STRATEGIC PATHWAYS FOR DEVELOPING CASSAVA-BASED AGROINDUSTRY WITHIN LOCAL AGRIFOOD SYSTEMS

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ABSTRACT

Cassava-based agroindustry plays a strategic role in strengthening local agrifood systems by connecting agricultural production, food processing, and local markets. However, many small-scale cassava processing enterprises operate under structural constraints that limit their contribution to sustainable agrifood system development. This study examines strategic pathways for developing cassava-based agroindustry by analyzing internal and external factors that shape enterprise performance within a local agrifood system. A qualitative–quantitative approach using SWOT analysis was applied, drawing on field observations, interviews with agroindustry actors, and secondary data. The results show that stable access to local cassava, processing experience, and product acceptance constitute key internal strengths; limited production capacity, simple technology, and narrow market reach remain major constraints. Externally, increasing demand for local food products and institutional support create development opportunities, whereas competition and market volatility pose persistent challenges. The resulting strategic pathways emphasize value upgrading, gradual innovation, enterprise resilience, and operational stability. Overall, the findings indicate that context-sensitive and system-oriented strategies are essential for enhancing the sustainability of cassava-based agroindustry and reinforcing the integration and resilience of local agrifood systems.

Keywords:
ekonomi desa, industri singkong, keberlanjutan usaha, rantai nilai lokal, Sistem agribisnis, strategi SWOT.

ABSTRACT

Industri pertanian berbasis singkong memainkan peran strategis dalam memperkuat sistem pangan pertanian lokal dengan menghubungkan produksi pertanian, pengolahan pangan, dan pasar lokal. Namun, banyak usaha pengolahan singkong skala kecil beroperasi di bawah kendala struktural yang membatasi kontribusi mereka terhadap pembangunan sistem pangan pertanian berkelanjutan. Studi ini meneliti jalur strategis untuk mengembangkan industri pertanian berbasis singkong dengan menganalisis faktor internal dan eksternal yang membentuk kinerja usaha dalam sistem pangan pertanian lokal. Pendekatan kualitatif-kuantitatif menggunakan analisis SWOT diterapkan, berdasarkan observasi lapangan, wawancara dengan pelaku industri pertanian, dan data sekunder. Hasil menunjukkan bahwa akses yang stabil terhadap singkong lokal, pengalaman pengolahan, dan penerimaan produk merupakan kekuatan internal utama; kapasitas produksi yang terbatas, teknologi sederhana, dan jangkauan pasar yang sempit tetap menjadi kendala utama. Secara eksternal, meningkatnya permintaan produk pangan lokal dan dukungan kelembagaan menciptakan peluang pembangunan, sedangkan persaingan dan volatilitas pasar menimbulkan tantangan yang terus-menerus. Jalur strategis yang dihasilkan menekankan peningkatan nilai, inovasi bertahap, ketahanan usaha, dan stabilitas operasional. Secara keseluruhan, temuan menunjukkan bahwa strategi yang peka terhadap konteks dan berorientasi pada sistem sangat penting untuk

meningkatkan keberlanjutan agroindustri berbasis singkong dan memperkuat integrasi serta ketahanan sistem agrifood lokal.

INTRODUCTION

Local agrifood systems play a critical role in supporting food security (Abidin, 2024; Suwarno, 2024), rural livelihoods (Widiati et al., 2020), and value creation in many developing regions (Santosa et al., 2024). Within these systems, agroindustry serves as a key mechanism for linking agricultural production with processing (Elizabeth, 2019), marketing (Rusmiyati & Bustomi, 2019), and consumption (Nurhapsa et al., 2018; Timisela et al., 2014). Small-scale agroindustries, particularly those based on locally available commodities, contribute to employment generation, income diversification, and the stabilization of rural economies (Estruch et al., 2013; Petrunenko et al., 2021). However, their sustainability and growth are often constrained by limited resources, market access, and strategic capacity, especially in rural contexts (Faqih et al., 2020; Yuliana et al., 2024).

Cassava is one of the most important staple and industrial crops in tropical regions due to its adaptability, relatively low production cost, and versatility as a raw material for various food products (Ardyani et al., 2022; Li et al., 2017; Setiani et al., 2021). Beyond its role as a primary agricultural commodity, cassava holds significant potential for value addition through agroindustrial processing (Fernando et al., 2022). Cassava-based agroindustries, such as traditional snack processing, represent an important pathway for transforming primary agricultural outputs into higher-value products while strengthening local agrifood systems (Ismail & Rudianto, 2024). Despite this potential, many cassava-processing enterprises remain small in scale and operate with limited integration across production, processing, and marketing stages (Tran et al., 2022; Wibowo et al., 2024).

In many rural areas, cassava-based agroindustries are dominated by household-scale enterprises that rely on traditional processing methods and informal market channels (Asnamawati & Nurmalia, 2024; Khoirudin & Kurniati, 2024). These enterprises often face structural challenges, including fluctuating raw material supply, limited capital, weak branding, and restricted access to wider markets (Darko-Koomson et al., 2020; Nurwani et al., 2023). Previous studies on cassava agroindustry development have largely focused on production efficiency (Faqih et al., 2020; Zakaria et al., 2021), financial feasibility (Tesfaye et al., 2021), or technological improvement (Dada et al., 2010), while strategic dimensions related to enterprise positioning, internal capacity, and external market dynamics receive less systematic attention (Leitão et al., 2024; Oteh et al., 2023). As a result, development efforts frequently emphasize technical aspects without adequately considering the broader agrifood system context in which these enterprises operate (Amelework et al., 2021; Masamha et al., 2024).

From a local agrifood system perspective, the sustainability of cassava-based agroindustry depends not only on production and processing performance but also on how enterprises interact with suppliers, consumers, institutions, and market environments (Lamboll et al., 2015; Lutta et al., 2024). Strategic decision-making becomes increasingly important for small-scale agroindustries to navigate competition, respond to changing consumer preferences, and enhance resilience (Chen et al., 2016; Gadanakis, 2024; Oluwafemi, 2024). Understanding internal strengths and weaknesses

alongside external opportunities and threats is therefore essential for identifying feasible development pathways that align enterprise growth with local agrifood system sustainability.

Against this background, this study examines strategic development pathways for cassava-based agroindustry within a local agrifood system by focusing on a household-scale cassava cracker enterprise. The study analyzes internal and external factors influencing enterprise performance and formulates development strategies using a SWOT-based approach. By situating enterprise-level strategies within the broader context of local agrifood systems, this research aims to identify strategic pathways that support the sustainability and development of small-scale cassava-based agroindustry.

RESEARCH METHODS

Research Design and Analytical Framework

This study employed a descriptive–analytical research design to examine strategic development pathways of cassava-based agroindustry within a local agrifood system. The research adopted a case-based analytical approach, focusing on a household-scale cassava processing enterprise as a representative unit embedded in the local agrifood system. This approach enables an in-depth examination of internal enterprise conditions and external environmental factors that shape strategic decision-making in small-scale agroindustrial contexts.

A SWOT-based analytical framework was used to systematically assess internal strengths and weaknesses as well as external opportunities and threats influencing agroindustry development. Rather than serving as a purely descriptive tool, SWOT analysis in this study functions as a structured analytical device to integrate enterprise-level characteristics with broader agrifood system dynamics, including raw material supply, market access, competition, and institutional support.

Study Area and Unit of Analysis

The study was conducted in a rural area where cassava-based agroindustry constitutes an important livelihood activity and contributes to local agrifood system functioning. The unit of analysis was a household-scale cassava cracker agroindustry operating under the brand Artela AR Food. This enterprise was selected because it utilizes locally sourced cassava as its primary raw material, applies traditional processing methods, and markets its products through local distribution channels, making it representative of small-scale cassava agroindustries in rural agrifood systems.

By focusing on a single enterprise, the study aims to capture the strategic challenges and opportunities faced by small-scale agroindustry actors operating within localized agrifood systems. The findings are intended to provide analytical insights that are transferable to similar cassava-based agroindustrial contexts.

Data Collection

Primary data were collected through in-depth interviews and direct observation. Interviews were conducted with the enterprise owner and key actors involved in production and marketing activities to obtain detailed information on internal operational conditions, resource availability,

production processes, cost structures, and marketing practices. Direct observation was used to validate interview responses and to document processing activities, input utilization, and product handling.

Secondary data were obtained from relevant literature, statistical reports, and policy documents related to cassava production, agroindustry development, and small-scale enterprise support. These data were used to contextualize the case within broader agrifood system dynamics and to support the identification of external opportunities and threats.

Identification of SWOT Factors

Internal and external factors were identified through a systematic process. Internal factors (strengths and weaknesses) were derived from enterprise-level characteristics, including raw material access, processing capacity, labor availability, product quality, and business management practices. External factors (opportunities and threats) were identified based on market conditions, competition, consumer demand, institutional support, and regulatory environments. To enhance analytical rigor, identified factors were cross-checked using multiple data sources, including interview responses, observations, and secondary information. This triangulation process helps reduce subjectivity and improves the credibility of the SWOT assessment.

SWOT Matrix and Strategy Formulation

Identified internal and external factors were organized into a SWOT matrix to facilitate the formulation of strategic alternatives. Four types of strategies were generated: SO (Strength–Opportunity) strategies, WO (Weakness–Opportunity) strategies, ST (Strength–Threat) strategies, and WT (Weakness–Threat) strategies. These strategies represent potential development pathways that align internal enterprise capacities with external agrifood system conditions. The resulting strategic options were evaluated qualitatively based on their feasibility, relevance to enterprise capacity, and consistency with local agrifood system sustainability.

Analytical Perspective

The analysis was conducted within a local agrifood system perspective, recognizing the cassava-based agroindustry as part of an interconnected system linking agricultural production, processing, and market distribution. By integrating SWOT analysis with a system-oriented perspective, the methodology captures how enterprise-level strategies are shaped by and contribute to broader agrifood system dynamics, rather than treating the agroindustry as an isolated business entity.

RESULTS AND DISCUSSION

Internal Conditions of Cassava-Based Agroindustry within the Local Agrifood System

The internal factors influencing the development of cassava-based agroindustry are summarized in Table 1. The availability of locally sourced cassava emerges as a key strength, providing a stable raw material supply that supports continuous production. This condition reinforces the integration between agricultural production and processing activities within the local

agrifood system. In addition, accumulated processing experience and product familiarity contribute to consistent product quality and sustained consumer acceptance in local markets.

However, Table 1 also highlights several internal weaknesses that constrain enterprise development. Limited production capacity and simple processing technology restrict output volume and product diversification (Al Maidah et al., 2024; Kusumandari et al., 2024), while limited capital and narrow marketing reach reduce the enterprise's ability to respond to expanding market opportunities (Dzikrullah & Chasanah, 2024). These findings are consistent with previous agroindustry studies indicating that household-scale enterprises often rely on operational simplicity for survival but face challenges in scaling up and upgrading their activities. From a system perspective, these internal conditions illustrate a dual role of small-scale cassava agroindustry: while internal strengths support operational stability, internal weaknesses limit the enterprise's contribution to broader agrifood system transformation.

Table 1. Internal factors affecting cassava-based agroindustry development

Internal Factors	Description
Strengths	
Availability of local cassava	Continuous access to locally produced cassava ensures stable raw material supply
Processing experience	Long-term experience supports consistent product quality
Product familiarity	Cassava crackers are well accepted in local markets
Simple production process	Low technological complexity enables operational continuity
Weaknesses	
Limited production capacity	Small-scale equipment restricts output volume
Simple processing technology	Limits efficiency and product diversification
Limited capital	Constrains business expansion and innovation
Narrow marketing reach	Sales are concentrated in local markets

External Environment and Agrifood System Dynamics

The external factors shaping cassava-based agroindustry development are presented in Table 2. Opportunities are driven by increasing consumer demand for local food products, abundant cassava production, and the availability of institutional support for small and medium enterprises. These conditions create a favorable environment for strengthening cassava-based agroindustry as a component of local agrifood systems.

At the same time, Table 2 identifies significant external threats, including intense product competition, raw material price fluctuations, and shifting consumer preferences. Limited product differentiation further amplifies competitive pressure (Liu & Atuahene-Gima, 2018; Theilen, 2012). These external challenges highlight the vulnerability of small-scale agroindustry to market dynamics and underscore the importance of strategic responses that align enterprise capabilities with external conditions.

Within the agrifood system framework, these opportunities and threats reflect the interconnectedness between producers, processors, markets, and institutions, emphasizing that enterprise performance is shaped by system-level interactions rather than isolated business decisions (Lee et al., 2012; Shiferaw et al., 2016; Tukamuhabwa et al., 2017).

Table 2. External factors influencing cassava-based agroindustry within the local agrifood system

External Factors	Description
Opportunities	
Increasing demand for local snacks	Growing consumer preference for traditional food products
Abundant cassava production	Supports raw material continuity
Institutional support for SMEs	Government programs and training opportunities
Market expansion potential	Opportunities to access wider distribution channels
Threats	
Product competition	Presence of similar cassava-based products
Price fluctuations	Variability in raw material prices
Changing consumer preferences	Risk of declining demand if products are not upgraded
Limited market differentiation	Weak branding increases competition pressure

Strategic Pathways for Agroindustry Development

The interaction between internal and external factors is synthesized in the SWOT matrix presented in Table 3, which outlines four strategic orientations for cassava-based agroindustry development. SO strategies focus on leveraging internal strengths to capitalize on external opportunities, such as improving product quality, strengthening branding, and expanding market reach. These strategies enhance the value-adding role of agroindustry within the local agrifood system by reinforcing linkages between cassava production and food markets (Panjaitan, 2024).

WO strategies, also shown in Table 3, emphasize addressing internal weaknesses through external opportunities. Actions such as upgrading packaging, adopting simple processing innovations, and expanding marketing channels illustrate how external support and market demand can be utilized to overcome internal constraints (Ainun & Suherman. 2020; Majid & Faizah, 2023; Nurwani et al., 2023; Wibowo et al., 2024; Wirahadi et al., 2024). These strategies are particularly relevant for facilitating gradual upgrading processes in small-scale agroindustry.

ST strategies utilize existing strengths to mitigate external threats by maintaining product consistency and strengthening customer trust. Such strategies support enterprise stability in competitive market environments. Meanwhile, WT strategies represent defensive measures aimed at minimizing weaknesses and avoiding external risks through cost control and market focus. Although conservative in nature, these strategies play an important role in ensuring enterprise continuity under uncertain conditions.

Table 3. SWOT matrix and strategic pathways for cassava-based agroindustry development

Strategy Type	Strategic Orientation	Strategic Implications
SO Strategies	Leveraging strengths to capture opportunities	Improve product quality, strengthen branding, expand market reach
WO Strategies	Overcoming weaknesses using opportunities	Upgrade packaging, adopt simple innovations, improve marketing
ST Strategies	Using strengths to mitigate threats	Maintain product consistency, strengthen customer trust
WT Strategies	Minimizing weaknesses and avoiding threats	Cost control, focus on core markets, maintain manageable scale

Systemic Interpretation and Sustainability Implications

The strategic positioning of cassava-based agroindustry within the local agrifood system is conceptually illustrated in Figure 1. The figure highlights how different strategic pathways correspond to varying interactions between internal capacities and external system dynamics. SO and WO strategies reflect proactive approaches to strengthening agrifood system integration, while ST and WT strategies emphasize stability and resilience.

Together, the strategies outlined in Table 3 and visualized in Figure 1 demonstrate that cassava-based agroindustry development is not solely an enterprise-level concern but a system-level process. By aligning strategic decisions with local agrifood system conditions, small-scale agroindustries can enhance economic sustainability, support local cassava producers, and contribute to food system stability (Dos Santos et al., 2024; Ikuemonisan, 2024; Lamboll et al., 2015; Sjauw-Koen-Fa et al., 2016).

These findings suggest that sustainable development of cassava-based agroindustry requires context-sensitive strategies that balance growth aspirations with operational capacity and system constraints. Supporting such strategies can strengthen the role of small-scale agroindustry in local agrifood systems while maintaining resilience against market uncertainties.

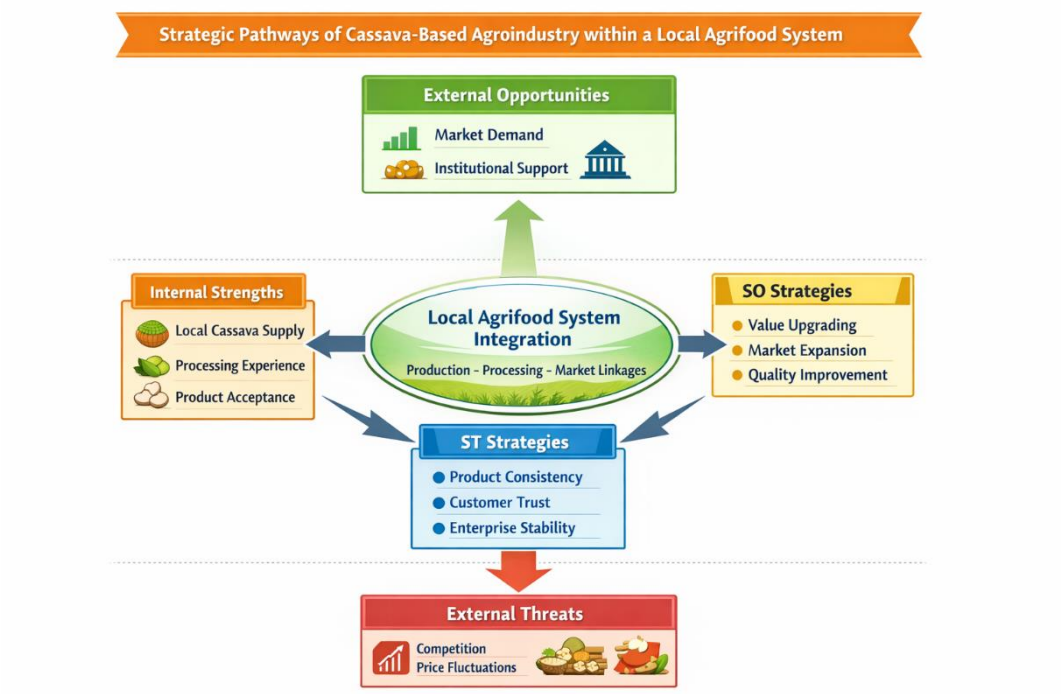

Figure 1. Strategic pathways of cassava-based agroindustry within a local agrifood system

Strategic Implications for Cassava-Based Agroindustry within Local Agrifood Systems

The findings presented in Tables 1 and 2 indicate that the development of cassava-based agroindustry is simultaneously enabled and constrained by internal enterprise capacities and external agrifood system conditions. Stable access to locally produced cassava, accumulated processing experience, and sustained product acceptance reflect strong functional linkages between agricultural production and household-scale food processing. Similar configurations have been documented in small-scale agroindustries across developing regions, where proximity to raw materials and experiential knowledge provide a foundation for enterprise continuity, although not

necessarily for structural upgrading or long-term transformation (Petrunenko et al., 2021; Zhang & Zhang, 2024).

The internal limitations identified in Table 1, particularly related to limited production scale, simple processing technology, and narrow market reach, are consistent with broader evidence that household agroindustries often operate in a "survival-oriented" mode. Such enterprises tend to prioritize short-term income stability over innovation or expansion, which can restrict their capacity to capture higher value within agrifood systems (Manyise & Dentoni, 2021; Mehrabi & Giagnocavo, 2024). Without strategic alignment to external opportunities, these agroindustries risk remaining embedded in low-value segments of the food system. Meanwhile, the opportunities and threats summarized in Table 2 highlight the increasing influence of market dynamics, institutional support mechanisms, and evolving consumer preferences in shaping agroindustry performance, reinforcing the view that agroindustry development is embedded within complex, multi-actor agrifood systems rather than isolated value chains (Poponi et al., 2021).

The integration of internal and external factors through the SWOT matrix (Table 3) provides insight into strategic pathways that extend beyond conventional firm-level planning. The SO and WO strategies illustrate how cassava-based agroindustry can gradually strengthen its role within local agrifood systems through value upgrading, improvements in product quality, and expanded market engagement. These pathways align with prior studies emphasizing incremental upgrading as a realistic and context-appropriate strategy for small-scale agroindustries facing capital, technology, and knowledge constraints (Hawas & Skvaril, 2021). In contrast, the ST and WT strategies underscore the importance of resilience and stability, particularly under conditions of market competition and price volatility commonly encountered by local food processors.

The systemic interpretation of these strategic pathways is further clarified in Figure 1, which positions cassava-based agroindustry within broader production–processing–market linkages. The figure illustrates that development outcomes are shaped by interactions across the agrifood system, rather than by isolated enterprise decisions. This perspective supports a growing literature that conceptualizes small-scale agro-industry as a critical node for strengthening local food systems, enhancing value retention, and supporting rural livelihoods (Plews-Ogan et al., 2017). Rather than prioritizing rapid expansion, the findings suggest that balanced strategies—combining upgrading, adaptation, and stabilization—are more aligned with the operational realities of household-scale cassava processing.

As an outcome, this study demonstrates that strategically guided cassava-based agroindustry development can contribute to local agrifood system sustainability by reinforcing production–processing linkages, stabilizing market participation, and enhancing local economic resilience. These impacts extend beyond individual enterprises to support broader food system stability, particularly in regions where cassava plays a central role in food security and rural livelihoods.

CONCLUSION

This study demonstrates that the development of cassava-based agroindustry within local agrifood systems is shaped by a dynamic interaction between internal enterprise capacities and external system conditions. The SWOT analysis reveals that while household-scale agroindustries

benefit from stable access to local cassava, accumulated processing experience, and established market acceptance, their growth is constrained by limited production capacity, simple technology, and narrow marketing reach. These findings confirm that small-scale cassava agroindustry operates with inherent structural strengths and vulnerabilities that influence its strategic options.

The strategic pathways identified through the SWOT matrix highlight that sustainable agroindustry development cannot rely on a single approach. Proactive strategies that leverage internal strengths to capture market opportunities, alongside adaptive strategies that address internal weaknesses through external support, are essential for enhancing enterprise resilience. At the same time, defensive strategies remain important for maintaining operational stability under competitive and uncertain market conditions. Together, these pathways underscore the need for context-sensitive strategies that align enterprise capabilities with local agrifood system dynamics.

Overall, the findings emphasize that strengthening cassava-based agroindustry contributes not only to enterprise sustainability but also to the resilience of local agrifood systems. By reinforcing linkages between agricultural production, processing, and markets, small-scale agroindustry can enhance value retention within local economies and support food system stability. Future research may extend this analysis across different regions and commodities to further explore how strategic agroindustry development influences agrifood system sustainability under diverse socioeconomic contexts.

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