factor Analysis (IFE)

The economic development strategy through seedless watermelon cultivation is supported by four key strengths:

1. Adequate Natural Resources: The availability of fertile land, reliable irrigation water, and a suitable climate. Suryanto et al. (2020) and Rahmawati & Dharma (2019) emphasize that soil conditions and water availability significantly affect fruit productivity and quality.
2. Qualified Human Resources: Farmers possess technical skills and an entrepreneurial spirit. Fauzi et al. (2021) found that training successfully increased productivity, while Priyatna et al. (2018) highlighted the importance of an agropreneurship approach for building business resilience.
3. Promising Economic Returns: The business offers increased income and cost efficiency. Handayani & Sari (2022) demonstrated its financial feasibility through a favorable R/C ratio, making it an attractive venture for farmers.
4. Superior Production Capacity: Consistent maintenance of quantity, quality, and supply continuity. Indriyani & Wicaksono (2019) identified this trilogy as key to competitiveness in the horticultural market and a solid foundation for economic development.

Conversely, farmers face several internal weaknesses:

1. Germination Difficulties: Farmers struggle with low germination success rates for seedless watermelon seeds, often below 80%, due to limited knowledge of sowing techniques and

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inadequate seedling facilities. Saputra and Lestari (2021) confirm that seedless watermelon seeds are more vulnerable and require special handling from the outset.

2. **Low Adoption of Innovation:** A major obstacle is the predominant use of traditional methods and low participation in extension programs. A study by Wijaya and Damayanti (2020) shows that resistance to change hinders agricultural modernization, resulting in suboptimal farming efficiency.
3. **Inefficient Input Use:** Farmers often rely excessively on chemical pesticides without proper monitoring. Research by Handayani et al. (2022) reveals that 65% of farmers use pesticides inappropriately, reducing effectiveness and increasing production costs.
4. **Limited Access to Capital:** Difficulty in obtaining formal financing forces farmers to rely on high-interest loans. Kurniawan et al. (2022) show that 70% of horticultural farmers depend solely on their own limited capital, hindering improvements in production quality.

b) External Factor Analysis (EFE)

Several external opportunities can be leveraged:

1. **Supportive Government Policies:** Local agricultural agencies provide technical assistance and subsidies for inputs like seeds and fertilizers. Siregar and Wijaya (2021) found that such policy support, including fiscal incentives and coaching programs, increases technology adoption and horticultural productivity, helping farmers reduce costs and improve technical capacity.
2. **Potential for Business Expansion:** Opportunities exist for partnerships with off-takers and modern markets, providing better marketing guarantees. Prasetyo et al. (2022) found that mutually beneficial partnerships can increase product sales value by 25-30%. Collaboration with financial institutions also facilitates access to capital with easier terms.
3. **Favorable Market Demand:** High market demand and potential for product diversification present significant income opportunities. Research by Febriyanti and Sari (2020) shows that seedless watermelon cultivation can increase farmers' family income by up to 40% in one growing season.
4. **Strong Institutional Support:** The presence of solid farmer groups and regular assistance from extension workers are crucial supporting factors. A Ministry of Agriculture (2023) report indicates that villages with strong farmer institutions see an average increase of 15-20% in annual horticultural production. Internship and comparative study programs facilitated by institutions also accelerate technology transfer.

The business also faces external threats:

1. **Competition from Imports:** The influx of cheaper imported watermelons threatens the local market. Competitive prices for imports, often due to economies of scale and foreign subsidies, are difficult for local farmers to match. Setiawan and Pratama (2022) state that horticultural trade liberalization can reduce local farmer-level prices by 25-30%. Currency exchange rate fluctuations further weaken local farmers' bargaining position.
2. **Input Availability and Cost:** Uncertainty in the availability of production inputs, such as the frequent scarcity of subsidized fertilizers during peak planting seasons, forces farmers to purchase fertilizers at higher prices. The Ministry of Agriculture (2023) reports that around 40% of horticultural farmers face this difficulty. Rising prices of quality seeds and dependence on specific distributors further increase production costs.
3. **Climate Change and Weather Variability:** Unpredictable weather patterns pose a significant threat. High rainfall can trigger disease outbreaks like anthracnose, while prolonged droughts cause irrigation water shortages. The Meteorological Agency (2023) notes that changing seasonal patterns have disrupted planting schedules in 60% of horticultural production centers, reducing yields and increasing maintenance costs.
4. **Information Asymmetry in Pricing:** A price information gap between farmers and middlemen weakens farmers' bargaining power. Research by Handayani et al. (2022) reveals that 70% of

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farmers sell their crops without knowing the actual market price, making them vulnerable to unexpected price fluctuations, especially during harvest when prices tend to fall.

c) Analysis of Internal Factors (Internal Factor Evaluation / IFE)

The internal strategic factors for the community economic development strategy based on seedless watermelon cultivation were analyzed using the IFE matrix. This analysis assigns weight values, ratings, and scores to key strategic strengths and weaknesses.

Table 1. Internal Factor Evaluation (IFE) Matrix

Internal Factors	Weight	Rating	Score
Strengths			
Natural resources available	0,138	4,000	0,554
Human resources (HR) are fulfilled	0,137	4,000	0,547
Farmers' income sources	0,139	4,000	0,557
High production yields	0,121	3,000	0,363
Total Strengths Score	0,535	15,000	2,020
Weakness			
Difficulty in seed germination	0,113	3,000	0,338
Lack of adoption of new innovations	0,110	2,000	0,220
Pest and disease control is not yet optimal	0,109	4,000	0,435
Access to business capital is insufficient	0,133	3,000	0,400
Total Weakness Score	0,465	12,000	1,393
Difference (Strength - Weakness)			
Total Weigh	1,000		3,413

Source: Primary Data (processed), 2025

On the strength side, the factor that received the highest score was its role as the primary source of income for farmers. This factor had a weight of 0.139 and a rating of 4.000, yielding a weighted score of 0.557. This indicates that seedless watermelon cultivation is a significant economic backbone for farming households. This advantage is reinforced by the commodity's suitability in meeting family needs and promoting economic development, as it promises more stable and higher income compared to other agricultural commodities (Rahim & Hastuti, 2020). Furthermore, the availability of abundant natural resources, such as a suitable climate and soil, constitutes a supporting strength. The availability of these resources minimizes the risk of production input scarcity and forms a foundation for the sustainability and growth of farming income in the future (Suryana, 2019).

On the weakness side, the principal factor identified is the suboptimal control of pests and diseases. This factor has a weight of 0.109 and a rating of 3.000, resulting in a score of 0.435. This weakness is critical because it directly impacts productivity and crop quality. This condition is attributed to two fundamental issues: first, farmers' perception that pest and disease outbreaks are normal disturbances, thus not requiring specific and preventive measures; and second, the application of pesticides that does not adhere to Standard Operating Procedures (SOPs). These inappropriate practices, involving incorrect types, dosages, and timing of application, not only reduce control efficacy but also potentially lead to pest resistance, environmental pollution, and pesticide residues in crops (Darma & Sari, 2021). Therefore, enhancing farmers' capacity through extension services and technical assistance on Integrated Pest Management (IPM) is an urgent necessity.

d) Analysis of External Factors (External Factor Evaluation/EFE)

The external strategic factors for the community economic development strategy based on seedless watermelon cultivation were analyzed using the EFE matrix, which assigns weight values, ratings, and scores for opportunity and threat factors.

Table 2. External Factors (External Factor Evaluation/EFE)

External Factors	Weight	Rating	Score
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Opportunities			
Existence of political policies	0,114	2,000	0,228
Expansion of business relationships	0,111	3,000	0,333
Promising business for improving family economy	0,135	3,000	0,405
Institutional contribution to increase production	0,110	3,000	0,330
Total Opportunity Score	0,470	11,000	1,296
Thraets			
Impact of imports	0,117	1,000	0,117
Impact of availability of agricultural production facilities	0,146	1,000	0,146
The effect of weather and seasonal changes	0,130	2,000	0,260
The effect of price information	0,137	2,000	0,273
Total Threats Score	0,531		0,796
Difference (Opportunity - Threats)			
Total Weight	1,000		2,094

Source: Primary Data (processed), 2025

On the opportunity side, the factor with the highest score is the business's potential to drive family economic improvement. This factor has a weight of 0.135 and a rating of 3.000, yielding a weighted score of 0.405. This finding indicates that seedless watermelon cultivation is considered a highly promising sector for improving the welfare of farming households in the study area. This commodity is viewed as a strategic choice for family economic development due to stable market demand and attractive selling prices (Hidayat et al., 2022). However, to maximize this opportunity, more concrete government support is required. The most anticipated forms of support include the provision of quality and affordable agricultural inputs (saprodi), access to financing, and technical assistance, which are believed to enhance farmers' production capacity and income (Ministry of Agriculture of the Republic of Indonesia, 2023).

On the threat side, the most critical factor is the instability in the supply of agricultural production inputs. This factor has the highest weight (0.146) but the lowest rating (1.000), resulting in a score of 0.146. The low rating reflects the current inability of farmers to respond effectively to this threat. The availability of inputs such as high-quality seeds, fertilizers, pesticides, and tools is fundamental to seedless watermelon cultivation. Scarcity, untimely distribution, or high prices of these inputs will directly lead to a decline in production quantity and quality (Wicaksono & Pratama, 2021). Ultimately, production disruptions are not only directly detrimental but also hinder the overall economic development of the farming community, given that this sector is their primary income source. Therefore, strategies to secure the supply of agricultural inputs, either through partnerships with reliable distributors or government advocacy, are urgently needed.

3.2.2. Stage 2: Analysis (Analysis Stage)

a) Internal and External Factor Analysis (IFE)

The results of the IFE (Internal Factor Evaluation) and EFE (External Factor Evaluation) matrix analysis place the strategy for developing the farming community's economy through seedless watermelon cultivation in Quadrant IV. The IFE score of 3.413, which significantly exceeds the average value of 2.5 (Wheelen et al., 2017), indicates solid internal strength. Conversely, the EFE score of 2.094 (Thompson et al., 2020) reflects external conditions with adequate opportunities, although certain challenges persist.

External Factor Evaluation		Internal Factor Evaluation		
		Strong 3,00 – 4,00	Moderate 2,00 – 2,99	Weak 1,00 – 1,99
Strong 3,00 – 4,00		I	II	III
Moderate		IV	V	VI

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	2,00 – 2,99			
	Weak 1,00 – 1,99	VII	VIII	IX

Figure 1. Internal-External (IE) Matrix Matching

(Source: Internal and external matrices processed in 2025)

Based on this configuration, David et al. (2020) recommend implementing an aggressive growth strategy focused on leveraging internal strengths to capitalize on external opportunities. Therefore, executing a market penetration strategy through increased production capacity, product diversification, and distribution network expansion is an appropriate approach to optimize the potential for local community economic development. The IE matrix for this strategy is presented below.

b) SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats)

Based on the internal and external factor analysis, the following alternative strategies were formulated using the SWOT Matrix:

Table 3. SWOT Matrix (Strengths, Weaknesses, Opportunities, Threats)

IFE EFE	Strengths (S)	Weakness (W)
	<ol style="list-style-type: none"> Natural resources available (S1) Human resources (HR) are fulfilled (S2) Farmers' income sources (S3) High production yields (S4) 	<ol style="list-style-type: none"> Difficulty in seed germination (W1) Lack of adoption of new innovations (W2) Pest and disease control is not yet optimal (W3) Access to business capital is insufficient (W4)
Opportunities (O)	Strategy (SO)	Strategy (WO)
<ol style="list-style-type: none"> Existence of political policies (O1) Expansion of business relationships (O2) Promising business for improving family economy (O3) Institutional contribution to increase production (O4) 	<ol style="list-style-type: none"> Expansion of cultivated land to increase income and economic growth (S1, S2, S3, O3) Enhancing the role of government institutions in ensuring the availability of production facilities (S3, S4, O1, O3, O4) Increasing the use of the latest innovations to make watermelon cultivation more effective (S3, S4, O1, O2, O3) 	<ol style="list-style-type: none"> Enhancing knowledge, experience, and adopting new innovations (W2, W3, O2, O3). Enhancing the contribution of government institutions (W4, O1, O4)
Thraets (T)	Strategy (ST)	Strategy (WT)
<ol style="list-style-type: none"> Impact of imports (T1) Impact of availability of agricultural production facilities (T2) The effect of weather and seasonal changes (T3) The effect of price information (T4) 	<ol style="list-style-type: none"> Enhancing cooperation with watermelon collectors or buyers (S3, S4, T1, T4) 	<ol style="list-style-type: none"> Enhancing experience and conducting comparative studies to improving knowledge (W1, W2, W3 T3, T4)

Source: Primary Data (processed), 2025

Based on the SWOT matrix analysis, seven strategies were identified and subsequently consolidated into six priority strategies for developing the farming community's economy through seedless watermelon cultivation. These strategies were formulated by combining internal factors (strengths and weaknesses) and external factors (opportunities and threats) to ensure their feasibility and effectiveness.

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S-O Strategy (Utilizing Strengths to Seize Opportunities): Expanding cultivation land is a priority strategy to increase economic scale. This expansion is supported by internal strengths in technical cultivation mastery and is leveraged to respond to market opportunities with high selling value. According to Rahim & Hastuti (2020), increasing business scale through land intensification significantly increases the income of horticultural farmers. Optimizing the government's role in providing production facilities is a determining factor for success. Support in the form of certified seeds, subsidized fertilizers, access to capital, and technical training is necessary to ensure business sustainability. This aligns with the findings of the Indonesian Ministry of Agriculture (2023) that comprehensive institutional support can increase farm productivity by up to 30%.

W-O Strategy (Overcoming Weaknesses by Utilizing Opportunities): Adopting innovative cultivation technologies aims to overcome weaknesses in production process efficiency. Implementing fixed irrigation technology and integrated pest control can increase crop care effectiveness. Research by Darma & Sari (2021) demonstrates that adopting appropriate technology can reduce production costs by up to 25% in watermelon farming. Strengthening farmer capacity through intensive knowledge and communication programs is necessary to improve technical competence. According to human capital investment theory (Becker, 1964), enhancing human resource capacity is a fundamental prerequisite for achieving maximum productivity.

S-T Strategy (Utilizing Strengths to Overcome Threats): Developing strategic partnerships with collectors and buyers is conducted to mitigate the threat of price fluctuations. Building sustainable partnerships can create marketing stability and protect farmers from price manipulation by middlemen. A study by Hidayat et al. (2022) shows that effective partnerships can increase farmers' profit margins by up to 40%.

W-T Strategy (Minimizing Weaknesses to Address Threats): Enhancing farmer experience through comparative studies and mental evolution aims to minimize losses resulting from managerial weaknesses. Learning from successful practices in other regions can accelerate innovation adoption and increase business resilience. The concept of experiential learning (Kolb, 1984) emphasizes that learning based on direct experience is the most effective method for competency development.

The implementation of these six priority strategies is expected to create a comprehensive synergy in developing the farmer community's economy, with a complementary approach between technical production aspects, institutional support, and human resource capacity building.

3.2.3. Stage 3: Decision Making Stage

Based on the SWOT analysis and the grouping of strategies, six alternative strategies for economic development based on leading commodities were identified. The results of the Quantitative Strategic Planning Matrix (QSPM) analysis for these priority strategy alternatives are shown in the table below.

Table 3. Priority Alternative Strategies using QSPM

No	Strategi Prioritas	STAS	Rank
1	Enhancing knowledge, experience, and adopting new innovations	5,841	4
2	Expanding cultivation land to increase income and economic growth	6,862	1
3	Increasing the use of the latest to be more effective in caring for watermelons	6,699	3
4	Enhancing experience and conducting comparative studies to increase knowledge.	5,380	6
5	Enhancing the role of government agencies in the availability of production facilities	6,712	2
6	Improving cooperative relationships with watermelon collectors or buyers	5,694	5

Source: Primary Data (processed), 2025

Strengthening the watermelon agribusiness requires an integrated strategic approach to address challenges in productivity, sustainability, and market access. Based on the priority analysis, a strategy to enhance competitiveness can be formulated around three main pillars: Land

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Intensification, Innovation and Human Resource Capacity, and Institutional and Market Strengthening.

Sustainable Land Intensification and Expansion (Priority 1): Expanding the planting area is a direct strategy to increase production volume and farmer income. However, this expansion must be guided by sustainable cultivation principles to prevent land degradation. Optimizing marginal land with environmental modification technologies, such as plastic mulch and drip irrigation, can increase the productivity of existing land (Singh et al., 2023).

Improving Human Resource Capacity through Innovation (Priorities 3, 4, and 6): Farmer capacity is a key factor in the adoption of innovation. Enhancing knowledge and experience through training, demonstration plots, and comparative studies (Priorities 4 & 6) encourages farmers to adopt the latest innovations (Priority 3), such as superior varieties, precision fertilization, and integrated pest management. According to a recent study, farmers with access to new knowledge and learning networks are quicker to adopt technologies that improve the efficiency and effectiveness of crop care (FAO, 2022).

Institutional Strengthening and Value Chain Development (Priorities 2 and 5): The success of the first two pillars is highly dependent on institutional support. The government's role in ensuring the availability and accessibility of quality, affordable inputs (seeds, fertilizers, pesticides) (Priority 2) is fundamental. Furthermore, building strong partnerships with offtakers (collectors/buyers) through sustainable contracts (Priority 5) creates market and price certainty, which ultimately stabilizes farmers' incomes. Multi-stakeholder collaboration within an agribusiness cluster has proven effective in shortening the supply chain and increasing added value (World Bank, 2021).

4. CONCLUSION

The position in Quadrant IV necessitates a strategy of diversification and consolidation. Farmers must leverage their solid internal strengths to overcome external challenges by: (1) optimizing land use and technology, (2) enhancing human resource capability through training, and (3) strengthening institutional partnerships to stabilize the market. In conclusion, strengthening the watermelon agribusiness requires an integrated strategy focused on three main pillars: (1) sustainable land intensification and expansion to increase production capacity; (2) improving human resource capacity through innovation adoption and continuous learning; and (3) reinforcing institutional frameworks and value chains to ensure market certainty. The synergy of these three pillars is a key strategy for building the competitiveness and long-term sustainability of watermelon farming businesses.

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