Market Opportunity and Consumer Preferences Analysis for Sawo (Manilkara zapota L.) Product Diversification as a Local Agribusiness in Angkola Muaratais District

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ABSTRACT

This study aims to identify the potential for diversification of products from sapodilla fruit (Manilkara zapota L) that need optimally utilized and have high market opportunities in Angkola Muaratais District. Using a descriptive qualitative approach supported by quantitative analysis, this research involved 42 respondents: farmers, workers, SME entrepreneurs, and consumers. Data were collected through in-depth interviews, structured questionnaires, and participatory observation, followed by mixed-method analysis, including product evaluation matrix and market feasibility analysis. Results show three main potential products with significant development opportunities. Premium sapodilla syrup shows the highest potential (score 4.24/5.0), followed by variant sapodilla chips (4.08/5.0) and natural sapodilla jam (3.92/5.0). Market segmentation analysis identifies three main consumer segments: health-conscious (35%), convenience seekers (40%), and traditional value seekers (25%). Digital market penetration projections indicate significant growth potential, reaching 85% through social media and e-commerce channels within six months. Product evaluation reveals that premium sapodilla syrup excels in raw material availability (4.5/5.0) and shelf life (4.5/5.0), while variant sapodilla chips show highest market interest (4.5/5.0) and value addition potential (4.5/5.0). The study indicates substantial market potential with a Total Available Market of 150,000 consumers and a Serviceable Obtainable Market of 15,000 consumers, projecting 15-20% annual market growth. The findings contribute to understanding critical factors in local resource-based product development and support the Green Economy theory regarding sustainable value addition in local economic development. This research provides practical implications for product development strategies and policy recommendations for supporting the sapodilla processing industry at the regional level.

1. INTRODUCTION

Angkola Muaratais Sub-district, located in South Tapanuli Regency, has excellent potential in producing sawo fruit (Manilkara zapota L). Based on statistical data, this region occupies the second position as the largest sawo producer in South Tapanuli Regency, with a land area of 695.80 Ha and an annual production of around 5,557.80 tons (Badan Pusat Statistik Tapanuli Selatan, 2023). Sawo has high nutritional value and various health benefits as revealed in studies (Budiarto et al., 2023; Elfrida et al., 2020; Hakim, 2017; Rohmah, 2022; Sukaris et al., 2023), which showed significant antioxidant, vitamin A, and fiber content in sawo fruit. Miranda (2022) also confirmed the potential of sawo as an important source of nutrients in the daily diet.
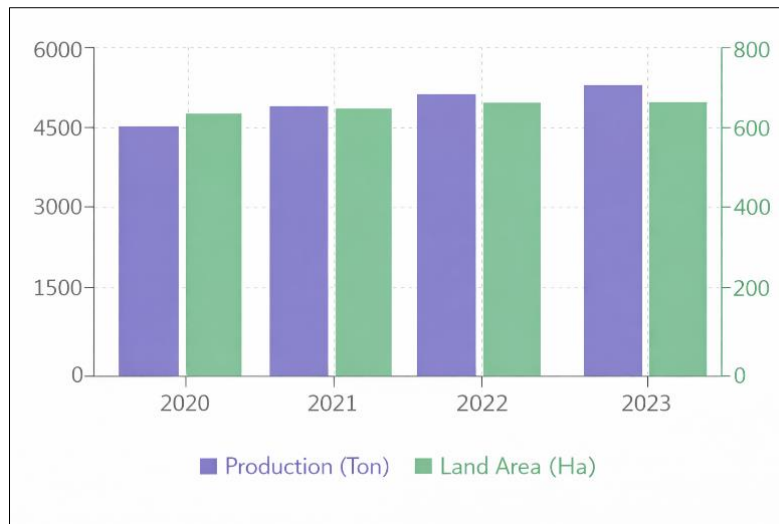
Figure 1. Development of Sawo Production and Land Area in Angkola Muaratais
Source: data processed by researchers, 2024

Despite its significant production, the economic value of mustard fruits has yet to be optimally utilized. The main problems are limited product diversification and traditional post-harvest processing (Bano & Ahmed, 2017). Kunyamee et al. (2010) and Liu et al. (2019) in their research identified that proper post-harvest processing can significantly increase the added value and shelf life of mustard fruits. This is in line with the findings of Baskar and Padmini (2015a), (2015b); Ms. Vaishali Wankhade, Ms. Sonali Wankhade and Mrs. Bhagyashri Patil (2015); dan Coimbra et al. (2022) who emphasized the importance of innovation in processing to improve the competitiveness of local agricultural products.

Other challenges in the development of sawo products include limited processing technology, lack of variety of processed products, and need for wider market access. Moura et al. (2019) revealed that diversification of agricultural products can contribute significantly to increasing farmers' income and local economic development. On the other hand, there are great opportunities in the development of mustard products, especially with the increasing consumption trend of natural and healthy products. Liu et al. (2019) found that bioactive components in mustard have potential anti-inflammatory and anti-HIV activities, which opens up opportunities for developing high value-added products.

The development of sawo products is in line with the Green Economy concept promoted by Pearce (1992), which emphasizes the importance of creating economic added value while paying attention to environmental sustainability aspects. Elkington (1997) through the Triple Bottom Line concept also emphasizes the importance of the balance between profit, people, and planet in sustainable business development. Muchammad et al. (2023) added that marketing digitalization can be an effective strategy in increasing sales of agricultural products, including processed sawo products.

In terms of policy, the development of sawo products supports government programs in strengthening the local economy and food security. This is in line with the Sustainable Development Goals (SDGs), especially in poverty alleviation and responsible production-consumption. Ramin (2023) in his research, he found that innovation in local product processing can positively impact farmers' income and regional economic development.

Based on the description above, this study aims to identify the potential for diversified products from sawo fruit that need to be optimally utilized and have market opportunities in Angkola Muaratais District. This research is important considering the large potential of sawo production in the region and the limited utilization of high value-added processed products. Rasmikayati, Karyani and Saefudin (2024) emphasized that consumers in urban areas are increasingly aware of the health benefits of local products, which opens up great opportunities for the development of sawo products. The results of this research are expected to make a real contribution to local economic development as well as become a model for sustainable agricultural product development in Indonesia.

2. METHOD

The research used a mixed-method approach, combining qualitative and quantitative methods. According to Sugiyono (2017), this approach enables a more comprehensive understanding of the phenomenon under study through data triangulation and analysis. The research was conducted in Angkola Muaratais Sub-district, South Tapanuli Regency, during six months from July to December 2024. The selection of the location was based on the potential of this region as one of the mustard production centers with a land area of 695.80 ha and an annual production of around 5,557.80 tons (Badan Pusat Statistik Tapanuli Selatan, 2023).

The study population consisted of three main groups, including farmers and workers (21 people), sawo processing MSME entrepreneurs (1 person), and consumers of sawo products (30 people). The sampling technique used the census method for the group of farmers and MSME entrepreneurs, considering their limited number. In contrast, simple random sampling was applied for the consumer group by taking 20 people as samples. This sampling approach refers to Babbie et al. (2001), which recommends combining sampling methods for heterogeneous populations with different characteristics.

Data collection was conducted through two main sources, namely primary and secondary data. Primary data was obtained through in-depth interviews, structured questionnaires, and participatory observation. Bachri (2010) emphasizing the importance of triangulation of data collection methods to increase the validity of qualitative research. Secondary data was collected through literature studies, statistical data, and other supporting documents. The research instruments included a structured questionnaire with 27 questions covering ten main aspects, a semi-structured interview guide, and a structured observation sheet.

The research instruments were developed with attention to validity and reliability (Seran, 2020). The validity test involved a sample of 3 salak farmers, 2 MSME entrepreneurs, and 5 consumers, including content validity and construct validity. Content validity was assessed by experts using a Likert scale, resulting in good average scores for relevance (4.6), clarity (4.6), and representation (4.4). Construct validity was tested through Exploratory Factor Analysis (EFA), showing satisfactory loading factors for all aspects measured: market awareness (0.75), quality assessment (0.80), innovation interest (0.72), and price perception (0.65).

Data analysis used a mixed-method approach that integrated qualitative and quantitative analysis. The qualitative analysis included data reduction, data presentation, and conclusion drawing, as Rukin (2019) suggested. Meanwhile, quantitative analysis included descriptive statistics to process survey data and a product evaluation matrix to assess development potential. In the Product Evaluation Matrix, several formulas were used, such as:

a. Calculate Weighted Score

$$WS = \sum (Wi \times Si)$$

Where:
WS = Weighted Score
Wi = Weight of criterion i
Si = Criteria score i

b. Calculating Product Performance Index (PPI)

$$PPI = \frac{\sum WS}{\sum max} \times 100$$

Where:
PPI = Product Performance Index
WS = Weighted Score
Wmax = Weighted maximum score

To assess Market Potential Analysis, the following formulas are applied:

a. Market Size Estimation

$$TAM = P \times Q$$

Where:
TAM   = Total Available Market
P   = Target population
Q   = Average consumption per capita

SAM = TAM × MS
Where:
SAM   = Serviceable Available Market
MS   = Market share that can be served (%)

SOM = SAM × CR
Where:
SOM   = Serviceable Obtainable Market
CR   = Conversion rate (%)

b. Price Sensitivity Measurement

$$\text{OPP} = \sqrt{(PMH \times PMT)}$$

Where:
OPP   = Optimal Price Point
PMH   = Price Maximum High
PMT   = Price Maximum Threshold

In Financial Feasibility Analysis, the following calculations are used:
a. Return on Investment (ROI)

$$\text{ROI} = \left[\frac{(TR - TC)}{TC}\right] \times 100\%$$

Where:
TR   = Total Revenue
TC   = Total Cost

b. Break Even Point (BEP)

$$\text{BEP unit} = \frac{FC}{(P - VC)}$$

Where:
FC   = Fixed Cost
P   = Price per unit
VC   = Variable Cost per unit

In Competitive Analysis :
a. Market Share Index

$$\text{MSI} = \left(\frac{UP}{TP}\right) \times 100\%$$

Where:
MSI = Market Share Index
UP = Sales Unit
TP = Total Market Sales

b. Competitive Position Index

$$\text{CPI} = \left(\frac{CS}{TS}\right) \times 100\%$$

Where:
CPI = Competitive Position Index
CS = Company Score
TS = Total Industry Score

The research was conducted in three main stages as recommended by Zakariah, Afriani and Zakariah (2020). The preparation stage includes the preparation of instruments and licensing arrangements. The implementation stage focused on data collection through surveys, interviews, and observations. The analysis stage provides data processing, results interpretation, and recommendations preparation. Each stage was carried out systematically by paying attention to scientific research principles and ethics. Data triangulation was conducted to ensure the validity of the findings by comparing data from various sources and collection methods.

3. RESULTS AND DISCUSSION

Result

Respondent and Market Characteristics

Table 1. Education Level of Respondents

Respondent Category	Elementary / Junior High School	High School/ Vocational School	Diploma/ Graduate	Total
Farmer & Worker	12	8	1	21
MSME Entrepreneurs	0	0	11	11
Consumers	2	10	8	20
Total	14	18	20	42

Source: data processed by researchers, 2024

Of the total 42 respondents involved in the study, the composition consisted of farmers (1 person), farm workers (20 people), MSME entrepreneurs (1 person), and consumers (20 people). As seen in the graph above, the respondents' level of education varied with the dominance of high school/vocational school graduates (42.9%) and elementary/junior high school graduates (33.3%). This is in line with the findings of Burhansyah (2016) which indicate that the education level of agricultural business actors can influence the adoption of technology and innovation in product processing. For example, a study conducted in West Sumatra found that farmers with good formal education were better able to adopt new technologies in cocoa cultivation, leading to improved quality and productivity (Hasan & Roswita, 2017). On the other hand, low levels of education can be a barrier for farmers in adopting new technologies. Research shows that farmers with low education often need more confidence in applying new technologies and are more likely to maintain existing traditional practices (Dewi & Rahmawati, 2020; Juniarti et al., 2022).

In terms of age, the majority of respondents (75%) were in the productive age group of 20-40 years, with male gender dominance reaching 73.8%. Zuhriyah et al. (2024) and Juniarti et al. (2022) stated that the productive age group has greater potential in developing agricultural product innovations. This demographic distribution provides an overview of the development potential that can be adapted to the characteristics of business actors.

Potential Analysis Of Sawo Diversification Products

An analysis of the potential of mustard diversification products was conducted to identify opportunities for developing new products with added value and competitiveness in the market. The evaluation includes existing products and mapping potential products that can be developed.

a. Evaluation of Existing Products

Table 2. Evaluation of Existing Sawo Products

Product Type	Utilization Rate (%)	Added value (× raw price)	Competitiveness (1-5)
Fresh Sawo	40%	1.0×	3.2
Sawo Syrup	25%	3.0×	3.8
Sawo chips	20%	4.0×	4.1
Sawo jam	15%	2.5×	3.5

Source: data processed by researchers, 2024

Based on the data above (Table 2), the utilization of sawo is still dominated by the sale of fresh fruit (40%). This is in line with the findings of Martadona, Purnamadewi and Najib (2014) which show that processed products still have a large development space, especially in increasing added value and competitiveness in the market. Sawo chips currently generate the highest added value with an increase of 4 times the price of raw materials, but the production volume is still limited.

b. Potential Product Mapping
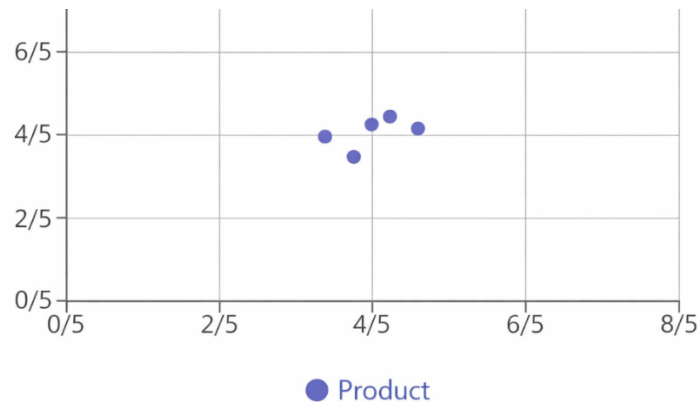
Figure 2. Product Potential Matrix (Ease of Production vs Market Interest)
Source: data processed by researchers, 2024

The graph above shows the mapping of potential products based on ease of production and market interest. Premium syrup and variant chips show the highest potential with scores above 4.0 for both dimensions. Warkianto Widjaja et al. (2022) asserts that a balance between ease of production and market interest is key to successful new product development.

c. Product Evaluation Matrix

Table 3. Potential Product Evaluation Matrix

Criteria (Weight)	Premium Syrup	Variant Chips	Natural Jam	Sawo Juice	Sawo Dodol
BB Availability (25%)	4.5	3.8	4.2	4.0	3.5
Ease of Process (20%)	4.0	3.5	4.2	3.8	3.2
Storability (15%)	4.5	4.2	3.8	3.5	4.0
Added value (20%)	4.0	4.5	3.8	3.7	3.8
Market Interest (20%)	4.2	4.5	3.5	4.3	3.6
Total Score (100%)	4.24	4.08	3.92	3.88	3.61
Rating	1	2	3	4	5

Source: data processed by researchers, 2024

Based on the evaluation matrix, premium sawo syrup ranked highest with a total score of 4.24, followed by sawo chips variant (4.08). This analysis uses the multi-criteria approach developed by Kumar et al. (2024) for the evaluation of processed agricultural products. Each criterion was weighed based on its importance in determining the product's success.

Analysis of the product evaluation matrix revealed several interrelated findings. Regarding raw material availability, premium syrup showed superiority with the highest score (4.5) due to the optimal efficiency of raw material use, where one kilogram of sawo can produce more final products than others. Meanwhile, mustard chips show a lower score (3.8) because it requires high selectivity in the selection of fruit maturity levels, which results in lower raw material utilization rates.

In terms of ease of production, natural jam leads with a score of 4.2 due to the simplicity of the process, which only requires basic equipment and minimal steps. This contrasts with sawo dodol production, which recorded the lowest score (3.2) due to the complexity of the process, which requires specialized skills and longer processing time. This finding is in line with research by Kumar

et al. (2024) which emphasizes the importance of process efficiency in the development of processed agricultural products.

Analysis of product storability showed the superiority of sawo syrup and chips with scores of 4.5 and 4.2, respectively. Both products have good durability at room temperature with a shelf life of up to 6-12 months. In contrast, sawo juice faces challenges in preservation with a score of 3.5 as it requires special handling and cold chain to maintain quality. Bangar et al. (2022) in their study also confirmed that storability is a critical factor in the development of processed fruit products.

In terms of economic value added, the chips variant shows the highest potential with a score of 4.5, capable of generating gross margins of up to 70-80% of the cost of production. Beverage products such as sawo juice show moderate added value (3.7) due to tougher competition in the beverage market. Meanwhile, from a market interest perspective, the variant chips and sawo juice received very positive responses from consumers with scores of 4.5 and 4.3, indicating promising market acceptance. Traditional products such as jam and dodol showed moderate interest (3.5-3.6), which according to Muchammad et al. (2023) reflects the shifting preferences of modern consumers towards more practical and innovative products.

Market Feasibility Analysis

A market feasibility analysis was conducted to evaluate the potential acceptance of mustard-diversified products in the market. This study includes consumer preferences, competitive analysis, market segmentation, and estimation of overall market potential.

a. Consumer Preferences

Figure 3. Consumer Preference Radar Diagram (Scale 1-5)
Source: data processed by researchers, 2024

The results of the consumer preference analysis show an interesting pattern in the acceptance of sawo products. The radar chart above shows the preference comparison between premium and regular products on various dimensions. Taste is the most important factor with a score of 4.5 for premium products, followed by packaging (4.3) and health benefits (4.2). This finding aligns with research Gamboa-Gamboa et al. (2019) that identified a shift in modern consumer preferences that prioritizes product quality and health value.

Table 4. Factors Influencing Purchasing Decisions

Factor	Weight (%)	Urgency
Taste and Quality	30	Very High
Health Benefits	25	High
Price	20	Medium
Packaging	15	Medium
Availability	10	Low

Source: data processed by researchers, 2024

Table 4 shows that the main factors influencing purchasing decisions are product taste and quality, with a weight of 30% and an urgency level of "Very High." This indicates that consumers are very concerned about taste and quality as a top priority when choosing a product. The health benefit factor has a weight of 25% and an urgency of "High," indicating that the health aspect of the product is also an important consideration for consumers, although not as crucial as taste and quality.

Product price, with a weight of 20% and an urgency of "Medium," indicates that consumers pay attention to price, but this factor is not a major consideration. Product packaging and availability, weighing 15% and 10%, have an urgency of "Medium" and "Low," respectively. This indicates that, while important, the appearance of the packaging and accessibility of the product are not as important as the taste, quality or health benefits in influencing purchase decisions. Overall, this table indicates that consumers prioritize intrinsic quality and product benefits over external factors such as price or packaging.

b. Competitive Analysis
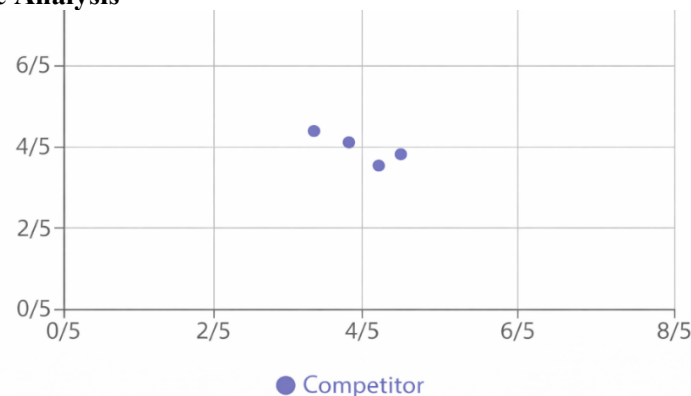
Figure 4. Competitor Positioning Map Diagram (Price vs Quality)
Source: data processed by researchers, 2024

Competitive analysis reveals the strategic positioning of mustard products in the market. Competitor mapping shows that mustard products have an advantage in the aspect of quality (4.2/5) with a competitive price (3.5/5). Liu, Cao and Liu (2019) stated that the right positioning between quality and price is the key to the success of processed agricultural products.

c. Market Segmentation

Table 5. Market Segmentation Profile of Sawo Diversified Products

Number	Health-Conscious Segment	Convenience Seeker	Traditional Value Seeker
Market Share			
Characteristics	25-40 years old, higher education	18-35 years old, urban	Age >40 years old, suburban
Preferences	Natural products, low sugar	Practical packaging, innovative flavors	Traditional flavors, affordable price
Price sensitivity	Low	Medium	High
Potential value	High	Medium-high	Medium

Source: data processed by researchers, 2024

The market segmentation analysis identified three main consumer groups with different characteristics and preferences. The health-conscious segment, which accounts for 35% of the total market, shows high concern for health aspects and product quality, with the highest scores on health benefits (4.9/5.0) and product quality (4.8/5.0) attributes. This group is dominated by consumers aged 25-40 with a high educational background and good purchasing power, have low price sensitivity (3.5/5.0) but are very concerned about nutritional information and product certification.

The largest segment is convenience seekers, which represents 40% of the market. This segment reflects the characteristics of modern urban consumers who prioritize practicality. This segment places the highest value on packaging (4.8/5.0) and product innovation (4.5/5.0), with a demographic profile of 18-35 year olds and a dynamic urban lifestyle. Price sensitivity is at a moderate level (3.8/5.0), indicating a balance between quality and value offered.

Traditional value seekers, who make up 25% of the market, show a more conservative consumption pattern with a primary focus on price (4.8/5.0) and basic quality (4.0/5.0). This group, dominated by consumers over the age of 40, shows minimal interest in innovation (2.8/5.0) and packaging design (3.0/5.0), but is highly loyal to products with traditional flavors.

This analysis provides the basis for a more targeted product development strategy, where product variations and marketing strategies can be tailored to the specific preferences of each segment. Kumar et al. (2024) support this segmentation approach, stating that product customization based on segment characteristics can significantly increase the effectiveness of market penetration.

Table 5. Target Market Priority Matrix

Criteria	Weight (%)	Health Conscious	Convenience Seeker	Traditional Value
Market Size	25%	4.2	4.5	3.8
Growth Potential	20%	4.5	4.2	3.5
Profitability	25%	4.3	3.8	3.2
Accessibility	15%	3.8	4.2	4.0
Competition	15%	4.0	3.5	3.8
Total Score	100%	4.18	4.07	3.64

Source: data processed by researchers, 2024

d. Market Potential

The market potential estimation shows promising prospects for the mustard diversification product, with market segmentation that allows for gradual penetration.

1. Market Size Estimation

Based on the Market Size Estimation, the Total Available Market (TAM) for this product is estimated at 150,000 potential consumers, which is the total number of consumers who may be interested in the product. Of this number, the Serviceable Available Market (SAM) or consumers who can realistically be served is 75,000. Furthermore, the Serviceable Obtainable Market (SOM), or the market segment that can be effectively reached under existing operational and marketing conditions, is estimated at 15,000 consumers. This data suggests that, with the right marketing strategy, sawo diversified products have a significant opportunity to attract a larger market share in the future.

2. Sales Projection

Table 6. Sales Projection

Product Category	Unit/Month	Price/Unit	Revenue/Month
Premium	1,000	Rp 25,000	Rp 25,000,000
Regular	1,500	Rp 18,000	Rp 27,000,000
Basic	800	Rp 15,000	Rp 12,000,000
Total	3,300		Rp 64,000,000

Source: data processed by researchers, 2024

This table displays monthly sales projections for various product categories. With total sales of 3,300 units, the estimated total monthly revenue reaches Rp 64,000,000. This market feasibility analysis indicates significant potential for the development of mustard diversified products, especially in the health-conscious and convenience seeker segments. Herlinda et al. (2023)

emphasized that an in-depth understanding of consumer preferences and proper market segmentation are important foundations in the development of successful processed agricultural products.

e. Swot Analysis Of Diversified Products

SWOT analysis was conducted to identify internal and external factors affecting the development of sawo diversification products. This analysis is important to formulate the right development strategy according to the existing conditions.

1). Internal Analysis

Figure 5. Internal Factor Evaluation Diagram (Scale 1-5)
Source: data processed by researchers, 2024

The analysis of internal factors reveals some significant strengths and weaknesses in the development of mustard diversified products. Based on the chart above, product quality shows the highest strength score (4.5) with minimal weakness (1.5), while aspects of human resources and production technology still show weaknesses that need to be addressed. As stated by Chatra (2021), consistent product quality is an important asset in developing processed agricultural products.

2). External Analysis

Table 7. External Factor Evaluation Matrix

External Factors	Weight	Rating	Score	Description
Opportunities				
Market Growth	0.20	4.5	0.90	Growth of 15-20%/year
Health Awareness	0.15	4.2	0.63	Healthy product trends
Digital Marketing	0.15	4.0	0.60	Online penetration
Threat				
Competition	0.20	3.8	0.76	Substitute products
Price Fluctuation	0.15	3.5	0.53	Raw materials
Technology Change	0.15	3.2	0.48	Technology gap
Total	**1.00**		**3.90**	

Source: data processed by researchers, 2024

This table presents the evaluation of external factors with weights and ratings for each factor, as well as the scores obtained. The total matrix score is 3.90, which describes the overall evaluation of external opportunities and threats in the business environment.

3). SWOT Matrix

Based on the internal and external analysis, a SWOT matrix was developed to formulate a development strategy

Table 8. Matriks SWOT

	Strengths	**Weaknesses**
Opportunities	**SO strategy**	**WO Strategy**
Market Growth	Development of health-based premium variants	Modernization of production technology
Health Awareness	Optimization of digital marketing and e-commerce	Continuous HR training program
Digital Marketing	Brand story and positioning development	Standardization of production process
	Application-based loyalty program	Integrated consumer education
Threat	**ST strategy**	**WT Strategy**
	Product differentiation and variant innovation	Operational efficiency and automation
	Strengthening quality control	Strategic partnership with MSMEs
	Premium packaging development	Collaboration with research centers
	Farmer contracts and supply chain management	Establishment of producer association

Source: data processed by researchers, 2024

This SWOT matrix shows that the development of sawo diversification products has great potential if supported by the right strategy. Manik, Adrianto and Subagiyo (2013) emphasized the importance of a holistic approach in agricultural product development, including production, marketing, and human resource development.

Table 9. Implementation Timeline

Short Term (0-6 months)	Medium Term (6-12 months)	Long Term (>12 months)
Product standardization	Technology modernization	R&D center
Premium variant development	Distribution expansion	Certification
Basic training	Consumer education	Regional expansion

Source: data processed by researchers, 2024

f. Product Development Recommendations

Based on the results of a comprehensive analysis of the potential of mustard-diversified products, the following outlines structured development recommendations for optimizing market opportunities.

1. Development Priority
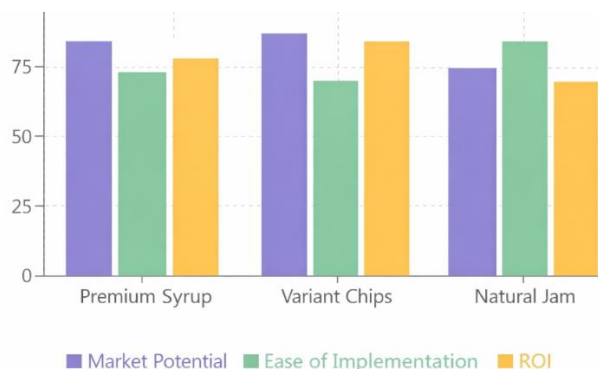
Figure 6. Product Development Priority Evaluation Chart (%)
Source: data processed by researchers, 2024

2. High Priority Products (Score >80%)

The graph above (Figure 6) shows that variant chips and premium syrup have the highest development potential. According to research Schilling and Hill (1998), focusing on products with high scores can optimize resources and accelerate market penetration. These two products have an ideal combination of market potential, ease of implementation, and projected ROI (Table 8).

Table 10. High Priority Development Plan

Aspect	Chip Variants	Premium Syrup
Target Market	Age 20-35, Urban lifestyle	Health Conscious, Premium segment
Product Innovation	- New flavor variants	- Organic formula
	- Premium packaging	- Exclusive packaging
	- Size variants	- Zero sugar option
Distribution Channels	- Modern retail	- Specialty store
	- Online marketplace	- Direct to consumer
	- Food service	- Health food store
Timeline	3-6 months	4-8 months
Investment	Rp 50-75 million	Rp 75-100 million
Expected ROI	85% (12 months)	80% (12 months)

Source: data processed by researchers, 2024

3. Medium Priority Products

Medium priority products such as natural jams, which have a high implementation score (85%) but moderate mrket potential (75%), require a phased development strategy to match market needs. According to Amajuoyi, Benjamin and Adeus (2024), products in this category benefit from an iterative approach, which allows for gradual adaptation and improvement based on market response. Recommended strategic steps include formula development to strengthen product appeal, shelf life enhancement to add functional value, packaging diversification to make it more appealing to consumers, and phased market testing to gauge market acceptance before conducting a large-scale launch. These strategies aim to ensure that the products meet consumer needs while maintaining quality and competitiveness in the market.

**g. Implementation Strategy**

1. Technical Aspects of Production

Table 11. Production Process Stages and Budget Allocation

Stage	Timeline	Budget (Rp)	PIC
Standardization	1-2 months	25 million	Prod. Manager
Equipment Modernization	2-3 months	50 million	Technical Dir.
HR Training	1-2 months	15 million	HR Manager
Quality Control	Ongoing	10 million/month	QC Team

Source: data processed by researchers, 2024

The implementation of mustard diversified product development requires a systematic and structured approach that covers various operational aspects. In terms of technical production, the implementation stage begins with process standardization, which is planned for 1-2 months with a budget allocation of IDR 25 million, under the responsibility of the Production Manager. This stage is followed by the modernization of production equipment which takes 2-3 months with an investment of IDR 50 million, which the Technical Director will directly supervise. A parallel HR training program is planned to last 1-2 months and have a budget of IDR 15 million under the coordination of the HR Manager. As emphasized by Kehoe (2012), a sustainable quality control system with an allocation of Rp 10 million per month is a critical component to ensure product quality consistency.

2. Marketing Aspect
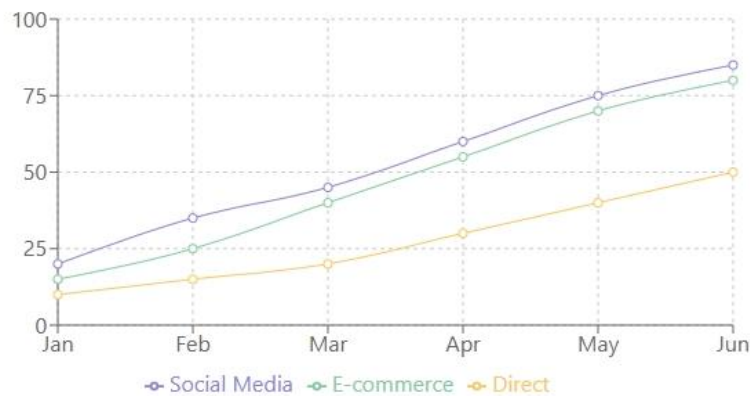
Figure 7. Diagram of Projected Digital Market Penetration (%)
Source: data processed by researchers, 2024

The marketing aspect of mustard diversification products shows a promising trend based on the projection of digital market penetration. The analysis shows significant growth in three main channels: social media, e-commerce, and direct marketing. Social media marketing showed the fastest growth from 20% in the first month to 85% in the sixth month, followed by e-commerce which grew from 15% to 80%. Direct marketing, although more moderate, still showed a consistent increase from 10% to 50%. Kanellos et al. (2024) emphasized that the integration of digital channels is the key to successful marketing of processed agricultural products in the modern era.

This digital marketing strategy is supported by several integrated programs that aim to strengthen brand presence and drive consumer engagement. First, content marketing focuses on educating consumers about the product's health benefits, which is expected to increase consumer awareness of the product's added value. In addition, collaborations with local influencers and food bloggers helped expand audience reach through relevant and authentic recommendations. A mobile app-based loyalty program was also introduced to increase customer retention by offering ongoing incentives. Optimization of marketplaces and e-commerce platforms was carried out to facilitate consumers' access to products online. As a complement, offline marketing events were held to strengthen brand awareness and create hands-on experiences for consumers, ensuring that the brand remains present in their daily lives.

a. Indicators of Success

Table 12. Key Performance Indicators (KPIs) for Production, Marketing, and Finance

Production KPI	Marketing KPI	Financial KPI
Production efficiency: 85%	Market penetration: 15%	Gross margin: >40%
Reject rate: <5%	Brand awareness: 60%	Operating profit: >25%
Quality consistency: >90%	Customer retention: 70%	ROI: >80%
Capacity utilization: 75%	Sales growth: 20%/year	Payback period: <18 months

Source: data processed by researchers, 2024

Indicators of successful implementation are measured through a comprehensive set of Key Performance Indicators (KPIs). Regarding production, the efficiency target was set at 85% with a maximum reject rate of 5%, supported by a minimum quality consistency standard of 90% and a capacity utilization target of 75%.

In terms of marketing, the market penetration target was set at 15% with the expectation of brand awareness reaching 60%. Customer retention is targeted at 70% with projected sales growth of 20% per year. The financial aspect set a gross margin target of at least 40% and

operating profit above 25%, with an expected ROI of at least 80% and a payback period of less than 18 months.

The monitoring and evaluation system is designed to be tiered, starting from weekly operational reviews to ensure smooth production processes, monthly performance reviews to track target achievement, quarterly strategic reviews for strategy evaluation and adjustment, to annual comprehensive evaluations to assess the achievement of the entire program. El Bilali (2019) emphasizes the importance of this multilevel evaluation system to ensure the sustainability and adaptability of agricultural product development programs.

Discussion

The study's results revealed significant potential in the development of mustard diversification products in Angkola Muaratais District. Based on the product evaluation matrix, premium sawo syrup showed the highest potential with a total score of 4.24/5.0, followed by variant sawo chips (4.08/5.0) and natural sawo jam (3.92/5.0). These findings indicate that diversified sawo products have promising market opportunities, especially for consumer segments that prioritize health and quality.

The consumer preference analysis shows a clear segmentation with the dominance of health-conscious (35%) and convenience-seeker (40%) groups. This pattern reflects the shifting preferences of modern consumers who are increasingly concerned with health aspects and practicality in selecting food products. The projected digital market penetration of 85% in 6 months through social media and e-commerce indicates the importance of digital marketing strategies in product development.

This study's findings align with the results of a study Bangar et al. (2022) that identified an increasing trend in demand for processed agricultural products with high added value. However, in contrast to the study Balogh et al. (2016) which found the dominance of traditional flavor preferences, the results of this study indicate a consumer tendency towards product innovation and new variants. Kumar et al. (2024) in their study also emphasized the importance of technology integration in agricultural product development, which is confirmed in the findings of this study through the need for modernization of production processes.

The results of this study make a significant contribution to the development of the theory of agricultural product diversification and local product marketing. The product evaluation model developed in this study enriches the understanding of critical factors in local resource-based product development. This research also supports the Green Economy theory proposed by Pearce (1992) on the importance of sustainable added value in local economic development.

The research findings provide practical guidance for business actors in developing sawo diversified products. The recommended phased implementation strategy allows for efficient resource allocation and risk minimization. Muchammad et al. (2023) emphasized that this phased approach is effective in the development of value-added agricultural products.

In addition to these practical implications, the research results also have an important impact on developing supporting policies for the sawo processing industry at the regional level. Some of the recommendations include facilitating access to technology and capital to improve productivity and production efficiency. In addition, human resource capacity-building programs need to be developed to strengthen the skills and knowledge of industry players. Another recommendation is the development of product quality standards, which aims to maintain consistency and consumer confidence in processed sawo products. Finally, support in marketing and promotion is also urgently needed to expand market share and increase the competitiveness of local products in the wider market.

Although this study provides various contributions, several limitations need to be considered. In terms of methodology, the research sample, which is limited to one sub-district, may only partially represent the potential of the wider market. Time constraints also limit the observation of seasonal consumption patterns. Amarasinghe, Shah and Singh (2007) showed that consumption patterns of agricultural products can vary significantly by season.

The development of diversified sawo products has strong relevance to the local socio-economic context. As a regional superior commodity, sawo has not only economic value but also cultural value

for the Angkola Muaratais community. The integration of local values in product development, as suggested by Hoaihongthong and Tuamsuk (2024) can strengthen the product's position in the market.

Further research is needed to explore several important aspects that can improve product development and competitiveness of the processed sawo industry. First, optimization of product formulations to increase shelf life is a key focus so that products can last longer and maintain their quality until they reach consumers. In addition, developing more efficient processing technologies also needs to be researched to increase productivity and reduce production costs. Long-term economic impact studies are also a priority to understand the industry's contribution to the local economy and its potential for the future. Finally, an analysis of consumer preferences in the wider market will provide greater insight into consumer needs and wants, which can be used to develop more effective marketing strategies.

This research confirms the significant potential for mustard diversified product development in Angkola Muaratais Sub-district. Successful development depends on appropriate strategies, stakeholder support, and adaptability to changing market preferences. This research's contribution lies in identifying specific opportunities and formulating a comprehensive development strategy to optimize the potential of sawo as a regional superior commodity.

CONCLUSION

The research conducted in Angkola Muaratais Sub-district aims to identify potential diversified products from sawo fruit that need to be optimally utilized and have market opportunities. The results of the comprehensive analysis revealed that there are three superior products with the highest development potential, namely premium sawo syrup, variant sawo chips, and natural sawo jam. Premium sawo syrup shows the highest evaluation score (4.24/5.0) with advantages in the aspects of raw material availability, optimal shelf life, and high value-added potential. Variant mustard chips with a total score of 4.08/5.0 stood out in terms of market interest and maximum added value, while natural mustard jam (3.92/5.0) excelled in ease of production process and efficient utilization of raw materials.

Market feasibility analysis indicates significant potential with a Total Available Market of 150,000 consumers and a Serviceable Obtainable Market of 15,000 consumers. Projected 15-20% market growth per annum with an average product acceptance rate above 80% indicates promising development prospects. Market segmentation identified three main consumer groups: health-conscious segment (35%) who focus on health benefits with a willingness to pay a premium, convenience seekers (40%) who prioritize ease of consumption, and traditional value seekers (25%) who are oriented towards affordable prices with loyalty to traditional flavors.

The results of the SWOT analysis provided the foundation for the development of a strategy that focuses on developing premium products for the health-conscious segment, optimizing digital marketing with a projected penetration of 85% in 6 months, standardizing production processes, and developing human resources and modernizing technology. The development program is designed in stages, starting with standardization and premium variant development in the short term, followed by distribution expansion and consumer education in the medium term, and R&D development and regional expansion in the long term.

The findings of this study support the results of Bangar et al. (2022) on the significance of agricultural product diversification in increasing economic added value, and are in line with Liu et al. (2019) on the importance of a market-driven approach in agricultural product development. Overall, the potential for the development of diversified sawo products in Angkola Muaratais District shows very positive prospects, supported by adequate availability of raw materials, high market interest, and significant value-added opportunities. Successful development program implementation will depend on proper strategy execution and collaborative support from all relevant stakeholders.

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