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Table of Content

Research Article

Determinants of Indonesia's Plantation Commodities Trade Flows with ASEAN: Insights from a Gravity Model Approach

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ABSTRACT

The trade relationship between Indonesia and ASEAN countries in plantation products exhibits fluctuations in export and import activities. This study aims to identify the factors influencing Indonesia's Plantation Commodities Trade Flows with ASEAN countries. The research utilizes secondary data from eight ASEAN countries-Indonesia, Cambodia, Malaysia, Singapore, Thailand, Vietnam, Myanmar, and the Philippines-over a 15-year period (2008–2022). A panel data regression analysis, based on the Gravity Model, was conducted to achieve the research objectives. The variables examined include Indonesia's Plantation Commodities Trade Flows, Indonesia's GDP, partner countries' GDP, exchange rates, economic distance, population, and inflation. The analysis revealed that fluctuations in Indonesia's Plantation Commodities Trade Flows are driven by variations in export and import values. The regression results identified Indonesia's GDP, partner countries' GDP, economic distance, and exchange rates as significant factors affecting trade flows, while population and inflation had no significant impact.

INTRODUCTION

International trade plays a crucial role in enhancing the economic performance of participating countries. It occurs through agreements and cooperation between nations, encompassing both import and export activities. By specializing in the production of specific goods and services, countries can boost their economic growth (Amir et al. 2020). The primary objective of international trade is to provide mutual benefits to the nations involved by facilitating the exchange of competitive products (Ibrahim & Halkam, 2021). Countries often rely more on exports than imports to stimulate economic growth. A stronger emphasis on exports can lead to increased national income and overall economic expansion.

The flow of export and import trade significantly influences a country's economic growth. Both exports and imports exert considerable effects in both the long and short term (Astuti & Ayuningtyas, 2018; Hodijah & Angelina, 2021). While export activities enhance the economy and positively impact the economic sector, imports can have an adverse effect by potentially hindering economic growth (Puspandari et al., 2022; Nur et al., 2023). As international trade becomes increasingly accessible in terms of market opportunities, developing countries like Indonesia can experience positive effects from open trade if they effectively leverage these opportunities without

becoming overly reliant on imported goods. Conversely, Indonesia may face negative consequences if it fails to capitalize on export opportunities and instead focuses on consuming imports. Thus, adapting to the evolving landscape of global trade presents both challenges and opportunities for Indonesia in this modern era.

The agricultural sector plays a crucial role in international trade, significantly contributing to both exports and imports. In 2022, the value of agricultural product imports reached USD 2,432,287 million, while exports totaled USD 2,325,521 million (see Figure 1). The higher value of agricultural imports compared to exports indicates that many countries still rely on foreign supplies to meet domestic demand. From 2018 to 2022, trade in agricultural products exhibited a general upward trend. The average annual growth rate for agricultural product exports during this period was 6.74%, while imports grew at an average rate of 7.37%. Notably, 2021 witnessed the highest growth, with exports increasing by 18.7% and imports by 19.2%.
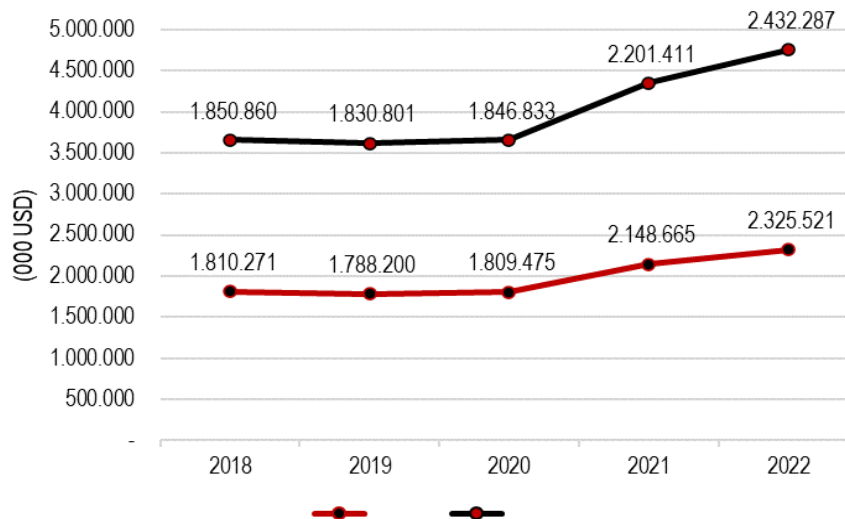
Figure 1. World Export and Import of Agricultural Products
Source: World Trade Organization (2024)

Figure 2 illustrates a significant disparity between the values of exports and imports of Indonesian agricultural products. Exports of agricultural goods consistently exceed import values (see Figure 2). The trends for both exports and imports align with the global patterns observed in agricultural product trade, with both experiencing notable spikes between 2021 and 2022. Over the past five years, the average annual growth rate for agricultural product exports reached 12.40%, while imports grew at an average rate of 7.62%. The most substantial growth in the export rate of Indonesian agricultural products occurred in 2021, increasing by 38.93% compared to the previous year. Similarly, imports also saw their highest growth in 2021, rising by 30.34% from the prior year's figures.

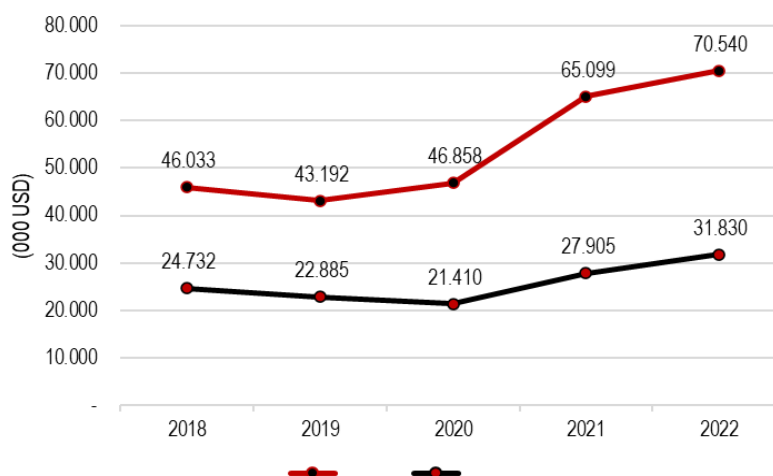**Figure 2.** Export and Import of Indonesian Agricultural Products
Source: World Trade Organization (2024)

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As a country engaged in global trade, Indonesia frequently collaborates with other nations and regional blocs to expand its trade network. A significant part of this cooperation involves neighboring ASEAN countries, due to their geographic proximity. ASEAN, which includes Indonesia, Malaysia, Vietnam, Thailand, the Philippines, Cambodia, Myanmar, Singapore, Timor-Leste, Brunei Darussalam, and Laos, plays a central role in Indonesia's trade activities, particularly in the exchange of agricultural products. Several factors influence a country's decision to engage in international trade. These factors include: 1) the importing country's inability to produce certain goods domestically, which can be sourced from exporting countries; 2) the need to import advanced technologies; 3) the desire to expand and increase market share; and 4) the advantages of product specialization for the exporting country (Ibrahim & Halkam, 2021).

Indonesia collaborates with ASEAN countries to trade its agricultural products, which encompass various subsectors. The plantation subsector, a vital component of the agricultural sector, plays a significant role in both export and import activities. It is essential for trade flows, particularly regarding Indonesia's agricultural trade. Indonesia boasts a diverse range of plantation products with competitive advantages in international markets. For instance, coconut products, including copra, coconut oil, and coconut cooking oil (Rinaldi & Karyani, 2015), have a comparative advantage in Malaysia (Darnita et al., 2021). The palm oil commodity, which represented a substantial 55.33% share of the global market from 2012 to 2019, demonstrates strong competitiveness, particularly in India, the Netherlands, China, and Kenya (Sulaiman et al., 2024) for its derivative products (Lugo-Arias et al., 2024; Tandra et al., 2022). Other competitive commodities include cocoa, which holds advantages in markets such as China, Malaysia, Germany, Singapore, and the United States (Augustin et al., 2022). Additionally, Indonesia's natural rubber has competitive positioning in Singapore but lacks comparative advantage in Cambodia, Malaysia, Myanmar, and Thailand (Sirait & Wibowo, 2021). Lastly, while coffee maintains a comparative advantage in the international market, its competitiveness has begun to decline (Amanda & Rosiana, 2023). Table 1. provides data on Indonesia's trade flows with ASEAN countries, highlighting its trading partnerships.

METHOD

The research on the export and import trade flows of Indonesia's plantation commodities with ASEAN countries utilizes secondary data, as detailed in Table 1. The analysis employs panel data, which combines cross-sectional and time-series data. Table 1 outlines the types and sources of data utilized in this study.

Table 1. Types and Sources of Data

No	Data	Sources of Data	Unit
1	Exports and imports	ITC Trade Map	USD
2	Gross Domestic Product (GDP)	World Bank	USD
3	Economic distance between countries	CEPII	Km/USD
4	Population	World Bank	individuals
5	Inflation	World Bank	%
6	Exchange rate	World Bank	USD

Source: Data processed, 2024

This research covers a time period of fifteen years, from 2008 to 2022, utilizing time series data. The cross-sectional data includes import and export figures for plantation commodities among ASEAN countries, as well as GDP, economic distance, population, inflation, and exchange rates. The ASEAN countries analyzed in this study are Indonesia, Cambodia, Malaysia, Singapore, Thailand, Vietnam, Myanmar, and the Philippines, selected for their established trade relations in plantation commodities. Laos is excluded from this analysis due to the absence of trade flows in plantation commodities between Indonesia and Laos. The Harmonized System (HS) codes for the plantation commodities examined in this study include HS 0901 (coffee), HS 0902 (tea), HS 1511 (palm oil), HS 2401 (tobacco), HS 4001 (natural rubber), HS 1701 (sugarcane), HS 0907 (cloves), HS 0908 (nutmeg), HS 5201 (cotton), HS 1513 (coconut), and HS 1801 (cocoa).

This study employs quantitative analysis to determine the factors influencing Indonesia's plantation commodities trade with ASEAN countries, utilizing panel data regression based on the Gravity Model approach. According to Gujarati & Porter (2009), panel data regression comprises three types: the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The selection among these models will be conducted using the Chow Test and the Hausman Test. The Chow Test assesses the suitability of either the CEM or FEM, with the following criteria:

H0: If the p-value > 0.05, the CEM is better than the FEM
H1: If the p-value < 0.05, the FEM is better than the CEM.

Conversely, the Hausman Test determines the more suitable model between the REM and FEM, with the criteria as follows:

H0: If the p-value > 0.05, the REM is better than the FEM.
H1: If the p-value < 0.05, the FEM is better than the REM.

Following the selection of the optimal model among the three available options, the analysis will proceed with several tests in the panel data regression utilizing the Gravity Model (Gujarati & Porter, 2009). These tests include the F-test, coefficient of determination (R^2), and t-test. The F-test evaluates whether all independent variables collectively influence the dependent variable. The coefficient of determination, or R^2, quantifies the proportion of variation in the dependent variable explained by the independent variables. In contrast, the t-test assesses the impact of each individual independent variable on the dependent variable.

The study employs panel data regression utilizing the Gravity Model, analyzed through Microsoft Excel and Stata version 17. Pohan et al., (2024) conducted similar research that identifies factors influencing agricultural commodity exports to ASEAN countries. The following section outlines the application of the Gravity Model in this research.

$$\text{Log\_Trade}_{ijt} = \alpha + \beta_1 \text{Log\_GDP}_{it} + \beta_2 \text{Log\_GDP}_{jt} + \beta_3 \text{Log\_EXC}_{ijt} + \beta_4 \text{Log\_JE}_{ijt} + \beta_5 \text{Log\_POP}_{jt} + \beta_6 \text{Log\_INF}_{it} + \varepsilon_{it} \qquad (1)$$

where:
Trade_{ijt} = Export and import of Indonesian plantation commodities to ASEAN countries
GDP_{it} = Gross Domestic Product of Indonesia
GDP_{jt} = Gross Domestic Product of partner countries (ASEAN)
EXCi_{jt} = Exchange rate
JE_{ijt} = Economic distance between Indonesia and partner countries (ASEAN)
POP_{jt} = Population of partner countries (ASEAN)
INF_{jt} = Indonesia's inflation
E_{it} = Error term
α = Constant (Intercept)
β = Slope
t = Year of observation

The operational definitions of the variables used in this study are as follows:
1. Trade Flow refers to the total export and import values of Indonesia's plantation commodities with ASEAN countries, expressed in USD. International trade encompasses the exchange of goods and services between countries. Trade flows involve similar products produced by a country (Ibrahim & Halkam, 2021).
2. Gross Domestic Product (GDP) of Indonesia serves as an indicator of the country's economic development, also measured in USD. An increase in Indonesia's GDP enhances the population's purchasing power to import goods and strengthens the production capacity for exports.
3. GDP of Partner Countries indicates the economic development of each ASEAN nation that trades with Indonesia in plantation products, measured in USD. GDP represents the change in national income within a given year, irrespective of other economic aspects (Ibrahim & Halkam, 2021).
4. Exchange Rate represents the value of the Indonesian currency relative to the currencies of ASEAN partner countries, expressed against the US dollar. Fluctuations in the exchange rate can significantly impact trade volumes. The formula for the exchange rate variable is as follows.

$$\text{Exchange Rate} = \frac{EXC_i}{EXC_j} \qquad (2)$$

Where:
EXC_i = Exchange rate of the Indonesian currency against the US dollar (US$)
EXC_j = Exchange rate of the partner country's currency against the US dollar (US$)

5. Economic Distance measures the geographical distance between Indonesia and ASEAN countries, adjusted for the GDP of each partner country, using the unit Km/USD. The following formula calculates economic distance (Li et al., 2008).

Economic Distance = $\dfrac{Geographic\ Distance\ x\ GDP_j}{\Sigma GDP_j}$ (3)

6. Population represents the number of inhabitants in each partner country. A higher population can influence economic growth positively by enhancing export performance or negatively by increasing imports.

7. Inflation is the sustained increase in the prices of goods and services in Indonesia over a specific period, expressed as a percentage.

RESULTS AND DISCUSSION

Indonesia's Plantation Commodities Trade Flows with ASEAN countries

Trade in Indonesia's plantation products can be evaluated based on the volumes of exports and imports with its trading partner countries. Indonesia engages in trade with eight ASEAN nations: Brunei Darussalam, Thailand, Malaysia, Singapore, the Philippines, Vietnam, Cambodia, and Myanmar. The plantation products involved include Indonesia's key commodities, which are significantly exported to international markets. These commodities comprise coffee, tea, oil palm, tobacco, natural rubber, sugar cane, cloves, nutmeg, cotton, coconut, and cocoa. The trade flow of Indonesia's plantation products is derived from the total value of exports and imports. From 2008 to 2022, the total trade flow of Indonesian plantation products reached approximately 63,000.36 million USD, with an average annual value of 4,200.024 million USD. Figure 3 illustrates the export and import trade flows of Indonesian plantation products with ASEAN countries during the period of 2008-2022.
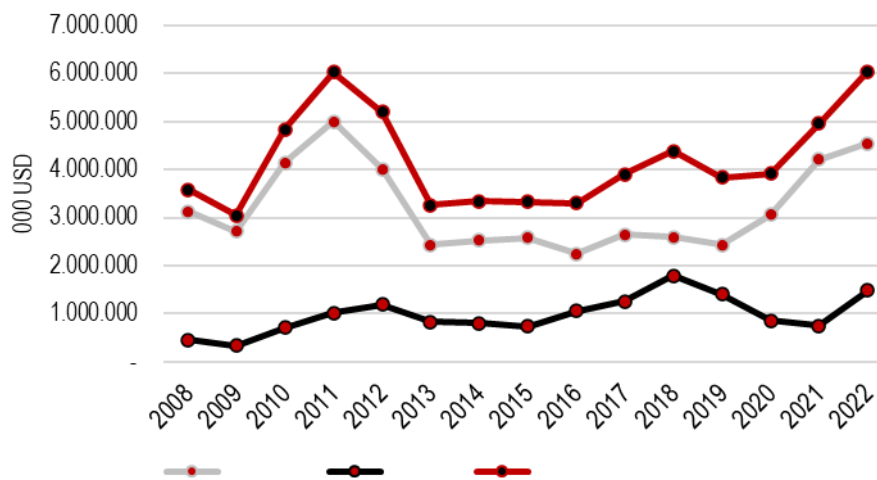
Figure 3. Exports, Imports, and Trade Flows of Indonesia's Plantation Products with ASEAN Countries
Source: Processed Data (2024)

Figure 3 illustrates the fluctuating trade flow of Indonesia's plantation products with ASEAN countries. These trade flows represent the combined total of exports and imports between Indonesia and its ASEAN partners. The graph indicates that the export value of Indonesia's plantation products consistently exceeds the import value, suggesting that Indonesia effectively satisfies its domestic demand for these products, thereby facilitating exports to ASEAN nations. The elevated export value highlights the significant contribution of plantation products to Indonesia's foreign exchange earnings. Additionally, the variability in export values influences the overall trade flow, resulting in corresponding fluctuations.

Over the fifteen-year period from 2008 to 2022, the trade flow of Indonesian plantation products peaked in 2011 and 2022, exceeding 6,000 million USD. In 2011, Indonesia's plantation trade flow with Malaysia reached its highest value of 3,098.905 million USD, primarily due to the substantial export of palm oil, which totaled 1,602.954 million USD. In contrast, the highest plantation trade flow in 2022 occurred with Vietnam, amounting to 1,087.214 million USD. Among the various plantation products, palm oil consistently emerged as the commodity with the

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highest export value, totaling 31,080.627 million USD. Siahaan et al. (2023) highlight that palm oil demonstrates positive growth in both export value and volume, indicating a high level of competitiveness in the global market.

Determinants of Indonesia's Plantation Commodities Trade Flows with ASEAN Countries

The fluctuations in the export and import values of traded plantation products can be attributed to various factors, including Indonesia's Gross Domestic Product (GDP), the GDP of partner countries, exchange rates of partner countries against the USD, economic distance, population dynamics, and inflation rates. This study analyzes the determinants of trade flows of Indonesian plantation products within the ASEAN region using the Gravity Model approach. The Gravity Model employs several analytical frameworks, namely the Fixed Effect Model (FEM), Common Effect Model (CEM), and Random Effect Model (REM). Among these three models, one will be selected based on the results of several diagnostic tests. Table 2 presents the findings of the Chow and Hausman tests conducted to identify the appropriate panel data regression model.

Table 2. Results of Model Fit Test

No	Test	Prob.	Result
1	Chow Test	0,0000	REM
2	Hausman Test	0,4019	REM

The test results presented in Table 2 indicate that the selected model for analysis in this study is the Random Effect Model (REM). The Chow test reveals a p-value of 0.0000, which is less than the significance level of 0.05, confirming that REM is the most appropriate model. Similarly, the Hausman test yields a p-value of 0.4019, which exceeds the significance threshold of 0.05. These findings affirm that the REM is preferred over the Fixed Effect Model (FEM) and Common Effect Model (CEM) for panel regression.

The analysis using the REM produced a p-value of the F-statistic of 0.0000, indicating that all independent variables collectively exert a significant influence on the dependent variable, which is the flow of Indonesian plantation trade with ASEAN countries. Additionally, the REM analysis yielded an R-squared value of 0.7310, suggesting that 73% of the variation in the dependent variable can be explained by the independent variables included in the model, while the remaining 27% is attributable to factors not accounted for in the research model. Table 4 presents the estimation results of the Gravity Model, leading to the formulation of the model equation.

$$Log\_TRADE = -19{,}185 + 0{,}7882711\ Log\_GDP_i + 1{,}579345\ Log\_GDP_j - 0{,}1452959\ Log\_EXC_{ij} - 1{,}511029\ Log\_JE_{ij} + 0{,}1123905\ Log\_POP_j - 0{,}0882124\ Log\_INF_i + \varepsilon it$$

Tabel 3. Result of Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log_GDP_i	0,7882711	0,3716622	2,12	0,034**
Log_GDP_j	1,5793450	0,4407073	3,58	0,000*
Log_EXC_{ij}	-0,1452959	0,0580050	-2,50	0,012**
Log_JE_{ij}	-1,5110290	0,5007398	-3,02	0,003*
Log_POP_j	0,1123905	0,3392733	0,33	0,740
Log_INF_i	-0,0882124	0,1343070	-0,66	0,511
Constanta	-19,185	5,0446140	-3,80	0,000

Source: Processed Data (2024)
Where: (*) Significant at the 5% level of significance
(**) Significant at the 10% level of significance

The trade flows of Indonesia's plantation products are influenced by various factors. The analysis conducted using the Gravity Model, as presented in Table 3, reveals that four of the six independent variables significantly impact the trade flow of Indonesia's plantation products. The variables that demonstrate a significant effect include Indonesia's Gross Domestic Product (GDP), the GDP of partner countries, exchange rates, and economic distance.

Indonesia's Gross Domestic Product (GDP)

In this study, Indonesia serves as the host country, and its Gross Domestic Product (GDP) significantly affects the trade flow of plantation products with ASEAN countries. The analysis reveals a probability value of 0.034 for Indonesia's GDP variable (GDPi), which is below the 10% significance level. This finding indicates that Indonesia's GDP has a significant impact on the flow of plantation trade with ASEAN nations. The coefficient value for Indonesia's GDP is 0.78, suggesting that a 1% increase in Indonesia's GDP results in a 0.78% increase in the trade flow of Indonesian plantation products with ASEAN countries, holding other factors constant (ceteris paribus).

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These results align with prior research conducted by Astuti et al., (2023), which asserts that Indonesia's GDP positively and significantly affects agricultural trade flows with other countries. Consequently, an increase in Indonesia's GDP can enhance both export and import values, leading to greater trade flows.

A country's national income positively influences its import and export activities. An increase in national income typically enhances the purchasing power of individuals, thereby boosting demand for foreign goods and services, which leads to higher import levels. Conversely, an increase in national income also strengthens the community's capacity to sustain the production of goods and services, resulting in greater exports to the global market. Yulianto & Djermor (2018) assert that Gross Domestic Product (GDP) reflects a country's productivity in producing goods and services, as well as the growth in public consumption of imported goods and services.

Partner Countries' Gross Domestic Product (GDP)

In addition to the host country's GDP, the GDP of partner countries significantly influences trade flows. The analysis reveals that the probability value for the GDP of partner countries (GDPj) is 0.000, which is below the 5% significance level. This finding indicates that the GDP of partner countries significantly impacts the trade flow of Indonesia's plantation products with ASEAN countries. The coefficient for the GDP of partner countries is 1.57, suggesting that a 1% increase in the GDP of partner countries correlates with a 1.57% increase in the trade flow of Indonesia's plantation products with ASEAN countries, ceteris paribus. Thus, the GDP of partner countries emerges as a crucial factor affecting trade flows from the host country. Consistent with the findings of Astuti et al., (2023), the GDP of partner countries positively and significantly influences the flow of Indonesian agricultural trade with other nations. Their research indicates that increased trade flows result from higher imports driven by rising public consumption and increased exports resulting from enhanced production in partner countries.

Partner countries with robust economies tend to rely on importing raw materials for their industries to produce finished goods for export (Narawinda & Ayuningsasi, 2023). Prior research indicates that the GDP of partner countries positively influences the flow of Indonesia's plantation trade. This finding aligns with the study by Cahyaningtyas & Aminata (2020), which asserts that the GDP of importing countries significantly impacts

trade by enhancing bilateral trade flows between the countries. As economic activity increases in a country, the trade flow from that country also rises (Astuti et al., 2023). The table below presents the GDP values and growth rates for each trading partner of Indonesian plantation products.

Tabel 4. Nilai GDP dan Trend Negara Mitra 2018-2022

ASEAN Countries	GDP (thousands in USD)	Growth Trend (%)
Brunei	14,519,197	2.57
Thailand	422,229,807	4.12
Malaysia	315,055,117	4.63
Singapore	319,163,406	6.82
Philippines	298,722,245	6.04
Vietnam	247,428,500	10.95
Camboja	19,003,624	7.87
Myanmar	60,226,607	5.59
Average	**212.043.563**	**6.07**

Source: Processed Data (2024)

Table 4 presents the GDP values of each ASEAN country that serves as a trading partner for Indonesia's plantation products. Thailand has the highest average GDP, amounting to 422,229,807 thousand USD. Conversely, Vietnam demonstrates the highest growth trend at 10.95%. This positive growth trend indicates an increase in economic activity or GDP among Indonesia's trading partner countries. Such developments present opportunities for Indonesia to enhance its cooperation with ASEAN nations, thereby increasing the flow of plantation product trade. Strengthened cooperation can facilitate access to new markets, potentially boosting domestic production for export and increasing imports of products from partner countries (Astuti et al., 2023)

Exchange Rate

In this study, the exchange rate serves as a variable representing the real exchange rate of each partner country against the U.S. dollar. The analysis reveals a probability value for the exchange rate (EXC) of 0.012, which is below the significant level of 10% (0.1%). This finding indicates that the exchange rate significantly influences the trade flow of Indonesia's plantation commodities with ASEAN countries. The coefficient for the exchange rate is -0.14, signifying that a 1% increase in the exchange rate leads to a 0.14% decrease in the trade flow of Indonesia's plantation commodities with ASEAN countries, ceteris paribus. Research by Chawarika et al. (2022) also supports the conclusion that the exchange rate exerts a significant and negative impact on agricultural trade flows. Devaluation, or a decline in a country's currency value relative to others, results in lower export prices

and higher import prices. This devaluation can trigger inflation, thereby reducing trade flows. As imports become more expensive, countries may limit their import activities. Furthermore, according to Mawardi (2023), the decline in export volumes corresponds to a decrease in domestic prices for those goods. Consequently, devaluation leads to a reduction in total imports due to the increased cost of these goods in the local currency.

Economic Distance

In this study, economic distance refers to the economic disparity between Indonesia and its ASEAN partner countries. The analysis yields a probability value for economic distance (ED) of 0.003, which is below the 5% significance level (0.05). This finding indicates that economic distance significantly affects the trade flow of Indonesia's plantation commodities with ASEAN countries. The coefficient for economic distance is -1.51, suggesting that a 1% increase in economic distance results in a 1.51% decrease in the trade flow of Indonesia's plantation commodities with ASEAN countries, ceteris paribus. Pohan et al. (2024) assert that the economic distance from the home country to the partner country negatively and significantly influences trade flows. As economic distance increases, transportation costs also rise, leading to a decline in both export and import activities. The findings of this study demonstrate that the economic distance between Indonesia and its ASEAN partners negatively impacts trade flows in plantation products. Furthermore, Krugman et al. (2012) contend that distance has an adverse relationship with trade between countries.

Population

The population of a country is a factor that can influence the value of trade, encompassing both exports and imports with other nations. The analysis reveals a probability value for population (POP) of 0.740, which exceeds the significance level of 10% (0.1). Consequently, we conclude that population does not significantly affect the trade flow of Indonesia's plantation commodities with ASEAN countries. This finding contrasts with the research conducted by Astuti et al., (2023), which indicates that the population of each partner country significantly influences the flow of Indonesian agricultural trade. Conversely, Bintoro & Khoirudin (2021) report that population does not significantly impact the value of Indonesian coffee exports to other countries, suggesting that population growth does not proportionately increase domestic coffee demand.

The coefficient of population indicates a positive relationship, suggesting that an increase in a country's population can enhance the trade flow of Indonesia's plantation commodities with ASEAN countries. This positive correlation aligns with the findings of Wardani & Mulatsih (2017), who assert that population growth in partner countries can elevate trade flows between nations. A larger population typically leads to increased demand and consumption of goods, thereby facilitating higher trade volumes. Furthermore, Salvatore (1997) posits that a country's population growth stimulates domestic demand, which in turn drives up imports and expands the labor force for production, resulting in increased exports. Purmiyati & Muhammad (2020) also emphasize that population size impacts trade from the demand perspective, as a larger population correlates with greater demand for goods.

Inflation

The inflation variable (INF) in this analysis does not significantly affect Indonesia's plantation commodities trade flow with ASEAN countries. This conclusion is supported by a probability value of 0.511, which exceeds the 10% significance level. The coefficient for inflation is negative, indicating that an increase in inflation within a country can diminish the trade flow of Indonesia's plantation commodities with ASEAN nations. Putri dan Jayadi (2023) also reported similar findings, noting that inflation does not significantly impact non-oil and gas exports to destination countries. They attributed this lack of significance to the influence of various other factors, such as GDP levels, costs and quality of raw materials, technology, tariffs, and tariff barriers.

While the results of this study indicate that inflation does not significantly affect trade flows, higher inflation can nonetheless lead to reduced trade flows, as evidenced by its negative coefficient. Research by Ashari et al. (2020) demonstrates that inflation negatively impacts export levels. Increased inflation raises the prices of goods, which in turn compels producers to decrease their output, ultimately resulting in a decline in export volume. This decrease in exports, coupled with lower prices for imported goods, can disrupt the balance of foreign currency flows. Consistent with the findings of Silaban and Nurlina (2022) and Fohoue et al. (2024), this study reaffirms that inflation adversely affects export value. The rising costs associated with inflation can lead to reduced production, thereby diminishing the quantity of exports to foreign markets.

CONCLUSION

The analysis results utilized the best model, the Random Effects Model (REM). The gravity model analysis revealed that Indonesia's GDP, the GDP of partner countries, exchange rates, and economic distance significantly influence Indonesia's plantation commodities trade flows with ASEAN countries. In contrast, the variables of

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Yafi & Adyanti (Determinants of Indonesia's Plantation Commodities . . ., ASEAN Trade, Gravity Model, Panel Data, Plantation Product)

population and inflation do not significantly affect trade flows. The research concludes that government intervention remains essential in shaping Indonesia's trade dynamics within the plantation subsector. The data indicates that trade flows of Indonesia's plantation commodities with ASEAN countries have fluctuated over the past 15 years. As the primary driver of Indonesia's economic development, the government must enhance the export competitiveness of plantation products in the international market. To achieve this, the government should implement export strategies and policies aimed at fostering Indonesia's economic growth. Furthermore, to effectively manage inflation, the government needs to balance fiscal and monetary policies to stabilize the economy. Although the research findings suggest that inflation does not significantly affect export-import trade flows, it nonetheless exerts a negative influence on trade dynamics. An increase in inflation could lead to a decline in Indonesia's plantation commodities trade flow with ASEAN countries. Therefore, the government's role in controlling inflation is crucial for sustaining Indonesia's trade with other nations.

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Research Article

Technical and Economic Efficiency of Production Factors in Javanese Tobacco Farming: A Case Study of Belun Village, East Java

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ABSTRACT

This study analyzes the technical and economic efficiency of production factors in tobacco farming in Belun Village, Temayang Subdistrict, Bojonegoro District, East Java. Using stochastic frontier software 4.1, the analysis was conducted with a sample of 87 Javanese tobacco farmers. The production inputs evaluated include land area, seeds, urea fertilizer, NPK fertilizer, NPK Phonska Plus fertilizer, labor, pesticides, and production output. The results indicate that the gamma elasticity coefficient for technical efficiency is 0.949, with all variables being statistically significant at the 1% level (t-table 2.64), except for pesticide input, which is significant at the 5% level (t-table 1.99). In the economic efficiency analysis, seedlings were identified as the inefficient input with an efficiency estimate (EE) of > 1 (52.4), while other inputs showed EE < 1. The study concludes that 94.9% of the inefficiency stems from production factors, while 5.1% is attributed to external factors. Moreover, the inputs used in Javanese tobacco farming are neither technically nor economically efficient. To achieve full technical efficiency, farmers should reduce inputs such as land area, NPK fertilizer, and NPK Phonska Plus fertilizer, while increasing the use of seeds, pesticides, urea fertilizer, and labor.

INTRODUCTION

Indonesia, endowed with abundant natural resources, relies heavily on the agricultural sector as a key contributor to national economic development. The agricultural sector in Indonesia is categorized into several subsectors, including agriculture, plantations, fisheries, livestock, and forestry. Among these, the farming subsector exhibits more consistent growth in both land area and productivity compared to other subsectors. Tobacco, a high-value crop, plays a significant role within this subsector.

As the 10th largest tobacco producer globally, Indonesia's top tobacco-producing provinces are East Java, West Nusa Tenggara, and Central Java. According to the head of East Java's Department of Industry and Trade in 2019, the tobacco industry contributed 27.35% to the provincial GDP (Mawaddah et al., 2022). However, according to data from the Central Statistics Agency (BPS), tobacco production has been steadily declining. Production reached 130,268 tons in 2020, decreased to 118,604 tons in 2021, and further dropped to 97,937 tons in 2022,

attributed to tobacco's sensitivity to external factors, particularly weather (Mu'min et al., 2019). In Bojonegoro Regency, a tobacco-producing area, the decline is evident, with production falling from 13,123 tons in 2020 to 11,250 tons in 2022 (Dewi I., 2021), while land area shrank from 11,522 ha to 11,439 ha over the same period (BPS, 2023). This decrease in production negatively impacts productivity and is closely linked to the efficiency of the production factors used, which in turn affects farmers' income.

Land conversion is believed to be a key factor in this decline. Other production inputs for tobacco farming include seeds, fertilizers, labor, and pesticides (Harya et al., 2023; Indah et al., 2019). Land use changes refer to the transformation of all or part of farmland, often shifting from tobacco cultivation to other crops like corn or non-agricultural uses (Indah et al., 2018). In Bojonegoro District, two main tobacco varieties are cultivated: Virginia and Javanese tobacco. The Virginia variety is planted in four subdistricts—Ngraho, Kasiman, Kedungadem, and Sugiwaras—often under contract with cigarette company PT. HM Sampoerna (Murdiyati & Basuki, 2019). Meanwhile, the Javanese variety, grown in five subdistricts—Kedungadem, Temayang, Sugiwaras, Purwosari, and Ngasem—is cultivated independently, with no corporate partnerships (Badan Pusat Statistik Provinsi Jawa Timur, 2023).

Belun Village, located in Temayang Subdistrict, primarily grows Javanese tobacco during the dry season. According to the village's kamituwo, approximately 90% of the 750 households engage in tobacco farming, with most labor provided by family members, particularly on smallholder farms. Farmers use a variety of pesticides, including bekatul, to control pests such as caterpillars. In addition, they apply three types of fertilizers: urea, NPK, and NPK Phonska Plus. However, not all farmers receive government subsidies for these fertilizers, and rising prices due to distribution delays further burden them.

Income serves as a key indicator of economic well-being, closely tied to both production costs and profitability (Harya, Kuswanto, et al., 2023; Sudiyarto & Harya, 2020). A farming enterprise is considered successful if its income exceeds production costs. Tobacco farming has the potential to increase income, but inefficiencies in the use of production factors can reduce output and earnings (Harya et al., 2020; Harya & Wahyuningrum, 2023). In Belun Village, some farmers rely on a barter system to sell their crops, particularly smallholders. Under this system, farmers sell their tobacco to collectors before the harvest, at a fixed price per tree, regardless of yield per kilogram. This practice often results in financial losses, as farmers lack the upfront capital to sustain production. Given these challenges, further research is needed to assess the technical and economic efficiency of tobacco farming in Belun Village, Temayang Subdistrict, Bojonegoro Regency.

METHOD

This research employed a direct observation method in Belun Village, Temayang Subdistrict, Bojonegoro District, conducted from February to March 2024. Primary data were collected through interviews with tobacco farmers and the administration of questionnaires, while secondary data were obtained from the Central Statistics Agency and local village agencies. Respondents were selected using Simple Random Sampling, a technique that ensures every individual in the population has an equal chance of being chosen. The sample size was determined using the Slovin formula with a 10% margin of error (Adhiana & Riani, 2019).

$$n = N / (1 + (N \times e2)) \tag{1}$$

Where:
n   = number of samples
N   = number of populations
e   = error limits percentage from samplings
n   = N / (1 + (N x e2))
    = 675 / (1 + (675 x 10%2))
    = 675 / (1 + (675 x 0,01))
    = 675 / 7,75
    = 87,09 rounded to 87 farmers

Based on the Slovin method used in this study, the total population of tobacco farmers in Belun Village, Temayang Subdistrict, Bojonegoro District, is 675. With a 10% margin of error, the sample size was calculated to be 87 farmers. The analysis employs a descriptive quantitative approach and utilizes a stochastic frontier production function model. Descriptive quantitative analysis interprets variables based on observed data (numerical values) from real perceptions. The stochastic frontier model assumes no observations result in zero output, as zero in the algorithm is considered undefined or infinite. It also assumes no technological differences

between observations, the X variable operates under perfect competition, and differences in external factors such as weather are treated as error factors. The stochastic frontier equation is as follows (Adhiana & Riani, 2019).

$$LnY = \beta 0 + \beta 1 LnX1 + \beta 2 LnX2 + \beta 3 LnX3 + \beta 4 LnX4 + \beta 5 LnX5 + \beta 6 LnX6 + \beta 7 LnX7 + ei \qquad (2)$$

Where:
Y   : Total tobacco production (kg)
β0   : Constant
X1   : Land area (m)2
X2   : Number of seedlings (Tree)
X3   : Amount of Urea fertilizer (Kg)
X4   : Amount of NPK Fertilizer (Kg)
X5   : Amount of NPK Phonska Plus Fertilizer (Kg)
X6 :   Labor (HOK)
X7   : Pesticides (Kg)
β1-β2   : Regression coefficient which is the elasticity of production
ei   : Residue

This study employs Stochastic Frontier Analysis (SFA) version 4.1 to estimate the parameters of production factors in tobacco farming using the Maximum Likelihood Estimation (MLE) method. MLE provides an assessment of the performance of tobacco farmers in Belun Village, Temayang Subdistrict, Bojonegoro District. The analysis utilizes Frontier software 4.1 to evaluate each constant parameter (β0) and production factor (βn) through partial testing. The gamma (γ) parameter measures the proportion of the total residual effect attributable to technical inefficiency. Gamma values range from 0 to 1, with values closer to 1 indicating that inefficiency (ui) is the primary source of the error term. Conversely, gamma values closer to 0 suggest that the error term is largely due to random noise (vi), such as weather or pests. The sigma-square (Σ²) parameter reflects the variance in technical inefficiency, with values between 0 and 1. Smaller sigma-square values indicate a normally distributed error term. The technical efficiency analysis in this study follows the following equation (Adhiana & Riani, 2019).

$$TEi = Yi / Yi^* \qquad (3)$$

Where:
TEi   : technical efficiency
Yi   : actual output
Yi*   : one-side error term or random change

Technical efficiency reflects a farmer's ability to maximize output from the inputs utilized. Farmers are considered technically efficient if their efficiency index exceeds 0.7, whereas an index of 0.7 or below indicates technical inefficiency in tobacco farming (Omar & Fatah, 2021). Enhancing production outcomes can be achieved by improving farmers' skills and abilities in utilizing more efficient tobacco cultivation technologies and strengthening farm management practices.

Economic efficiency, on the other hand, refers to the comparison between actual and maximum potential profits. It can be evaluated using two criteria: profit maximization and cost minimization. Profit maximization occurs when a farmer's profits have reached their optimal level, while cost minimization serves as a strategy to further increase profitability. Economic efficiency is realized when the ratio of each marginal product value (NPM) equals the cost of production inputs. This can be calculated using the following formula (Soekartawi, 2019)

$$NPM\ Xi = b . Y/X . Py \qquad (4)$$

Where:
NPMxi   = Marginal product value of production factor (Rupiah)
B   = Production elasticity / regression coefficient of production factor (unit)
Y   = Average production of tobacco (Kg)
Py   = Selling price of tobacco leaf production (Rupiah)
X   = Average use of inputs/factors of production (m or Kg or Hok)
Px   = Input/factor of production price (IDR)

Based on the calculations presented above, the following conclusions can be drawn (Bloom & Reenen, 2019).

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1. If NPMxi   = 1, the utilization of production inputs is optimal.
2. If NPMxi   > 1, the utilization of production inputs is not optimal, indicating that the quantity of production inputs should be increased.
3. If NPMxi   < 1, the utilization of production inputs is not optimal, necessitating a reduction in the quantity of production inputs

RESULTS AND DISCUSSION

Descriptive Statistic

This study focuses on farmers engaged in Javanese tobacco farming in Belun Village. The profiles of these farmers provide essential context for understanding their conditions in the research area. The characteristics of the Javanese tobacco farmers are as follows.

Farmers Age

Age significantly influences a farmer's physical capabilities in performing agricultural activities. As farmers age, their physical abilities may decline, which is a critical consideration since farming requires substantial physical effort, from land preparation to post-harvest activities. Conversely, farmers of productive age tend to maintain better physical fitness, which can enhance their farming productivity. The age distribution of the tobacco farmers is presented in the table below:

Table 1. samples of tobacco farmers' age

Vulnerable Age of Farmers (Years old)	Number (farmers)	Percentage (%)
31 – 60	78	89.65
>60	9	10.35
Total	87	100

Source: Primary Data Analysis, 2024

Based on the table, the age distribution of farmers engaged in tobacco farming in Belun Village indicates that a significant majority, 89.65%, fall within the productivity-vulnerable age group, while the remaining 10.35% are classified as being in the non-productivity-vulnerable age group. This demographic composition may facilitate the expansion of production in the Javanese tobacco farming business, as age influences productivity levels and overall performance, both physically and non-physically. Prasetya (2019) argues that human age affects achievement levels, particularly in agriculture, which demands considerable physical strength for fieldwork. Similarly, Nasir, et (2023) assert that optimal productivity occurs between the ages of 15 and 55, as individuals within this age range typically possess the physical capacity necessary for effective business operations.

Education Level of Farmers

Education plays a crucial role in shaping the knowledge and skills that influence farmers' mindsets. According to Nasir, et (2023), education level significantly impacts individuals' ability to adopt and experiment with new ideas. Furthermore, education enhances farmers' capacity to understand and implement innovations. This finding aligns with the research conducted by Pramesti (2023), which highlights that higher education levels contribute positively to farmers' willingness to absorb and apply new techniques. The education levels of the sample farmers, as measured by their formal education, are presented in the table below.

Table 2. Samples of Tobacco Farmers' Education Level

Farmers Education Level	Number (farmers)	Percentage (%)
Uneducated	4	4,6
SD (Elementary School)	19	21,84
SMP (Middle School)	17	19,54
SMA (High School)	47	54,02
Total	87	100

Source: Results of Primary Data Processing, 2024

The table indicates that the majority of farmers have attained a formal education level that meets the governor's standard, specifically completing high school (SMA). However, a few farmers have not met these educational criteria or have never attended school. The low education level among farmers contributes to inefficiencies in tobacco farming. According to Febriyanto (2021), inefficiencies arise from both internal and external factors, with the farmers' education level being a key internal factor. Education significantly influences decision-making processes and the selection of appropriate production inputs for farming businesses.

Tobacco Farming Business Experiences

Experience in farming refers to the length of time a farmer has been engaged in agricultural activities. A farmer's experience significantly influences decision-making processes and the ability to manage risks in the farming business. The table below presents the experience of tobacco farmers in Belun Village in managing their tobacco farming businesses.

Table 3. Samples of Tobacco Farming Business Experience

Farmer's Experience on Farming Business (Year)	Frequency (People)	Percentage (%)
16 – 20	5	5,75
21 – 25	6	6,9
26 – 30	27	31,03
31 – 35	19	21,84
36 – 40	17	19,54
41 – 45	8	9,2
46 – 50	5	5,75
Total	87	100

Source: Results of Primary Data Processing, 2024

The table indicates that the majority of tobacco farmers in Belun Village have between 26 and 30 years of farming experience, accounting for 31.03% of the sample. Farming experience plays a crucial role in the success of a farming business, as it informs decision-making throughout the production process. Hertanto (2019) highlights that a farmer's experience serves as a foundation for expanding the business and improving production outcomes. Similarly, Pramesti (2023) emphasizes that the length of farming experience significantly influences the success of a farming enterprise, particularly in decisions related to production, processing, and marketing.

Tobacco Farmer's Land Area

Land area is a key input in farming that significantly influences productivity, as it determines the quantity of other production inputs required in the cultivation process. The table below presents the distribution of land area used by Javanese tobacco farmers in Belun Village.

Table 4. Sample of Tobacco Farmer's Land Area

Land Area (meter^2)	Numbers (Farmers)	Percentage (%)
1001 - 2000	51	58,62
2001 - 3000	27	31,03
3001 - 4000	5	5,75
4001 - 5000	4	4,6
Total	87	100

Source: Results of Primary Data Research, 2024

The table indicates that most tobacco farmers in Belun Village have a land area between 1,001 and 2,000 square meters, with 51 farmers in this category. These farmers can be classified as small-scale farmers, as half of them cultivate less than 0.5 hectares (5,000 square meters). This limited land area requires them to carefully adjust production inputs, such as seedlings, fertilizers, labor, and pesticides, to achieve maximum efficiency in the production process. The efficiency of farming operations is often tied to land size, with larger areas typically enabling more efficient use of inputs. According to research by Parichatnon et al (2019), farmers must adjust labor allocation based on the size of the land being managed. Inefficiencies in farming can arise from both internal and external factors, with land area being a key internal factor. Febriyanto (2021) also emphasized that land control is a major internal factor contributing to inefficiency in farming operations.

Efficiency Analysis Using the Production Function

Javanese tobacco production in Belun Village is influenced by several key production factors, including land area, seedlings, fertilizers (urea, NPK, and NPK Phonska Plus), labor, and pesticides. On average, farmers cultivate tobacco on plots of approximately 2,076 square meters. Seedlings play a crucial role in the production process, with farmers typically using high-quality Javanese tobacco varieties. The average number of seedlings used per planting season is 2,875 branches, with the quantity dependent on the size of the farmer's land.

Fertilizers are another essential input in the tobacco production process. On average, farmers apply 48 kg of urea per planting season. Additionally, they use 12 kg of NPK fertilizer and approximately 22 kg of NPK Phonska Plus for each 2,076 square meters during the same period.

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Putri et al. (Technical and Economic Efficiency of . . ., Economic Efficiency, Technical Efficiency, SFA)

Labor and pesticides are also significant factors in the production process. Most farmers rely on family labor, with an average of 31 laborers involved per planting season. Although tobacco plants naturally produce substances that help deter pests, farmers in Belun Village use an average of 6 kg of pesticides as an additional precaution. They also spread rice bran on the leaves as a pest control measure, utilizing bran produced from previous rice harvests.

Based on the estimated production function using stochastic frontier software (version 4.1), the analysis of tobacco farming in Belun Village resulted in the elasticity coefficients shown in Table 5.

Table 5. Production input elasticity coefficient

No	Variables	Elasticity Coefficient	T count
1	Constant	5.720	4.606*
2	LnX1 (land area)	-0.013	-9.254*
3	LnX2 (Seedlings)	0.745	3.931*
4	LnX3 (Urea fertilizer)	0.007	3.046*
5	LnX4 (NPK fertilizer)	-0.614	-3.768*
6	LnX5 (NPK Phonska Pluss fertilizer)	-0.008	-3.474*
7	LnX6 (Labor)	0.386	3.950*
8	LnX7 (Pesticide)	0.004	2.399**
9	*Gamma*	0.949	17.575*
10	N	87	

Source: Primary Data Processing, 2024
Description: * : significant at 1% α
             ** : significant at 5% α

Regression equation capital = 5.720 - 0.013LnX1 + 0.745LnX2 + 0.007LnX3 - 0.614LnX4 - 0.008LnX5 + 0.386LnX6 + 0.004LnX7

The table above presents the results of the estimated function using Stochastic Frontier Software 4.1, with a t-table value of 2.64 at the 1% significance level and 1.99 at the 5% significance level. All variables in the analysis have elasticity coefficients less than 1, indicating significance at either the 1% or 5% levels. The key elasticity coefficients are as follows:

1. Gamma Coefficient: The elasticity of the gamma coefficient is 0.949, significant at the 1% level, indicating that 94.9% of the inefficiency in production is due to input variations, while the remaining 5.1% is attributed to uncontrollable external factors such as weather, climate, pests, and diseases.
2. Land Area: The elasticity coefficient for land area is -0.013, significant at the 1% level. This implies that a 1% increase in land area results in a 1.3% decrease in Javanese tobacco production. The negative relationship suggests that as land size increases, efficiency decreases, consistent with Unique (2019) finding of land area efficiency at 0.311, suggesting the need for reduced land use.
3. Seedlings: The elasticity coefficient for seedlings is 0.745, significant at the 1% level. A 1% increase in seedlings leads to a 74.5% increase in tobacco production, indicating that increasing seedling input significantly boosts production.
4. Urea Fertilizer: The elasticity coefficient for urea fertilizer is 0.007, significant at the 1% level. This shows that a 1% increase in urea fertilizer use leads to a 0.7% increase in tobacco production, reflecting the fertilizer's role in promoting plant growth. Balandina (2019) supports this, indicating that fertilizer quantities directly impact production outcomes.
5. NPK Fertilizer: The elasticity coefficient for NPK fertilizer is -0.614, significant at the 1% level. A 1% increase in NPK fertilizer results in a 61.4% decrease in production. This suggests overuse of NPK fertilizer reduces efficiency, aligning with Unique (2019) finding of -0.051 elasticity, which calls for reduced NPK usage to optimize production.
6. NPK Phonska Plus Fertilizer: The elasticity coefficient for NPK Phonska Plus fertilizer is -0.008, significant at the 1% level. A 1% increase in its use leads to a 0.8% decrease in production, implying inefficiency due to overuse. This is corroborated by Unique (2019) research, which also recommends reducing NPK Phonska Plus fertilizer for better efficiency.
7. Labor: The elasticity coefficient for labor is 0.386, significant at the 1% level. A 1% increase in labor leads to a 38.6% increase in production, highlighting the critical role of manpower in enhancing tobacco yields.
8. Pesticides: The elasticity coefficient for pesticides is 0.004, significant at the 5% level. A 1% increase in pesticide use results in a 0.4% increase in production. This suggests that pesticide application has a positive, albeit modest, impact on tobacco yields.

Technical Efficiency Analysis

Technical efficiency refers to the ability of Javanese tobacco farmers to maximize productivity using the available production inputs during the production process. The analysis of production inputs utilized by farmers in Belun Village, conducted using Frontier Software version 4.1, is presented in the following table:

Table 6. Technical Efficiency

Technical Efficiency Level	Number of Respondents (farmers)	Percentage (%)
< 0.70	28	32.18
> 0.70	59	67.82
Total	87	100

Source: Primary Data Analysis of Research, 2024

Table 6 indicates that most tobacco farmers in Belun Village demonstrate technical efficiency, with an efficiency level greater than 0.70. Analysis using Frontier Stochastic Software version 4.1 reveals that the lowest level of technical efficiency is 0.13, while the highest is 0.92, with an average technical efficiency of 0.675. This average, being less than 0.70, indicates that tobacco farming in Belun Village has not yet achieved full technical efficiency. The standard deviation is 0.184, lower than the mean of 0.675, suggesting limited variability in the data. A lower standard deviation compared to the mean implies that the data points are relatively close to the mean, indicating less dispersion. This finding is consistent with research, which shows that variables with standard deviations smaller than the mean are more accurate, while larger standard deviations indicate more variability and less accuracy.

The production inputs used by Javanese tobacco farmers—land area, seedlings, urea fertilizer, NPK fertilizer, NPK Phonska Plus fertilizer, labor, and pesticides—are technically inefficient. This aligns with Dewi (2021), who argues that a farming business is technically inefficient if its efficiency score is far from 1 and closer to 0. Soekarwati (2016) also supports this view, stating that the use of production inputs is technically efficient only when it results in maximum productivity.

Most Javanese tobacco farmers in Belun Village operate on small plots of land, but they use excessive production inputs, leading to suboptimal profits. With an average technical efficiency of 67.5%, farmers have the potential to increase production by 32.5%. This improvement can be achieved by enhancing farmers' ability to adopt technological advancements and improve farm management practices (Indah et al., 2018; Mutiarasari, 2019).

Economic Efficiency Analysis

This analysis evaluates the economic efficiency of Javanese tobacco farming businesses in Belun Village. Prior to conducting the economic analysis, it is essential to determine the production elasticities for each input utilized in the production process. The production elasticities obtained using Frontier Stochastic Software version 4.1 yield the following regression equation:

$$\text{Regression equation model: } 5{,}720 - 0{,}013\text{LnX1} + 0{,}745\text{LnX2} + 0{,}007\text{LnX3} - 0{,}614\text{LnX4} - 0{,}008\text{LnX5} + 0{,}386\text{LnX6} + 0{,}004\text{LnX7}$$

The parameters B1, b2,…b7 represent the production elasticities for each input employed in the Javanese tobacco production process. These production elasticities facilitate the calculation of the Marginal Physical Product (MPP) and the Normal Profit Margin (NPM), which are essential for assessing economic efficiency. The results of the economic efficiency analysis for Javanese tobacco in Belun Village are presented in the table below:

Table 7. Economic Efficiency

No	Variables	MPP Value $\left(b.\dfrac{y}{Xi}\right)$	NPM Value (MPP. Py)	Production Input Price (Px$_i$)	Economical Efficiency $\left(\dfrac{NPMxi}{Pxi}\right)$
1	Land area	-0,01	-40	-20	-2
2	Seedlings	0,393	1.572	30	52,4
3	Urea fertilizer	0,222	888	2.250	0,394
4	NPK fertilizer	-68,69	-274.760	2.300	-119,46
5	NPK Phonska Pluss fertilizer	-0,559	-2.236	11.000	-0,203
6	Labor	19,124	76.496	80.000	0,956
7	Pesticides	0,972	3.888	5.000	0,778

Source: Primary data processing, 2024

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Economic efficiency is achieved when the efficiency (EE) value equals 1; it is considered inefficient when the EE value is less than 1 and not yet efficient if the EE value exceeds 1. This aligns with Soekartawi's (2019) assertion that if the Net Profit Margin (NPM) exceeds the price of input (Pxi), or if the ratio of NPM to Pxi exceeds 1, then the utilization of each production input is not economically efficient, necessitating an increase in input quantity. Conversely, an EE value less than 1 indicates inefficient use of production inputs, suggesting that to attain economic efficiency, a reduction in input quantities is required. In Javanese tobacco farming, land area as a production input exhibits an efficiency value of approximately -2, indicating significant economic inefficiency. As depicted in the accompanying table, 51 farmers in Belun Village cultivate land areas ranging from 1,001 to 2,000 square meters, constituting 58.62% of the sample, which is relatively small. Balandina, (2019) and Nasrullah et al., (2020) assert that land area correlates positively with farming efficiency, as broader land areas facilitate more efficient use of production inputs, leading to higher output.

Seedling inputs show an efficiency value of 52.4, indicating that their economic utilization remains inefficient. On average, Javanese tobacco farmers in Belun Village use 2,875 seedlings per planting season. Cultivation techniques, including seed spacing, significantly impact productivity; however, some farmers do not adhere to recommended practices. The farmers utilize high-quality, non-subsidized Javanese variety seeds, priced at approximately Rp. 30 per seedling, resulting in an average expenditure of Rp. 86,241 per planting season. Balandina (2019) emphasizes the critical role of seeds in determining production outcomes.

Urea fertilizer exhibits an economic efficiency value of 0.394, indicating economic inefficiency. On average, farmers use 47.66 kg of urea fertilizer at a cost of Rp. 107,250 per planting season. To achieve full economic efficiency, farmers must reduce their urea fertilizer usage.

The efficiency values for NPK and NPK Phonska plus fertilizers are -119.46 and -0.203, respectively. Farmers in Belun Village typically require approximately 13.56 kg of NPK fertilizer, costing Rp. 31,209 per planting season, and 21.72 kg of NPK Phonska plus fertilizer, costing Rp. 238,966. Both fertilizers are economically inefficient, and farmers need to reduce their usage to achieve optimal economic efficiency. Poppy (2020) and Septiadi, (2023) highlight that excessive use of these inputs negatively affects production outcomes.

Manpower inputs exhibit an efficiency value of 0.956, indicating economic inefficiency in the Javanese tobacco production process in Belun Village. To attain economic efficiency, farmers must reduce their reliance on manpower. Soekartawi (2019) notes that achieving economic efficiency in manpower inputs is challenging due to farmers' limited knowledge and utilization of resources. Additionally, external factors hinder farmers from maximizing their agricultural productivity. The average expenditure per tobacco farmer is approximately Rp. 2,449,655 each planting season.

The economic efficiency of pesticide inputs is 0.778, signifying that their usage has not reached the economic efficiency threshold. On average, farmers use 6.24 kg of pesticides per planting season at a cost of Rp. 31,207. To achieve full economic efficiency, farmers should decrease pesticide application.

CONCLUSION

This study on the Javanese tobacco farming business in Belun Village, Temayang Subdistrict, Bojonegoro District, East Java, yields the following conclusions: Approximately 67.82% of farmers demonstrate technical efficiency, while the remaining 32.18% possess the potential to enhance production by improving their skills in technology adoption and farm management. The Gamma coefficient indicates a value of 0.949, suggesting that 94.9% of inefficiencies arise from internal production factors, with the remaining 5.1% attributable to external factors, such as weather conditions. Among the inputs, only pesticide usage is statistically significant at the 5% level, while land area, fertilizers, seedlings, and manpower are significant at the 1% level.

Regarding economic efficiency, the seedling inputs utilized by Javanese tobacco farmers in Belun Village are economically inefficient, as their efficiency value exceeds 1. Conversely, other production inputs, including land area, urea fertilizer, NPK fertilizer, NPK Phonska plus fertilizer, manpower, and pesticides, exhibit inefficiency with values less than 1.

Based on the findings from this study, it is recommended that Javanese tobacco farmers in Belun Village enhance their capacity to utilize production inputs proportionately. This includes optimizing the use of land area, seeds, fertilizers, labor, and pesticides, as 94.9% of inefficiencies stem from production factors. To achieve full technical efficiency, farmers should reduce inputs such as land area, NPK fertilizer, and NPK Phonska plus fertilizer, while simultaneously increasing inputs such as seeds, pesticides, urea fertilizer, and labor.

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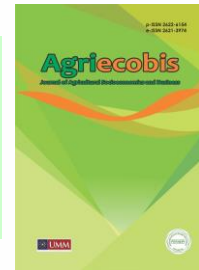
Research Article

Utilization and Effectiveness of Agro-industrial Digital Marketing in Malang Raya

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ABSTRACT

In the digital era, the agro-industrial sector has transitioned from conventional marketing to digital marketing. One of the agro-industry companies in Malang Raya, ALE, focuses on processing fruits and vegetables into healthy snack chips. The company engages in various digital marketing activities, including sales through e-commerce platforms such as Shopee, Tokopedia, and Lazada, and promotional efforts on social media platforms like TikTok and Instagram. This research aims to analyze (1) the utilization of digital marketing, and (2) the effectiveness of social media promotion based on engagement rates. The study employs both primary and secondary data, incorporating qualitative and quantitative forms, which are analyzed descriptively using a case study approach. Data collection methods include interviews, observation, and content analysis. The findings highlight the advantages of e-commerce channels, sales strategies like bundling and live streaming on e-commerce platforms, and storytelling and sales promotion strategies on social media. Additionally, the engagement rates on ALE's TikTok (12.71%) and Instagram (4.50%) indicate a high engagement rate level, with values exceeding the 2.72% benchmark, demonstrating the strong effectiveness of these platforms as promotional tools for the company.

INTRODUCTION

In the era of globalization, technology has evolved into a fundamental necessity for most individuals (Farida et al., 2021). One significant indicator of this technological advancement is the widespread use of the internet. The internet serves as a highly efficient communication medium that is borderless, real-time, and cost-effective. Additionally, it is the fastest and most effective means of disseminating information and data (Uno, 2019). According to a survey conducted by the Indonesian Internet Service Providers Association (APJII), internet users in Indonesia reached 73.7%, or approximately 196.7 million people, in 2020. By 2024, this figure is projected to increase to 79.5%, equivalent to 221.8 million users. This reflects a 5.8% increase in internet penetration over the past five years.

The advancement of the internet in this era has facilitated its application across various sectors, including finance, government, education, law, e-commerce, healthcare, transportation, fisheries, plantations, agriculture,

and business (Fauzi et al., 2023). Digital transformation is essential for businesses to remain competitive, achieved by leveraging the internet to create added value and meet increasingly complex customer demands (Harto et al., 2023). The rapid development of technology, digital platforms, and the internet has had a profound impact on marketing. Global marketing trends have shifted from traditional methods to digital approaches (Syukri & Sunrawali, 2022). Digital marketing, which involves the use of digital media such as the internet, mobile devices, and other online platforms, promotes products, services, or brands. It comprises interactive and integrated marketing strategies that enable interactions between producers, market intermediaries, and potential consumers (Robby Aditya & Rusdianto, 2023).

Agro-industry, or agricultural industrialization, is a sector well-positioned to benefit from digital marketing. The application of digital marketing in agro-industry is a strategic approach to enhance the sales of processed agricultural products. It also involves the use of data and analytics to understand consumer behavior, design more effective marketing campaigns, and boost sales (Sekali, 2023). Digital marketing encompasses all marketing efforts that utilize the internet and digital platforms, including search engines, marketplaces, social media, websites, and email. These channels facilitate communication between producers or marketers and consumers or buyers, thereby streamlining buying and selling activities (Gawade, 2019).

Malang Raya, a region in Indonesia, holds significant potential for agro-industrial development, with 50.46% of its population reliant on agriculture, which serves as the foundation for a robust agro-industrial sector. The government has implemented strategies to support agro-industrial growth in this region by fostering small, medium, and micro industries, which have strong potential to absorb labor (Bappekab Malang, 2009). Consequently, with over half of the population engaged in agriculture, the region demonstrates considerable potential for agro-industry development.

The implementation of digital marketing in agro-industries by the Agriculture Office in Grobogan Regency, East Java, demonstrated that digital marketing enables agro-industry players to enhance product visibility and accessibility, strengthen supply chains, and generate sustainable added value for the local economy. Similarly, Gumilang (2019), Intan et al. (2019), and Susanto et al. (2020) emphasized that the effective use of social media and digital marketing can significantly boost industry sales. Additionally, digital marketing strategies on social media enhance product value and competitiveness. Utilizing marketplaces as platforms for buying and selling also serves as a strategic approach to expanding market reach and increasing sales.

One of the key advantages of digital marketing is its significantly lower cost compared to traditional marketing methods. This cost reduction allows businesses to offer more competitive prices, thereby attracting a larger customer base. Additionally, digital marketing leverages internet technology, providing consumers with easy access and convenience, enabling them to make purchases anytime and anywhere through their devices (Sulaksono & Zakaria, 2020). The impact of digital marketing on product promotion is substantial, as it can increase both sales volume and company profits (Fadhilah & Pratiwi, 2021).

One of the agro-industrial companies in Malang Raya that has implemented digital marketing is ALE, which specializes in processing fruits and vegetables, particularly producing fruit and vegetable chips. ALE recognizes the substantial potential of digital marketing when utilized effectively. Currently, the company relies entirely on digital marketing channels, such as e-commerce platforms, to distribute its products to consumers. This approach is favored for its low capital requirements and extensive reach. Stating that e-commerce involves the buying, distributing, selling, and marketing of products and services via the internet, offering a broad consumer base, eliminating geographical barriers, and allowing activities without time constraints.

In its promotional activities, ALE utilizes digital marketing, particularly social media, as a key promotional tool. Zulvikar et al. (2023) found that social media plays a crucial role in helping companies disseminate information about their products or services. However, it is also essential to assess the effectiveness of social media as a promotional medium. Ramadhan et al. (2023) demonstrated that using engagement rate analysis for marketing optimization provides valuable insights into the performance of a company's social media account.

This study aims to examine the utilization of digital marketing by ALE and assess the effectiveness of the company's social media through engagement rate analysis. The objectives are to evaluate the implementation of digital marketing and to analyze the performance of the company's social media in terms of engagement.

METHOD

This study employs a descriptive analysis method utilizing both qualitative and quantitative approaches. Agustini et al. (2023) define the qualitative descriptive method as an analytical approach that examines social life within real-world settings, focusing on natural, broad, complex, and detailed situations. Similarly, Kusumastuti & Ahmad Mustamil Khoiron (2019) highlight that the qualitative descriptive method incorporates data from observations, interviews, or document analysis. This method offers flexibility in addressing complex realities, illustrates the relationship between researchers and respondents, and allows for problem refinement. The

qualitative descriptive analysis in this study aims to address the research objective of evaluating the company's digital marketing utilization. Primary data were collected through in-depth interviews with the managing director of ALE.

In contrast to qualitative research, Abdullah et al. (2021) define quantitative research as a systematic scientific investigation of various aspects and phenomena, including the causal relationships among them. This research approach entails a structured examination of phenomena through the collection of measurable data, employing statistical, mathematical, or computational techniques. Quantitative methods are utilized to evaluate the effectiveness of social media in digital marketing by calculating the engagement rate percentage. The data consist of upload insights from the relevant social media platforms, including the number of likes, comments, saves, and shares recorded from January to June 2024. To calculate the engagement rate per upload, this study employs Mackenzie Taylor's formula (Taylor, 2023).

$$engagement\ rate = \frac{Likes + Comment + Saves + Shares}{Total\ number\ of\ Followers} \times 100 \tag{1}$$

Subsequently, this study employs the range of engagement rate value established by Arman and Sidik, (2019)) to interpret the quality of the engagement rate, as illustrated in the table below.

Table 1. Range of E*gagement Rate Value*

Number of Followers	Average of Engagement Rate	Range of Engagement Rate	Quality of Engagement Rate
>300K	1,72%	<1,72	Low Engagement Rate
		1,72-2,72	Good Engagement Rate
		>2,72	High Engagement Rate

RESULTS AND DISCUSSION

Analysis of Digital Marketing Utilization

Established in 2016, ALE is an agro-industrial company specializing in the processing of fruits and vegetables. The company offers a range of products, including fruit chips, vegetable chips, and traditional souvenirs from Malang. Initially positioned as a provider of local souvenirs, ALE has since shifted its branding to emphasize its role as a producer of healthy snacks. The company's vision is to become the leading brand in the healthy snack category, focusing on products made from real fruits and vegetables. ALE differentiates itself from competitors by offering a diverse selection of fruit and vegetable chips, with its flagship product being the Mix Fruit and Vegetable Chips. This product allows consumers to sample various types of chips, crafted with careful consideration to ensure that the combinations maintain a cohesive theme. One of ALE's best-selling items is its tropical fruit chip mix, which exemplifies this thoughtful approach to product development.

At the onset of its establishment, ALE did not initially employ digital marketing as a channel for sales and promotion. Instead, the company opted to place its products in conventional gift shops as an introductory strategy to penetrate the market. However, this approach yielded unsatisfactory results. Challenges in collecting payments from these retail partners disrupted the company's cash flow and led to financial losses. This experience highlighted the significant weaknesses of traditional distribution methods, particularly regarding operational control and efficiency.

To address these challenges and ensure business sustainability, ALE sought a more innovative and sustainable solution. Following a comprehensive evaluation, the company transitioned to digital marketing as its primary channel for sales and promotion. By leveraging digital platforms, ALE was able to connect directly with consumers, eliminating intermediaries while enhancing brand visibility through personalized and measurable interactions with its target audience.

This strategic pivot proved advantageous. By effectively utilizing digital marketing, ALE significantly improved product visibility, expanded its market reach, and reduced reliance on traditional retail outlets. Furthermore, the company developed a more flexible and responsive marketing strategy that adapted to evolving market trends, ultimately enabling it to operate independently and thrive within the industry.

E-Commerce
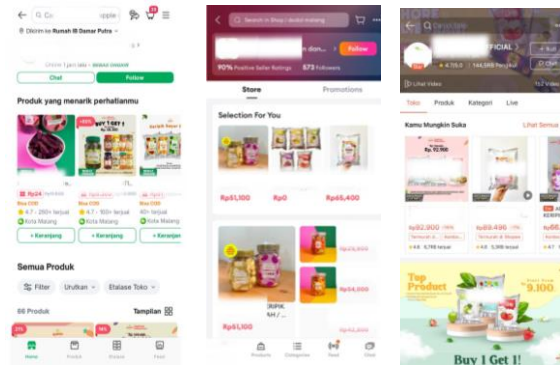
Figure 1. The Appearance of Ale company's online store on e-commerce platforms

ALE Company has fully integrated a digital marketing strategy, operating exclusively online without any physical stores. This approach encompasses all business activities, including promotion, sales, and product distribution. ALE relies on prominent e-commerce platforms such as Shopee, Tokopedia, and Lazada to streamline sales and distribution processes efficiently.

The choice of these platforms is strategic, driven by a careful analysis of consumer behavior. According to data from Similar Web, in 2024, Shopee, Tokopedia, and Lazada rank as the top three e-commerce platforms in Indonesia, with Shopee leading, followed by Tokopedia and Lazada. By aligning with these highly trafficked platforms, ALE not only expands its consumer reach but also benefits from the trust and popularity these platforms hold among Indonesian consumers.

Being present on these major platforms allows ALE to enhance product visibility and reach a wider audience. Furthermore, ALE leverages digital marketing tools provided by these platforms, including promotional features, sales analytics, and customer review management, which contribute to a superior consumer experience. These tools allow ALE to optimize brand exposure and increase sales potential.

This comprehensive digital strategy positions ALE to expand its market reach and strengthen its competitive edge in the digital marketplace. By continuously innovating and using digital technologies, the company can effectively meet consumer needs while optimizing its operational efficiency.

Advantages of E-Commerce Digital Marketing Channels

In utilizing e-commerce as a sales platform and connecting with consumers, ALE Company has identified five key reasons for choosing digital marketing:

a. **Expanded Consumer Reach:** E-commerce removes time and location barriers between sellers and consumers. Unlike physical stores, e-commerce allows customers to place orders at any time, ensuring continuous order processing. Putri et al. (2021) found that e-commerce significantly enhances market reach in the digital era. By doing so, e-commerce not only increases market access but also boosts sales, enhances customer loyalty, and improves operational efficiency, ultimately strengthening business competitiveness.

Figure 2. Reach of Ale company's online store on the e-commerce platform: Shopee

b. **Cost Efficiency and Simplified Financial Management**: E-commerce has drastically reduced inventory and store-related costs for ALE. Instead of investing in physical stores, the company can allocate resources to digital marketing efforts, such as setting up a studio for live-stream sales. Karimah et al. (2022) emphasize that e-commerce reduces costs, simplifies payment transactions, and streamlines transaction records. Moreover, e-

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commerce eliminates the need for intermediaries, which shortens communication chains and further reduces operational costs.

Figure 3. Inventory of ALE company's live streaming selling studio

c. **Enhanced Customer Relationships:** E-commerce platforms like Shopee, Tokopedia, and Lazada provide chat features that facilitate direct interaction between customers and companies, allowing for personalized customer experiences. Otalvaro (2019) describes this as "one-to-one marketing," where personalized marketing strategies focus on individual customer experiences. Octa (2022) also highlights that one-to-one marketing personalizes interactions, making customers feel like they are receiving exclusive attention. This approach increases customer satisfaction, loyalty, and retention. By using one-to-one marketing, ALE tailor's product offerings to specific customer segments, fostering deeper relationships through continuous, personalized engagement.

Figure 4. Appearance of the chat feature on the e-commerce platform of ALE company

d. **Facilitating Evaluation and Improvement of Purchasing Decisions Through Customer Reviews:** E-commerce platforms provide a rating and review feature that enables customers to share their transaction experiences. This feature allows companies to evaluate their performance based on direct customer feedback, helping them address issues and improve customer satisfaction. Positive reviews and ratings can also influence the purchasing decisions of future customers. According to Kotler and Armstrong (2010), customer reviews and ratings play a significant role in shaping buying interest by providing credible and relevant information. This feedback mechanism helps companies assess their performance and improve their products or services to better meet customer needs. The purchasing decision is a critical stage in the consumer decision-making process, where customers decide to buy based on the value and credibility of the information provided by previous customers**.**

Figure 5. Appearance of the customer review feature on the e-commerce platform of ALE company

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e. **Minimizing Fraud and Fictitious Orders:** E-commerce platforms serve as a trusted intermediary between sellers and buyers, ensuring secure transactions. These platforms hold payments during the transaction process, releasing funds to the seller only after the customer has received the product. This system helps prevent fictitious orders, as the order is only processed after payment is made. Additionally, many platforms offer a Cash on Delivery (COD) option, which provides customers with an extra layer of security by allowing payment upon receipt of the product. However, e-commerce platforms also implement protective policies for sellers, such as penalizing customers who reject COD deliveries multiple times. Article 1513 of the Civil Code further reinforces this by stating that buyers must pay the agreed price at the specified time and place. These legal protections and platform policies ensure the security and integrity of e-commerce transactions.

Sales Strategy on E-Commerce Platforms

a. Bundling

Bundling is a marketing strategy that combines two or more products and offers them at a lower price than if purchased individually. This approach is increasingly popular as it provides benefits to both producers and consumers (Irfan & Suasana, 2021). For example, Figure 6 "Storefront A" shows a Shopee listing that offers a bundle of 150 grams of tropical fruit mix chips and 100 grams of original vegetable mix chips with a free 40-gram garlic chips package. This bundling strategy successfully boosts sales, not only of the primary product but also of other items with slower sales. Offering free products in smaller packages serves as a consumer trial, potentially leading to repeat purchases. Harahap (2021) similarly argues that bundling adds value for consumers, enhancing their purchasing interest.

Figure 6 "Storefront B" illustrates a similar strategy on Tokopedia, where ALE offers a bundle of original or spicy okra chips with a free fruit or vegetable chip. In contrast, Figure 6 "Storefront C" on Lazada features a bundle of four chip packages, offering a lower price compared to buying individual pieces. Regularly updating storefronts with new and varied product combinations keeps customers engaged with ALE's offerings on e-commerce platforms. Research by Witarsana et al. (2022) supports the effectiveness of bundling strategies, demonstrating a positive impact on purchasing decisions. Combining products into one price is an effective way to increase sales volume, as customers are drawn to the cost savings. Irfan and Suasana (2021) also found that bundling has a positive and significant effect on consumer purchasing behavior.
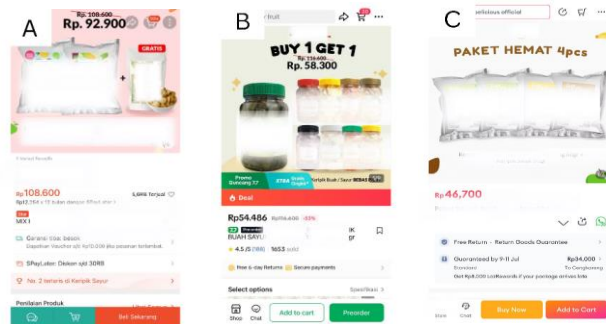
Figure 6. Storefront appearance on the e-commerce platform of ALE company

b. Live Streaming selling

Live streaming selling, also known as direct selling via social media, represents a significant innovation in digital media by facilitating real-time and interactive engagement between sellers and customers (Suhyar & Pratminingsih, 2023). ALE Company regularly utilizes this feature on e-commerce platforms such as Shopee and TikTok, in collaboration with Tokopedia. Through live streaming, sellers can showcase and demonstrate products in real time, while customers can respond directly, fostering interactive two-way communication. This dynamic interaction allows ALE to offer exclusive promotions or discounts that differ from the regular storefront prices, effectively encouraging viewers to make purchases during the live sessions Rahmawati et al. (2023) found that live streaming selling simplifies transactions for consumers, as it allows them to view products in real time and consider the ratings and reviews from previous buyers.

Figure 7. Digital marketing strategy of ALE company utilizing live streaming selling

Social Media

ALE Company utilizes multiple social media platforms for promotion and customer interaction, including Instagram, TikTok, and WhatsApp. The choice of these platforms aligns strategically with the company's target market—women aged 18-35 years. According to a survey conducted by NapoleonCat in January 2024, Instagram User in Indonesia 2024 numbered 89.9 million, representing 31.8% of the population, with women accounting for 54.9% of users. The largest age group of users is 25-34 years, with 35.8 million individuals. Additionally, there is a significant gender difference in the 18-24 age group, where women outnumber men by 12.5 million. TikTok's user base in Indonesia reached 127.5 million as of April 2024, the highest globally, with 63.1% of users aged 18-35 years (Santika, 2023). Furthermore, according to Annur (2024), 90.9% of Indonesian internet users aged 16-64 years actively use WhatsApp. With such extensive user bases across these platforms, ALE Company effectively ensures substantial customer reach.

Digital Marketing Techniques on Social Media Platforms

The utilization of social media for promotional activities by ALE Company involves specific techniques aimed at achieving its digital marketing objectives, primarily positioning the brand as the leading choice for healthy snacks made from real fruits and vegetables. An analysis of the digital content shared on ALE's social media platforms reveals the application of several key techniques, including:

a. Storytelling

Storytelling is a widely used marketing strategy that fosters emotional engagement between consumers and products. By crafting compelling, relevant, and meaningful narratives, companies can connect product values to consumer experiences or aspirations. This approach not only strengthens the bond between the brand and its audience but also enhances consumer engagement, fosters a sense of connection, and ultimately influences purchasing decisions (Butcher, 2018). Storytelling enables effective communication and promotion, making products more relatable to consumers and influencing their buying choices. Furthermore, storytelling allows brands to convey their messages subtly yet powerfully, shaping consumer perceptions and preferences (Kurniawan, 2020). Based on these insights, ALE Company has successfully implemented storytelling techniques in its digital content on Instagram and TikTok, enhancing brand engagement and visibility.

Figure 8. Digital content with storytelling concept on social media of ALE company

In Figure 8, "content A," uploaded by ALE Company on their TikTok account on May 22, 2024, the company presents how okra, a vegetable known for its sliminess and difficulty in processing, can be transformed into crispy and crunchy vegetable chips using the vacuum frying method employed by ALE. Through storytelling, the content effectively promotes ALE's ability to produce healthy and delicious chips while minimizing nutrient loss during processing. Similarly, in "content B," uploaded on January 11, 2024, on ALE's Instagram account, the company narrates the journey of creating garlic chips. Initially met with skepticism, the product eventually went viral and achieved significant sales. The inclusion of garlic chips' health benefits further enhances the content's appeal. Supporting this strategy, Mavilinda et al., (2023) found that storytelling effectively increases consumer interaction with brands and products, contributing to improved purchasing decisions. By leveraging compelling and relevant narratives, ALE successfully engages consumers on an emotional level, fostering a deeper connection with their products. As a result, social media posts featuring storytelling strategies, particularly those covering trending topics, consistently achieve higher interaction rates on ALE's accounts.

b. Sales Promotion as Digital Marketing

Sales promotion is a widely utilized strategy among businesses. Kotler and Keller (2012) define sales promotion as a collection of short-term incentives designed to stimulate consumer or trader purchases more quickly and in greater volumes. Supporting this view, research by Putrinda Ratu and Tulung (2022) demonstrates that sales promotion in digital marketing significantly influences consumer purchasing interest in an effective manner. By employing various promotional methods, such as discounts, special offers, product bundling, and cashback, companies can directly capture consumer attention and drive purchasing decisions.

In Figure 4, "content A and B" illustrate the application of sales promotion in ALE's social media content. Both posts were uploaded during Ramadan, capitalizing on the festive moment of Eid Fitr. The sales promotion offered, such as a "buy 1 get 1 free" deal, highlights how customers can benefit by purchasing Eid snacks at a reduced price. Fauziah et al. (2019) further corroborate the positive impact of sales promotion, showing that it has a significant effect on boosting sales. Consequently, sales volume can experience a marked increase, reinforcing the effectiveness of sales promotion as a powerful tool to enhance sales performance and meet business objectives. Therefore, ALE's implementation of this strategy is both timely and beneficial for sustaining sales growth
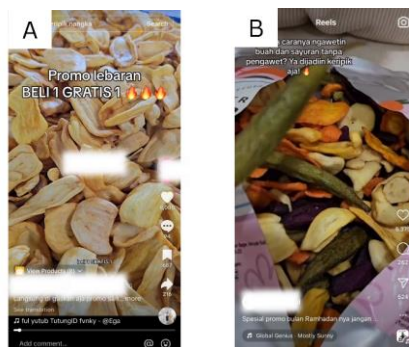
Figure 9. Digital marketing content with the concept of sales promotion

Analysis of the Effectiveness Level of Social Media as a Promotional Media Based on Engagement Rate

a. Tiktok

During the period from January to June 2024, ALE Company uploaded a total of 55 content pieces to its TikTok account. Using Taylor's engagement rate calculation formula, the data is presented in Table 2:

Table 2. Detailed data of uploads on Tiktok accounts of ALE companies from January to June 2024

No	Month	Total				Total of Followers	Eng.	Eng. Rate
		Likes	Comments	Saves	Shares			
1	Jan-24	1,231,096	11,807	75,410	17,450	612,100	1,335,763	218.23
2	Feb-24	612,208	4,847	38,815	9,238	612,100	665,108	108.66
3	Mar-24	877,407	5,329	42,393	8,905	612,100	934,034	152.60
4	Apr-24	506,995	2,626	28,688	4,433	612,100	542,742	88.67
5	May-24	562,736	2,911	26,157	5,311	612,100	597,115	97.55
6	Jun-24	191,399	1,669	8,734	1,722	612,100	203,524	33.25
	Rata-rata	72,397	531	4,004	856	66,775	77,787	12.71

b. Instagram

Total konten yang diunggah pada akun instagram perusahaan ALE selama periode januari s.d. Juni 2024 adalah 85 konten. Dari rumus perhitungan engagement rate yang dikemukakan oleh Taylor maka dihasilkan data seperti pada tabel 3:

Table 3. Detailed data of posts on Instagram accounts of ALE companies from January to June 2024

No	Month	Total			Total of Followers	Eng.	Eng. Rate
		Likes	Comments	Shares			
1	Jan-24	419,394	3,842	28,319	290,670	451,555	155.35
2	Feb-24	92,484	4,214	12,579	290,670	109,277	37.59
3	Mar-24	239,105	5,857	11,630	290,670	256,592	88.28
4	Apr-24	21,243	913	822	290,670	22,978	7.91
5	May-24	170,734	2,895	7,624	290,670	181,253	62.36
6	Jun-24	86,444	1,525	2,634	290,670	90,603	31.17
	Rata-rata	**12,111**	**230**	**748**	**290,670**	**13,085**	**4.50**

The average engagement rate of ALE Company's TikTok and Instagram accounts from January to June 2024 indicates a high level of engagement, with TikTok achieving 12.71% and Instagram 4.50%, both exceeding the 2.72% threshold for high engagement. These figures demonstrate the effectiveness of TikTok and Instagram as promotional tools for ALE Company. Miyata (2019) also supports this, stating that the effectiveness of social media as a promotional medium can be evaluated based on engagement rate metrics, providing valuable insights for company assessments.

CONCLUSION

The utilization of digital marketing, particularly through platforms like e-commerce, TikTok, and Instagram, has proven highly effective for ALE Company in promoting its products and engaging with consumers. The high engagement rates on TikTok and Instagram, averaging 12.71% and 4.50%, respectively, highlight the success of the company's digital marketing strategy in reaching and interacting with its target audience. By employing compelling storytelling, impactful sales promotions, innovative bundling strategies, and consistent live streaming sales, ALE has effectively captured consumer attention and fostered ongoing relationships with its audience. This strong engagement has led to increased visibility and, ultimately, a positive impact on sales. Thus, ALE Company has successfully leveraged digital marketing to build strong branding and drive consumer engagement.

To further develop its business, several strategic recommendations can be made. One key step is content diversification. While ALE has succeeded with its current strategy, diversifying digital content can help the company reach a broader audience and increase engagement across different market segments. For instance, ALE could expand its content offerings by producing short videos in various formats. Tutorials on product usage, unboxing videos that showcase the consumer experience, and collaborations with micro-influencers in niche communities could effectively attract new audience segments previously untapped by ALE's marketing efforts.

Additionally, the creation of interactive content, such as polls, quizzes, or live Q&A sessions on social media, would not only enhance user engagement but also provide valuable insights into consumer preferences and needs. Expanding the content variety would help ALE maintain brand relevance, broaden its marketing reach, and ultimately increase growth opportunities in an increasingly competitive market. Content diversification would also enable ALE to adapt to emerging trends in the digital space, ensuring that it remains at the forefront of marketing innovation.

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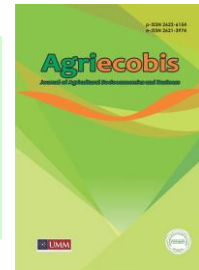
Research Article

Performance Analysis of the Village Unit Cooperative (KUD) "Suka Makmur" Using the Balanced Score Card

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ARTICLE INFO	ABSTRACT
	This study aims to analyse the performance of the village unit cooperative (KUD) "Suka Makmur" using the Balanced Scorecard instrument because cooperatives must be run with good management by implementing Good Corporate Governance (GCG). Therefore, it is necessary to measure the performance of cooperatives that focus on financial and non-financial performance. This research was conducted from July to October 2023 at the KUD "Suka Makmur". Mixed methods are used for primary and secondary data. According to the results of research on customer and membership perspectives, it shows that the existing membership at the KUD "Suka Makmur" totals 1,978 people, where the 2021-2022 membership comparison has no cooperative members who have resigned. Second, the financial aspect shows that the results of financial ratios (liquidity, solvency, and profitability) of the KUD "Suka Makmur" are in good condition, the third aspect of the cooperative business is related to the business of buying and selling FFB, UKM Mart, agricultural production facilities unit and savings and loan unit. According to the fourth learning and growth perspective, there are efforts made by cooperatives aimed at improving the ability of cooperative human resources through cooperative training and education, as well as assistance from the Ministry of Cooperatives and the West Tanjung Jabung Cooperative Office.

INTRODUCTION

Economic development in Indonesia is carried out through three main sectors, namely the government sector through State-Owned Enterprises (BUMN), the private sector through businesses managed by the private sector and through cooperatives as a source of people's economy based on family principles which play an important role in directing policies and regulations to encourage economic growth (Naufalina & Saputra, 2021). Cooperatives are considered the main pillar of the economy that could survive during business progress and competition. As a form of joint business, cooperatives have strong resilience because they prioritize the interests of members and the principle of togetherness, so they can face various challenges in the evolving business world (Singgih & Sulistyono, 2020). The Village Unit Cooperative is an institution that is very close to rural communities whose aim is to prosper its members through various cooperative business ventures (Wijayanti et al., 2015). In order for the cooperative's objectives to be achieved, the cooperative must be managed properly in accordance with the principles of GCG (good corporate governance). Managing cooperatives in line with GCG will ensure that cooperatives operate

optimally and efficiently. Therefore, cooperatives need to continuously strive to improve their performance to function better (Octaria et al., 2023). West Tanjung Jabung Regency has great potential in the agricultural sector, especially in the oil palm plantation subsector. In 2023, the oil palm land area reached 88,099 hectares, with Tebing Tinggi sub-district having the largest plantation area of 18,924 hectares, which is also the location of KUD Suka Makmur. (BPS, 2024).

KUD Suka Makmur is a cooperative established in 1987. KUD Suka Makmur is located in Tanjung Jabung Barat Regency and has 1,978 members. Most of its members are cooperative partner farmers, where the farmers directly sell their FFB (fresh fruit bunches) through intermediary traders or to KUD Suka Makmur in partnership with PT Agro Wiyana (Bakrie Sumatera Plantation). There are several business ventures of KUD Suka Makmur, including savings and loans, provision of production facilities for farmers, a one-stop shop (UKM Mart) and rental of traditional markets through the traditional market revitalization program. The business run by KUD Suka Makmur certainly needs to be measured for the success of its performance to measure the success of the cooperative in running its business. Performance is a description of the extent to which cooperative programs have succeeded in achieving the goals, vision, and mission of the cooperative (Astawa et al., 2020). There are five main aspects used to assess the performance of cooperatives, which include cooperative institutions, cooperative businesses, cooperative finance, benefits for cooperative members, and benefits for the community (Puspayoga, 2015). The function of cooperative business entities as economic institutions and social institutions makes performance measurement. In general, cooperative performance is often only measured from a financial point of view, even though the financial aspects alone do not reflect the overall performance of the cooperative.

Previous research conducted by (Gavinanda et al., 2018) at KUD Suka Makmur to measure financial performance at KUD Suka Makmur and is considered ineffective because it only still measures the performance of cooperatives from the financial side so that measurement of cooperative performance is needed which includes non-financial and financial performance. This can be measured using the Balanced Scorecard is one of the strategic management approaches that assesses 4 main perspectives, namely finance, customers, internal business processes, and growth and learning (Soryaningsih et al., 2019). Cooperatives benefit a lot from the implementation of the Balanced Scorecard. Balanced Scorecard is one of the strategic management approaches that assesses performance from four main perspectives: finance, customers, internal business processes, and growth and learning (Wardani et al., 2013). The application of the Balanced Scorecard provides several benefits for cooperatives, including: (1) cooperatives can develop work programs that are in accordance with objectives, based on performance indicators, and clear and measurable time and cost management; (2) cooperatives have a tool to monitor and evaluate the implementation of their management; and (3) cooperatives can better improve business performance by assessing financial and non-financial performance (Suryanawa, 2021; Augustinah, 2018). Currently, KUD Suka Makmur has not used the Balanced Scorecard as a performance measurement tool and only assesses from a financial perspective. Therefore, this study aims to analyse business performance at KUD Suka Makmur using the Balanced Scorecard instrument.

METHOD

Time and Place of the Research

Basically, this section describes the way the research was done. The main materials must be written here: (1) research design; (2) population and samples; (3) sample collection techniques and instrumental development; and (4) data analysis techniques. The specification and type of tools and materials must be written in case the researches have been conducted by using them. The qualitative research, such as classroom action research, case studies, and so forth, need to mention the researcher attendance, research subject, and participated informants, as well as the methods used to explore the data, research location, research duration, and the description of research results validation. It is suggested that the authors avoid organizing the article content into the smaller parts than second subheading in this section. However, in case of unavoidable factors, the writing style must follow the "Results and Discussion" section.

Data Analysis

KUD Suka Makmur performance measurement using the Balanced Score Card approach to determine performance indicators. The data that has been collected is grouped into categories through Balanced Scorecard Theory. Perspectives according to Balanced Scorecard theory. (Balanced et al., 1990) the perspectives in the Balanced Score Card theory are as follows:

1. Customer Perspective
   This view relates to how customers see the cooperative from their point of view according to the quality of service obtained from the cooperative.

2. Financial perspective
   This perspective shows how stakeholders see cooperatives from a financial perspective both in the short and long term. The more secure the cooperative is in obtaining capital resources, the better its position is.

3. Internal business process perspective
   The view of the cooperative's internal business processes describes the cooperative's business that can be adjusted to meet customer needs.

4. Learning and growth perspective
   This view focuses on showing how the cooperative can survive and thrive when affected by external factors.

FINANCE	CLIENTS
INTERNAL	IMPROVEMENT & INNOVATION
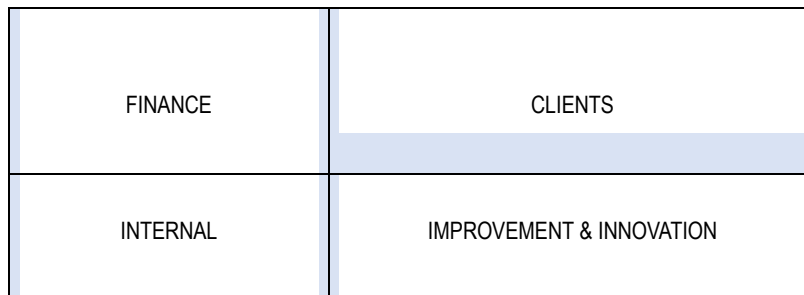
Picture 1: Balanced Score Card Theory

Research indicators in accordance with the Balanced Score Card Theory

Table 1. Research indicators in accordance with the Balanced Score Card Theory (Wahyudi & Aini, 2020)

Variable	Indicators	Measurement	How to Obtain the Data
	1. Membership growth includes an increase in the number of members 2. Member participation	Increase Customers' satisfaction	Interview
Finance	1. Financial performance is measured by financial ratios including liquidity and solvency 2. Capital 3. Income	Improved financial ratios	Board accountability report (RAT)
	4. Welfare provided to members	Management and business operations have been well implemented by cooperatives	Interview
Internal business processes	1. Cooperative Education for Members 2. Competency development of cooperative resources 3. Efforts to develop the character quality of cooperative human resources	Knowledge development and development of individual competencies within KUD	Interview

Source: (Wahyudi & Aini, 2020)

RESULTS AND DISCUSSION

KUD Suka Makmur Profile

KUD Suka Makmur has a vision and mission that aims to prosper cooperative members, by becoming one of the best cooperatives in the region that benefits members and the public. In line with research (Hasman, 2018) in addition to vision and mission, there are important values that cooperatives must strive for, including innovation, dynamics, quality orientation, openness, justice, democracy, and independence. KUD Suka Makmur runs various business ventures including:

a. Savings and Loan Business
   This business is provided for cooperative members with several terms and conditions when making loans including photocopies of ID cards, family cards (KK) and photocopies of member cards. This is a requirement that

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is easy enough for members to fulfil when members need capital assistance through loans from cooperatives with a repayment period of 1 year. In line with research (Gavinanda et al., 2018) that the administration that makes it easy for members to provide loans is a factor in the satisfaction of cooperative members with the performance of the cooperative.

b. Provision of Farmer Production Facilities

The system of providing farmers' production facilities is carried out with a credit system that is given a grace period of 4 months in instalments from the farmers' harvest.

c. One-stop Shop (UKM Mart)

One-stop shop (UKM mart) is a business that provides groceries for members and non-members.

d. Traditional market leasing through the traditional market revitalization program (Febrinova, 2013)

Traditional market rentals are carried out by cooperatives because KUD Suka Makmur once got a government program through market revitalization aimed at advancing the traditional market managed by KUD Suka Makmur.

In addition, KUD Suka Makmur has also received assistance programs from the government including mentoring activities from the Ministry of Cooperatives, the local Cooperative Office and the program to help rejuvenate people's oil palm from BPDPKS to assist cooperative members in replanting oil palm. oil palm plants that are replanted are plants that are 28 years old and KUD Suka Makmur gets a budget for the implementation of the people's oil palm replanting program for the 2021-2022 fiscal year covering 500 Hectares. Research conducted by (Siahaan et al., 2024), (Hardiningsih, 2023) states that to be able to get the program, cooperative members first register themselves to participate in the people's oil palm replanting program to the cooperative, then later the cooperative will register its members to the Plantation Office. After obtaining the funds, all the oil palm replanting process from planting to harvesting is carried out by the cooperative. The management carried out by the KUD Suka Makmur applies Good Agriculture practices, namely using certified seeds, the use of fertilizers and plant medicines in an appropriate and balanced manner to get good productivity and FFB quality (Siahaan et al., 2023).

PERFORMANCE ANALYSIS OF KUD SUKA MAKMUR
1. Customer/Membership Perspective

Cooperative performance from the perspective of KUD Suka Makmur membership is seen from the increase and participation of cooperative members. Member participation in activities in cooperatives has a good share in carrying out cooperative activities, for example participating in making cooperative decisions, cooperative business capital (Arifudin & Risnaningsih, 2021). Membership in KUD Suka Makmur consists of members and non-members. KUD Suka Makmur membership amounts to 1,978 people. The human resources (HR) of the cooperative consist of 23, namely as supervisors, cooperatives, and the rest are KUD members. Cooperative members also participate in the oil palm replanting program as many as 617 members with a total land area of 1,595 Ha. Based on the number of memberships, there is no change from the 2021-2022 membership. The following is the membership of KUD Suka Makmur.

Table 2. Total members of KUD Suka Makmur

No	Description	Members Year 2021	Members Year 2022
1	Purwodadi	1.277	1.277
2	Kalagian	572	572
3	Suban	129	129
	Jumlah	**1.978**	**1.978**

Source: Primary Data Processed, 2024

KUD Suka Makmur members mostly work as oil palm farmers who are also members of farmer groups. From the following table there are no members who resigned from the cooperative). This happens because there are many benefits received by members (Harsela et al., 2022) states that the absence of a reduction in cooperative members means that the cooperative provides good services that make cooperative members loyal to the cooperative. When becoming a member of the cooperative, among others, the purchase price of FFB is higher than that of cooperative members selling to collecting traders. In line with research (Rayesa, n.d.) that there are benefits obtained by members if they join a cooperative, one of which is a higher purchase price. In addition, with cooperative institutions, members can get the opportunity to participate in the program to rejuvenate unproductive oil palm with a member's land area of 2-4 Ha/person, and government assistance programs cannot be obtained by

farmers when farmers do not join farmer institutions such as farmer groups and cooperatives, thus motivating farmers to actively participate in cooperatives. Member participation can be seen from the participation of members in carrying out cooperative activities, including attending meetings and attendance at annual member meetings (RAT). The implementation of the Annual Members Meeting (AGM) held by cooperatives is usually related to (a) the cooperative's articles of association, (b) general policies in the fields of cooperative organization, management, and cooperative business, (c) election, appointment, and dismissal of management and supervisors, and (d) ratification of the accountability report of the management and supervisors. (Andriani & Tamami, 2020).

2. Internal Business Process Perspective

The business at KUD Suka Makmur consists of:

a. Savings and Loans

Savings and loans are given to members and non-members of the cooperative who need loans for oil palm cultivation purposes. Where the repayment system is carried out by providing instalments from the farmer's oil palm harvest.

b. Provision of farmer's production facilities

The system of providing production facilities for farmers is carried out with a credit system that is given a grace period of 4 months in instalments from the harvest of farmers. The provision of agricultural production facilities can be in the form of fertilizers, herbicides and production facilities needed in oil palm cultivation.

c. One-stop shop (UKM Mart)

The one-stop shop (UKM Mart) consists of basic goods, clothing, and household appliances managed by the cooperative. The management of the one-stop shop is aimed at meeting the needs of cooperative members

d. Traditional Market Leasing through the Traditional Market Revitalization Program

In 2013, the cooperative received traditional market revitalization assistance from the Ministry of Cooperatives and SMEs. Then the cooperative provides traditional market rentals to sellers in the market where the results of the market rental are managed by KUD Suka Makmur:

There are several innovations made by KUD suka Makmur in running the cooperative business, namely:

a. Selling FFB produced by cooperative members

Initially, before joining the cooperative, farmers sold their own FFB to middlemen/collecting traders. However, after joining the cooperative, the farmers sold the FFB to the cooperative and then the cooperative sold it to the partner company, PT Agrowiyana. The benefit for cooperative members is the higher price obtained by farmers which ultimately creates prosperity for cooperative members

b. Getting the opportunity to join the program to replant unproductive palms

Farmers who join the cooperative could join the oil palm replanting program with a land area of 2-4 ha that is no longer productive for replanting. Members must fill out the requirements and conditions of the program. Then, the cooperative will take care of the relevant agencies until the replanting program is implemented. To measure the welfare of KUD members, consider the benefits received by members when joining the cooperative. Economic benefits include income from the remaining results of operations (SHU), satisfaction with the price of fertilizer and agricultural inputs cheaper, and the welfare of KUD members seen from the benefits received by members of the cooperative when joining the cooperative both economic benefits and social benefits. Economic benefits in the form of income received by members through the remaining results of operations (SHU), satisfaction with the price of fertilizer and agricultural inputs through cheaper prices, and ease of making loans to KUD and its return. Social benefits perceived by members of the cooperative when joining the cooperative membership is the existence of farmer institutions that make the position of farmers stronger than when farmers do not join into cooperative institutions. In addition, it is also related to the network and relationships that farmers get when joining the cooperative so that it adds to the insight and ability of farmers in running oil palm farms owned.

3. Financial Perspectives

Indicators for the financial performance perspective of KUD Suka Makmur are determined by three factors, namely financial ratios, cooperative capital, and revenue realization. Capital is an important element in cooperative

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operations. In 2022, the capital of KUD Suka Makmur consisted of own capital, including principal savings, mandatory savings, donations, general reserves, and cooperative reserves, as follows:

Table 3. Modal of KUD Suka Makmur

No	Description	2022 (Rp)
1	Principal deposit	20.340.000
2	Compulsory savings	1.333.775.000
3	Donation	1.065.450.000
4	General reserve	1.177.966.664
5	Cooperative reserve	1.997.921.564
6	SHU	599.577.307
	Total	**6.195.030.535**

Source: RAT KUD Suka Makmur, 2022

Based on the table above, the increasing mandatory savings of cooperative members, the higher the cooperative capital. Principal savings, mandatory and voluntary deposits are obtained from cooperative members, where cooperative members can request at any time the number of voluntary deposits given. (Suwarmi, 2021). Donations obtained Where KUD Suka Makmur has received government donations of IDR 900,000,000 for the revitalization of traditional market development and capital assistance from the Cooperative Office of IDR 14,425,000. The amount of capital owned by KUD Suka Makmur shows that the performance of the cooperative is in a healthy state, because most businesses are financed by capital originating from cooperatives. In the table above, mandatory savings are the largest source of cooperative capital, reaching Rp 1,333,775,000 which means the high participation of members in paying member obligations.

Table 4. Cooperative financial statements:

No	Description	2022 (Rp)
1	Current assets	8.247.832.648
2	Fixed assets	3.336.054.300
3	Accumulated depreciation of fixed assets	(2.051.995.690)
4	Other assets	119.031.677
5	Total assets/cooperative assets	9.650.922.935
6	Current liabilities	3.455.892.401
7	Long-term liabilities	-
8	Own capital	6.195.030.535
9	Total debt and equity	9.650.922.935

Source: RAT KUD Suka Makmur, 2022

The results of the financial ratios of KUD Suka Makmur are as follows:

Table 5. Financial Ratio of KUD Suka Makmur

Financial Benchmarks	December 2022 (%)	Note
Liquidity	238.660	Good
Solvency	279.260	Good
Rentability	9.678	Good

Source: RAT KUD Suka Makmur, 2022

The results of the liquidity ratio analysis relate to the ability of the cooperative to pay off current liabilities / debts. The liquidity ratio shows that the result is 238,660% which means that KUD Suka Makmur can pay current liabilities with a ratio of 1, where current liabilities are guaranteed assets of 2.39. The results of the solvency ratio relate to the ability of the cooperative to pay all its debts with all its assets. The solvency ratio value is 279.260% with a ratio of Rp 1. This means that current liabilities with assets amount to 2.79. The results of the profitability ratio relate to the ability of the cooperative to generate profits. KUD Suka Makmur can generate SHU from independent capital of 9.68%. Research (Septiasari et al., 2015) shows that the remaining results of operations (SHU) obtained are not only aimed at achieving benefits in the form of profits, but also to ensure equal welfare for cooperative members.

Income

KUD Suka Makmur income is obtained from all cooperative business businesses, namely as follows:

Table 6. Source of Income KUD Suka Makmur

Description	Amount (Rp)
FFB unit income	629.545.712
Savings and loan unit income	119.059.274
Fertilizer unit income and agricultural production facilities	183.852.217
KUD Suka Makmur transportation income	6.547.500
UKM Mart (one-stop shop) income	765.415.727
Traditional market unit income	43.483.000
Total gross income	1.787.903.430

Source: RAT Suka Makmur, 2022

Table 7. Total of Income KUD Suka Makmur

Description	Amount (Rp)
Total gross income	1.787.903.430
Total operating expenses	380.638.117
Total operating SHU	1.407.265.313
Total organization, ADM and general expenses	722.034.105
Total SHU before tax	685.231.208
Total KUD business tax expense	85.653.901
Remaining operating result for the year	599.577.307

Source: RAT Suka Makmur, 2022

The highest income generated by KUD Suka Makmur is from the FFB (fresh fruit bunches) purchase unit of Rp 629,545,712 which is the main activity in KUD Suka Makmur which results in FFB being sold to PT Agrowiyana as a partner of KUD Suka Makmur. The remaining gross operating result of the cooperative is the total deduction of income earned by the cooperative from cooperative business ventures, operating costs and taxes that must be paid by the cooperative. This is related to the provision of fertilizers and agricultural production facilities in accordance with the requests of cooperative members while the remaining net operating results are the total income obtained by the cooperative obtained from reducing costs, depreciation and other liabilities within one year. The remaining results of the cooperative's operations in 2022 at KUD Suka Makmur amounted to Rp 599,577,307.

4. Learning and growth perspective

Indicators of cooperative growth and learning include systems, human resource capacity and organizational operational systems (Wardana, 2005). Currently, the system available at KUD Suka Makmur is a system for sales in convenience stores, savings and loans to facilitate running a cooperative business, but for information systems such as social media or cooperative websites are not yet available. Regarding human resources, there are 23 people working as supervisors, cooperative management and employees in running the cooperative business, while cooperative members number 1,978. For cooperative growth, there is currently no reduction in the number of cooperative members, but in the long term it is expected that there will be an increase in Suka Makmur cooperative members. The learning and growth performance of the Suka Makmur cooperative is also assessed based on access to provide education for members, an increase in the competence of cooperative resources, and character building for cooperative human resources. This relates to learning to support the improvement of cooperative human resource capabilities obtained from cooperative education and training. Cooperatives get training from the Jambi Cooperative Office and the West Tanjung Jabung District Cooperative Office, and in 2023 KUD Suka Makmur get assistance in the field of business management from the Ministry of Cooperatives and SMEs. In line with research (Kharisma Genta, 2020) states that the importance of implementing cooperative education and training with up-to-date information to provide a good understanding of cooperative members in accordance with the cooperative law which states the role and function of the cooperative is to increase the opportunities that exist in cooperative members.

CONCLUSION

The performance of KUD Suka Makmur is divided into 4 perspectives, namely the first perspective of customers / membership shows that the existing membership at KUD Suka Makmur totals 1,978 people where the 2021-2022 membership comparison has no cooperative members who have resigned because of the many benefits received by members when joining the cooperative membership so that cooperative members are loyal to the cooperative. Second, the financial aspect shows that the results of financial ratios (liquidity, solvency, and profitability) of KUD Suka Makmur are in good condition, Third, the business aspects of cooperative businesses are related to the business of buying and selling FFB, UKM Mart, agricultural production facilities units and savings

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and loan units. Fourth, the learning and growth perspective describes the cooperative's efforts to increase human resource capacity through training, cooperative education, and assistance from the Ministry of Cooperatives in 2024, as well as assistance from the Cooperative Office of Tanjung Jabung Barat Regency. In this study, it is recommended that cooperatives remain consistent in providing good performance in cooperative management in accordance with the principles of good cooperative management (GCG).

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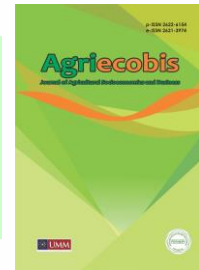
Research Article

The Strategy of Agroindustry Development of Teng-Teng Apel (A Case Study on Hilwa Nusantara Shop in Batu City)

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ABSTRACT

This study is conducted by purpose of identifying company environment and analyzing the strategy for agroindustry development of Teng-Teng Apel (cake made from apple fruit) in Hilwa Nusantara Shop in Batu City. The methods of data analysis used in this study are internal and external company analysis, Internal Factor Evaluation (IFE) Matrix, External Factor Evaluation (EFE), SWOT analysis, and Quantitative Strategic Planning Matrix (QSPM) analysis. The results of the study have showed that SWOT analysis indicates IFAS score 2.84 and EFAS value 2.94. Moreover, agroindustry position of Teng-Teng Apel of Hilwa Nusantara Shop is at Quadrant One (I). Based on company position, there are three alternative strategies, 1. To increase production capacity and quality using technology, 2. To extend market in developing sales volume, and 3. To maintain relationship and trust with raw material suppliers. First becomes first priority for Hilwa Nusantara with TAS value 5.49.

INTRODUCTION

Agriculture is a significant sector that plays an important and strategic role in national economy which concerns the livelihoods of many people (Syabena et al., 2023). The agricultural sector can contribute significantly to national development, along with development efforts and growth in other sectors. One of the prerequisites for developing other sectors such as industry and services is a superior and reliable agricultural sector (Raharjo et al., 2023). One of numerous agricultural products that contribute to the national economy is fruit. Apples are an agricultural product in the form of annual fruit that originally came from the West Asian region which has a temperate climate. Apples have been cultivated in Indonesia since 1934 and have many varieties that can be found in many regions, especially in East Java. According to BPS (2022), East Java is the region with the largest apple production in Indonesia. One of the many potential areas in East Java province which is a center for apple production is Batu City, precisely in the Bumiaji District. Apples are one of the leading commodities and are widely developed in this region, so that apples are used as a tourism icon for Batu City.

The availability and existence of apples, which are very easy to obtain in this region, can be a strength factor to increase the selling value of apples. Considering that apples are climacteric fruit, they will continue to experience the ripening process even after being picked from the tree (Arti & Manurung, 2018) so that they will rot faster and

further processing is needed to increase the economic value of apples. Sometimes, in an effort to increase income, businessman prefer to process agricultural products first rather than sell them directly (Pahlupi et al., 2023). One of the efforts to increase the economic value of a commodity is to support agricultural industrialization through agroindustry. Agroindustry has a crucial role in the economy, functioning as the main driver of the agricultural industry. The existence of agroindustry may create job opportunities, income distribution to be more balanced, and community welfare (Faliha et al., 2022). According to Maryam et al., (2020), agroindustry is intended as an industry that produces input for the production process that will produce a new product. This product is ready for consumption or a semi-finished product that must be processed first.

Agroindustry is an industry that in its process uses agricultural products as the main raw materials in its manufacture (Soekartawi, 2005). In the perspective of agroindustry side, this is more emphasis on food processing. Agroindustry is a bridge connecting the agricultural sector in the upstream activity process and the downstream industrial sector (Jhonson et al., 2024). Agroindustry includes activities that change the original form of agricultural products into a new product form. Agroindustry plays a very important role where it is the center of the agricultural chain and increase the value of agricultural products on the market. The process will result in added value and utility so that the economic value of an agricultural product becomes higher (Dore et al., 2021). Apple agroindustry is a processing industry formed by utilizing apples as the main raw material in producing various processed products such as apple pie, apple dodol, apple chips, Teng-Teng Apel, etc. One of the apples agroindustries that is developing in the Batu City area is Hilwa Nusantara Shop.

Hilwa Nusantara is a business unit located in Batu City and focuses on apple processing which has been managed since 2015. Numerous efforts in business development have been made to increase the company's value. One of the business developments carried out by Hilwa Nusantara is to produce various kinds of processed products to increase the economic value of apples. There are some featured products of Hilwa Nusantara's products, such as Teng-Teng Apel, apple dodol, apple chips, apple cookies, apple pie, and other processed apple products. The presence of Hilwa Nusantara is expected to support the economy of the surrounding areas.

Being in a tourism area provides many opportunities for Hilwa Nusantara to expand its business. According to Dinas Pariwisata Kota Batu (2022), tourist visits to Batu City have increased significantly compared to previous years. The increase in tourist visits to Batu City has an impact on the volume of souvenir sales. This is proven by the increasing sales of Hilwa Nusantara products during the holiday season. Based on this opportunity, some agroindustry in this region have begun to grow to utilize apples as raw materials for processed products to meet market demand. This situation makes Teng-Teng Apel product of Hilwa Nusantara have great potential in sales considering that its marketing area located in the tourist city of Batu. On the other hand, the growing number of agroindustry has created the competition between one and another. This condition requires Hilwa Nusantara to maintain its business considering the growing other agroindustry and opening businesses with products made from the same raw materials. In maintaining a business amidst competition, an appropriate strategy is needed to carry out developments that are in accordance with the company's circumstances.

Strategy is a sustainable response to threats and opportunities as well as strengths and weaknesses that can influence the company (Rohmawati, 2020). Strategy encompasses various combinations of competitive moves and business approaches used by managers to meet consumer needs and compete effectively in achieving organizational goals (Arthur et al., 2022). Considering the large number of competitors, it is necessary to understand the company's environment, both from internal and external factors that will support or hinder Hilwa Nusantara in its operations. As a result, this condition is profitable as the basis getting information which is used as an evaluation for business development strategy.

There are several previous studies used as guidelines which conducted by Tamaradewi et al., (2019) regarding development strategy of coffee business (Coffea, sp) among Forest Farming Group (KTH) Green Cibulao and Slamet et al., (2022) regarding development strategy for the dragon fruit skin processing industry in Banyuwangi Regency. This study contributes to the selection of analysis methods and understanding of the use of data methods, namely the IFE matrix, EFE matrix, SWOT matrix and QSPM. The novelty of previous studies that has been conducted with the current research lies in the object and location of the study, Teng-Teng Apel product located at Hilwa Nusantara Shop in Batu City using several data analyses including the IFE matrix, EFE matrix, Grand Strategy Matrix, SWOT Matrix, and QSPM. Based on problem statements above, the purpose of this study is to identify the company environment (internal and external); to formulate alternative strategies; and to determine the main strategy for Hilwa Nusantara in an effort to develop the business.

METHOD

This study was conducted in Hilwa Nusantara Agroindustry located at Cop St. Kasdi, Bumiaji District, Batu City, East Java. The determination of research object is using purposive sampling considering Hilwa Nusantara is one of agroindustry that actively processing apple fruit in Batu City. The study was held in March until June 2024.

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This study applied purposive sampling to determine respondents criteria (Sugiyono, 2019). The criteria for respondents selected and used as informants are parties who understand Hilwa Nusantara internally and externally. The selection of respondents was carried out with several considerations, namely that the respondents selected were parties who understood and knew the business conditions in more depth and had the authority in terms of the data needed for the research. The respondents who were used as key informants for the study were eight people, including the Owner of Hilwa Nusantara, the head of the administration division, three employees in the production division, the head of the marketing division, raw material suppliers, and the PLUT of Batu City.

The data used in this study consists of primary data and secondary data. Primary data is obtained from interview with key informants and secondary data is obtained from literature review relevant to the research topic. The method used to analyze data in this study is quantitative descriptive analysis. Descriptive analysis is used to describe the environmental factors of the Hilwa Nusantara agroindustry, while quantitative analysis is used to calculate the IFE & EFE matrix for evaluating strengths, weaknesses, opportunities and threats (SWOT analysis). The analysis tool used in compiling the company's strategic factors is the SWOT matrix (Rangkuti, 2018). QSPM (Quantitative Strategies Planning Matrix) is an analysis tool used to determine the main strategy for Hilwa Nusantara.

1. Identifying internal and external factors of Hilwa Nusantara

Information regarding the company environment, both internal and external, is obtained from in-depth interviews with key informants. Key informants in this study are the Owner of Hilwa Nusantara, the head of production division, the head of the administration division, raw material suppliers, and the PLUT KUMKM of Batu City.

2. Determination of weight and rating scores for each factor

In determining the magnitude of the weight and rating values in the IFE & EFE matrix, participation is required from informants who are considered to understand the company's condition in the activity process. Key informants in this study are the Owner of Hilwa Nusantara, the head of production division and its member, administration division, marketing division, raw material suppliers, and the PLUT KUMKM of Batu City.

3. Formulating strategic alternatives and priorities

Alternative strategies are derived from the company's position. Determination of strategic priorities is obtained from the total attractiveness scores in the QSPM matrix. The party that determines the strategic priorities is the owner of Hilwa Nusantara with the review that the business owner knows the condition of the company. Furthermore, the results of the strategy that has been determined in the QSPM matrix can be applied to the company environment.

RESULTS AND DISCUSSION

Identification of Internal and External Environment Factor for Teng-Teng Apel of Hilwa Nusantara

The analysis of company environment aimed to identify variables being factors that can influence Hilwa Nusantara internally and externally. Internal factors come from within the agroindustry and the challenges can be controlled by the company. Meanwhile, external factors come from outside the company and any challenges appeared are beyond their control. By identifying the internal environment, the company can find the strengths and weaknesses of Teng-Teng Apel product. On the other hand, identifying the external environment will create the opportunities and face the threats. (Harisudin, 2019). The environmental factors of the company from Teng-Teng Apel can be explained in Table 1.

Table 1. Environmental Factors of Hilwa Nusantara's Teng-Teng Apel Product

No.	Internal Factors	Strength	Weaknesses
1	Human Resources	- Having permanent employees	- There is no competitive recruitment for employees
2	Marketing	- Quality product	- Lack of product promotion - Limited marketing area
3	Production	- Availability of raw materials - Having regular suppliers - Becoming a pioneer in the agroindustry of *Teng-Teng Apel*	- Unattractive product packaging
4	Management	- Well planning of financial management - Production profit	-
5	Setting	- Accessible location	-
6	Organization	-	- Imbalanced distribution of employees' tasks

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No	External Factors	Opportunities	Threats
1	Economy	- Funding	- fluctuated cost of raw materials
2	Politics	- Government supports	-
3	Technology	- Technology development	-
4	Socio-culture	- High demand market during particular seasons.	-
		- Having a good relationship with suppliers	
		- Employees absorption	
5	Competition	-	- substitute products availability

Source: Processed Primary Data, 2024

1. Identification of Strength Factor
    a. Availability of raw materials. Hilwa Nusantara receives apples from the suppliers in the area of Batu City. To meet the need of fresh apples, Hilwa Nusantara collaborates with another supplier as business partner. By establishing a good relationship, the availability of raw materials for Teng-Teng Apel is always guaranteed.
    b. Quality product. Teng-Teng Apel produced by Hilwa Nusantara does not contain preservatives, artificial sweeteners, and colorings. The production process of Teng-Teng Apel must be carried out properly and every employee must comply with the S.O.P. that has been determined in order to create quality product with well-maintained and to be accepted by consumers.
    c. Strategic/ accessible production place. Hilwa Nusantara is located in the apple agro-tourism area and the center for apple production. The access eases the store to market Teng-Teng Apel as typical souvenirs from Batu City.
    d. Having permanent employees. The presence of permanent employees can fulfill the task of making Teng-Teng Apel. Moreover, their presence may overcome human resources aspect in the production process.
    e. Production profits. The profits increase in every period.
    f. Financial management. Financial management of the company has been carried out in detail by Hilwa Nusantara in order to identify its income and expenditure. By establishing good financial management, the bussiness of Teng-Teng Apel will be running smoothly.
    g. Becoming a pioneer in the agroindustry of Teng-Teng Apel. Hilwa Nusantara is the only agroindustry business produced Teng-Teng Apel in the area of Malang. As a pioneer, of course, this is a strength for Hilwa Nusantara that Teng-Teng Apel will be more easily recognized by the public.

2. Identification of Weakness Factors
    a. Lack of product promotion. The sales system is only carried out through souvenir shops, Hilwa Nusantara does not carry out any online promotional and sales activities.
    b. Limited marketing area. Teng-Teng Apel is only marketed at souvenir outlets, such as Brawijaya, Kendedes, Royal Oleh-Oleh shop outlets, etc. As a result, the marketing of Teng-Teng Apel is still considered not optimal due to limited marketing area.
    c. Unattractive product packaging. Teng-Teng Apel only uses plastic packaging and distributed by using cardboard box.
    d. There is no competitive recruitment for employees. In recruiting employees, there is no specific consideration of skills or education. The majority of employees working in Hilwa Nusantara is coming from housewives surrounding area.
    e. Task Distribution of Employees. In the implementation of production activities, task distribution of employees is still not in accordance with the organizational structure. The employees have double job description in the production phase so they cannot focus on one task.

3. Identification of Opportunity Factors
    a. Government supports. The government supports brand registration, PIRT, halal certification, as well as SME development through workshop trainings.
    b. High demand market during particular seasons. The market of Teng-Teng Apel has increased significantly in particular seasons, such as holidays. Many tourist visits result high demand of market in Batu City.
    c. Technology development. Sustainable development of technology highly contributes to Hilwa Nusantara in branding aspect. The proper use of technology can make it easier for Hilwa Nusantara to run the operations.

    d. Having a good relationship with suppliers. Hilwa Nusantara has a very good relationship with the suppliers of apple raw material. This relationship has been well established and loyally collaborated for long term periods.

    e. Funding. Hilwa Nusantara received capital loans from banks. It is expected the agroindustry business expanded and profitable.

    f. Employees absorption. The majority of employees at Hilwa Nusantara are coming from local people surrounding area by purpose to empower local community.

4. Identification of Threat Factor

    a. fluctuated cost of raw materials. fluctuated cost of in raw materials is affected by the supply of fresh apples on the market. Hence, it will affect production cost and profit.

    b. substitute products availability. The large number of substitute products on the market will give consumers many options in purchasing the souvenirs other than Teng-Teng Apel. The existence of other products will influence consumer preferences.

The Development Strategy of Teng-Teng Apel of Hilwa Nusantara Shop
IFE (Internal Factor Analysis Strategy) Matrix

    IFE is a matrix used to analyze internal factors of a company's environment by classifying them into two categories, namely strengths and weaknesses for the development of Teng-Teng Apel of Hilwa Nusantara business, which is then used for weighting and rating calculations. The amount of weight given by the informant will depend greatly on the level of importance or influence of the key factors on the success of the Hilwa Nusantara.

Table 2. Internal Factor Analysis Strategy (IFAS) Matrix of Hilwa Nusantara

Internal Factors	Weight	Rating	Total
Strengths:			
1. Availability of raw materials	0.09	3.5	0.315
2. Having regular suppliers	0.08	3.125	0.25
3. Quality product	0.08	3.25	0.26
4. Accessible Production Place.	0.07	2.75	0.2
5. Having permanent employees	0.08	3.125	0.25
6. Production profit	0.07	2.875	0.2
7. Financial Management	0.07	3	0.21
8. Becoming a pioneer in the agroindustry of *Teng-Teng Apel*	0.06	2.5	0.15
Number of strength variables	**0.63**		**1.83**
Weaknesses:			
1. Lack of product promotion	0.08	3.125	0.25
2. Limited marketing area	0.07	2.75	0.19
3. Unattractive product packaging	0.07	2.75	0.19
4. There is no competitive recruitment for employees	0.08	3	0.24
5. Task Distribution of Employees	0.06	2.375	0.14
Number of weaknesses variables	**0.37**		**1.01**
Total Score	**1**		**2.84**
Score Differences			**0.82**

Source: Processed Primary Data, 2024

    Table 2 has showed that total score of strengths and weaknesses is 2.84. The total score has indicated that the Teng-Teng Apel of Hilwa Nusantara is considered moderate category. The strength of strategic internal factor of Hilwa Nusantara is the availability of raw materials with a score of 0.315. This shows that the availability of raw materials in the form of fresh apples is the most important factor and needs to be considered in developing a business. The availability of raw materials will impact the running of the business. If there is a shortage or delay in the supply of fresh apple raw materials, this will hamper the production process of Teng-Teng Apel. The internal strategic factor that is the biggest weakness of Hilwa Nusantara is the suboptimal product promotion and is indicated by a score of 0.25. The promotion that has been carried out by Hilwa Nusantara is limited to making sales by placing Teng-Teng Apel at souvenir shops and there are still no activities carried out via online branding. As a result, promotional activities are considered not optimal. According to Anggina et al., (2020), promotion is a determinant factor for success in marketing activity. Promotion becomes a determinant factor for consumers to decide purchasing a product. In addition, the strengths of the company tend to be higher compared to its weaknesses. This condition indicates that Hilwa Nusantara has a good enough ability to anticipate weaknesses in Teng-Teng Apel business development.

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EFE (External Factor Analysis Strategy) Matrix

EFE Matrix is an analysis tool for external factors in the company's environment by classifying them into categories of opportunities and threats in the development process of Teng-Teng Apel in Hilwa Nusantara Agroindustry. Table 3 provides weight and rating scores of external companies.

**Table 3.** External Factor Analysis Strategy (EFAS) Matrix Teng-Teng Apel of Hilwa Nusantara

External Factors	Weight	Rating	Total
Opportunities:			
1. Government supports	0.14	3.125	0.43
2. High demand market during particular seasons.	0.15	3.5	0.52
3. Technology development	0.11	2.625	0.29
4. Having a good relationship with suppliers	0.14	3.375	0.47
5. Funding	0.12	2.75	0.33
6. Employees absorption	0.13	3.125	0.4
Number of opportunity variables	**0.79**		**2.46**
Threats:			
1. fluctuated cost of raw materials	0.12	2.875	0.34
2. substitute products availability	0.08	1.75	0.14
Number of threat variables	**0.20**		**0.48**
Total Scores	**1**		**2.94**
Score Differences			**1.98**

Source: Processed Primary Data, 2024

Table 3 has showed that the total scores of opportunities and threats are 2.94 - means that Teng-teng Apel of Hilwa Nusantara agroindustry is categorized moderate. The opportunity as a strategic external factor for Hilwa Nusantara is high demand market during particular seasons. The increasing demand of products will certainly affect the amount of income and profits obtained. The high demand of the product will affect the grow of the business. Meanwhile, the main threat is fluctuation or uncertainty in raw material costs. Fluctuated cost of raw materials surely impacts the production cost or expenditure. High production costs will affect the income and profits received by the company. According to Nisa (2023) regarding "The Development Strategy for Tempe Home Industry in Sungan Tabuk District, Banjar Regency (SWOT Analysis)", fluctuations in raw material costs may significantly impact on various aspects. Fluctuated costs make budget planning more difficult and unsureness. The company needs to adjust budgets periodically to accommodate changes in raw material costs. Profit margin of the company is fluctuated based on changes in raw material costs. This increase could lead to a decrease in profits. By understanding and managing the impact of raw material price fluctuations, the company can reduce risk and maintain their operational and financial stability.

Grand Strategy Matrix

Business location is combined with various factors of strengths, weaknesses, opportunities and threats of Hilwa Nusantara using the total score of the strengths and weaknesses factors in the IFAS matrix and the total score of the opportunities and threats factors in the EFAS matrix. This analysis aimed at determining the coordinate points so that the type of appropriate strategy for business conditions in the SWOT quadrant can be identified. The calculation of the internal factors for Hilwa Nusantara is obtained from the results of subtracting the strength and weakness scores, 1.83 - 1.01 = 0.82, which is used as the X axis and categorized positive position. Meanwhile, the calculation of external factors is obtained from the results of subtracting opportunities and threats by 2.46 – 0.48 = 1.98, which is used as the Y axis and categorized positive position. The calculation results showed that Hilwa Nusantara shop is in quadrant I. This quadrant position showed that Hilwa Nusantara is strong and has the opportunity to develop. The recommendation of strategy is an aggressive strategy, in which Hilwa Nusantara agroindustry is suggested to make efforts in business development on products and markets. The strategies are adding product quantities, variations, networkings by using technology aids. These strategies may extend economy growth to reach maximum success.
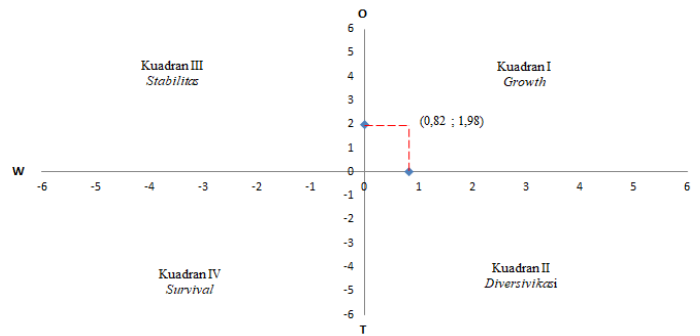
Picture 1. Grand Strategy Matrix for Teng-Teng Apel of Hilwa Nusantara

The location of Hilwa Nusantara is based on Fajriyah et al., (2023) about "The Strategy of Banana Chips Business of Prigi Jaya in Batuan Village, Batuan District, Sumenep Regency" located in quadrant I. The study explained that the location has great opportunities to expand. Aside from quadrant position, aggressive strategies conducted in the study are relevant to Hilwa Nusantara strategies. By focusing on strengths and opportunities, the company can formulate strategies by carrying out expansion to achieve optimal progress. The strategy of increasing the production quantity and quality is carried out by both companies in order to increase competitiveness, meet the market demand, and encourage sustainable business growth.

SWOT (Strength, Weakness, Opportunity, Threat) Matrix

According to calculation of Grand Strategy Matrix, the location of Hilwa Nusantara lies in quadrant I. This situation describes the strategies being planned based on strength and opportunity factors. The analysis conducted previously becomes a reference in determining alternative strategies in the business development process, the S-O strategy (strengths-opportunities). Alternative strategy of S-O in the agroindustry development of Hilwa Nusantara can be seen in Table 4.

Table 4. SWOT Matrix of Business Development for Hilwa Nusantara

Internal Factors / External Factors	STRENGTH 1. Availability of raw materials 2. Having regular suppliers 3. Quality product 4. Accessible location 5. Having permanent employees 6. Production profit 7. Financial Management 8. Becoming a pioneer in the agroindustry of *Teng-Teng Apel*
OPPORTUNITIES 1. Government supports 2. High demand market during particular seasons. 3. Technology development 4. Having a good relationship with suppliers 5. Funding 6. Employees absorption	S-O Strategy 1. To increase production capacity and quality using technology (S1, S3, S4, O2, O3, O5) 2. To extend market in developing sales volume (S4, O1, O3) 3. To maintain relationship and trust with raw material suppliers (S1, S2, O4)

Source: Processed Primary Data, 2024

The formulation of alternative strategies for developing the Hilwa Nusantara is based on the shop location which has previously been analyzed using a grand strategy matrix, lied on quadrant I. This is in line with Pradani's research (Pradani et al., 2021). Position of CV (Commanditaire Vennootschap) Pantiboga Natural Food lies on quadrant I and its strategy focus on product and market development. Hilwa Nusantara's market strategies are product development by promoting product quantity and quality using technology aids, as well as maintaining relationships and trusts with raw material suppliers. Meanwhile, the development strategy that concentrates on the market is by expanding the market to increase sales volume. Several ways of market development conducted by each business owner are the expansion of market networks and distribution based on business segments (Lubis et al., 2019).

The first strategy is obtained from the strengths and opportunities which is the availability of raw materials and increasing market demand in certain seasons (S1, S3, S4, O2, O3, O5). The sales of Teng-Teng Apel product encounter a significant increase during certain seasons such as national holidays, holiday seasons, etc. The

increase of Teng-Teng Apel sales has showed that numerous consumers purchase the product which indicating high demand of market. When sales percentage increases, Hilwa Nusantara faces the limitation in the existence product capacity. New technology may assist production efficiency allowing the company or home production to produce Teng-Teng Apel in short period of time. The use of technology eases Hilwa Nusantara to run its business.

The second strategy is obtained from accessible place and technology development (S4, O1, O3). The strategy can be implemented by Hilwa Nusantara by adding market place. Strategic or accessible location is around tourism place, souvenir shop outlets, and supermarket. This situation may profit for Hilwa Nusantara to promote its products. Furthermore, conventional and technology-based promotion are needed to increase sales percentage. E-commerce and social media branding will generate wider market place. The supports of local government become comparative advantages for Hilwa Nusantara.

The third strategy is obtained from the availability of raw materials and having regular suppliers, as well as well-maintained relationships with them (S1, S2, O4). To optimize or have good relationships with other partners may positively affect business relationships. Building and maintaining good relationships with suppliers is an important business strategy to ensure the sustainability of operations and long-term success of the company. Well-maintained relationships ensure a stable and uninterrupted supply of raw materials. This is important aspect for business stability. The suppliers are trusted to deliver lower or competitive price (special discounts) in order to minimize production costs. They are expected to provide high quality materials based on initial agreements. Strong relationships with suppliers as business partners may increase trust and minimize risks in long term relationships.

The Priority of Development Strategy for Teng-Teng Apel of Hilwa Nusantara

The priority of applied strategies for Hilwa Nusantara is using QSPM (Quantitative Strategic Planning Matrix) analysis. QSPM is an analysis method to assess alternative and factual strategies in accordance with critical factors from external and internal environment by matching relevant information and data (Parmitasari & Syariati, 2020). This matrix indicates attractiveness level of each alternative strategy. The strategy with the highest attractiveness value will be the company's priority in developing its business. There are three strategies generated by SWOT matrix followed by QSPM as advanced analysis, namely: (1) to increase production quality and quantity by using technology aids; (2) to expand the market by increasing sales volume; and (3) to maintain strong relationships and trust with suppliers as business partners. The calculations of those three development strategies for Teng-Teng Apel of Hilwa Nusantara are described in Table 5.

Table 5. QSPM Matrix of Hilwa Nusantara

Key factors	Weight	Alternative Strategy					
		I		II		III	
		AS	TAS	AS	TAS	AS	TAS
Strengths							
1. Availability of raw materials	0.09	4	0.36	2	0.18	4	0.36
2. Having regular suppliers	0.08	4	0.32	2	0.16	3	0.24
3. Quality product	0.08	3	0.24	4	0.32	3	0.24
4. Accessible Production Place.	0.07	3	0.21	3	0.21	2	0.14
5. Having permanent employees	0.08	3	0.24	1	0.08	1	0.08
6. Production profit	0.07	3	0.21	3	0.21	2	0.14
7. Financial Management	0.07	2	0.14	2	0.14	2	0.14
8. Becoming a pioneer in the agroindustry of Teng-Teng Apel	0.06	1	0.06	4	0.24	1	0.06
Weaknesses							
1. Lack of product promotion	0.08	1	0.08	3	0.24	1	0.08
2. Limited marketing area	0.07	1	0.07	3	0.21	1	0.07
3. Unattractive product packaging	0.07	3	0.21	2	0.14	1	0.07
4. There is no competitive recruitment for employees	0.08	1	0.08	1	0.08	1	0.08
5. Task Distribution of Employees	0.06	1	0.06	1	0.06	1	0.06
Opportunities							
1. Government supports	0.14	2	0.28	4	0.56	1	0.14
2. High demand market during particular seasons.	0.15	4	0.6	3	0.45	4	0.6
3. Technology development	0.11	4	0.44	3	0.33	2	0.22
4. Having a good relationship with		4	0.56	1	0.14	4	0.56

Key factors		Weight	Alternative Strategy					
			I		II		III	
			AS	TAS	AS	TAS	AS	TAS
	suppliers	0.14						
5.	Funding	0.12	4	0.48	3	0.36	3	0.36
6.	Employees absorption	0.13	1	0.13	2	0.26	2	0.26
	Threats							
1.	fluctuated cost of raw materials	0.12	4	0.48	1	0.12	3	0.36
2.	substitute products availability	0.08	3	0.24	4	0.32	2	0.16
	Total TAS			**5.49**		**4.81**		**4.42**

Source: Processed Primary Data, 2024

According to Table 5, the calculations of QSPM analysis indicated that the score of attractiveness for first strategy is 5.49, second strategy is 4.81, and third strategy is 4.42. First strategy has the highest score with 5.49. Moreover, this strategy aimed at increasing production capacity and quality using technology aids. This strategy obtained the highest total attractiveness score indicating that it is more attractive compared to other strategies and becomes is priority to implement in business development. The company should increase product quality and capacity to meet market needs. The development of technology, such as sophisticated production machines, is highly important to assist the needs of market by maintaining quality, efficiency, and responsiveness towards consumers' needs.

The technology also allows the company to rapidly cover production capacity to be greater in order to meet market needs without recruiting additional employees significantly (Ningsih, 2024). By utilizing technology, the company allows automized-production process in order to reduce time and cost. Automatic machines with automatic control system will increase the operational efficiency of the company. Advanced technology such as computer-based quality control and error detection systems can help to ensure Teng-Teng Apel produced by Hilwa Nusantara have stable quality based on predetermined standards. Thereby, it will automatically. reduce the risk of errors that humans may make in the production process. By adopting advanced technology in production system, the company may ensure product quality to be competitive and efficient in the market place. Initiating small things and moving gradually will assist the company to adapt to the changes without experiencing high risks.

CONCLUSION

Based on the analysis conducted by Hilwa Nusantara in Batu City, strategic internal factor of strength consists of the availability of raw materials, regular suppliers, quality product, financial management, and founder of Teng-Teng Apel. Internal factors of weakness consist of lack of promotion, limited marketing area, unattractive product packaging, less competitive recruitment for employees, and imbalance task distribution. Strategic factor of opportunity consists of government supports, high demand market during particular seasons, technology development, having strong connection with suppliers, funding, and employees' absorption. Meanwhile, strategic factor of threat consists of fluctuated cost of raw materials and substitute products availability.
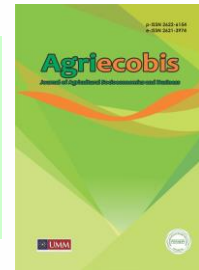
Hilwa Nusantara lies on quadrant I and is recommended to apply aggressive strategy. There are three alternative strategies that can be used, to name: (1) to increase production quality and quantity by using technology aids; (2) to expand the market by increasing sales volume; and (3) to maintain strong relationships and trust with suppliers as business partners. The prioritized strategy is to increase production quality and quantity by using technology aids by means of fulfilling market needs with the score 5.49.

There is an alternative for Hilwa Nusantara, to name using advanced technology such as automatic machines in the production system of Teng-Teng Apel to be more efficient and quality. Hilwa Nusantara is expected to be committed in planning market development by implementing advanced technology for promotion and branding purposes through social media and e-commerce services to expand wider markets.

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Research Article

An Analysis of Alternative Strategy Model for Agroindustry Business Development of Crystal Guava in Malang Raya

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ARTICLE INFO	ABSTRACT (10PT)
	PT. Kreasi Tani Bumiaji is agroindustry company located in Banaran, Bumiaji Village, Bumiaji District, Batu City, East Java. This company focuses on processing agricultural products in the form of crystal guava and becomes a superior local product. This study aimed at analyzing alternative strategy of agroindustry business development of crystal guava as a product in PT. Kreasi Tani Bumiaji. Descriptive-quantitative method was used to collect the primary data from interviews and questionnaire items. Eight participants from the company were selected by using purposive sampling technique. The secondary data were obtained from academic articles. The data were analyzed by using SWOT analysis, Internal Factor Evaluation (IFE) Matrix, External Factor Evaluation (EFE) Matrix, Internal-External (IE) Matrix, and QSPM. The results of analysis showed that main internal factor is diversification of processed products with the score 0.277. Meanwhile, external factor is internship collaboration with the score 0.418. The position of company in IE matrix lies on the fifth cell which showed that stable growth with coordinate scores 2.930; 2.594. According to 15 alternative strategies identified using SWOT analysis, prioritized strategy based on QSPM analysis refers to business partnership with investors for the development of production facilities, business concept, and marketing with the highest score 7.23.

INTRODUCTION

Agroindustry serves as a solution for agriculture sector in Indonesia through industrial activities of agriculture products and value-added approach with quality-oriented. The purpose of agroindustry is to provide value-added economically towards agriculture products. According to Elizabethh & Anugrah (2020), the existence of agriculture products through quality value-added approach may create competitive sources adjusted to market demands. Hence, the efficiency, effectiveness, and optimization of industrial activities for raw material products may create high quality products. Kementrian Perindustrian, (2020) stated that growth percentage of agroindustry business in Indonesia during 2015-2019 has reached 6.34 percent. As a result, agroindustry is a sub-sector of the non-oil and gas processing industries which plays an important and strategic role in improving the national economy.

Several regions with central agriculture production in Indonesia are located in Batu City, Malang City, and Malang Regency, East Java Province. These three regions refer to Malang Raya. Malang Raya has numerous

agricultural commodities with high-economic values through industrial activities as an agroindustry sector development. Agricultural products have been developed in Malang Raya and become alternatives to increase economic values.

In the development of agroindustry business, effective strategies are needed to ensure the sustainability in order to grow amidst competitive markets (Rusminah et al., 2021). According to Satoto & Norhabiba, (2021), the development strategies are attempted to analyze internal and external factors from the results of analysis methods of IFE matrix, EFE matrix, SWOT matrix, and QSPM.

One of agroindustry business located in Malang Raya utilizing agricultural products is PT. Kreasi Tani Bumi in Benaran, Bumiaji Village, Bumiaji District, Batu City. Agroindustry business has been performed by PT. Kreasi Tani Bumiaji since 2012 (12 years) in agriculture processing products, to name crystal guava (Psidium guajava). Along with its operations, PT. Kreasi Tani Bumi is supported by the availability of raw material sources that can easily obtained from surrounding area. Crystal guava has unique and special tastes. Based on its experiences in managing agricultural products, PT Kreasi Tani Bumiaji has produced numerous variants of products, such as Kristal Pastry, Rujak Shake, and Guava Chips. This agroindustry business possibly increases income of guava farmers in Bumiaji Village.

This study is necessary to conduct since PT. Kreasi Tani Bumiaji plays strategic roles in expanding local products-based agroindustry, such as crystal guava. By conducting the study, PT. Kreasi Tani Bumiaji can identify and analyze internal and external factors that influence its business development. Moreover, this study assists to plan effective strategies in order to ensure the sustainability of business performance. Considering agroindustry having great potentials to promote value-added and revenue of local farmers, this study significantly contributes to business optimization of PT. Kreasi Tani Bumiaji and encourages economic growth in Malang Raya in overall.

METHOD

This study was conducted in March until August 2024. The study took place at PT. Kreasi Tani Bumiaji located on Dewi Mutmainah Street, Banaran, Bumiaji Village, Bumiaji District, Batu City, East Java Province. The researcher selected PT. Kreasi Tani Bumiaji since it is one of agroindustry business which utilizes superior local products through industrialization of agroindustry system.

Purposive sampling was selected as a sampling technique considering the participants have particular knowledge regarding research topics. The study applied mixed-methods by implementing descriptive approach. Descriptive approach refers to structured understanding and illustration based on collected data systematically, accurately, and objectively concerning various aspects, characteristics, and phenomena. Mixed-methods are the combination of quantitative and qualitative methods Qualitative method used to identify external factors and SWOT analysis. Meanwhile, quantitative methods, such as IFAS Matrix, EFAS Matrix, IE Matrix, and QSPM, are used to develop and prioritize alternative strategies of agroindustry business in PT. Kreasi Tani Bumiaji, Batu City, East Java.

The data were obtained from primary and secondary data. Primary data are generated from interview, questionnaires, and direct observation in PT. Kreasi Tani Bumiaji. On the other hand, secondary data are generated from the results of literature reviews and documentation. There eight informants as participants involved in this study. The information was obtained from business owner as the key informant, four managers, and three employees of PT. Kreasi Tani Bumiaji.

IFAS and EFAS Matrices are highly needed to identify and calculate the score of each component in internal and external factors that may influence business improvement (Syafa'at & Wahid, 2020). IE Matrix aims at identifying company position in nine cells that describe the situation based on IFAS and EFAS Matrices. Furthermore, SWOT analysis is required to identify four development strategies, to name: (1) S-O (Strengths-Opportunities), W-O (Weaknesses-Opportunities), S-T (Strengths-Threats), and W-T (Weaknesses-Threats) (Kyana et al., 2023).

At the final stage of identification for alternative strategy, QSPM (Quantitative Strategic Planning Matrix) is used to provide the results of alternative strategy for business development by preparing solutions of the issues faced by the company (Banka et al., 2022).

RESULTS AND DISCUSSION

The results of data analysis, interview sessions, and questionnaire responses from eight participants of PT Kreasi Tani Bumiaji will be presented as follows. IFAS and EFAS Matrices present the weights and ratings of each component that influence company development. These results will be formulated to IE Matrix and SWOT analysis

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based on participants' perspectives regarding influencing internal and external factors. Furthermore, QSPM is obtained from alternative strategies of SWOT analysis.

Internal and external factors are identified from observation and interview results concerning alternative strategy model of agroindustry business development at PT. Kreasi Tani Bumiaji in Batu City, East Java.

Internal Factor:

A. Strengths
1. Diversification of product variants
According to interview with Mr. Rakhmad Hardiyanto, one of strength components from agroindustry business is the creation of product variants. At this moment, PT. Kreasi Tani Bumiaji already has several variants of crystal guava products, such as: (1) Rujak Shake is made from mixed fruits with simple packaging appearance with some pieces of crystal guava and chili pepper as rujak seasoning; (2) Kristal Pastry looks like pastry cake smeared with crystal guava jam inside it; and (3) Crystal Guava Chips has unique and delicious tastes.
2. Certified Products
All products produced by the company have been certified Halal from Indonesian Council of Ulema (MUI) and certified Food Production of Home Industry (PIRT).
3. Hygienic products
Strength component has explained that the products produced by PT. Kreasi Tani Bumiaji obtains Halal Food Certificate and PIRT. This achievement must be followed by maintaining S.O.P. of job description.
4. Company achievements
The owner of agroindustry business PT. Kreasi Tani Bumiaji, Mr. Rakhmad Hardiyanto, has revealed that efforts to run the business since 2012 have yielded innovations and profits for surrounding community from Bumiaji Village. PT. Kreasi Tani Bumiaji got some achievements regionally, such as: (1) First Place for Best Ambassador of Leading Farmer in Batu City 2023; (2) Outstanding Farmer of East Java Province 2022; (3) First Place for Outstanding Farmer 2022; and (4) Leading Farmer in Batu City 2022.
5. Company legality
Company legality is considered important for strength aspect since it validates business entity acknowledged by wider community. Legality must be based on constitutions and regulations to ensure the company protected by law through legal and formal documents (Indrawati & Rachmawati, 2021). According to the decree of the Ministry of Law and Human Rights of the Republic of Indonesia in 2023, the company led by Mr. Rakhmad Hardiyanto officially became PT. Kreasi Tani Bumiaji located in Batu City, East Java.
6. Production support assets
To assist production process of crystal guava in PT. Kreasi Tani Bumiaji, all aspects must be ensured from upstream (farm land and farming equipments) to downstream (home production, kitchen equipments, heater machine, cooler for raw materials, heat sealers packing equipment, labeling, and transportation for product distribution).
7. Production continuity
To respond market demands, PT. Kreasi Tani Bumiaji attempts to maintain sustainability of production by ensuring the availability of raw materials and the quality of products obtained from private farmland Located in Bumiaji Village, Bumiaji District, Batu City, East Java.
8. Product export
Marketing performed by PT. Kreasi Tani Bumaji in the wide range of regional and national market place. PT. Kreasi Tani Bumiaji has involved in product exports to several countries, such as Netherlands, Germany, Pakistan, Korea, Japan, Australia, Philippines and Malaysia.
9. Hexahelix network
The collaboration of hexahelix is a mapping concept with six stakeholders as partners to create good communication and performance in achieving the desired purposes (Anisykurlillah, 2024). PT. Kreasi Tani Bumiaji collaborated with six stakeholders, to name government, scientists, media, aggregator, community, and business.

B. Weaknesses
1. Neffective promotion
Promotion is a significant aspect in development strategy of product market generated from business entities and advanced technology to adjust with modern era (Salampessy et al., 2023). The lack of promotion is of weaknesses for PT. Kreasi Tani Bumiaji since the absence of strategy management and consistency in marking the products.

2. Raw materials storage

The storage raw materials is quite challenging experienced by Rakhmad Hardiyanto as an owner. Cooler facility for crystal guava needs to be enlarged. If the company receives large number of materials after harvest season, cooler facility is overloaded.

3. Employees' competences

PT. Kreasi Tani Bumiaji is awarded certification by Training Center for Agriculture and Rural Management/ Pusat Pelatihan dan Perdesaan Swadaya (P4S) assigned by Ministry of Agriculture in 2024. PT. Kreasi Tani Bumiaji has an obligation to empower local community as employees. Therefore, some employees with minimum skills and competences are trained to work in agroindustry process of PT. Kreasi Tani Bumiaji.

4. Limited export market

Export market has become strength component for PT. Kreasi Tani Bumiaji. However, this component must be expanded to wider global market. Due to different policy of each country, PT. Kreasi Tani Bumiaji needs to adjust to export permit regulations. This situation is considered challenging for PT. Kreasi Tani Bumiaji to expand its market.

5. Investor partnership

Another weakness is the absence of investments from the investors for PT. Kreasi Tani Bumiaji. The investors are expected to support the development of business ecosystem.

External Factor:

A. Opportunities
1. Business partnership

Business partnership serves as a vital component for agroindustry business by means of expanding and promoting amidst competitive markets. In this context, the company can leverage strategic partnerships with various parties, such as raw material suppliers, distributors, investors, and technology partners to strengthen the supply and distribution chain.

2. Marketing and digital promotions

Massive improvement of technology and information leads to effective solutions in order to perform promotion activities (Apriyani et al., 2022), such as empowering marketing and digital promotion performed by PT. Kreasi Tani Bumiaji.

3. Lifestyle changes

Healthy lifestyle of consumers tends to positive ways by consuming organic foods, as well as growing awareness of healthy foods (Gustiawan & Satriyono, 2022). This trend can be momentum for PT. Kreasi Tani Bumiaji to focus on promotion contents and product packaging of certified organic foods.

4. Internship collaboration

PT. Kreasi Tani Bumiaji perceives internship collaboration as significant external factor. By having certification of P4S and hexahelix network, PT. Kreasi Tani Bumiaji have established strong partnership with education institutions, such as Vocational School, Senior High School, and Higher Education.

This collaboration provides great opportunities to absorb competent human resources in agroindustry sector. Through this program, PT. Kreasi Tani Bumiaji not only accesses trained human resources, but also contributes to skill improvement for students. In sustainable development, PT. Kreasi Tani Bumiaji utilizes the development of global market to promote company growth and profit. Through global market expansion, the company may access the needs of various consumers.

B. Threats
1. Business competition

Business competition is a real threat for company profit and income. The competitors offers cheaper products where the company is required to improve the quality and efficiency. Without implementing the right strategy, the company will lose the consumers and profits. Therefore, understanding and anticipating market competition are keys for company growth.

2. Climate change

Climate changes, such as wind, air, temperature, humidity, and rainfall, significantly affect the decrease of product quantity and quality (Nuraisah & Budi Kusumo, 2019). The threat of climate change causes uncertain harvest schedules for crystal guava and threatens the availability of raw materials.

3. Farmer regeneration

In this era, few young people have an interest in pursuing a career in agriculture due to the decline in popularity of the agricultural sector (Santoso et al., 2020). The lack of farmer regeneration is an important component that

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needs to be considered since the decreasing interest of the community in the agricultural sector will reduce crystal guava distributors for PT. Kreasi Tani Bumiaji.

4. Additional raw material inflation

In the production process of PT. Kreasi Tani Bumiaji, there are some products required additional raw materials, such as chilli, that often encounter inflations. Chilli is one of main ingredients for making Rujak Shake. Kreasi Tani Bumiaji. The increase in chili prices forces producers to spend more, which can reduce profit margins or force them to increase selling prices.

IFAS and EFAS Matrices

The results of the questionnaire responses give the weight and rating on internal factors (strength and weakness) of IFAS Matrix. The weight is obtained by adding up the weight of each factor and then dividing it by the overall total. Meanwhhile, the rating is obtained from the number of informant responses divided by the number of informants. EFAS Matrix is obtained by identifying external factor (opportunity and threat) for PT. Kreasi Tani Bumiaji.

Table 1. IFAS Matrix

No	Internal Factor	Weight	Rating	Scores
	Strengths			
1	Diversification of product variants	0.074	3.75	0.277
2	Certified products	0.071	3.75	0.268
3	Hygienic products	0.073	3.75	0.272
4	Company achievements	0.070	3.63	0.254
5	Company legality	0.073	3.63	0.264
6	Production support assets	0.074	3.63	0.269
7	Production continuity	0.071	3.50	0.247
8	Product export	0.061	3.13	0.191
9	Hexahelix network	0.075	3.38	0.252
	Weaknesses			
1	Ineffective promotion	0.068	1.88	0.127
2	Raw materials storage	0.071	1.75	0.124
3	Employees' competences	0.074	1.75	0.129
4	Limited export market	0.072	2,.00	0.145
5	Investor partnership	0.074	1.50	0.111
	Total		**1**	**2.930**

Source: Processed primary data (2024)

Table 2. IFAS Matrix

No	Internal Factor	Weight	Rating	Scores
	Opportunities			
1	Business partnership	0.111	3.63	0.402
2	Marketing and digital promotions	0.113	3.50	0.396
3	Lifestyle changes	0.105	3.25	0.341
4	Internship collaboration	0.115	3.63	0.418
5	Export market development	0.108	3.00	0.324
	Threats			
1	Business competition	0.111	1.88	0.209
2	Climate change	0.114	1.38	0.157
3	Farmer regeneration	0.114	1.50	0.172
4	Additional raw material inflation	0.108	1.63	0.175
	Total		**1**	**2.594**

Source: Processed primary data (2024)

The results of IFAS Matrix showed that the major strength of PT. Kreasi Tani Bumiaji is diversification of product variants with the score 0.277. The informants (participants) perceived that the existence new product variants will follow market needs as important components of company strengths. On the other hand, weaknesses factor with high influence is limited export market indicating the score 0.145. Export market is considered a weakness of PT. Kreasi Tani Bumiaji since the company exports the product only to several countries due to permit policy of each country.

Based on EFAS Matrix, the significant factor of opportunity for PT. Kreasi Tani Bumiaji is internship collaborations. The company needs to expand the collaborations with education institution or professional training center in order to boost human resource competences. The factor of threat with business competition has significant score 0.209. Business competition should be paid more attention since it has the highest score.

IE Matrix
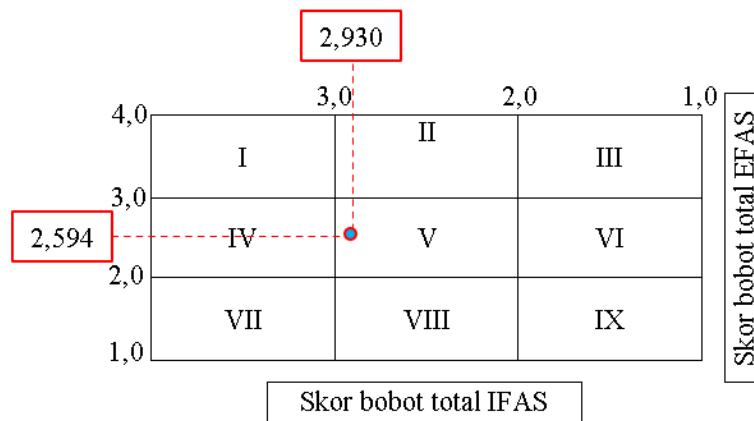
Picture 1. IE Matrix

Picture 1 illustrates IE Matrix of agroindustry business for PT. Kreasi Tani Bumiaji with the total score 2.930 at horizontal axis for IFAS Matrix and 2.594 at vertical axis for EFAS Matrix. Both scores are documented into IE matrix illustration which placed PT. Kreasi Tani Bumiaji on the fifth cell with the coordinate points (2.930; 2.594). The place of company on the fifth cell showed that the company is required to implement concentration strategy with horizontal or stability integration. Qanita (2020), The company is on the fifth place indicating that the maintaince. The company is recommended to implement market penetrations and product improvement. Furthermore, the strategy become the guidelines to formulate alternative strategies based on SWOT analysis.

Table 3. Matrix SWOT

EFAS \ IFAS	Strengths (S) 1. Diversification of product variants 2. Certified products 3. Hygienic products 4. Company achievements 5. Company legality 6. Production support assets 7. Production continuity 8. Product export 9. Hexahelix network	Weaknesses (W) 1. Ineffective promotion 2. Raw materials storage 3. Employees' competences 4. Limited export market 5. Investor partnership
Opportunities (O) 1. Business partnership 2. Marketing and digital promotions 3. Lifestyle changes 4. Internship collaboration 5. Export market development	**Strategy S-O** 1. Making promotion contents for product branding through social media (S1,S2,S3,S4,O1,O2,O3). 2. Using hexahelix network to engage new investors, education institution, and training center for business development (S2,S4,S5,S6,S7,S9,O1,O4,O5). 3. Identifying market needs and developing new product variants to engage new business partners (S1,S2,S3,S6,S9,O1,O5). 4. Identifying hexahelix network and experience to create new opportunities in global market (S4,S5,S9,O1,O5). 5. Conducting market research and adapting the products based on new needs and preferences (S1,S2,S3,S6,S7,S2,S3).	**Strategy W-O** 1. Arranging the schedules for making promotion contents and product market by using social media (W1,W3,O2,O3). 2. Expanding internship collaboration with education institutions and certified training center (W3,O4). 3. Building business partnership with investors in the development production facilities, business concept, and marketing (W2,W4,W5,O1,O5). 4. Inviting investors to focus on sustainability, communication, green projects (W4,W5,O1,O5).

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Threats	Strategy S-T	Strategy W-T
1. Business competition 2. Climate change 3. Farmer regeneration 4. Additional raw material inflation	1. Creating innovative, unique, and attractive products for various market segments (S1,S2,S3,S6,S7,T1,T2,T4). 2. Highlighting certification and recognition in marketing contents and communication with consumers (S2,S3,S4,S5,T1). 3. Arranging the schedules for education-based activities purposes and training for young people surrounding the village by telling succes stories of company (S4,S9,T3). 4. Promoting branding awareness and global market with high growth business (S8,S9,T1).	1. Adopting efficient storage technology, inventories, and building strong connection with the suppliers (W2,W3,W5,T2,T3). 2. Conducting global market research, joining market exhibitions, and building partnership with local distributor (W1,W4,T1,T4).

Source: Processed primary data (2024)

Table 3 presents the results of SWOT analysis with total 19 alternative strategies for agroindustry business at PT. Kreasi Tani Bumiaji. Alternative strategies are categorized in S-O, W-O, S-T, and W-T. The findings of SWOT analysis can be implemented at PT. Kreasi Tani Bumiaji.

1. Strategy Strength-Opportunity (S-O)
   The strategy can be performed through identification of strengths owned by the company by creating opportunities.
a. Making promotion contents for product branding through social media (S1,S2,S3,S4,O1,O2,O3). By making digital contents for promotion, the consumers are curious to purchase the products (Larasati & Roidah, 2023). The optimization through media social of PT. Kreasi Tani Bumiaji must be performed to engage consumers in purchasing crystal guava product variants.
b. Using hexahelix network to invite new investors, education institution, and human resource training center for business development (S2,S4,S5,S6,S7,S9,O1,O4,O5). PT. Kreasi Tani Bumiaji has applied Hexahelix network concept in collaboration process with particular functions. Hence, PT. Kreasi Tani Bumiaji may establish relationships and partnerships with investors, education institutions, and human resource training center.
c. Identifying market needs and developing new product variants to engage new business partners (S1,S2,S3,S6,S9,O1,O5). Identifying market needs can be implemented as an important strategy to provide the products relevant to market demands (Hidayat, 2020). PT. Kreasi Tani Bumiaji has performed diversification of product variants of crystal guava, however, market identification should be done to identify market partnerships in order to promote product variants.
d. Identifying hexahelix network and experience to create new opportunities in global market (S4,S5,S9,O1,O5). The collaboration of PT. Kreasi Tani Bumiaji with hexahelix results potential and targeted advantages in order to promote market by creating collaboration with government supports.
e. Conducting market research and adapting the products based on new needs and preferences (S1,S2,S3,S6,S7,S2,S3). Conducting market research and adapting the products are key factors to compete in the market demands. This process ensures the products based on consumers' desires and needs to obtain consumers' satisfaction and loyalty.

2. Strategy Weakness-Opportunity (W-O
a. Arranging the schedules for making promotion contents and product market by using social media (W1,W3,O2,O3). The making of content timeline as promotion and branding media aims at boosting the selling of products (Rahmat et al., 2023). The consistency of making contents and branding products for PT. Kreasi Tani Bumiaji also aims at using social media as promotion scale for wider markets.
b. Expanding internship collaboration with education institutions and certified training center (W3,O4). Internship collaboration performed by the company provides the opportunities for human resources to enrich their knowledge and experience (Wasih & Tama, 2023). PT. Kreasi Tani Bumiaji has established the collaborations with education institutions and training center for internship programs and provided opportunities for employees of PT. Kreasi Tani Bumiaji to exchange their knowledge and experience.

c. Building business partnership with investors in the development production facilities, business concept, and marketing (W2,W4,W5,O1,O5). The collaboration with investors of PT. Kreasi Tani Bumiaji. aims at promoting production scales through providing production facilities based on integrated business concept.

d. Inviting investors to focus on sustainability, communication, green projects (W4,W5,O1,O5). Sustainable business focuses on the reduction of negative impacts resulted from production activities towards green environment (Sjioen et al., 2023). PT. Kreasi Tani Bumiaji utilizes organic certification as a proof to implement environment sustainability concept which engages the investors to have great concerns for the environment.

3. Strategy Strength-Threat (S-T)
Strategy S-T can be performed to cope with the existence threats.

a. Creating innovative, unique, and attractive products for various market segments (S1,S2,S3,S6,S7,T1,T2,T4). By creating new variants from agriculture products, PT. Kreasi Tani Bumiaji has Lemon, Apple, Asian pigeonwings, and Kale plant can be solutions for raw materials. Moreover, production facilities support these products to respond the threats, such as business competition, climate change resulting in limited raw materials for crystal guava, and inflations.

b. Highlighting certification and recognition in marketing contents and communication with consumers (S2,S3,S4,S5,T1). Packaging appearance must be concerned in order to attract consumers (Suprapto & Azizi, 2020). By showing food certification and recognition in product design packaging, PT. Kreasi Tani Bumiaji obtains unique and comparative points for market products.

c. The company arranges schedule timeline for local young people surrounding area to make an event of telling success story (S4,S9,T3). By providing training center for local community, PT. Kreasi Tani Bumiaji can develop the potentials of agriculture products and motivate the community to engage with agriculture business.

d. Promoting branding awareness and global market with high growth business (S8,S9,T1). PT. Kreasi Tani Bumiaji has exported the products to several countries, yet market demands need to be expanded. The development of export market may answer the challenges faced by PT. Kreasi Tani Bumiaji, such as business competition in local market.

4. Strategy Weakness-Threat (W-T)
Strategy W-T may reduce the weaknesses and anticipate high risks.

a. Adopting efficient storage technology, inventories, and building strong connection with the suppliers (W2,W3,W5,T2,T3). The availability of raw materials is significant aspect for business sustainability (Wahid & Munir, 2020). The technology of raw materials storage and establishing partnerships with the suppliers can be alternative strategies for PT. Kreasi Tani Bumiaji to respond the threats of climate changes and farmer regeneration.

b. Conducting global market research, joining market exhibitions, and building partnership with local distributor (W1,W4,T1,T4). Export marketing is conducted by PT. Kreasi Tani Bumiaji to focus on the sustainability of business products. Research about global market demands is required to identify product demands based on consumers' needs.

Alternative strategies are obtained from SWOT analysis by establishing five prioritized strategies with the total Attractiveness Score (STAS) through QSPM.

Table 4. QSPM Matrix

Key Factors	Weight	Strategy I		Strategy II		Strategy III		Strategy IV		Strategy V	
		AS	TAS	AS	TAS	AS	TAS	AS	TAS	AS	TAS
Strengths (S)											
1. Diversification of product variants	0.074	4	0.3	4	0.3	4	0.3	4	0.3	4	0.3
2. Certified products	0.071	4	0.29	4	0.29	4	0.29	4	0.29	4	0.29
3. Hygienic products	0.073	4	0.29	4	0.29	4	0.29	4	0.29	3	0.22
4. Company achievements	0.070	4	0.28	4	0.28	4	0.28	3	0.21	4	0.28
5. Company legality	0.073	4	0.29	4	0.29	4	0.29	4	0.29	4	0.29
6. Production support assets	0.074	4	0.3	4	0.3	4	0.3	3	0.22	4	0.3
7. Production continuity	0.071	4	0.28	4	0.28	4	0.28	3	0.21	3	0.21
8. Product export	0.061	4	0.24	4	0.24	3	0.18	3	0.18	3	0.18
9. Hexahelix network	0.075	4	0.3	4	0.3	4	0.3	3	0.22	4	0.3

Key Factors	Weight	Alternative Strategy of Priority									
		Strategy I		Strategy II		Strategy III		Strategy IV		Strategy V	
		AS	TAS	AS	TAS	AS	TAS	AS	TAS	AS	TAS
Weaknesses (W)											
1. Ineffective promotion	0.068	3	0.2	4	0.27	3	0.2	3	0.2	4	0.27
2. Raw materials storage	0.071	3	0.21	4	0.28	4	0.28	3	0.21	4	0.28
3. Employees' competences	0.074	3	0.22	4	0.3	4	0.3	3	0.22	3	0.22
4. Limited export market	0.072	4	0.29	4	0.29	4	0.29	3	0.22	3	0.22
5. Investor partnership	0.074	4	0.29	4	0.29	4	0.29	3	0.22	4	0.29
Opportunities (O)											
1. Business partnership	0.111	4	0.44	3	0.33	4	0.44	4	0.2	3	0.33
2. Marketing and digital promotions	0.113	4	0.45	3	0.34	4	0.45	4	0.21	3	0.34
3. Lifestyle changes	0.105	3	0.31	4	0.42	3	0.31	4	0.22	3	0.31
4. Internship collaboration	0.115	3	0.35	4	0.46	3	0.35	4	0.22	3	0.35
5. Export market development	0.108	3	0.32	4	0.43	3	0.32	3	0.22	3	0.32
Threats											
1. Business competition	0.111	4	0.45	4	0.45	3	0.33	4	0.45	3	0.33
2. Climate change	0.113	3	0.34	3	0.34	3	0.34	3	0.34	4	0.46
3. Farmer regeneration	0.105	3	0.34	2	0.23	4	0.46	3	0.34	3	0.34
4. Additional raw material inflation	0.115	4	0.43	2	0.22	3	0.32	4	0.43	4	0.43
Total Scores			**7.23**		**7.22**		**7.21**		**6.95**		**6.87**

Source: Processed primary data (2024)

According to calculation results using QSPM, there are five of 15 alternative strategies to be prioritized.

1. Building business partnership with investors in the development production facilities, business concept, and marketing (7.23).
2. Using hexahelix network to engage new investors, education institution, and training center for business development (7.22).
3. Inviting investors to focus on sustainability, communication, green projects (7.21).
4. Conducting market research and adapting the products based on new needs and preferences (6.95).
5. Creating innovative, unique, and attractive products for various market segments (6.87).

These five alternative strategies can be basis for company development of PT. Kreasi Tani Bumiaji in facing critical issues

CONCLUSION

Based on the results of study towards alternative strategy model for agroindustry business model at PT. Kreasi Tani Bumiaji located in Banaran, Bumiaji Village, Bumiaji District, Batu City, East Java, internal factor of company had IFAS score 2.930. It indicated that the strength of internal PT. Kreasi Tani Bumiaji is quite significant to solve the existence weaknesses. Meanwhile, the results of EFAS showed that external factor influencing the company has score 2.594 which illustrated great potentials for company to face external threats through opportunities.

The results of IE assigned PT. Kreasi Tani Bumiaji on the fifth cell which illustrated the stable growth of company by recommending product development and market penetration strategies. Based on SWOT analysis, there are five of 15 alternative strategies to be prioritized that can be implemented by PT. Kreasi Tani Bumiaji.

One of prioritized strategies is developing innovative, unique, and new products with the score 6.87 which is correlated with market research and product adjustment strategy to meet consumers' needs with the score 6.95. The strategy of inviting investors to make investments by focusing on green project sustainability and development has the score 7.21; and the strategy of making Hexahelix network to build strong partnership with investors, education institution, and trained human resources has the score 7.22. The main strategy with highest score of 7.23 is building business partnership with investors in the development production facilities, business concept, and marketing

The suggestions for PT. Kreasi Tani Bumiaji are focusing on the implementation of prioritized strategies related to innovative and unique products based on market research. Moreover, the company should prioritize the collaboration with investors and Hexahelix networks to improve production facilities, sustainable business concept, and export capability. Therefore, PT. Kreasi Tani Bumiaji can stably grow by creating effective market opportunities and maintain sustainability principles in order to make business partnerships.

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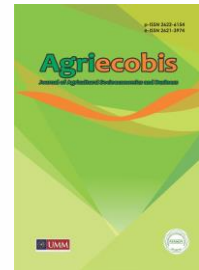
Research Article

Staying Happy During COVID-19: Analyzing Happiness Indicators Among Poultry Farmers in Malang Regency

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ABSTRACT

This study aims to examine the contribution of each happiness indicator, assess the overall happiness levels among laying hen and broiler chicken farmers, and analyze variations in happiness based on farm scale during the COVID-19 pandemic in Malang Regency. The research site was chosen through purposive sampling, as Malang Regency is a key center for poultry farming in East Java. Accidental sampling yielded 75 respondents, comprising 36 farmers with less than 5,000 livestock and 39 with more than 5,000. Results identified 16 valid indicators out of the 21 used in the study. The roles of each happiness indicator were as follows: education and skills (0.782), employment (0.780), health (0.632), family harmony (0.735), leisure availability (0.757), social relations (0.754), security conditions (0.584), happiness (0.716), absence of depression (0.793), optimism (0.867), empathy (0.570), independence (0.828), environmental mastery (0.815), self-development (0.598), positive relationships (0.615), and life goals (0.605). The overall happiness score for poultry farmers was 4.37, with laying hen farmers at 4.33 and broiler chicken farmers at 4.39, placing them in the "happy" category. No significant difference was observed in happiness levels between farmers with business scales below and above 5,000 livestock.

INTRODUCTION

Meat and eggs are poultry products that provide complete nutrition, are relatively affordable, readily available, easily digestible, and simple to process. Broiler chickens exhibit a rapid growth rate, produce a larger quantity of meat compared to other chicken breeds, have efficient feed utilization, and reach harvest age quickly. Laying hens, meanwhile, produce a high and consistent yield of eggs. The potential for laying hen farming is significant, as it can effectively meet community consumption needs (Mangalisu, 2017; Pelafu et al., 2018; Pusat Data dan Sistem Informasi Pertanian, 2020; Umam et al., 2015).

Over the past decade, the broiler chicken population has grown by 12.76%. Broiler chicken meat production in Indonesia has shown fluctuations but generally increased, with an average annual growth rate of 12.75%. According to the National Socio-Economic Survey (SUSENAS) from 2010 to 2019, per capita broiler chickens meat consumption increased by 5.64% annually, driven by population growth, rising incomes, and improved nutritional

awareness. Retail-level broiler meat prices during the same period rose by an average of 2.97% per year. Price increases at the consumer level are influenced by complex marketing chains, which result in high prices for consumers but relatively low prices for producers (Pusat Data dan Sistem Informasi Pertanian, 2020a). The laying hen population in Indonesia increased at an average annual rate of 2.82% from 2017 to 2020. Egg production has also grown, with an annual increase of 2.90%. Although egg consumption levels have fluctuated, they exhibit a general upward trend as the population increasingly recognizes eggs as a valuable source of protein. Egg consumption grew at an average rate of 0.08% per year. Retail egg prices for the 2018-2020 period fluctuated but generally trended upward on a monthly basis (Pusat Data dan Sistem Informasi Pertanian, 2020).

The cultivation of laying hens and broiler chickens must consider not only production and consumption but also farmers' welfare levels. Farmers' welfare can be assessed by their purchasing power to meet daily needs; higher purchasing power generally indicates a higher level of prosperity. Home ownership also serves as a key welfare indicator, as housing, along with food and clothing, constitutes a fundamental human need. In recent years, welfare has expanded beyond economic metrics to include both material prosperity (welfare or well-being) and subjective well-being, or happiness. Happiness indicators encompass dimensions of life satisfaction, emotional states, and life meaning. Life satisfaction is further divided into personal life satisfaction and social life satisfaction sub-dimensions.

In Indonesia, the welfare index rose from 68.28 in 2014 to 70.69 in 2017, placing the population within the moderately happy category. Regionally, the happiness index for urban residents tends to be higher than that of rural residents. In East Java, the happiness index also increased, from 68.70 in 2014 to 70.77 in 2017, surpassing the national average (Badan Pusat Statistik Indonesia, 2017). The happiness level of broiler chicken farmers is categorized as happy, with key contributing indicators including health, income, family harmony, environmental security, positive emotional experiences, and opportunities for self-development (Habibi, 2021; Ibrahim, 2021).

Malang Regency is a primary production center for laying hens and broiler chickens in East Java, with poultry populations distributed across thirty-three sub-districts. Due to the COVID-19 pandemic, many poultry farmers in the region face significant losses, compounded by overproduction, which has led to drastic price drops and decreased market demand as the economy weakened. Farmers have struggled to meet feed and operational costs under these conditions, aligning with findings by Armelia et al (2020); Ilham & Haryanto (2020), which indicate that the pandemic has had both positive and negative effects on broiler chicken farming. Large-scale social restrictions have limited community activities, reducing consumer purchasing power and disrupting the supply chain, which has led to an imbalance between supply and demand. Farmers have also incurred additional costs associated with culling Day-Old-Chickens (DOC), preventive measures, compensation, industry partnership disruptions, and lost market opportunities. Overall, chicken meat sales turnover has decreased by 30-50% from pre-pandemic levels, contributing to reduced selling prices and financial losses for many farmers.

This study aims to evaluate the role of each happiness indicator, assess happiness levels among laying hen and broiler chicken farmers, and examine variations in farmers' happiness based on the scale of farm ownership during the COVID-19 pandemic. Unlike previous studies, this research applies happiness indicators from Badan Pusat Statistik (2017) and the Oxford Happiness Questionnaire (2020) specifically to laying hen and broiler chicken farmers in Malang Regency.

METHOD

This study selected Malang Regency as the research site through purposive sampling, given its role as a major center for laying hen and broiler chicken farming with a significant livestock population. The sample was obtained using accidental sampling, resulting in 75 respondents, of whom 36 were farmers operating on a business scale below 5,000 livestock, and 39 were operating above 5,000 livestock. Data were collected through observation, interviews, and questionnaires. The study employed a 6-point Likert scale, based on the Oxford Happiness Questionnaire, to measure dimensions of life satisfaction, feelings, and meaning in life. Response options included: Strongly Disagree (1), Moderately Disagree (2), Slightly Disagree (3), Slightly Agree (4), Moderately Agree (5), and Strongly Agree (6).

The research variable, the happiness index, comprises three dimensions: life satisfaction, feelings, and meaning of life. The personal life satisfaction sub-dimension includes five indicators: education and skills, employment/business/main activities, household income, health, and housing conditions and facilities. The social life satisfaction sub-dimension includes family harmony, availability of free time, social relationships, environmental conditions, and environmental safety. The feelings dimension is represented by five indicators: happiness, absence of worry, lack of depression, optimism, and empathy. The meaning of life dimension includes six indicators: independence, environmental mastery, self-development, positive relationships, life goals, and self-acceptance. These 21 indicators were adapted from Badan Pusat Statistik (2017) and the Oxford Happiness Questionnaire.

The study applied Confirmatory Factor Analysis (CFA) to validate the indicators against latent variables, using Principal Component Analysis (PCA) for factor extraction. The CFA method was used to evaluate the validity and reliability of each indicator. The happiness index calculation formula is as follows:

$$Personal\ life\ satisfication = \frac{\sum w_i \times x_i}{\sum w_i}$$

$$Social\ life\ satisfication = \frac{\sum w_i \times x_i}{\sum w_i}$$

$$Life\ satisfication = \frac{w_1 \times Personal\ life\ satisfication\ + w_2 \times Social\ life\ satisfication}{w_1 + w_2}$$

$$Feelings = \frac{\sum w_i \times x_i}{\sum w_i}$$

$$Meaning\ of\ life = \frac{\sum w_i \times x_i}{\sum w_i}$$

The happiness index can be calculated with the following formula:

$$Happiness\ index = \frac{w_1 \times Life\ satisfication\ + w_2 \times Feeling + w_3 \times Meaning\ of\ life}{w_1 + w_2\ + w_3}$$

Where:
1. x_i is the score of the i-th indicator
2. w_i is the weight of the i-th indicator
3. Determination of the number of weights (w) based on the Confirmatory Factor Analysis (CFA) method

This study employs two data analysis methods. The first method uses Partial Least Squares (PLS) with the SmartPLS 3.0 software to analyze indicators influencing the happiness of laying hen and broiler chicken farmers, as well as to identify the specific impact of each indicator on the happiness of these farmers in Malang Regency. PLS analysis involves both inner model assessment and hypothesis testing. The second method is the Mann-Whitney test, which evaluates differences between two independent samples that may or may not be normally distributed. The null hypothesis posits that both samples have the same mean, while the alternative hypothesis suggests differing means. Conducted as a one-sided test, the alternative hypothesis specifies whether the mean from one population is greater or smaller than that of the other (Silaban et al., 2014). SPSS version 22 assists in testing differences for decision-making purposes, with H0 being rejected if |Z count| ≥ Z table or the significance value ≤ 0.05, indicating a significant difference in the happiness levels of farmers based on business scale.

RESULTS AND DISCUSSION

Characteristics of Respondents

Chicken farming in Malang Regency comprises two main types: laying hens and broilers. Among the respondents, 56% (42 individuals) engage in broiler farming, and 89.33% (67 individuals) are male, as men are typically considered family heads responsible for family welfare (Nurwandi et al., 2018). Most respondents are in the productive age group (15–64 years), enabling them to contribute effectively to household income, adapt to new tasks, embrace technology, and achieve high work productivity (Nurwandi et al., 2018). Educationally, 56% of laying hen and broiler farmers possess a high school or vocational high school diploma, which enhances their ability to understand and implement technology, fostering productivity through directed thinking (Nurwandi et al., 2018). Additionally, 54.67% of respondents support 3–4 family members, with increased dependents placing greater financial pressure on household income (Adiana & Karmini, 2012; Ibrahim et al., 2020).

For most farmers, poultry breeding is their primary occupation, often with years of business experience that contribute to sufficient income for household needs and business growth. Most respondents report between 1–5 years of experience, a factor positively correlated with skill level and productivity. Furthermore, 39 respondents have livestock holdings exceeding 5,000 birds, with livestock numbers reflecting individual capabilities in management, resource fulfillment, and technological innovation. Monthly incomes for most farmers range from IDR 2,100,000 to

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IDR 4,000,000, typically sufficient for household expenses and proportionate to their work efforts. However, farmers reported income declines at the beginning of the Covid-19 pandemic due to fluctuations in consumer prices and rising production costs.

Outer Model Evaluation (Measurement Model)

The outer model evaluation of the reflective indicator model encompasses individual item reliability, construct reliability, and average variance extracted (AVE). These measurements fall under the category of convergent validity, which assesses the correlation between constructs and latent variables. A loading factor value of ≥ 0.7 indicates ideal validity, demonstrating that the indicator effectively measures the constructed variable. In other studies, a loading factor value of ≥ 0.5 remains acceptable and meets the criteria for convergent validity.

Construct reliability is evaluated through Cronbach's alpha and composite reliability values. A Cronbach's alpha of ≥ 0.7 is considered acceptable, while a composite reliability of ≥ 0.8 is deemed very satisfactory. The AVE measures the extent of diversity among the manifest variables associated with latent constructs. A higher variance within the latent construct signifies a stronger representation of the latent variable. An AVE value of at least 0.5 indicates a robust measure of convergent validity, suggesting that latent variables explain, on average, more than half of the variance of their indicators (Haryono, 2017).

Validity Test

The validity test involves evaluating the loading factor values and average variance extracted (AVE). Loading factor values and AVE of ≥ 0.5 are considered acceptable and indicative of validity. As shown in Figure 1, several indicators exhibit loading factor values ≤ 0.5, necessitating further examination. Specifically, the income indicator (X1.3), housing and home facilities (X1.5), environmental conditions (X1.9), feelings of not being worried (X2.2), and self-acceptance (X3.6) display loading factor values < 0.5, rendering them invalid for measuring the constructed variable.
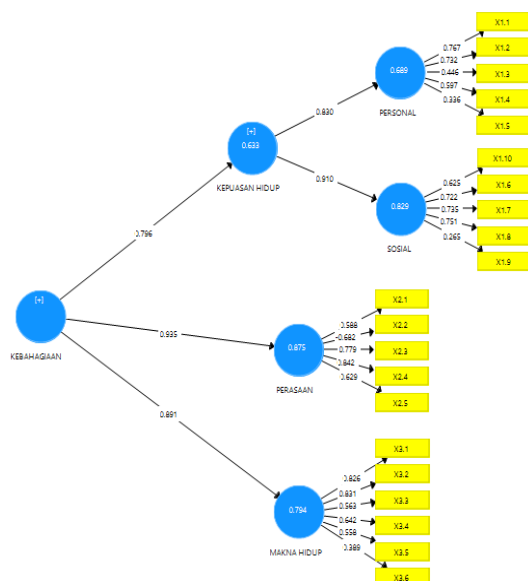

Figure 1. Outer Model Output: Stage One
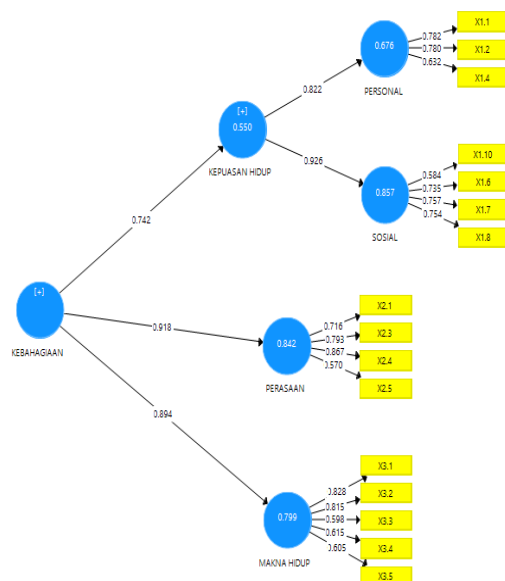*Source: Data processed with SmartPLS 3.0*

Figure 2. Outer Model Output: Stage Two
Source: Data processed with SmartPLS 3.0

In the initial testing stage, certain indicators failed to meet the required loading factor values and were consequently removed from the model. A subsequent analysis of the remaining indicators yielded loading factor values of ≥ 0.5 across all measures. Within the sub-dimension of personal life satisfaction, the education and skills indicator demonstrated the highest loading factor value, making it the strongest representative of this sub-dimension. In the social dimension's satisfaction sub-dimension, the availability of free time emerged as the most representative indicator, with a loading factor value of 0.757. The indicator reflecting feelings of optimism achieved a loading factor value of 0.867, identifying it as the strongest measure within the feelings dimension. Additionally, the independence indicator recorded a loading factor value of 0.828, marking it as the most significant representative of the meaning of life dimension.

The subsequent validity assessment examines the average variance extracted (AVE) values, as detailed in the following table.

Table 1. *Average Variance Extracted* (AVE) Testing

Variable	Stage One		Stage Two	
	AVE	Description	AVE	Description
Happiness	0.295	Invalid	0.295	Invalid
Life Satisfaction	0.293	Invalid	0.402	Invalid
Personal Life Satisfaction	0.358	Invalid	0.540	Valid
Social Life Satisfaction	0.417	Invalid	0.506	Valid
Feelings	0.504	Valid	0.553	Valid
Meaning of Life	0.427	Invalid	0.491	Invalid

Source: Primary Data, processed 2021

In both the first and second stages of testing the average variance extracted (AVE), several variables recorded values below 0.5, indicating poor convergent validity. Variables achieving a minimum AVE of 0.5 meet the required threshold and therefore demonstrate satisfactory convergent validity, explaining an average of more than half the variance in their indicators.

To assess discriminant validity, we compared the AVE values with the squared correlation values between constructs.

Table 2. AVE and Root AVE Testing

Variable	Stage One			Stage Two		
	AVE	Root AVE	Description	AVE	Root AVE	Description
Happiness	0.295	0.543	Met	0.295	0.543	Met
Life Satisfaction	0.293	0.541	Met	0.402	0.634	Met
Personal Life Satisfaction	0.358	0.598	Met	0.540	0.734	Met
Social Life Satisfaction	0.417	0.645	Met	0.506	0.711	Met
Feelings	0.504	0.709	Met	0.553	0.743	Met
Meaning of Life	0.427	0.653	Met	0.491	0.700	Met

Source: Primary Data, processed 2021

The test results indicate that the square root of the AVE value exceeds the AVE itself, confirming that the latent variable explains more than half of the variance in its indicators, thereby demonstrating strong discriminant validity.

Reliability Test

The reliability test assesses the consistency of measurement instruments in capturing a given concept. Reliability is evaluated using Cronbach's alpha and composite reliability values. The criteria for Cronbach's alpha are as follows: 0.00-0.20 indicates very low reliability, 0.21-0.41 indicates low reliability, 0.42-0.60 indicates moderate reliability, 0.61-0.80 indicates reliability, and 0.81-1.00 indicates high reliability. Cronbach's alpha values for this study are presented in the following table.

Table 3. *Cronbach's Alpha Testing*

Variable	Stage One		Stage Two	
	Cronbach's Alpha	Description	*Cronbach's Alpha*	Description
Happiness	0.824	Very Reliable	0.860	Very Reliable
Life Satisfaction	0.696	Reliable	0.696	Reliable
Personal Life Satisfaction	0.529	Moderately Reliable	0.569	Moderately Reliable
Social Life Satisfaction	0.646	Reliable	0.674	Reliable
Feelings	0.354	Unreliable	0.720	Reliable
Meaning of Life	0.710	Reliable	0.731	Reliable

Source: Primary Data, processed 2021

In the first stage of testing, the Cronbach's alpha for the feeling dimension was 0.354, indicating unreliability. Indicators that did not meet the required threshold were removed, and further testing was conducted. In the second stage, all variables demonstrated reliable Cronbach's alpha values.

Composite reliability testing assesses the internal consistency of indicators within a latent variable and provides a more accurate measure than Cronbach's alpha by not assuming equal indicator weight. A composite reliability value of ≥ 0.7 is considered acceptable (Haryono, 2017). In the first stage, the feeling dimension had a composite reliability of 0.652, which was unreliable. In the second stage, all variables met the reliability criteria with composite reliability values ≥ 0.7.

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Table 4. *Composite Reliability Testing*

Variable	Stage One		Stage Two	
	Composite Reliability	Description	*Composite Reliability*	Description
Happiness	0.863	Reliable	0.885	Reliable
Life Satisfaction	0.786	Reliable	0.784	Reliable
Personal Life Satisfaction	0.721	Reliable	0.777	Reliable
Social Life Satisfaction	0.767	Reliable	0.802	Reliable
Feelings	0.652	Unreliable	0.830	Reliable
Meaning of Life	0.808	Reliable	0.825	Reliable

Source: Primary Data, processed 2021

Evaluation of the Inner Model (Structural Model)

The evaluation of the structural model follows the assessment of the measurement model, focusing on the coefficient of determination (R^2), predictive relevance through blindfolding procedures or calculating the Q-square predictive relevance value, and the Goodness of Fit (GoF) value. The coefficient of determination (R^2) measures the extent to which exogenous variables explain the variance in endogenous variables. According to Ghozali (2014), R^2 values classify models as strong (≥ 0.75), moderate (≥ 0.50), and weak (≥ 0.25). A higher R^2 indicates a more effective model where exogenous variables better explain endogenous variables. Based on the test results, the model explains 60.7% of the life satisfaction variable, 84.4% of the feeling variable, and 80.1% of the meaning of life variable, with the remaining variance influenced by other factors.

Table 5. R^2 values for each variable

Variable	R^2	Criteria
Personal Life Satisfaction	0.662	Moderate
Social Life Satisfaction	0.842	Strong
Life Satisfaction	0.607	Moderate
Feelings	0.844	Strong
Meaning of Life	0.801	Strong

Source: Primary Data, processed 2021

The predictive relevance value (Q^2) assesses the model's predictive capability. Researchers can calculate the Q^2 value using Stone-Geisser's formula (SQ^2) derived from the blindfolding procedure. A Q^2 value greater than zero indicates that the model possesses predictive relevance, while a value less than zero suggests a lack of predictive relevance. Higher Q^2 values signify that the exogenous latent variables serve effectively as explanatory variables capable of predicting the endogenous variables.

The SQ^2 value is calculated as follows:

$SQ^2 = 1 - (1 - R_1{}^2)(1 - R_2{}^2)(1 - R_3{}^2)(1 - R_4{}^2)(1 - R_5{}^2)$
$SQ^2 = 1 - (1 - 0,662)(1 - 0,842)(1 - 0,607)(1 - 0,844)(1 - 0,801)$
$SQ^2 = 1 - (0,338)(0,158)(0,393)(0,156)(0,199)$
$SQ^2 = 1 - 0,000651$
$SQ^2 = 0,999349$

Based on these calculations, the SQ^2 value is 0.999349, indicating that the model exhibits strong predictive relevance. This conclusion aligns with the value of $Q^2 = 1 - SSE/SSO$, which also yields a value greater than zero. The blindfolding procedure applied to the research model confirms that the predictive relevance value (Q^2) for the latent variables exceeds zero.

Table6. Predictive Relevance Based on Blindfolding Results

Variable	SSO	SSE	Q^2 = 1-SSE/SSO
Personal Life Satisfaction	225.000	149.025	0.338
Social Life Satisfaction	300.000	179.607	0.401
Life Satisfaction	750.000	633.311	0.156
Feelings	300.000	166.191	0.446
Meaning of Life	375.000	236.637	0.369
Happiness	1200.000	1200.000	0.000

Source: Primary Data, processed 2021

The predictive relevance values (Q^2) for the life satisfaction variable, feelings, and meaning of life are 0.156, 0.446, and 0.369, respectively, indicating that this research model demonstrates strong predictive relevance.

To assess the overall quality of the model, the Goodness of Fit (GoF) value can be calculated. The GoF value serves as a comprehensive measure to validate the combined performance of both the measurement and structural models. It ranges from 0 to 1, with thresholds of 0.1 (small), 0.25 (medium), and 0.36 (large) indicating varying levels of fit (Haryono, 2017). The formula for calculating the Goodness of Fit (GoF) value is as follows:

$$GoF = \sqrt{\overline{AVE} \times \overline{R^2}}$$

$\overline{AVE}$ is the average of the AVE values
$\overline{R^2}$ is the average of the R^2 values

The GoF value in this study is as follows:

$$GoF = \sqrt{\overline{AVE} \times \overline{R^2}}$$
$$GoF = \sqrt{0{,}4984 \times 0{,}7512}$$
$$GoF = 0{,}6118$$

The Goodness of Fit (GoF) value was calculated to be 0.6118, indicating a large effect size. This result suggests that the model is well-suited and demonstrates strong explanatory power for the data.

DISCUSSIONS
The Role of Indicators in Measuring Happiness Levels

This study employs 21 indicators to assess the level of happiness, with 19 sourced from the Central Bureau of Statistics and 2 from the Oxford Happiness Questionnaire (OHQ). These indicators have been validated and tested for reliability by both institutions. Testing was conducted to ensure the indicators' applicability and accuracy when applied to respondents from layer and broiler farming backgrounds. The results identified 16 indicators as both valid and reliable, providing an effective representation of each dimension. Based on these tests, the valid and reliable indicators yield loading factor values that meet the required standards. The following section outlines the contribution of each indicator to the happiness index.

Table 7. Weights of Life Happiness Indicators

Dimension	Sub Dimension	Indicator	Weights (Wi)
Life Satisfaction	Personal Life Satisfaction	1. Education and skills	0.782
		2. Occupation/ business/ main activity	0.780
		3. Health	0.632
	Social Life Satisfaction	4. Family harmony	0.735
		5. Availability of free time	0.757
		6. Social relationship	0.754
		7. Security conditions	0.584
Feelings		8. Feelings of pleasure/ cheerfulness/ happiness	0.716
		9. Feeling not depressed	0.793
		10. Feeling optimistic	0.867
		11. Feeling of empathy	0.570
Meaning of life		12. Independence	0.828
		13. Mastery of the environment	0.815
		14. Self-development	0.598
		15. Positive relationships with others	0.615
		16. Life purpose	0.605

Source: Primary Data, processed 2021

Dimensions of Life Satisfaction

The life satisfaction dimension comprises two sub-dimensions: personal life satisfaction and social life satisfaction. Indicator development considers individuals with stable physical and mental conditions that enable them to perform daily activities. Several indicators constitute the personal life satisfaction sub-dimension.

Table 8. Average of Personal Life Satisfaction Sub-Dimensions

Indicator	Score	Description
Education and Skills	3.84	Moderately satisfied
Employment	3.63	Moderately satisfied
Health	3.96	Moderately satisfied

Source: Primary Data, processed 2021

The health indicator, with a value of 3.96, is the most significant factor affecting personal life satisfaction among laying hen and broiler chicken farmers in Malang Regency. This finding aligns with Sutawi et al. (2020), who emphasized that health is essential for life satisfaction, influencing farmers' productivity and farm management capabilities. Farmers report satisfaction with their health and maintain it through regular exercise, dietary adjustments, adequate rest, and vitamin intake. In addition, they receive information on Covid-19 and adhere to health protocols, recognizing the importance of these measures to prevent infection. Regular health facility visits also support farmers' well-being.

The education and skills indicator scored 3.84, reflecting farmers' satisfaction with their education and skill levels. Farmers actively seek information to increase their knowledge, consistent with Singh et al. (2002), who found that poultry farmers gain substantial skills and knowledge through training, enhancing their confidence in managing poultry farms. The job satisfaction indicator scored 3.63, with farmers expressing moderate satisfaction with their work during the Covid-19 pandemic, reporting that their income has generally met family needs. This outcome contrasts with findings by Balogun (2020) and Cavalli et al. (2020), who observed that Covid-19 led to job dissatisfaction among farmers due to mobility restrictions, market closures, and reduced demand. Despite pandemic-related losses, farmers reported enjoying their work and continued farming activities. The social life satisfaction sub-dimension includes indicators that reflect the social well-being of farmers.

Table 9. Average of Social Life Satisfaction Sub-Dimensions

Indicator	Score	Description
Family harmony	4.32	Satisfied
Availability of free time	3.68	Moderately satisfied
Social relationships	4.20	Satisfied
Security	5.06	Very satisfied

Source: Primary Data, processed 2021

The study results indicate that farmers experience high satisfaction with neighborhood security, scoring 5.06, as they feel safe and have not been recent victims of crime. This finding aligns with Grouh and Andjomshoaa (2018), who emphasize that security is crucial for housing satisfaction, particularly among low-income families. Family harmony also contributes positively to farmers' satisfaction, reflected by a score of 4.32. This aligns with Doré et al. (2019), who suggest that family dynamics, including interactions with animals and communication patterns, influence family relationships. Farmers report positive interactions and mutual respect among family members, creating a harmonious environment free from conflict.

Farmers' social relationships within their communities are also satisfactory, with an indicator score of 4.20. Factors such as social ties, community attachment, and environmental quality impact residential satisfaction, as noted by Cope et al. (2022) and Gu and Kim (2023). Despite the Covid-19 pandemic, farmers maintain social connections with livestock groups while adhering to health protocols and trust community leaders' decisions. Living in a diverse environment fosters tolerance, and farmers actively participate in social activities and assist neighbors in need.

Finally, farmers show moderate satisfaction with leisure time availability, indicated by a score of 3.68. They report adequate time for rest, equipment maintenance, sports, socializing, and hobbies, though balancing work and personal activities can be challenging.

Feeling Dimension

The feeling dimension includes indicators such as happiness, freedom from depression, optimism, and empathy. Farmers report satisfaction in this dimension, with a score of 4.70, expressing happiness in their farming lives. Both before and during the Covid-19 pandemic, farmers maintained a positive outlook, finding fulfillment in their poultry business due to the associated benefits. Sutawi et al. (2020) support this, indicating that poultry farming offers significant growth potential. Most farmers do not feel pressured in their daily lives, with many earning above the minimum wage in Malang Regency and supplementing their income with additional jobs, which reduces financial stress.

Farmers demonstrate confidence and optimism about future opportunities, consistent with Hernanto et al. (2020), who found that optimism regarding market opportunities strengthens business resilience. Farmers remain committed

to supporting their families, working diligently despite challenges posed by the Covid-19 pandemic. They view their achievements as the product of hard work.

Furthermore, farmers exhibit empathy, showing warmth and care for those around them. They believe in supporting community members facing difficulties. This perspective enables farmers to navigate daily life with low stress, as they accept outcomes sincerely, even when events do not align with their plans.

Tabel 10. Average of Feeling Dimension

Indicator	Score	Description
Feeling of pleasure	4.70	Satisfied
Feeling of non-depressed	4.20	Satisfied
Feeling of optimism	4.68	Satisfied
Feeling of empathy	4.61	Satisfied

Source: Primary Data, processed 2021

Farmers' life happiness is influenced by several routine habits, particularly worship practices such as charity and almsgiving, which contribute to peace of mind and overall happiness. This aligns with findings by Mohseni and Ahmadi Bighash (2020), who assert that charitable acts and regular worship, including giving and prayer, positively impact mental health and happiness. Farmers practice almsgiving as an expression of gratitude for their sustenance and supporting others. Farmers who routinely give alms tend to experience a more fulfilled life, characterized not by wealth but by the ability to meet daily needs.

Dimensions of the Meaning of Life

The dimension of meaning in life reflects an individual's ability to interpret and create value in their own life, contributing to a sense of happiness. Laying hen and broiler chicken farmers in Malang Regency demonstrate a capacity for independent decision-making. This finding aligns with Pakage et al. (2023), which emphasizes that access to education and information empowers farmers to make informed and autonomous choices about their farming practices. Farmers report confidence in resolving issues by making appropriate decisions without external influence, fostering a sense of control and comfort in their work environment. This sense of comfort further enhances their confidence in managing poultry farming activities. Farmers also feel that they contribute to others' well-being by supporting neighbors in need. Consistently striving to develop their potential, most farmers actively engage in enhancing their skills, knowledge, and insights, aiming to optimize their current business efforts.

Table 11. Average of Dimensions of the Meaning of Life

Indicator	Score	Description
Self-reliance	4.80	Happy
Environmental mastery	4.76	Happy
Self-development	4.45	Happy
Positive relationships with others	4.51	Happy
Life purpose	4,.76	Happy

Source: Primary Data, processed 2021

Farmers' happiness levels are structured around the dimensions of life satisfaction, feelings, and life meaning. Analysis of 75 respondents, including both layer and broiler farmers in Malang Regency, revealed an overall happiness level of 4.37.

Table 12. Life Happiness Index of Chicken Farmers in Malang Regency

Index	Score	Description
Life satisfaction	4.06	Happy
Feelings	4.54	Happy
Meaning of life	4.67	Happy
Happiness of farmer's life	4.37	Happy

Source: Primary Data, processed 2021

The findings indicate that laying hen and broiler chicken farmers in Malang Regency experience happiness across the dimensions of life satisfaction, emotional well-being, and life meaning. Farmers report satisfaction with their education, work, and health. They actively seek information and knowledge to address challenges and participate in training and counseling activities, aligning with findings by Sinaga et al. (2022) and Singh et al. (2022), which highlight that poultry farmers enhance their skills and confidence in farm management through training

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programs. The study shows an overall happiness level of 4.33 for laying hen farmers and 4.39 for broiler chicken farmers.

Table 13. Level of Happiness in the Life of Laying Hen and Broiler Chicken Farmers in Malang Regency

Index	Broiler Chicken Farmers		Laying Hen Farmers	
	Score	Description	Score	Description
Life satisfaction	4,05	Happy	4,08	Happy
Feelings	4,50	Happy	4,58	Happy
Meaning of life	4,59	Happy	4,69	Happy
Happiness of farmer's life	4,33	Happy	4,39	Happy

Source: Primary Data, processed 2021

The happiness of laying hen and broiler farmers falls within the "happy" category, as they earn sufficient income to support their families' daily needs. On average, farmers' incomes cover household necessities and ensure business continuity, even with modest lifestyles (Ibrahim, 2021; Khoerudin, 2019). Study results indicate that farmers find the farm environment pleasant and feel that their income adequately reflects their effort in terms of time and labor. Farmers report enthusiasm for their work and maintain optimism for the future. These positive factors contribute to their happiness and gratitude in their farming roles, helping them find meaning and establish clear life goals. This sense of well-being persists, even throughout the Covid-19 pandemic.

Happiness Level of Farmers by Business Scale

The Mann-Whitney Test was employed to test the hypothesis regarding differences in happiness levels among laying hen and broiler chicken farmers in Malang Regency, based on livestock ownership size during the Covid-19 pandemic. The decision-making criterion relies on the probability value and Z score, as follows:

If Z calculated < Z critical and the significance level > 0.05, then H_0 is accepted.
If Z calculated > Z critical and the significance level < 0.05, then H_0 is rejected.

The hypotheses tested in this study were:

H_0 = No significant difference exists in happiness levels of laying hen and broiler chicken farmers based on livestock ownership size.

H_1 = A significant difference exists in happiness levels of laying hen and broiler chicken farmers based on livestock ownership size.

Results from the Mann-Whitney Test indicated a significance level of 0.451 > 0.05 and a Z score of 0.753 < 1.96, supporting H_0.

Tabel 14. Output of *Mann-Whitney Test*

	Happiness Level
Mann-Whitney U	631.000
Wilcoxon W	1297.000
Z	-0.753
Asymp. Sig (2-tailed)	0.451

Source: Primary Data, processed 2021

The findings indicate that H0 is accepted, suggesting no significant difference in happiness levels among laying hen and broiler chicken farmers based on livestock ownership in Malang Regency. Livestock ownership scale does not directly impact farmer happiness. Rather, farmer happiness is determined by dimensions of life satisfaction, feelings, and life meaning. Farmers in this study successfully meet essential human needs, including physiological needs, security, social connections, esteem, and self-actualization. Additional factors contributing to happiness include current health status, family harmony, adequate leisure time, a supportive social life, a sense of security in their living environment, and an optimistic outlook for the future.
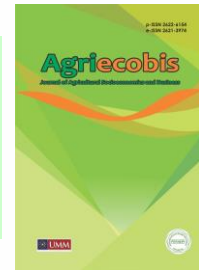
CONCLUSION

Sixteen valid indicators effectively represent the happiness index for laying hen and broiler chicken farmers in Malang Regency during the Covid-19 pandemic. The happiness level for these farmers falls within the "happy" category, scoring an average of 4.37. Specifically, laying hen farmers reported a happiness level of 4.33, while broiler

chicken farmers reported 4.39, both categorized as "happy." No significant differences in happiness levels were observed between farmers with livestock holdings below 5,000 and those above 5,000 during this period.

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Research Article

Consumers' Willingness to Pay for Gamy Salt in Jabodetabek

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ABSTRACT

Seaweed, being an abundant resource, has the potential to be processed into raw material for salt. This potential is supported by the high demand for salt consumption and the serious problem of hypertension in Indonesia. Consuming salt made from seaweed can be an alternative with low sodium content, which can help manage hypertension. Currently, the salt made from seaweed that is available to be purchased is Gamy salt. However, Gamy salt is more expensive than other low-sodium salts. This research aims to estimate the amount of consumers' willingness to pay for Gamy salt and identify factors that influence their willingness to pay. The analytical methods used in this research include descriptive analysis, Contingent Valuation Method, and logistic regression. The research involved 103 respondents aged 30 years and above, residing in Jabodetabek, and having a history or risk of hypertension. The results indicate that the average willingness to pay for Gamy salt is Rp17,873.79 per 100 grams. Factors that significantly influence consumers to pay an extra price for Gamy salt are income, knowledge regarding seaweed salt, and health awareness.

INTRODUCTION

Household salt needs continue to increase from 3.5 million metric tons in 2016 to around 5 million metric tons in 2023. Meanwhile, hypertension or high blood pressure still becomes a health problem in Indonesia with a prevalence in 2019 showing 40% in the population aged 30-79 years (World Health Organization [WHO], 2023). One of the causes of high blood pressure is excessive salt consumption, because sodium as a content of salt can increase blood pressure. Therefore, people can switch from household salt to diet salt with a lower sodium content. The standard for dietary salt is to have a maximum NaCl content of 60% (Indonesian Ministry Regulation of Industry, 2014). One of the low sodium salts that can be produced is salt made from seaweed. The results of the study showed that salt with certain treatments can meet the criteria for dietary salt, namely NaCl content <60%, and even has the potential to be a source of antioxidants. (Nurjanah et al., 2018; Nurjanah et al., 2020). Seaweed also contains a number of bioactive components, namely flavonoids, phenolics, phlorotannins, saponins, terpenoids, steroids, and alkaloids (Ramakrishnan et al., 2015; Erniati et al., 2016; Nufus et al., 2017; Manteu et al., 2018; Nazarudin et al., 2021). According to Manteu et al. (2021), minerals Ca, Mg, and K in seaweed salt function in the process of lowering blood pressure.

Currently, seaweed-based salt is already available on the market, which is the result of innovation from a research team from the Faculty of Fisheries and Marine Sciences, Institute of Agriculture Bogor (IPB). The

seaweed salt is then marketed under the Gamy brand by PT Akuanutrindo Sukses Makmur. Gamy salt has been proven to have a NaCl content of <60% in accordance with dietary salt regulations. The seaweed in Gamy salt provides a number of contents, namely fiber, antioxidants, and minerals such as magnesium, calcium, iron, zinc, iodine, and other mineral elements. In addition, Gamy salt has a different taste compared to other salts. Gamy salt not only has a salty taste, but also savory taste. The distinctive taste and content of Gamy salt makes it superior to other low-sodium salts. Currently, there are two product variants, namely brown seaweed salt and green seaweed salt. According to its claim as an alternative salt, Gamy salt is aimed primarily at people with hypertension. Gamy Salt also targets consumers who have a healthy lifestyle and are interested in health products.

However, the price difference between Gamy Salt and other variants of salt, even other low-sodium salts, can be a challenge. A comparison of the prices of salts with low sodium content is presented in Table 1. The selling price range for low sodium salt in 2024 is selected based on information from various e-commerce platforms. In Table 1, it can be seen that Gamy salt is sold at a higher price at IDR 25,000 and IDR 30,000 per 100 grams. The high price of Gamy salt can be caused by the high price of raw materials. The added value of seaweed salt, such as additional nutritional content, can also affect the price of salt to become more expensive. The additional health benefits gained by consumers and the increased selling price, it is essential to know for sure whether consumers are willing to pay a higher price for this salt compared to other salts.

Table 1. Low sodium salt price (in Rupiah)

Salt Brand	Price
Lososa	≈ 22,000/250 gr = 8,800/100 gr
Garena	≈ 16,000/200 gr = 8,000/100 gr
Nutrisalin	≈ 54,000/200 gr = 27,000/100 gr
Gamy	= 25,000-30,000/100 gr

Apart from the higher price, the limited sales of Gamy salt are also due to the lack of information consumers have about this product. This shows that consumer understanding of the benefits of Gamy salt needs to be improved. Therefore, the company must develop more effective marketing strategies, focusing on educating and counseling consumers about the health benefits offered by this product. Information on willingness to pay (WTP) is very important in this context, as it can provide in-depth insights into how consumers perceive the value of Gamy salt compared to conventional salt. By identifying how much consumers are willing to pay for the product, the company can design more appropriate pricing strategies and adjust product offerings to make them more attractive to consumers. Furthermore, the magnitude of the WTP value for Gamy salt can also help companies in market segmentation, identifying consumer groups with the most potential to make Gamy salt their choice, and developing marketing messages that suit their needs and preferences. Through this approach, it is expected that sales of Gamy salt will not only increase, but can also expand market range and increase public awareness of healthier salt alternatives, thereby making a positive contribution to overall public health.

Willingness to pay is the maximum amount of money that a person is willing to spend to obtain a particular good or service. There are various methods for calculating WTP values, which can be divided into stated preference and revealed preference methods. Numerous studies have examined WTP using a variety of approaches, including those conducted by De-Magistris & Lopéz-Galán (2016), Di Vita *et al*. (2016), Romano *et al*. (2016), Vecchio *et al*. (2016), Van der Stricht *et al*. (2023), etc. The above studies explore consumers' willingness to pay more (WTP) for various food products associated with health and innovation claims. De-Magistris & Lopéz-Galán (2016) have found that consumers in Spain are willing to pay more for low-fat and low-salt cheese in a bid to overcome obesity. Di Vita *et al*. (2016) identified that a limited WTP of Italian consumers for low-salt bread, namely only 20% above the price of regular bread. Meanwhile Romano *et al*. (2016) found that consumers in Brazil were willing to pay more for value-added pomegranate juice. Vecchio *et al*. (2016) examined WTP for conventional, organic, and functional yogurts. The research showed that consumers are willing to pay 38-euro cents (26%) more for organic yogurt compared to conventional yogurt, while WTP for functional yogurt is 8-euro cents (5%) lower. This low WTP is likely due to respondents' lack of familiarity with functional products. However, with the addition of health claims, WTP for functional yogurt increased. Furthermore, Van der Stricht *et al*. (2023) found that the use of organic, nutri-score, and vegan labels on pasta products with microalgae protein can increase the WTP of the product.

Consumer's willingness to pay is influenced by a variety of things, including demographic characteristics and knowledge. Lutfiadi *et al*. (2023) highlighted demographic factors as variables supposed to influence consumers' willingness to pay. Otherwise, Sonya (2021) added the variables of health awareness and product knowledge as potential factors that influence willingness to pay, showing that both variables have a significant influence. Another research conducted by Hasanah & Yanuar (2024) and Narine *et al*. (2015) also introduced the perception of health benefits as a factor that may influence consumers' willingness to pay. Both research provided significant results,

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however Hasanah & Yanuar (2024) found that perceived health benefits had a negative impact on consumers' willingness to pay..

Although various studies have examined consumers' willingness to pay for food products associated with health claims, research on WTP for Gamy salt, especially in the Jabodetabek area, still does not exist. This study attempts to fill this gap by using the Contingent Valuation Method to analyze consumers' willingness to pay for Gamy salt and the factors that influence it, so that it can provide more specific guidance for marketing strategies in the local market.

This study aims to analyze the value of consumers' willingness to pay for Gamy salt in Jabodetabek area and to identify the factors that influence willingness to pay. By using the Contingent Valuation method, this study is expected to provide a deeper understanding of how consumers assess Gamy salt products and what the main considerations are in their purchasing decisions. Moreover, the results of this study will support the company in evaluating and adjusting pricing and marketing strategies to be more effective and relevant to consumer preferences. The results are also expected to contribute to the development of more innovative and sustainable Gamy salt products, while supporting the utilization of seaweed potential in Indonesia as a broader health solution. In conclusion, this study not only provides insight for the company, but also plays a role in increasing public awareness about healthier salt alternatives.

METHOD

The study was conducted online to community of Jabodetabek for six months from November 2023 to May 2024. The sampling method used is non-probability sampling with purposive sampling technique where samples are taken based on predetermined criteria (Sugiyono, 2018). The sample criteria were persons domiciled in Jabodetabek with a history or risk of hypertension, and were 30 years and over. The number of the population of Jabodetabek that meets the criteria of this study is not known with certainty, so this study uses the Lemeshow formula (Lemeshow et al., 1997).

$$n = \frac{z^2 P(1-P)}{d^2}$$

$$n = \frac{1.96^2 0,5(1-0,5)}{0.1^2}$$

$$n = 96.04/100$$

Identified:

n = total sample

z = score z at level of trust 95%

P = proportion of unknown population (0.5)

d = distance in both directions (0.1)

Based on the calculations, the minimum research sample was 96.04 rounded up to 100 respondents. However, the sample in this study amounted to 103 respondents because after data collection, all respondents met the criteria.

The data used are primary data and secondary data. The primary data used are data from interviews and questionnaire distribution results. The interview was conducted with Mrs. Anggrei Viona Seulalae as the co-founder of PT Akuanutrindo Sukses Makmur to obtain information regarding the product and its marketing. Meanwhile, the questionnaires are processed using analysis tools to answer the research objectives. Online data was collected through Google Form and distributed via Whatsapp, X, Instagram, and Facebook to reach respondents widely in Jabodetabek. Data collected through questionnaires include demographic characteristics of respondents, value of willingness to pay, and factors influencing willingness to pay.

This study uses descriptive analysis, Contingent Valuation Method (CVM), factor analysis, and logistic regression. Descriptive analysis was conducted to describe the characteristics of research respondents. CVM analysis is used to estimate the consumer's willingness to pay for Gamy salt. There are several variants of elicitation formats that can be applied when collecting data using CVM (Fauzi, 2014), including open ended, payment card, bidding game, single bounded dichotomous, and double bounded dichotomous. In this study, the

elicitation technique used was payment card. Meanwhile, logistic regression analysis was conducted to identify factors that influence consumers' willingness to pay for Gamy salt. Dependent variable used is consumer willingness to pay more for Gamy salt compared to the average price of other low-sodium salts. Variable Y is a dummy, where 1 is that consumers are willing to pay more for Gamy salt and 0 is that consumers are not willing to pay more. Meanwhile, independent variables used are gender (GNDR), age (AGE), income (INCM), knowledge of low sodium salt (KNWLSN), knowledge of seaweed salt (KNWLSS), health awareness (HLTHAW), and perception of health benefits (HLTHBN). The logistic regression equation is as follows:

$$Y = \beta_0 + \beta_1 GNDR + \beta_2 AGE + \beta_3 INCM + \beta_4 KNWLSN + \beta_5 KNWLSS + \beta_6 HLTHAW + \beta_7 HLTHBN + \varepsilon$$

Before conducting logistic regression analysis, factor analysis was conducted. Two independent variables of the logistic regression analysis were measured using a Likert scale and had a total of 8 indicators (Table 2). Factor analysis is used to ensure that all indicators are appropriate and can explain the measured variables. The scores of generated factors from this analysis are then used as input data in the logistic regression analysis.

Table 2. Variable Indicator

Variable	Indicator	Source
Health Awareness	Often think about health (X1) Understand and be aware of health (X2) Be alert to changes in health (X3) Responsible for health condition (X4) Being aware of health condition while performing daily activities (X5)	Michaelidou & Hassan (2008)
Perception of Health Benefits	Gamy salt can maintain health (X6) Gamy salt has more health benefits than regular salt (X7) Gamy salt effectively provides additional nutrition (X8)	Wang & Tsai (2019)

RESULTS AND DISCUSSION

Respondents' Characteristics

The demographic characteristics obtained were gender, age, education, income, family members, and medical record. The results of the descriptive analysis of demographic characteristics are presented in Table 3, which includes frequency, mean, and standard deviation. It is identified that the majority of respondents were female having a history of illness, 4-6 family members, 50-59 years old, 13-16 years of education, and a monthly income of IDR 4,000,000 to less than IDR 7,000,000.

Table 3. Respondents' Characteristics

Variable	Total	Percentage	Average	Deviation standard
Gender			-	-
Male	39	37.86		
Female	64	62.14		
Age			52.07	11.39
30-39	14	13.59		
40-49	19	18.45		
50-59	54	52.43		
60-69	11	10.68		
70-79	3	2.91		
80-86	2	1.94		
Education			14.74	3.35
0-6	3	2.91		
7-12	29	28.16		
13-16	42	40.78		
17-22	29	28.16		
Income (thousands)			6,514,281.55	9,171,453.64
< 1,000	15	14.56		
1,000 s.d < 4,000	29	28.16		
4,000 s.d < 7,000	36	34.95		
7,000 s.d < 10,000	3	2.91		
≥ 10,000	20	19.42		
Family members			4.83	2.03
1-3	21	20.39		
4-6	71	68.93		
7-9	8	7.77		
10-13	3	2.91		

Variable	Total	Percentage	Average	Deviation standard
Medical history/record			-	-
Yes	73	70.87		
No	30	29.13		

Willingness to Pay

Willingness to pay is the highest price that a person (consumer) is willing to pay for a good or service, depending on the perceived economic value and utility of the product (Breidert, 2005). The calculation of consumer willingness to pay in this study uses the Contingent Valuation method with elicitation technique of payment card. There are three elements must be considered before calculating consumer' willingness to pay. First, respondents were given information about the characteristics and benefits of Gamy salt products. This information can provide an overview of the product to respondents, especially those who have no knowledge at all about the product. Then, respondents were given information about an increase in the price of regular table salt as a result of changes in the benefits obtained. Finally, respondents were asked to choose the maximum price they were willing to pay for Gamy salt based on the price options provided. There are six price options provided, to name IDR 10,000, IDR 15,000, IDR 20,000, IDR 25,000, IDR 30,000, and IDR 35,000. However, respondents were also given the additional option to directly determine the maximum price they were willing to pay for Gamy salt without relying on the price options given. The scenario is made as clear as possible so that respondents can understand well the changes in the characteristics of requested product, namely Gamy salt. The distribution of consumers' willingness to pay can be seen in Table 4.

Furthermore, respondents were classified based on their willingness to pay for Gamy salt into two categories, those willing to pay more and those unwilling to pay more. Standard price of the category created is the average price of three other low-sodium salt brands, which is IDR 14,600. It can be concluded that respondents who give prices above the average price are considered willing to pay more, while respondents who give prices below the average price are considered unwilling to pay more. The results of data collection showed that 59 respondents (57%) were willing to pay more, while other 44 respondents (43%) were not willing to pay more than the average price of other low-sodium salts.

Table 4. Distributed scores of willingness to pay for Gamy salt

WTP Score (Rp/100 gr)	Total (person)	Percentage (%)
50000	1	0.97
40000	1	0.97
35000	8	7.77
30000	7	6.80
25000	16	15.53
20000	13	12.62
15000	13	12.62
10000	38	36.89
5000	5	4.85
1000	1	0.97
Total	**103**	**100**

Willingness to pay in this study was compared with the price of IDR 14,600 which is the average price of three brands of low-sodium salt other than Gamy salt. Based on the results of the distribution of the willingness to pay for Gamy salt, it was found that the majority of respondents (57.28%) were willing to pay more than IDR 14,600 for Gamy salt. The results showed that the majority of respondents consider Gamy salt to be of high value if Gamy salt is sold at the same price as other alternative salt brands. Furthermore, in-depth analysis was carried out based on the score distribution of willingness to pay for Gamy salt by calculating the total and average willingness to pay (WTP). Total score of willingness to pay (TWTP) value for Gamy salt from all respondents was IDR 1,841,000. In addition, the average score of willingness to pay is obtained by dividing the total score of WTP by the number of respondents so that the average WTP value is IDR 17,873.79 The average WTP figure indicated that consumers are willing to pay Rp3,274 more for Gamy salt than other alternative (low sodium) salts. The results are relevant to Uliano *et al*., (2024) stated that consumers are willing to pay more for functional foods, such as snack bars with high antioxidant value produced through sustainable production processes, compared to the average market price of conventional snack bars. Furthermore, the results of a systematic review assessing consumers' WTP for healthier foods (Alsubhi *et al*., 2023) indicated that 23 of 26 experiments (15 studies) shows that consumers have a preference for healthier foods compared to conventional foods, with a willingness to pay a premium price ranging from 5.6% to 91% (average 30.74%) for healthier products.

Although the average score of WTP (IDR 17,873.79) shows a higher price compared to other alternative salts' price. In fact, this result is still far below IDR 25,000 which is the actual selling price of Gamy salt. The distribution

of willingness to pay for Gamy salt in Table 3 also showed that only 33 respondents (32.04%) were willing to pay for Gamy salt above the equivalent of IDR 25,000. These results can be used as a reference for companies to pay attention to prices from the consumers' perspectives. It can be done by evaluating the selling price or developing a strategy to increase consumers' WTP for Gamy salt. One of the strategies that needs to be designed is a marketing strategy based on the results of the analysis of factors that influence consumers' WTP for Gamy salt.

Factors Influencing Willingness to Pay More (Higher Price)

There are seven variables that influence WTP, such as gender, age, income, knowledge of low-sodium salt, knowledge of seaweed salt, health awareness, and perception of health benefits. Logistic regression analysis was used to answer the suspected influence.

Table 5. Results of logistic regression analysis

	B	S.E.	Sig.	Exp(B)
Gender (GNDR)	0.427	0.493	0.387	1.532
AGE	-0.010	0.022	0.629	0.990
Income (INCM)	0.192***	0.064	0.003	1.212
Lack of Knowledge about Sodium Salt (KNWLSN)	-0.562	0.536	0.295	0.570
Knowledge of Seaweed Salt (KNWLSS)	1.327*	0.785	0.091	3.769
Health Awareness (HLTHAW)	-0.431*	0.244	0.078	0.650
Perception of Health Benefits (HLTHBN)	0.086	0.230	0.710	1.089
Constant	-0.363	1.333	0.785	0.695
L_0		140,596		
L_1		116,530		
Cox and Snell R square		0.208		
Nagelkerke R square		0.280		
Hosmer and Lemeshow Test		0.926		
Omnibus Tests of Model Coefficients		0.001		

Descriptions: *** significant 1%; * significant 10%

Table 5 shows the level of significance of the model in the Omnibus tests of model coefficients is less than 0.05, namely 0.001, so H0 is rejected. This means that there is at least one independent variable that has a real influence on the dependent variable. Nagelkerke R square value is 0.280, which means that the ability of the independent variable to explain the model is 28%, while the remaining 72% is explained by other factors outside the model. Based on the Wald test, three independent variables had a significant influence on respondents' willingness to pay a higher price for Gamy salt. These variables consist of one significant variable at 1% significance level, such as income, and two significant variables at 10% significance level, such as knowledge about seaweed salt and health awareness. Meanwhile, the other four independent variables do not have a significant influence on the dependent variable. The four variables are gender, age, knowledge of low-sodium salt, and perception of health benefits. Logistic regression equation based on the analysis results can be seen in the following equation:

$$Y = \ln\frac{p}{1 - p} = -0{,}363 + 0{,}427\ GNDR - 0{,}010\ AGE + 0{,}192\ INCM - 0{,}562\ KNWLSN + 1{,}327\ KNWLSS - 0{,}431\ HLTHAW + 0{,}086\ HLTHBN + \varepsilon$$

Income variable has a positive coefficient and odds ratio of 1.212 so that the income variable is in accordance with the research hypothesis, stating that it has a positive influence on consumers' willingness to pay higher price for Gamy salt. Consumers having high incomes are willing to pay more for Gamy salt because they have high purchasing power. The significance score of income variable is 0.003, which is smaller than the real level of 1%, so the income variable has a significant positive effect. The higher the consumer income, the greater the consumers' willingness to pay more for Gamy salt also increases by 1.212 times, *ceteris paribus.* According to Fajria *et al.* (2020) and Saraswati *et al.* (2023), the increase in income results causes increased opportunities for consumers' willingness to pay.

Knowledge variable of seaweed-based salt shows a significant positive influence on consumers' willingness to pay more for Gamy salt. Based on the odds ratio value, consumers who have knowledge about seaweed salt are 3.769 times more likely to pay more for Gamy salt, *ceteris paribus.* These results indicate that consumers who have knowledge about seaweed-based salt tend to respond more positively to Gamy salt customers. This finding can be used as a strategy for the company to increase consumers' knowledge regarding Gamy salt. This finding is relevant to Tyas & Fitriana (2023) stating that knowledge influences consumers' willingness to pay positively and significantly.

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In contrast to the income and seaweed salt knowledge variables, the health awareness variable has a negative coefficient. This finding is inconsistent with the initial hypothesis which assumed that the health awareness variable would have a positive effect on consumers' willingness to pay more for Gamy salt. Variable of health awareness has a significance value of 0.078, which means that at a real level of 10%. It means that health awareness has a significant effect on consumers' willingness to pay. The high influence of the variables on the possibility of WTP occurrence is seen from the odds ratio value - if consumer awareness of health increases, then the chance of consumers' willingness to pay more for Gamy salt will decrease by 0.650 times, *ceteris paribus*. This finding of a significant negative effect differs from previous research conducted byAli & Ali (2020), health awareness has a significant positive effect on the willingness to pay for healthy food products. Meanwhile, Ulfa *et al*. (2022) revealed that health awareness does not have a significant effect on consumers' willingness to pay for healthy food products. On the other hand, negative coefficient was found in the research conducted by Puspitasari *et al*. (2021) on the decision to purchase organic food products. Su *et al*. (2022) also indicated that there is a negative influence of health awareness on consumers' attitudes towards organic food products, although not significantly. Based on the results, it is concluded that health awareness of consumers does not always consider Gamy salt as the main preference. As a result, the consumers are not willing to pay more for Gamy salt.

Variables of gender and perception of product benefits for health are relevant to research hypothesis, having a positive influence on customers' willingness to pay more for Gamy salt. The positive influence of both variables is in line with the results of previous research (Narine *et al*., 2015). However, the significance value of gender and perception of health benefits variables is greater than the specified real level, 0.387 and 0.710 respectively. Both variables do not statistically have a significant effect on the willingness to pay more for Gamy salt. This means that variables of gender and perception of health benefits of Gamy salt are not strong enough to encourage consumers to pay a higher price for the product. The finding of no significant influence exerted by gender is relevant to Fajria *et al*. (2020). Meanwhile, the variable of perception of product benefits for health has results that are very much inversely proportional to the research conducted by Hasanah & Yanuar (2024) stating that the variables negatively significantly influence WTP.

In contrast to variable of knowledge of seaweed-based salt, the coefficient of the low-sodium salt knowledge variable has a negative value, indicating that low-sodium salt knowledge has a negative effect on consumers' willingness to pay more for Gamy salt. However, the significance value shows 0.295 so that the variable does not have a significant effect. In addition to the low sodium salt knowledge variable, the age variable in the analysis results is not relevant to the research hypothesis. It is identified that younger ages tend to be more willing to pay more for Gamy salt. This is relevant to the current Gamy salt market, where the majority of customers are aged between 35-40 years. However, the age variable has a significance value of 0.629 so it does not have a significant effect on the willingness to pay more for Gamy salt. According to Romano *et al*. (2016), negative influence is caused since younger people tend to follow trendy food habits. In this study, young consumers are also supposed of being more open to innovations and new trends in Gamy salt, thus having a higher willingness to pay for Gamy salt. Differences in significance levels can occur due to differences in data variation and size.

Managerial Implications

This research provides several implications for Gamy salt producers. Consumers' WTP for Gamy salt shows a higher score than the average selling price of other low-sodium salts, indicating that Gamy salt as an alternative salt has a fairly high value for consumers. However, WTP score is still far below the actual selling price of Gamy salt. Hence, consumers do not have a surplus if the company continues to sell Gamy salt at the current price. Based on these problems, the solutions for the company are to develop a strategy to increasing consumers' willingness to pay for Gamy salt and also to evaluating the selling price. The first step is to evaluate the target consumers and position of the Gamy salt product. Income variable has a significant positive effect on Gamy salt which is relevant to targeted consumer segments with high incomes. However, the company needs to ensure that the product marketing strategy can reach this group, for example by determining the proper marketing media. Then, the company can position Gamy salt as an innovative product that utilizes and increases the value of seaweed resources with a zero-waste concept. The company also emphasizes the product characteristics and advantages of using seaweed as the raw materials for Gamy salt. This process differs from other alternative salt products. Meanwhile, based on the results, consumers with less aware of their health are likely to pay more for products than those who are aware of their health. The results indicated that potential consumers of Gamy salt are not only limited to health-conscious consumers. Therefore, Gamy salt also needs to strengthen attributes other than health aspects to increase consumer interest that does not prioritize health products, such as packaging, taste, labels, and others.

The second step to perform promotions by providing product-related education to support consumers understand the value of the product by utilizing social media. This step can be considered to increase brand

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awareness among consumers, increase consumer interest, and reach a wider market. In addition, collaboration with other parties can also be an approach to expanding market reach. One of the collaborations that can be done is B2B, such as selling to retailers or co-branding with healthy food producers. Through this collaboration, Gamy salt becomes popular and gains a wider market. If there is increasing demand from consumers, the company may consider increasing production capacity. Finally, the company may establish partnerships with seaweed farmers as raw material suppliers to obtain price stability and certainty of raw material quality. Having better prices can reduce production costs, so the company may consider evaluating selling prices.

CONCLUSION

The average score for consumers' willingness to pay (WTP) is IDR 17,873.79 per 100 grams. WTP score is Rp3,274 higher compared to the average price of other low-sodium salts. However, WTP score is still below the selling price of Gamy salt, which is IDR 25,000 and IDR 30,000. Factors that significantly influence consumers' WTP for Gamy salt are income, knowledge of seaweed salt, and health awareness. Income and knowledge of seaweed salt have a positive effect, while health awareness has a negative effect.

Gamy salt producers should evaluate their selling prices to be closer to consumers' willingness to pay (WTP), for example by offering discounts or bundling packages to attract initial interest. In addition, it is important to strengthen marketing to high-income consumer segments through appropriate social media and digital platforms, with an emphasis on the innovative benefits of seaweed-based salt. Consumers' education about product advantages, both in terms of health and environmental value-added, must be strengthened through creative marketing campaigns and collaboration with influencers or health experts. The company also needs to establish strategic partnerships with seaweed farmers to ensure the stability of raw material supply and prices, and consider B2B partnership with retailers and healthy food manufacturers to expand the market. Lastly, if demand continues to increase, producers can increase the scale of production to reduce costs and increase the price competitiveness of products in the market.
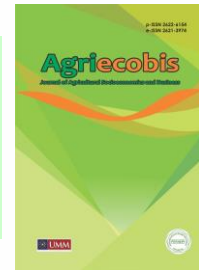
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Halimah & Putri (Consumers' Willingness to Pay . . ., Contingent Valuation Method, Low sodium salt, Logistic regression, Willingness to pay)

Research Article

Risk Management of Green Bean Farming Production in GluranPloso Village, Gresik District

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ABSTRACT

Green beans are the most important food crop in Indonesia and production continues to increase to meet domestic demand. However, production is still insufficient due to several risks faced by farmers. This research analyzes the risk management of green bean production in Gluranploso Village using the Coefficient of Variation (KV) and Failure Mode and Effect Analysis (FMEA) methods. The results showed that yield variation was relatively low with a KV value of 17%, indicating good yield stability. The FMEA analysis identified four main sources of risk affecting production: seed aspect with an RPN value of 5.808, weather with an RPN value of 7.04, pests and diseases with an RPN value of 12.936, and technical aspects with an RPN value of 47.88, particularly delays in pest and disease control spraying. In addition, the market aspect is also a source of risk with the largest value in the increase in production input prices at 12.288. These sources require special attention in risk management. The study concludes that the implementation of appropriate risk management strategies, focusing on the identified key risk sources, can help farmers improve yield stability and farm profitability. These strategies include improving seed quality, mitigating weather risks, controlling pests and diseases, and improving technical procedures in cultivation and market risks. Thus, effective risk management can be key in increasing the productivity and sustainability of green bean farming in Gluranploso village.

INTRODUCTION

Indonesia with its various beauties has an abundance of natural resources, especially in the farming sector, making most of the population dependent on the profession as farmers (Arisaputra, et al., 2021). Many domestic products come from the agricultural sector, especially food crops, which play an important role in meeting nutritional needs as well as the domestic market in Indonesia. An example of a food crop developed in Indonesia is green beans (Vigna radiata L.). according to Petropaulus (2020), green beans have high nutritional content, such as 58% carbohydrates, 22.9% protein, 4.9% iron, 0.52% vitamin B1, 0.29% vitamins A and C, 0.89% potassium, and other minerals. According to Hasen et.al (2019), Green beans are a strategic commodity that can survive in dry rice fields in the dry season with a more prominent chance of success than other commodities. However, green bean plants are very sensitive to low temperatures and water shortages (Prazak, 2020).

Green bean, also known as Vigna radiata, is a secondary crop that grows in the tropics. Included in the Fabaceae family, green beans have many benefits, especially as a source of high protein for the body (Hou, 2019). Green beans are the third most important legume crop in Indonesia after soybeans and peanuts. Green bean seeds are of high economic value and can be consumed. Once cooked, it makes an alternative to the staple menu. In addition to its dry nature, the development of introduced bean varieties has made a valuable contribution to the development of the global agricultural industry (Ma, et., al, 2022).

Green beans have advantages that include short planting time, resistance to various pest organisms and diseases, tolerance to drought, easy cultivation methods, and the ability to grow well on less fertile land. The potential for green bean development is huge due to its high economic value and stable price. However, the ever-increasing population growth in Indonesia has led to a demand for green beans, while limited production remains a challenge to meet market needs.

Increasing the area under green bean cultivation, especially in Central and East Java, is essential to increase production. The use of superior varieties and the application of more sophisticated cultivation technologies are also very effective in increasing yields. According to Faizin (2019), superior varieties have better resistance to diseases and pests, as well as better adaptability to climate change. In addition, modern cultivation technologies, such as effective irrigation, proper fertilization according to procedures, and integrated pest control methods, can increase productivity and quality of crops.

Farmers can achieve more optimal yields by selecting superior varieties and using innovative cultivation technologies. This can increase their income and meet the growing market demand. When market demand rises, farmers' welfare tends to improve in several ways. Increased demand usually causes the price of agricultural products to rise, allowing farmers to allocate their crops at the right price and increase their income. In addition, larger sales volumes mean additional income for farmers. With higher incomes, farmers can invest in better farming technology, quality seeds, and modern equipment, all of which are capable of increasing yields, efficiency, and reducing production costs in the long run.

Higher incomes enable farmers to improve their quality of life, such as gaining accessibility to education, healthcare, and rural infrastructure. In addition, farmers' bargaining power with buyers and middlemen becomes stronger, allowing them to negotiate better prices and get a fairer deal. With better capital, farmers can also diversify their businesses, such as growing different crops or starting side businesses, which helps reduce the risk of dependence on one type of product and increases income stability (Hidayat, 2023).

However, to ensure that increased demand actually improves farmers' welfare, supportive policies are needed, such as price protection, fair market access, and infrastructure support. Without the right policies, the benefits of increased market demand may not be fully realized by farmers. Research and development continues to discover new superior varieties and more effective cultivation techniques, to ensure the sustainability of green bean production in the future.

Government efforts to increase green bean production include seed breeding programs, production facility assistance, and extension services. According to Aristya (2019), plant breeding in the public sector is hampered by the use that suits the needs and interests of farmers. The development of plant breeding technology for strategic commodities needs to be done by taking into account the market, preferences, and needs of farmers through research and innovation. Although green bean production in Indonesia has increased, it is still not enough to meet national consumption needs. Indonesia still imports green beans from other countries to meet these needs.

Based on the information in Table 1, the production and harvest area of green beans during the 2019-2023 period experienced unstable fluctuations and tended to decline. Data from the Central Statistics Agency (BPS) shows that:

Table 1. Green Bean Productivity Production in Indonesia

Years	Production	Harvest Areas	Productivities (Ton/Ha)
2019	245.000 ton	208.000 ha	1,18
2020	235.000 ton	198.000 ha	1,19
2021	272.758 ton	204.824 ha	1,33
2022	280.000 ton	207.000 ha	1,35
2023	285.000 ton	209.000 ha	1,36

Source : Central Bureau of Statistics, (Badan Pusat Statistik, 2023)

According to Anugrahtama, et. al (2020), green bean production in 2019 decreased by 2.7% compared to 2020 and has not been able to meet the national demand of 350,000 tons per year for various purposes such as food, seeds, and feed. Therefore, to increase national green bean production, it is necessary to develop the utilization of suboptimal land, such as saline land (Abdillah, 2021). The decline in yield is influenced by various factors, such as the area of productive land, the quality and genetic superiority of seeds, soil type, fertilizer type, medicines, and

farmers' knowledge in cultivation practices. The main challenge in increasing green bean production is the reduction of land used for production, which indirectly causes a decrease in yield every year.

Although green bean production data from 2019-2023 shows an increase in productivity, there are several risks that cause this increase in productivity to be unstable or variable. According to Faizin (2019), seeds are a major source of risk in green bean production because the quality of seeds greatly affects various important aspects of the cultivation process. High-quality seeds support better and faster plant growth. Plants from good seeds can photosynthesize optimally and produce quality green beans. In addition, seed resistance to pests and diseases is very important because resistant seeds will reduce the risk of losses due to pest attacks and reduce the need to use pesticides that have a negative impact on the environment.

The second source of risk is weather. According to Taek et al (2022), extreme and unpredictable weather changes and irregular rainfall patterns greatly affect green bean farming activities and increase food insecurity. These extreme weather patterns can cause floods, landslides or droughts, making it difficult for farmers to predict planting and harvesting times. In addition, traditional farming methods such as slash and burn and the lack of application of appropriate technology also affect family food security.

The third source of risk is pest and disease attacks. According to Firdaus et. al (2023), pest attacks such as Agromyza phaseoli Cog, Phenacoccus manihoti, Spodoptera, Aphidoidea, and Callosobrunchus chinesis L, often reduce green bean production. Farmers generally use chemical pesticides such as Biopatek, Nopatek, and Biowasil, spraying 25 times from 10-14 days after planting until the last harvest in 3-4 months.

The fourth source of risk is technical risk. According to Arifin et al (2022), the decline in green bean production in Indonesia is caused by inappropriate cultivation techniques, such as tillage, fertilization, and pest and disease control. To increase green bean production, it is necessary to intensify and apply appropriate cultivation techniques. Intensification includes improving cultivation methods by using technology packages that can produce optimal yields with minimal inputs.

Next is market risk. According to Mardiana et al. (2022), market risk in green bean production often occurs due to changes in agricultural product prices that are influenced by product supply and demand, as well as production costs that differ each period. By understanding and managing these various sources of risk, farmers can increase the stability and sustainability of green bean production, thereby meeting the growing market demand and improving their welfare.

The Ministry of Agriculture provides great support to green bean production centers across Indonesia, including East Java Province, with key areas such as Mojokerto, Jombang and Lamongan. Within the framework of this support, Gresik District plays an important role as one of the main centers of green bean production in the province, with a land area of 1,100 hectares and a production value of IDR 1.2 trillion in 2020 (BPS East Java, 2021). Several sub-districts in Gresik Regency, such as Benjeng, Kedamean, Balongpanggang, Bungah, and Panceng, are known as major production centers. Increased green bean production is expected to increase farmers' income and boost the local economy.

However, farmers face various challenges that can affect production outcomes, such as market price fluctuations, technological limitations, and unpredictable weather conditions. To overcome these problems, the government needs to provide solutions in the form of counseling, access to appropriate technology, and a price guarantee system. Gresik district, which is currently ranked 7th in East Java with a productivity of 1.42 tons per hectare, shows significant achievements.Despite progress, challenges such as weather and climate change still limit the potential for greater increases in production.

At the village level, Gluranploso village in Benjeng sub-district showed prominent productivity in 2020 and continued to increase until 2023. However, this increase is still hampered by the risks and challenges faced by farmers, as described by previous researchers. Identifying and analyzing risks in green bean production is essential for designing effective preventive measures such as selecting kutilang variety seeds, using mulch on the soil, using pesticides, and using pesticides.

This study aims to use the Failure Mode and Effect Analysis (FMEA) and Coefficient of Variation methods to evaluate the potential failures and severity of risks in green bean production in Gluranploso Village. With this approach, it is expected to provide in-depth insight into production risks and develop effective strategies to increase production yields in a sustainable manner.

METHODS

To achieve the Observation objective, the approach applied is descriptive quantitative, which is useful to provide an in-depth understanding of the phenomenon being studied through numerical and qualitative data analysis obtained from faizin (2019). This approach is based on relevant literature from previous research, as well as comprehensive data collection techniques.

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Data Collection Techniques
This research relied on three main techniques for the data collection:
1. Questionnaires: Questionnaires are useful for collecting primary data from respondents. The questionnaire was designed to obtain structured information on farmers' experiences, cultivation techniques, and challenges faced in green bean production. The questions in the questionnaire covered technical aspects, risks, and practices of green bean cultivation relevant to this study.
2. Observation: Observation was conducted to obtain direct data on field conditions, cultivation techniques applied, and other factors affecting green bean production. These observations helped the researcher understand the practical context of the information obtained through the questionnaire.
3. Interviews: In-depth interviews were conducted with green bean farmers to gain a more in-depth perspective on the challenges and risks they face. These interviews also allowed the researcher to explore issues that may not be covered by questionnaires and observations.

Data Type
The data used in this study consists of:
1. Primary Data: The data were collected through a survey involving interviews and questionnaires as well as field observations. The data includes direct information from respondents on cultivation techniques, experiences and challenges in green bean production.
2. Secondary Data: The secondary data was obtained from reports and documents provided by relevant agencies. This secondary data provides additional context and historical information on green bean production in the study area.

Research Location
This research was conducted in Gluranploso Village, Benjeng Sub-district, Gresik District, East Java. This location was chosen because it has characteristics that relevant to the study of green bean production and shows the potential and challenges in green bean cultivation.

Sampling Technique
The sampling technique used is purposive sampling. Purposive sampling is a method of selecting samples based on special considerations from researchers. This technique selects subjects based on the characteristics of the farmer, namely the recommended respondent of the Gapoktan leader/manager, and those who have at least 5 years of experience in green bean farming. In this case, the sample was taken from green bean farmers who had experience and a minimum land area of 1 hectare in Gluranploso village. These characteristics ensure that respondents have significant knowledge and experience related to green bean production.

Data Analysis Method
Descriptive quantitative data analysis in this study was conducted with two main methods:
1. Failure Mode and Effect Analysis (FMEA): FMEA is a systematic technique for identifying potential failures in a design, process, or product and assessing their impact. FMEA helps in identifying possible failures, evaluating their impact on the system, and developing mitigation strategies to reduce risks. According to Wang et. al (2009), FMEA uses 3 scales with each rating of 1-10, namely the severity, occurrence, and detection scales, from the average results of the severity, occurrence, and detection scales calculated by the formula RPN

$$RPN = Severity(S) \times Occurence (O) \times Detection (D)$$

2. Coefficient of Variation: The coefficient of variation is necessary in measuring the level of variability in production data. It is the ratio between the standard deviation and the average, which gives an idea of how consistent the production results are compared to the average. According to Hernanto (1999), the coefficient of variation is the ratio of the risk that must be borne to the amount of production costs, calculated by the formula:

$$KV = Va/Qi$$

Description:
KV = Coefficient of Variation
Va = Standard Deviation
Qi = average production output (kg/ha)

Data obtained from questionnaires, observations, and interviews will be analyzed descriptively to describe existing patterns, trends, and relationships, using FMEA and Coefficient of Variation methods. This research aims to provide an in-depth insight into the risks and challenges in green bean production, as well as develop strategies to sustainably increase production output

RESULTS AND DISCUSSION

The results of risk analysis on green bean farming using the Failure Mode and Effect Analysis (FMEA) method aim to show the Risk Priority Number (RPN) for various potential problems. This RPN is obtained by multiplying the values of three main criteria: severity, occurrence, and detection. This approach allows the evaluation and ranking of risks based on impact, frequency of occurrence, and effectiveness of detection methods. As such, this analysis provides a clear picture of the most significant risks and those that require primary attention in green bean production. The RPN results of this analysis are shown in Table 2, which reflects how risks are prioritized based on severity, frequency of occurrence, and detectability.

Table 2. Risk Priority Number (RPN) Results

No.	Indicators	RPN Value
1	Delayed pest and disease control spraying	47,88
2	Green bean pod checking	25,2
3	Green beans damaged after harvesting	18,72
4	Green beans infested with pests and diseases	12,93
5	Price of production inputs rises	12,28
6	Low quality seed	5,80
7	Green bean selling price decreases	7,68
8	Nutrients are absorbed by weeds	7,29
9	Environmental temperature is too hot	7,04
10	Uneven distribution of solid fertilizer	4,75
11	Uneven harvest of green beans	4,60

Source : Data Processing Research Results (2024)

Based on the processed data in Table 2, the RPN values in the table indicate the priority of risk handling in green bean farming. For example, the delay in spraying pest and disease pesticides has the highest RPN value of 47.88, indicating that this issue is crucial and must be prioritized to prevent production failure. Next, the activity of checking green bean pods has an RPN of 25.2, while damaged green beans after harvest shows an RPN value of 18.72. Other risks include green beans being attacked by pests and diseases with an RPN value of 12.99, low quality seeds with an RPN value of 5.80, and a decrease in the selling price of green beans with an RPN value of 7.68. Additional risks include nutrients being absorbed by weeds (RPN 7.29), excessively hot ambient temperatures (RPN 7.04), uneven distribution of solid fertilizer (RPN 4.75), and uneven harvesting of green beans (RPN 4.60).

The results of risk analysis using the FMEA method calculated using the RPN formula show some of the main risks in green bean farming. The implications of these findings are very significant in the research conducted by Prasetyo (2022), to increase the productivity and efficiency of green bean farming. First, risks with the highest RPN values, such as delays in spraying pesticides, require immediate attention and handling. It shows a huge impact on plant health and production yields. Therefore, it is important to optimize pesticide spraying schedules and techniques to prevent greater losses.

In addition, the analysis also highlights the need for improved management techniques and agricultural technologies, such as environmental temperature monitoring and more efficient fertilizer distribution. Appropriate technology development and implementation can reduce risks related to seed quality and environmental conditions. The research also underscores the importance of better planning and risk management, by developing mitigation strategies for key risks. Policy support and extension programs from the government and relevant agencies are also needed to help farmers overcome these challenges.

Finally, price stabilization and market security policies should be considered to reduce the impact of price fluctuations on farmers. Overall, the results of this analysis provide deep insights into critical areas that require strategic action to improve the resilience and productivity of green bean farming. These findings are consistent with research by Khasanah, et. al. (2023), Pests and plant diseases are major factors that severely limit crop production. They not only cause significant physical damage to various parts of the plant such as leaves, stems, roots, and fruits, but also disrupt various important physiological processes occurring within the plant, including photosynthesis, respiration, and nutrient absorption. This damage has a direct impact on plant

growth and development, ultimately resulting in reduced productivity and crop quality. Therefore, pest and disease control efforts are very important to ensure that plants can grow optimally and produce adequate yields.

Coefficient of Variation (KV)

Before discussing the coefficient of variation (CV) further, it is important to understand the results of the study, which showed that the CV value for green bean production risk was 0.17. This coefficient of variation is a statistical measure that describes the relative level of variation in green bean production over time.

A KV value of 0.17 is low, which means that the variation or fluctuation in green bean production is not significant. In this context, a low KV value indicates that production output tends to be stable and does not experience major changes from year to year. This means that although there are minor fluctuations, there are no drastic changes that affect the overall consistency of production.

To provide a clearer picture, the green bean production data used in this analysis can be seen in Table 3, which details the production results over time. Meanwhile, Table 4 presents the results of the standard deviation, which provides additional information on how far the green bean production data spreads from the mean. This information helps in understanding the stability of production and provides a basis for further analysis of production fluctuations.

Table 3. Green Bean Production Per Ha

Total Production		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	900.00	1	20.0	20.0	20.0
	1000.00	1	20.0	20.0	40.0
	1200.00	1	20.0	20.0	60.0
	1300.00	1	20.0	20.0	80.0
	1400.00	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

Source : Data Processed, 2024

Table 4. Standart Deviation Results

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Production	5	900.00	1400.00	1160.0000	207.36441	43000.000
Valid N (listwise)	5					

Source : Data Processed, 2024

The results of data analysis of green bean production show that the standard deviation value obtained is 207.36441. By dividing this standard deviation by the average production yield (Q_i), a Coefficient of Variation (KV) of 0.17 was obtained. KV is a measure that reflects the degree of fluctuation or variation in production over time. A KV value of 0.17 indicates that the variation in green bean production is relatively low, indicating high stability in yields from year to year. This means that green bean production does not experience significant fluctuations, so yields tend to be consistent.

The implications of this low KV are very positive in the context of agriculture. First, production stability provides farmers with certainty regarding their yields, allowing them to better plan production and distribution activities. It also reduces the risk of income uncertainty, providing a sense of security for farmers. Secondly, stable production supports consistent availability of green beans in the market. As such, green bean prices can be more stable, and consumer demand can be optimally met, benefiting the entire supply chain.

Furthermore, the low KV indicates that the farming practices are efficient and well adapted to environmental conditions and climate change. This reflects the success of the cultivation techniques and shows the potential for continued growth in the green bean farming sector.

When combined with the results of the Failure Mode and Effect Analysis (FMEA), where the highest Risk Priority Number (RPN) value is 47.88, it indicates that the technical risks in green bean production are at a low to moderate level, meaning that the potential for failure in the production process or technology used is not significant. The low KV value underlines that production fluctuations remain minimal, and yields tend to be stable. With the combination of non-high RPN and low KV values, green bean producers can feel more confident in the stability of their yields and production processes. Therefore, the risk management strategies implemented can be maintained or even improved to ensure sustainability and increased productivity in the future. This research is also in line with the findings by Firdaus et al. (2023), which showed that low KV values

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in soybean farming indicate stable profits despite risks, emphasizing the importance of good risk management for farm sustainability. This is in accordance with the research conducted by Pani., et al (2023), who explained that the results of the production and price risk analysis showed that the KV value < 0.5, which means that soybean farming carried out by farmers is profitable in terms of production and price. However, the profit risk analysis shows a KV value of > 0.5, which indicates that farmers suffer losses due to price fluctuations because the KV results are more than 0.5.

Efforts to Control Production Risks of Green Bean Farming

Control Efforts due to seed

In green bean farming, seed-related risks are an important factor that can affect success or failure in production. Based on the interviews and analysis that has been conducted, there are key indicators that could potentially lead to seed-related risks, namely: Low seed quality and seeds that are susceptible to pest attacks. Low seed quality is a significant risk in green bean production. Poor quality seed can inhibit plant growth, result in low yields, or even cause crop failure. Some of the factors causing low seed quality include lack of proper seed selection, disease infection of the seeds, or seeds with low viability.

One of the main steps is the use of certified seeds. Certified seeds have usually gone through a rigorous selection and testing process, so their quality can be ensured. To ensure seed quality, quality tests should be conducted before planting. These tests may include germination tests and tests to detect pathogens in the seeds.

Research conducted by Faizin, M., Nadrawati, E. T., & Turmudi, E. (2019) that emphasizes the importance of high-yielding varieties as a component of production technology that is effective, easily adopted by farmers, and environmentally friendly, is closely related to previous studies that have also highlighted the importance of selecting high-yielding varieties in increasing crop productivity. Previous research has shown that improved varieties can provide higher yields, have better resistance to pests and diseases, and are able to adapt to different environmental conditions. In addition, several studies have also confirmed that the use of improved varieties is one of the most effective and economical strategies in increasing agricultural yields without having to rely on the use of high inputs such as chemical fertilizers and pesticides, thus supporting more sustainable agriculture, thus Faizin and his colleagues' research strengthens previous findings by providing concrete evidence through testing of green bean varieties such as Vima 1, Vima 2, Vima 3, Murai, Kenari, Sriti, and Kutilang types, which are proven to have superior quality. This research also adds to the knowledge of the superiority of these varieties and encourages the adoption of superior varieties by farmers to achieve better production and be more environmentally friendly. Among these varieties, the Kutilang seed variety is one of the recommended choices for farmers due to its superior quality.

By implementing the use of certified seeds and conducting seed quality testing, farmers can reduce the risk of crop failure and significantly increase green bean production yields.

Weather-Related Control Measure

Excessively hot ambient temperature, with a Risk Priority Number (RPN) of 7.04, is a significant source of risk in green bean production as it can cause plant stress. Stress due to high temperatures inhibits the photosynthesis process, reduces gas exchange, and disrupts the function of plant enzymes, which in turn can reduce productivity and yield.

To address the risk of hot temperatures, several mitigation measures can be applied. The use of organic mulches such as straw, compost, or dry leaves is an effective method to reduce water evaporation and maintain soil moisture. It can also improve soil fertility over time. Another alternative is the use of plastic mulch, which serves to reflect some of the sun's rays, reduce soil temperature, and reduce water evaporation. In addition, plastic mulch also helps control weeds that compete with green bean plants for water and nutrients.

Research by Febriyantiningrum et al. (2021) reinforces these findings by providing empirical evidence on the effectiveness of biofertilizers in enriching soil nutrient content and improving crop growth in challenging land conditions such as drylands. This research also adds insight into how biofertilizers can act as environmentally friendly biological agents, which not only support plant health, but also contribute to environmental sustainability and long-term agricultural success. As such, this research is in line with previous efforts in promoting the use of biofertilizers as an important component in modern sustainable agriculture. Besides the application of mulch, other mitigation measures include delaying the initial planting schedule, harrowing to loosen the soil, and land conversion. To ensure quality and quantity of production, farmers are

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advised to follow Good Agricultural Practices (GAP) and establish Indonesian National Standards (SNI) for green beans. This will help produce high-quality green beans, maintain the quality of local green beans, and reduce uncertainty in production yields.

Pest and Disease Control Measures

Pest and disease infestation, with an RPN value of 12.936, is one of the main risks in green bean production. The high RPN value indicates that attacks by pests such as caterpillars, aphids and leafhoppers, as well as diseases such as late blight, can significantly damage the crop and reduce yields. Pests can damage plant parts, while diseases can cause leaves to turn yellow, wilt and fall off, resulting in a drastic reduction in yield.

To control pests and diseases, an important first step is early detection. This can be done through regular field inspections to identify early signs of infestation. Regular monitoring allows farmers to take preventive measures before the problem spreads further. In addition, the use of traps such as pheromone traps can help monitor pest populations and determine the right time for intervention.

In pest control, the use of pesticides can also be applied in several ways. First, natural pesticides made from ingredients such as Neem seed powder, garlic, ginger rhizomes, papaya leaves, and chili marinade can be used. According to Indiati (2022), these natural pesticides are environmentally friendly options that are safe for the agricultural ecosystem and effective in controlling pests. Secondly, the use of chemical pesticides, if needed, should be done judiciously with the recommended dosage, which is 2-3 times a month with an application dose of 0.5-1.5% active ingredient. According to Ria (2023), it is also important to rotate pesticide types to prevent pest resistance. Finally, pesticide application should be done at the right time, usually in the morning or evening, to minimize side effects and increase effectiveness.

These mitigation measures will help reduce the risk of damage caused by pests and diseases, and thus increase the overall yield of green bean production.

Technical Control Measures

Delays in spraying for pest and disease control in green beans, with a Risk Priority Number (RPN) value of 47.88, indicate a high risk that requires immediate attention. To address this issue, it is important to organize and adhere to a timely spraying schedule. This will help to effectively prevent the development of pests and diseases, thereby reducing losses caused by such delays.

Regular inspection of green bean pods, which have an RPN value of 25.2, is also a crucial step to ensure pod health and quality. By conducting regular inspections, farmers can detect and address pod health issues before they significantly affect yields.

The problem of uneven green bean harvest, reflected by the RPN value of 4.608, can be improved by implementing good tillage practices. This includes ensuring an even distribution of water and nutrients across the field, so that each plant gets optimal growing conditions.

Damage to green beans after harvesting, which has an RPN value of 18.72, can be prevented by proper storage. Storing green beans in a dry and well-ventilated area will help avoid mold growth. Fungicides can also be applied if needed to protect the crop.

Nutrients absorbed by weeds, with an RPN value of 7.296, require regular weeding to remove weeds that compete with the green bean crop. The use of mulch or herbicides can also be used to control weed growth and ensure that green bean plants get enough nutrients.

The problem of uneven distribution of solid fertilizer, which has an RPN value of 4.752, can be addressed by using a proper fertilizer spreading device. This tool will ensure that the fertilizer is spread evenly across the field. To improve the effectiveness of fertilization, technological innovations can be applied, as proposed by Arifin et al (2022). They showed that fertilizing with cow manure, which is rich in macro and micronutrients, can improve soil physical, chemical and biological properties. This will increase nutrient availability to plants and support healthier and more productive growth of green beans.

By implementing these mitigation measures, the risks associated with green bean production can be reduced, and the stability and productivity of the crop can be improved.

Market-Driven Control Measures

The decline in green bean prices, reflected in the Risk Priority Number (RPN) value of 7.68, is a risk that needs to be addressed to reduce the negative impact on farmers' income. To address this issue, several control measures can be implemented. Firstly, improving the quality of green beans through the application of

more sophisticated post-harvest processing technologies can help maintain product quality and positively affect selling prices. In addition, training by authorities on efficient and sustainable green bean cultivation is essential to improve farmers' skills and their yields. This effort should also include training in creating added value from green beans, which will increase the product's competitiveness in the market.

This study is in line with research conducted by Mardiana et. al (2022) supporting this approach, showing that partnerships between farmers and industry can reduce the risk of unstable prices. In the study, farmers who partnered with the industry had lower price risk than non-partnered farmers. Therefore, the government's role in creating policies conducive to price stability and risk management is crucial. In addition, effective and efficient land intensification, crop diversification to reduce dependence on one commodity, and providing education and training to farmers to improve their capabilities in community-based enterprises can contribute to improving farmers' income stability

CONCLUSION

The results of this study show that production risks in green bean farming involve several key factors, namely seed quality, weather, pests and diseases, cultivation techniques, and market risks. Analysis using the Failure Mode and Effect Analysis (FMEA) method identified that delays in pest and disease control are the biggest risk, with the highest Risk Priority value of 47.88. This indicates that delays in control measures can have a serious impact on green bean production. The second largest risk is pest and disease infestation with an RPN value of 12.936, which also requires serious attention. Rising production input prices, with an RPN value of 12.288, represent a significant negative impact on farm profitability. The associated risk of seed quality being susceptible to pest attacks has an RPN value of 11.424, emphasizing the importance of using quality seeds. Meanwhile, overheating of the environment has the lowest RPN value of 7.04, but should still be considered.

With a Coefficient of Variation (KV) value of 0.17%, indicating relatively good production stability, suggestions for improving the productivity and profitability of green bean farming include several strategic measures. First, the selection of high-quality seeds is crucial to ensure optimal yields. Second, the use of pesticides should be done wisely and in a timely manner to control pests and diseases. Third, the application of crop rotation techniques can help reduce the risk of pest and disease attacks and improve soil fertility. Fourth, counseling and training farmers on effective cultivation practices and risk management will be very helpful in increasing the productivity and resilience of green bean farming. With these measures, it is hoped that green bean farming can face challenges.

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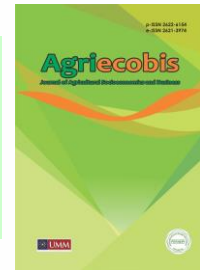
Research Article

Level of Consumer Satisfaction Towards Brown Rice in Malang District: A Customer Satisfaction Index (CSI) Analysis

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ARTICLE INFO	ABSTRACT
	In general, the current demand for brown rice does not receive the same attention from the public as white rice. So, it is important to further understand consumer behavior related to consuming brown rice because this has an impact on consumer satisfaction and has an impact on the strategies formulated by producers. Thus, this study aims to assess the level of consumer satisfaction with brown rice and evaluate the performance and importance of certain attributes. The variables analyzed include product quality, price, and benefits. This study applied a quantitative approach with Accidental Sampling technique, involving 100 respondents who were analyzed using the Customers Satisfaction Index (CSI) technique. The results of these findings indicate that the product quality variable (Taste) has the highest level of importance and performance, with values of 4.56 and 4.49, respectively. The level of satisfaction of brown rice consumers in Pakis District, Malang Regency, reached 74.53%, which is classified as satisfied (range 60.1% - 80.0%). The suggestions given are that producers need to improve the quality of brown rice in terms of taste, color, and texture, while marketers are advised to utilize social media and creative campaigns to attract young consumers and offer discounts for large purchases to increase customer satisfaction.

INTRODUCTION

Rice is a common type of food consumed by Indonesians. According to Rizal et al. (2020) stated that rice is the main staple food that is often consumed by the population in Indonesia and is now a very important food ingredient. Meanwhile, Federici et al. (2021) explained that white rice is more in demand by consumers than brown rice because brown rice requires a longer cooking time, has a chewier texture, and an attractive appearance. Based on a report by the Badan Pusat Statistik (2024), the average rice consumption of Indonesians increased to 1.45 kg per week in 2021. However, brown rice is also very good for health as it contains anthocyanins in addition to carbohydrates, fat, protein, fiber, and minerals. According to Hernawan & Meylani, (2016) anthocyanins are red pigments contained in the rice skin layer that function as antioxidants. This explains that brown rice has a higher nutritional content than white rice, which makes it better. In addition, brown rice is also a healthy food for weight loss and diabetes (Agung et al., 2023). In general, people consume brown rice the same as consuming white rice. Meanwhile, according to Kabeakan, (2019) based on respondents in East Java province stated that the introduced

brown rice is better than white rice, generally respondents like brown rice because it tastes different from white rice.

However, when compared to rice in general, the demand for brown rice is not currently a top priority. In contrast, some areas in Malang Regency produce as much as 800 kg of brown rice every quarter, with a land area of 0.1 (Dewi & Hayati, 2021). One of the brown rice agents in Malang Regency is "the Indonesian Organic Rice Wholesaler" located at Jl. Subali XIII 12A No. 2 Pakis District, Malang Regency. Apart from marketing brown rice, this agent also distributes various kinds of organic rice, one of which is brown rice to various cities. In addition, brown rice is also marketed in various modern markets, namely Transmart, Superindo, Indomaret and Alfa Mart. Thus, it is important to understand consumer behavior.

Understanding the consumers is very important for producers or marketers, because the goal is to increase customer satisfaction. According to Surti & Anggraeni, (2020) explains that customer satisfaction is the level of a person's feelings after comparing the perceived performance with his expectations. The main target of every company in marketing management is to increase customer satisfaction and customer value. Rizal et al. (2020) explain that the price, quality, and benefits of brown rice are some of the factors that influence the level of consumer satisfaction with brown rice. Therefore, this explanation aims to analyze the level of consumer satisfaction with brown rice in Malang Regency.

Previous studies have shown that customer satisfaction with organic rice products is influenced by its service quality, product quality, and price (Riyandani et al., 2021) pandanwangi organic rice satisfaction level (Ahmad & Mohammad, 2020). However, there are still few who conduct research related to the level of brown rice satisfaction. So that the differences in this study with the previous one are in the research object, variables, and analysis methods. Where in previous studies the analytical method used was multiple linear regression and the research site was conducted in Cianjur. While this research uses the CSI method and is in Malang Regency. Based on the description above, it is necessary to conduct research on the level of consumer satisfaction with brown rice in Malang Regency.

METHOD

This study uses quantitative methods. Sugiyono (2016) explains that the quantitative approach measures, analyzes, and describes social phenomena with numerical data. In addition, this research was determined intentionally, namely at one of the Indonesian Organic Rice Wholesalers Jl Subali XXII, No. 2, RT 01 / RW 18, Keduyo Mangliawan, Pakis District, Malang Regency, in May-June 2023. The data used in this study is primary data. Primary data sources were obtained from consumers who consume brown rice at the Indonesian Organic Rice Wholesaler, Keduyo Mangliawan, Pakis District, Malang Regency.

Sampling Method

The sampling method in this study uses an *Accidental Sampling*. This is a sampling technique by chance or whoever the brown rice consumer happens to meet with the researcher (Nasution et al., 2019). The number of samples in this study were 100 respondents. The sample criteria in this study are consumers who consume brown rice as another staple food.

Data Analysis

The analysis technique used is Customer Satisfaction Index analysis, because this method is able to measure the level of customer satisfaction comprehensively by considering all factors related to satisfaction (Novita et al., 2020). CSI analysis evaluates customer satisfaction based on four stages.
a. Determine The Means Important Score (MIS) and The Mean Satisfaction Score (MSS).

$$MIS = \frac{\sum_{i=1}^{n} y_i}{n}$$
$$MSS = \frac{\sum_{i=1}^{n} X_i}{n},$$

It's known that:
n   = Number of Brown Rice Consumers
$\sum_{i=1}^{n} y_i$ = sum of attribute importance values Y to-i

$\sum_{i=1}^{n} X_i$ = sum of attribute importance values X to-i

b. Determining the Weight Factors (WF) value. Third,

$$WF = \frac{MIS_i}{\sum_{i=1}^{p} MIS_i} \times 100\%$$

It's known that:

MIS_i = Average value for *i*

$\sum_{i=1}^{p} MIS_i$ = Average Total Importance from *i* to *p*

c. Calculate the Weight Score value (WS).

$$WS_i = WF_i \times MSS$$

It's known that:
Wfi = Consideration Factors to-*i*

d. Calculate The Costumers Satisfaction Index (CSI).

$$CSI = \frac{\sum_{i-1}^{p} WS_i}{HS} \times 100\%$$

It's known that:
CSI = Customer satisfaction Index (%)
$\sum_{i-1}^{p} WS_i$ = The average total importance from *i* to *p*
HS = The highest scale used.

The measurement of variables in this study is designed through a linear scale, where the level of customer satisfaction is obtained through a numerical linear scale in the table below.

Table 1. Linear Scale Measurement

00,00%	Very Unsatisfied
20,01%	Not Satisfied
40,01%	Normal or Neutral
60,01%	Satisfied
80,01%	Very Satisfied

Source: Primary Data, processed 2023

RESULTS AND DISCUSSION

Consumer's Characteristics

Based on the results of interviews in the study using available questionnaires, there were 100 respondents who purchased brown rice at the Indonesian Organic Rice Wholesale Keduyo Mangliawan, Pakis District Malang. The following are the characteristics of consumers in this study.

Table 2. Consumer's Characteristics

No	Consumer's Characteristics	Total	%
1	Gender		
	Male	27	27
	Female	73	73
2	Ages		
	20-29	9	9
	30-39	22	22
	40-49	50	50
	50-60	19	19

No	Consumer's Characteristics	Total	%
3	Occupations		
	Civil Servants	8	8
	Private Employee	41	41
	Self-Employed	37	37
	Others	14	14

Source: Primary Data, Processed 2023

Table 2 outlines the characteristics of respondents based on gender, age, and occupation. This study noted that there were 27 male respondents and 73 female respondents. In terms of age, the majority of respondents were in the 40–49-year range, with a total of 50 people. For the occupation category, private employees were the most numerous, with 41 respondents. Therefore, it can be concluded that most research respondents are women aged 40-49 who work in the private sector.

The Importance and Performance of Brown Rice

Consumer satisfaction serves to measure how much difference there is between the level of performance and interest in an attribute. The level of performance and expectations in brown rice can be seen in the table of customer satisfaction attributes, which are assessed according to the average score of performance and importance levels.

Table 2. the Importance and Performance of Brown Rice

Attributes	Importance Level	Performance Level
Product Quality		
Taste	4,56	4,49
Color	4,36	4,08
Texture	4,49	4,31
Product Price		
Price according to the quality of brown rice	3,18	3,27
There is a discount on the price of brown rice	3,14	3,45
Affordable Brown Rice Price	2,91	3,26
Product Benefit		
Lower Cholesterol	4,07	3,4
Lower Blood Glucose	4,29	3,5
Lose Weight	4,18	3,33

Source: Primary Data, Processed 2023

Based on Table 2 shows the Mean Importance Score (MIS) and Mean Satisfaction Score (MSS) values. Attributes with the highest level of importance and performance are found in the product quality variable (Taste) obtaining a value of 4.56 and 4.49. While the value < 4 is obtained by the price variable (Affordable Brown Rice Price) with a value of 2.91 and 3.26.

1. Product Quality

The results of the MIS and MSS calculations for the product quality variable on the taste indicator obtained an average score of 4.56 and 4.49. Consumers consider that taste is very important in brown rice and has good performance when consumed. Based on interviews with the respondents, it is stated that consumers are satisfied with the taste of brown rice because it tends not to be too sweet. According to Wahyuni et al., (2021) stated that the taste of rice from brown rice is better than the taste of rice that is usually consumed. The second attribute is color, obtaining an average score of 4.36 and 4.08. This means that consumers consider the color of brown rice to be very important and has good performance. Rice is bright red due to its high Anthocyanin (red dye) content. Anthocyanin, a red pigment in the rice skin layer, acts as an antioxidant for human health, so there is a relationship between the color of rice and the benefits of brown rice (Suliartini et al., 2017; Sumartini, 2018). However, if stored brown rice is more prone to discoloration because it is not protected by rice husks, which can affect its quality and appearance (Qu et al., 2023). Finally, the texture attribute obtained an average score of 4.49 importance and 4.31. This result is the same as the average score of the previous attribute, namely, consumers consider the texture of brown rice to be very important and the performance of the texture attribute is very good for consumers. Based on the results of interviews with respondents, it is stated that consumers are satisfied with the texture of brown rice because after cooking brown rice has a fluffy rice texture. Most of the Indonesian population likes the fluffy texture of rice so that it gives satisfaction to those who consume it (Koesrini et al., 2020; Putri, 2019).

2. Product Price

The results of the calculation of the average score of the importance and performance of the price variable can be seen in each variable attribute. The first attribute is the price according to quality with an average score of 3.18 and 3.27. The second attribute is Discount prices with an average score of 3.14 and 3.45. Finally, the affordable price attribute is 2.91 and 3.26. Based on these scores, it shows that the brown rice price attribute is not very important, and the performance level is not good. Based on interviews with the respondents, it is known that brown rice is more expensive than white rice. According to Rizal et al., (2020) explained that brown rice not only receives less government attention, but also its production is limited and more expensive than white rice. However, this study is not in line with Ahmad & Mohammad, (2020) explaining that price has a direct influence on consumer satisfaction of pandanwangi brown rice. Poor perceptions of brown rice are usually caused by its high price and limited availability (Gyawali et al., 2022).

3. Product Benefits

In the benefit variable, the MIS and MSS calculation scores for each attribute show a good level of importance and performance. The first attribute, which lowers cholesterol, obtained an average score of 4.07 and 3.4. This score indicates that consumers consider brown rice as a very important cholesterol benefit, but the performance of this attribute is not good. Based on the results of interviews with respondents, it is stated that consumers consume brown rice one or two days a week so that the performance provided is less effective. This is in accordance with the statement of Br Kabeakan (2020) stating that effective brown rice consumption patterns can reduce cholesterol levels. In addition, brown rice is known for its high antioxidant content. In addition, it contains flavonoids that have antioxidant, anti-inflammatory, and potential anticancer properties (Feng et al., 2023). The second attribute of brown rice as lowering blood glucose with mean values of 4.29 and 3.5. This means that respondents consider brown rice to be very important in lowering sugar levels and very suitable for diabetics. Brown rice consumption is associated with improved metabolic function, gluten-free, hypoallergenic properties, low fat, easy digestibility, as well as reduced risk of several health conditions such as sugar levels (Lim et al., 2024). In addition, brown rice is low in carbohydrates, high in protein, minerals, and does not raise blood sugar quickly (Hernawan & Meylani, 2016; Kuzairi, 2018). Finally, brown rice attributes as losing weight with an average of 4.18 and 3.33. Based on these results, it shows that respondents consider brown rice very important as losing weight. This is in accordance with the results of interviews with respondents who stated that their goal is to consume brown rice to lose weight. Ramon Syahrial (2021) stated that brown rice consumption is currently mostly carried out by young people, along with the trend of the times. They consume brown rice with the aim of losing weight.

Consumer Satisfaction Level with Brown Rice

The level of customer satisfaction is a function of the difference between performance and expectations felt by a person. Total customer satisfaction can be measured through the Customers Satisfaction Index (CSI) analysis. The following is a table of total customer satisfaction as follows.

Table 3. Consumer Satisfaction Level with Brown Rice

No	Variable	Attributes	MIS	MSS	WF	WS
1	Product Quality	Taste	4,56	4,49	12,96	58,20
		Color	4,36	4,08	12,39	50,57
		Texture	4,49	4,31	12,76	55,01
2	Price	Price based on the quality	3,18	3,27	9,04	29,56
		Discounted Price	3,14	3,45	8,93	30,79
		Affordable Brown Rice Price	2,91	3,26	8,27	26,97
3	Benefits	Lowers Cholesterol	4,07	3,4	11,57	39,33
		Lower Blood Glucose	4,29	3,5	12,19	42,68
		Lose Weight	4,18	3,33	11,88	39,57
	Total Weight Average					372,67
	Total CSI					74,53

Source: Primary Data, Processed 2023

Table 3 shows that the level of consumer satisfaction with brown rice is 74.53%, this satisfaction index is in the range (60.1% - 80.0%). This means that consumers are satisfied in consuming brown rice. These results are in line with Safitri et al. (2017) found that the level of customer satisfaction was 76.6% when they bought organic rice in Surakarta City, meaning that customers were satisfied with the product. Another study in line with this research was conducted by Rasyid et al., (2022) found that the level of consumer satisfaction was 74.3% or brown rice farmers were satisfied with the partnership pattern in Bulukumba Regency. Meanwhile, the results of interviews with respondents stated that consumers were satisfied with brown rice due to the quality and benefits of brown rice

Ra'if et al. (Level of Consumer Satisfaction Towards . . ., Brown Rice, Consumer Satisfaction, Level Of Importance, Performance Level)

that could meet consumer needs. According to Wahyuni et al., (2021) stated that brown rice is a food ingredient used to make brown rice flour, which is a healthy food product. Thus, brown rice serves as a solution to overcome food and nutritional deficiencies. In addition, brown rice has a very high quality, this is because consumers feel that the consumption of brown rice is better than white rice.

Overall satisfaction levels generally vary depending on individual preferences and how brown rice is consumed. This study shows that consumers are satisfied with brown rice due to the quality of the brown rice itself as it has a distinctive flavor. The processing of brown rice, such as soaking it before cooking, can affect its taste, aroma and color. Soaking brown rice for two hours before cooking can increase its volume and organoleptic qualities, including its flavor (Sumartini, 2018).

Based on the results of the CSI analysis, the implications obtained indicate that marketers or business actors need to improve product quality standards to meet consumer satisfaction. This can be measured through the taste, color, and texture of brown rice, so that consumers feel satisfied with the products they consume. In addition, marketers are also advised to promote brown rice by emphasizing its benefits, because many consumers choose brown rice because of this benefit factor. Furthermore, the government or related institutions can prioritize effective price regulation policies to ensure that the price of brown rice remains affordable for the community.

CONCLUSION

Based on the results of the calculation of the MIS value and the MSS level, it shows that the elements with the highest level of importance and performance are in the product quality variable (Taste) obtaining a value of 4.56 and 4.49. While the smallest value < 4 is obtained by the price variable (Affordable Brown Rice Price) with a value of 2.91 and 3.26. In addition, the calculation of the level of satisfaction of brown rice consumers in Pakis District, Malang Regency shows 74.53%, this satisfaction index is in the range (60.1% - 80.0%). This means that consumers are satisfied consuming brown rice. Therefore, it is hoped that the government will pay more attention to effective price regulation policies, to ensure that the price of brown rice can be affordable for the community.

Brown rice producers should continue to improve their product quality standards, especially in terms of taste, color and texture, to meet consumer expectations. Marketers can also leverage social media and creative marketing campaigns can help emphasize the benefits of brown rice, appealing to young people who are the main target market. In addition, offering discounts or promotions for bulk purchases can help consumers get more value and feel more satisfied with their investment.

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This section could also provide the expected results. The introduction must be written in single line spacing. The introduction comprises of: (1) research problem; (2) insight and problem solve planning; (3) summary of theoretical studies and the results of the present study (state of the art), related to the observed problems (gap), and (4) research aims.

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This section is the main part of the research result article in which the "fix" results are served. The data analysis processes, such as statistical computing and hypothesis testing, are not necessary to be served. The materials reported are the analysis results and hypothesis testing results. In addition, tables and graphics are also can be showed to enunciate the verbal narration. Tables and images must be given a comment or discussion. The details of qualitative research written in some sub-topics which directly related to the focused category.

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$$\frac{\partial \rho}{\partial t} = -\nabla \cdot (\rho\, \mathbf{u}) \tag{1}$$

$$\rho\left(\frac{\partial}{\partial t} + \mathbf{u}\cdot\nabla\right)\mathbf{u} = -\nabla P + \rho\mathbf{g} + \frac{1}{c}\mathbf{J}\times\mathbf{B} \tag{2}$$

$$\rho\left(\frac{\partial}{\partial t} + \mathbf{u}\cdot\nabla\right)e = -P\nabla\cdot\mathbf{u} + \rho\mathbf{u}\cdot\mathbf{g} + \frac{1}{\sigma}\mathbf{J}^2 \tag{3}$$

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CONCLUSION

This part provides the summary of results and discussion which refers to the research aims. Thus, the new principal ideas, which are essential part of the research findings, are developed.

The suggestions, which are arranged based on research discussed-findings, are also written in this part. These should be based on practical activities, new theoretical development, and/or advance research.

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Supplementary material that may be helpful in the review process should be prepared and provided as a separate electronic file. That file can then be transformed into PDF format and submitted along with the manuscript and graphic files to the appropriate editorial office.

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