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The Effect of the Plasma Core System and Cultivation Development Strategy on the Income of Tilapia Fish Farmers

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Abstract: The core-plasma system is a way for small-scale fish farmers to work together to boost production, efficiency, and their edge over their competitors. Under this approach, each farmer (plasma) works with a core partner, which usually provides technical support, funding, quality feed, seeds, and access to larger markets. This cooperation helps farmers get around problems with technology, money, and marketing that they would not be able to handle on their own. But relying too much on partner institutions can also be risky. For example, farmers may become dependent on prices, have unequal bargaining power, or lose some of their freedom to decide on output. Lubuklinggau City is one of the best places to grow freshwater fisheries, especially aquaculture. Eka Marga Village in the Lubuklinggau Selatan II District is an example of a place where tilapia aquaculture has grown a lot. The community has natural conditions that enable aquaculture, such as sufficient water, suitable land for pond construction, and roads that facilitate the procurement of inputs and the transport of caught fish. Irrigation systems make it easy to control pond water levels, which is crucial for keeping fish healthy and growing. Eka Marga Village can make the most of its aquaculture potential by leveraging partnership models such as the core-plasma model. This would help farmers make more money and expand the local economy.

Keywords: Economic Growth; Farmer Income; Natural Resources; Water Availability; Market Access; Production Efficiency; Farmer Cooperation; Bargaining Power; Price Dependency.

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1. Introduction

Tilapia is a leading freshwater fishery commodity in Indonesia and enjoys high market demand. Tilapia's advantages lie in its favourable traits, such as high reproductive capacity, rapid growth, tolerance to less-than-ideal environmental conditions, and resilience to high salinity [1]. However, tilapia farming development faces challenges, one of which is the high cost of commercial feed, a frequent complaint among farmers [5]. The continued growth of tilapia production across regions requires support for proper cultivation techniques, innovation, and management, thereby reducing production costs and increasing business profits. Tilapia cultivation is an intensive system that requires optimised feeding and increased fish population density in ponds [7]. Efforts to achieve fish production targets require appropriate maintenance practices to improve tilapia cultivation quality and production. Therefore, this study aims to develop optimal management for tilapia cultivation, as reported by Gule

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and Geremew [10]. The core-plasma system is a partnership type introduced to improve production yields and competitive advantage for fish farmers [18]. In this system, small-scale fish farmers collaborate with partners/plasma partners who provide technical support, capital, and market access.

While this system offers opportunities, dependence on a second party can also pose risks [19]. Lubuklinggau City is one of the cities with vast freshwater fisheries potential. One example is the Eka Marga Village in South Lubuklinggau II District, which is home to many tilapia farmers [20]. Eka Marga Village, Lubuklinggau City, is a potential aquaculture area due to its supporting facilities and infrastructure, such as irrigation systems, land for pond construction, and production roads. Although Eka Marga Village physically possesses the facilities and infrastructure needed for aquaculture, in reality, there are still obstacles to fish farming, namely capital and market access [20], as noted by Saputra et al. [14], PT. Timur Mandiri Aquaculture has significant potential, with strengths including abundant water resources and a strategic location. Still, it faces challenges including limited capital, seed, and promotional resources, as well as competition with fresh sea fish and price fluctuations [21]. The most attractive strategy is "Increasing Production Efficiency and Reducing Operational Costs" with the highest Attractiveness Score, promising success for the Company's tilapia business [23]. In responding to opportunities and minimising threats, the main strategy is to expand the production partnership network to increase production and increase community income [12]. The core-plasma partnership model is a mutually beneficial form of cooperation between large business actors (the nucleus) and small business actors (the plasma). The core provides production facilities, technology, guidance, and market access, while the plasma executes production in accordance with the agreement.

According to Lasena et al. [11], this model aims to strengthen the economic position of small business actors through support from large business actors. In the context of tilapia cultivation in Eka Marga Village, the core-plasma model helps small farmers overcome capital and marketing constraints. However, Lasena et al. [11] also highlight that its implementation is often less than ideal due to a lack of transparency and an unequal relationship between the core and plasma [17]. Therefore, this pattern must be implemented fairly, openly, and under supervision to truly empower small farmers [23]. This form of cooperation/partnership helps cage farmers who lack the capital to establish their own tilapia farming businesses [24]. This collaboration allows cage farmers to meet their daily needs. Similarly, capital owners, through this form of cooperation, do not need to work hard directly, and most importantly, it helps cage farmers who lack capital [6]. According to Partnership Theory, partnerships between large companies (nucleus) and small businesses or farmers/cultivators (plasma) aim to create mutually beneficial relationships by sharing roles, risks, and results and according to Institutional Economics Theory, the core-plasma system reflects the institutional role (core institutions) in providing inputs (seeds, feed, training) and market access for plasma, which ultimately affects productivity and income [25]. The core-periphery system is a form of partnership between companies, or, according to Andre Gunder Frank's dependency theory, a situation in which developing countries depend on developed countries, causing economic inequality.

Foreign capital, although intended for development, often reinforces dependency because developing countries must provide large profits to foreign investors. This theory shows how these three components work together to strengthen patterns of economic dependency, making it difficult for developing countries to escape the influence and domination of developed countries [2]. According to Law No. 20 of 2008, a partnership is a voluntary collaboration between two or more parties that need, strengthen, and benefit each other, so that no party is disadvantaged and all parties benefit from a synergistic business relationship. In research by Rogers et al. [13], it was shown that shrimp farmers experienced an increase in income, although not significant, after establishing partnerships, yet still faced major obstacles, including disease outbreaks among shrimp. The nucleus-plasma system has three main models. The nucleus-plasma system has three main models: the provision of capital, broodstock, or seeds by the nucleus-plasma, with the agreement that the seeds produced will be resold to the nucleus-plasma. This model helps farmers increase production and ensures the marketing of their produce, thereby benefiting both parties. Research results demonstrate that the cooperative system is based on Islamic economic principles, under which the parties mutually agree [6]. However, there are practices involving unwritten agreements that are deemed contrary to Islamic values and may lead to injustice in their implementation [15]. In research, Ariadi et al. [4] noted that cooperative partnerships can provide mutual benefits for both parties by fulfilling each partner's rights and obligations.

More broadly, this partnership model is considered capable of driving improvements across various aspects of the tilapia (O. niloticus) hatchery business, particularly in business management and technical cultivation operations during the partnership period. The 2022 Smart Fisheries Village (SFV) program successfully established partnerships through a nucleus-plasma scheme, with BRPI as the nucleus and farmer groups as the plasma. This program integrates research, training, and technology to create a connected fisheries ecosystem from upstream to downstream, supporting sustainable fisheries [16]. The nucleus-plasma system is a strategic partnership capable of increasing the efficiency and productivity of aquaculture businesses, particularly in the fisheries sector. By dividing roles between the nucleus, which provides production facilities and training, and the plasma, which cultivates, this system can create a mutually beneficial relationship. Furthermore, the nucleus-plasma system also supports farmers' access to technology, capital, and markets that were previously difficult to reach independently. Therefore, the relevance of the nucleus-plasma system to increasing tilapia farmers' income warrants further examination, as its effectiveness can directly impact productivity, cost efficiency, and the sustainability of aquaculture businesses. The extent to which the nucleus-plasma system influences tilapia farmers' income is a primary focus in determining whether this partnership model can truly provide significant economic benefits to farmers. In research by Jayadi et al. [8], the core-plasma partnership method applied in PKMS activities demonstrates the effectiveness of the relationship between fish farmers as plasma partners and partners providing production inputs, such as feed.

The implementation of this program resulted in increased group capacity in administrative management, the application of innovative cultivation technologies, and the strengthening of partnership networks. Overall, this activity has had a positive impact on increasing production, understanding institutional governance, developing data-based work programs, and establishing formal collaborations through memoranda of understanding. Based on the research results of Saputra et al. [14]. According to the QSPM analysis of alternative business development strategies, the most attractive strategy is "Increasing Production Efficiency and Reducing Operational Costs," with the highest Total Attractiveness Score (TAS) of 6.75. This indicates that this strategy has the greatest potential in driving the success of the tilapia fish farming business at PT. Timur Mandiri Akuakultur. Aquaculture is a human effort to increase aquatic productivity. This definition positions human activity in producing and increasing aquatic productivity, especially freshwater fish, for profit. Aquaculture typically involves raising fish in ponds, fishponds, and rice paddies, but more generally encompasses human activities to cultivate fishery commodities in reservoirs, rivers, or the sea. Research results indicate that the Aki Dalang tilapia fish farming business is economically feasible for development. Likewise, research conducted by. The tilapia cultivation carried out by villagers, together with the Village-Owned Enterprise (BUMDes) and community service groups, has successfully generated additional income [3].

2. Research Methodology

A population is a group of objects or subjects that have certain characteristics and traits, as determined by the researcher, that are the target of observation, and from which conclusions are drawn. In this study, the researcher applied a non-probability sampling technique, namely purposive sampling, to determine the research sample. According to Yudawisastra et al. [17], purposive sampling is a method of selecting samples based on specific criteria. These criteria include the data source, according to Yudawisastra et al. [17], which can be divided into two, namely:

- Primary data, namely data obtained directly by conducting interviews with the relevant parties and relating to the problem being researched.
- Secondary data, namely data obtained from outside the company in the form of books and literature relevant to the problem being discussed, also serves as the theoretical basis for the researcher.

The research instrument used in this study was a Likert-scale questionnaire, with 10 questions for variable X1, 10 for variable X2, and 10 statements for variable Y. The Likert scale is used to measure attitudes, opinions, and perceptions of individuals or groups regarding social phenomena. Yudawisastra et al. [17] reported the following answers and scores (Table 1).

Table 1: Likert scale scoring of respondents' answers

No.	Response Category	Score
1	Strongly Agree	5
2	Agree	4
3	Less Agree / Quite Disagree	3
4	Disagree	2
5	Strongly Disagree	1

2.1. Data Analysis Methods

Data analysis is a crucial stage in scientific research, as it is through this process that the information contained in the data is organised, interpreted, and conclusions are drawn. According to Kankaew [26], data analysis is a systematic process for discovering meaningful patterns, trends, and relationships to answer research questions. In research on the nucleus-plasma system and the development of tilapia cultivation strategies, data analysis plays a crucial role in identifying the extent to which partnership patterns and cultivation strategies influence farmer income. The data evaluation approach used in this study is a statistical test and a SWOT analysis, both of which are quantitative. A SWOT analysis attempts to systematically identify aspects that play a significant role. The focus is on exploiting existing potential and opportunities while minimising potential vulnerabilities and challenges.

3. SWOT Analysis

A contextual analysis and field data-based strategy based on quantitative results was conducted. The data evaluation approach used in this study employed a SWOT analysis, with a mixed qualitative and quantitative methodology. This approach includes identifying significant internal and external factors in formulating a strategy. A SWOT analysis attempts to identify the aspects that play a significant role systematically. The focus is on exploiting existing potential and opportunities while minimising potential vulnerabilities and challenges. This strategy, known as situational analysis, is commonly used. The initial step in the internal factor analysis was to identify strengths and weaknesses that would influence the development strategy for tilapia cultivation in Eka Marga Village, Lubuklinggau City. Strengths included having sufficient ponds or land to support fish cultivation and the necessary equipment. Meanwhile, weaknesses included insufficient knowledge and skills in risk management, marketing, or new technologies. Next, an external factor analysis aims to identify opportunities and threats that could shape the development strategy for tilapia fish farming in Eka Marga Village, Lubuklinggau City. Opportunities encompass all factors that could support the development of tilapia fish farming in the area. Meanwhile, threats encompass factors that could hinder the success of tilapia fish farming development. To determine the appropriate strategic direction, the next step is to analyse the business or institution's position using quadrants. Comparing the weighted scores of internal and external factors generates strategic alternatives based on their position within the quadrant. These four quadrants help identify the development situation:

- **Quadrant I:** This situation is highly favourable because the farmer possesses both internal strengths and external opportunities. Under these conditions, the strategies implemented will support aggressive growth.
- **Quadrant II:** Despite facing external threats, farmers still possess internal strengths that can be leveraged. A diversification strategy may be an option to capitalise on long-term opportunities.
- **Quadrant III:** At this stage, despite significant market opportunities, farmers also face internal constraints. The right strategy may involve balancing opportunities and constraints.
- **Quadrant IV:** This situation is less favourable because farmers face external threats and have internal weaknesses. Action is needed to address these challenges.

With this approach, appropriate strategies can be formulated based on quadrant analysis, helping farmers navigate internal and external conditions more effectively. A SWOT analysis diagram can be illustrated as follows:

4. SWOT Analysis Quadrant Diagram

After gathering important information on tilapia cultivation development in Eka Marga Village, Lubuklinggau City, the next step is to use the data to develop a strategic plan. A more detailed SWOT analysis requires a SWOT framework. Its function is to support strategy development by grouping problem aspects (Figure 1).

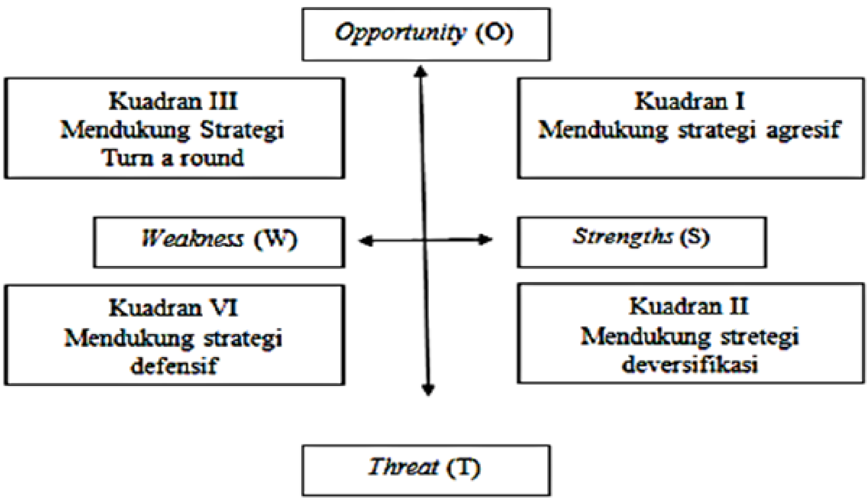

Figure 1: SWOT diagram

This framework matrix serves as a tool to summarise crucial project factors using the SWOT framework. Through this analysis, the project's external opportunities and challenges can be integrated with its existing internal strengths and weaknesses. From this matrix, four boxes emerge containing various possible strategic options (Table 2).

Table 2: SWOT matrix

Internal Factors / External Factors	**Strength (S)** Determine 5-10 strength factors internal	**Weakness (W)** Identify 5-10 weaknesses internal
Opportunity (O) Determine 5-10 external threat factors	**SO Strategy** Determine strategy by using strengths to take advantage of opportunities	**WO Strategy** Determine a strategy that can minimise weaknesses to take advantage of opportunities
Threat (T) Determine 5-10 external threat factors	**ST Strategy** Determine a strategy by using strengths to overcome the threat	**WT Strategy** Determine strategies to minimise weaknesses and avoid threats.

In selecting crucial external and internal factors, considerations are based on the field situation, including an assessment of Opportunities, Difficulties, Threats, and Weaknesses (ODTW), the community's readiness to develop tilapia cultivation, and data collected through both primary and secondary research. After this stage, significant external and internal factors are organised into a SWOT matrix. The SWOT matrix illustrates how external opportunities and threats can be linked to internal strengths and weaknesses. Therefore, strategic steps can be made based on key external and internal factors. After the SWOT analysis, there are four strategic alternatives: SO (Maximising Strengths - Exploiting Opportunities), ST (Exploiting Strengths - Overcoming Threats), WO (Minimising Weaknesses - Exploiting Opportunities), and WT (Minimising Weaknesses - Avoiding Threats). Strategic priorities are determined by summing the weighted values in the SWOT matrix. The strategy with the highest total score is the most prioritised. SWOT analysis is conducted to identify strategic development options through the following steps:

- Identifying the strengths, weaknesses, opportunities, and threats of tilapia fish farming development in Eka Marga sub-district, Lubuklinggau City.
- Conducting a SWOT analysis by analysing internal factors (strengths and weaknesses) and external factors (opportunities and threats) of tilapia fish farming development in Eka Marga sub-district, Lubuklinggau City.
- Conclude the SWOT analysis through the IFAS (Internal Factor Analysis Summary) and EFAS (External Factor Analysis Summary) Tables.

4.1. In the Context of the SWOT Matrix

- SO strategy focuses on exploiting opportunities by leveraging the farmer's internal strengths.
- ST strategy focuses on leveraging internal strengths to overcome external threats.
- WO strategies involve exploiting external opportunities to overcome internal weaknesses.
- WT strategy refers to minimising internal weaknesses and avoiding external threats.

5. Results and Discussion

5.1. Results of Data Analysis Techniques

5.1.1. Simple Linear Regression

A simple linear regression model was used to examine how the plasma core system and the farmer development strategy significantly influenced tilapia farmers' income in the Eka Marga sub-district of Lubuklinggau City (Table 3). The formula used is:

$Y = a + bX1$

- 1 Plasma Core System Variable (X1) on Cultivator Income
- Tilapia (Y)

Table 3: Simple linear regression calculation results coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	15,786	2,378	-	6,639	,000		
TOTX1	,647	,064	,887	10,181	,000	1,000	1,000
a. Dependent Variable: *TOTY*							
Source: *Data processing results, 2025, SPSS 22*							

From the regression equation above, it can be explained as follows:

- Constant value (a) = 15.786
- Regression coefficient X1 = 647

From these values, they can be arranged into the following equation:

- Y = a + bx1
- Y = 15.786 + 0.647X1

From the equation for the estimated regression function above, it can be seen that the constant value of X1 is 15.786. This illustrates that without being influenced by the plasma core system variable (X1), the income of tilapia fish farmers (Y) is 15.786. The regression coefficient for the plasma core system variable is 0.647, indicating that any change in the plasma core system will directly and proportionally affect tilapia fish farmers' income (Table 4). Variable Cultivation Development Strategy (X2) on the income of tilapia fish farmers (Y).

Table 4: Simple linear regression calculation results coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	10,100	4,326	-	2,335	,027		
TOTX2	,769	,112	,793	6,886	,000	1,000	1,000
Dependent Variable: *TOTY*							
Source: *Data processing results, 2025, SPSS 22*							

From the regression equation above, it can be explained as follows:

- Constant value (a) = 10,100
- Regression coefficient X2 = 796

From these values, they can be arranged into the following equation:

- Y = a + bX2
- Y = 10.100 + 0.796X2

For the constant X2 obtained 10.100. This illustrates that without being influenced by the cultivation development strategy variable (X2), the income of tilapia fish farmers (Y) is 10.100. The regression coefficient for the cultivation development strategy variable is 0.796, indicating that a one-unit increase in X2 is directly associated with a proportional increase in tilapia farmers' income.

5.1.2. Correlation Coefficient Test Results

Testing the influence of the independent variable (X) on the dependent variable (Y) can be seen from the correlation coefficient, where 0 < r2 < 1. This shows that the closer r2 is to -1, the stronger the independent variable (X) 's influence on the dependent variable (Y). Conversely, if r2 is closer to 0, the weaker the influence of the independent variable (X) on the dependent variable (Y) (Table 5).

Table 5: Results of the simple linear regression model summary

Model Summary				
Model	**R**	**R Square**	**Adjusted R-Square**	**Standard Error of the Estimate**
1	,887a	,787	,780	2,018
a. Predictors: *(Constant), TOTX1*				
b. Dependent Variable: *TOTY*				
Source: *Data processing results, 2025, SPSS 22*				

Based on the results of the correlation coefficient test in Tables 5 and 6 obtained from the processing results with SPSS 20 for windows, it is known that the R value is 0.887 and 0.793, the correlation coefficient value of 0.887 and 0.793 is in the coefficient interval of 0.80 - 1.00 for X1 and in the coefficient interval of 0.60 - 0.799 for X2, which means the relationship between the core plasma system variables, and cultivation development strategies on the income of tilapia fish farmers shows a very strong and strong relationship, a positive correlation value means the correlation or relationship between the core plasma system, and cultivation development strategies on performance is in the same direction (Table 6).

Table 6: Model summary of the effect of TOTX2 on TOTY

Model Summary				
Model	**R**	**R Square**	**Adjusted R-Square**	**Standard Error of the Estimate**
1	,793a	,629	,615	2,667
a. Predictors: *(Constant), TOTX2*				
b. Dependent Variable: *TOTY*				
Source: *Data processing results, 2025, SPSS 22*				

5.1.3. Partial t-Test

5.1.3.1. The Effect of the Plasma Core System on the Income of Tilapia Fish Farmers in Eka Marga Village, Lubuklinggau City

The partial influence of each independent variable on the dependent variable can be assessed using a t-test. The following are the results of the t-test calculation (Table 7).

Table 7: Results of the t-test for X1 and Y

Model	t	sig
(Constant)	6,639	.000
Plasma Core System	10,181	.000
a. Dependent variable: *income of tilapia fish farmers*		
Source: *Data processing results, 2025 SPSS 22*		

So it can be explained that the plasma core system variable on the income performance of tilapia fish farmers in Eka Marga sub-district, this is indicated by the t-count value greater than t-Table, which is 10.181> 0.683 (t-test Table can be seen in the appendix) with dk = 30 and a significant level of sig = 0.000, meaning that partially the plasma core system variable has a significant influence on the income of tilapia fish farmers in Eka Marga sub-district, Lubuklinggau City. This shows whether the hypothesis in this study is proven or accepted.

5.1.3.2. The Influence of Cultivation Development Strategy on the Income of Tilapia Fish Farmers in Eka Marga Village, Lubuklinggau City

The partial influence of each independent variable on the dependent variable can be assessed using a t-test. The following are the results of the t-test calculation (Table 8).

Table 8: Results of the X2 and Y t-test

Model	t	sig
(Constant)	2,335	.027
Cultivation development strategy	6,886	.000
Dependent variable: *income of tilapia fish farmers*		

Source: *Data processing results, 2025 SPSS 22*

So it can be explained that the variable of cultivation development strategy on the income of tilapia fish farmers in Eka Marga Village, the t-count value indicates this is greater than t-Table, which is 6.886> 0.683 with dk = 30 and a significant level of sig = 0.000, meaning that partially the variable of cultivation development strategy has a significant influence on the income of tilapia fish farmers in Eka Marga Village, Lubuklinggau City. This shows whether the hypothesis in this study is proven or accepted.

5.1.4. SWOT Analysis

To determine strategies to increase farmer income, researchers conducted a SWOT analysis. The results of the study indicate that the supporting factors, both strengths and opportunities for developing tilapia farming strategies, include:

Table 9: SWOT analysis of tilapia aquaculture development

Strength	Weakness
Tilapia is easy to cultivate	Dependence on artificial feed
Feed can be made from local ingredients	Susceptible to disease
Market demand is stable.	Limited access to business capital
Opportunity	**Threat**
Government support	Price competition in the market
Open export market	Climate change and environmental pollution
Partnership with the private sector	Feed price fluctuations
Source: *Processed Primary Data, 2025*	

To determine the strategy for developing tilapia cultivation, a SWOT analysis is used, classifying data into four groups: strengths and weaknesses (internal factors) (IFAS), and opportunities and threats (external environmental factors). These are then analysed in IFAS and EFAS Tables. The following SWOT analysis Table 9 shows the IFAS and EFAS (Table 10).

Table 10: Recapitulation of strengths and weaknesses calculation results

No.	Internal Factors	Weight	Rating	Score
Strengths				
1	Tilapia is easy to cultivate	0.18	4.50	0.81
2	Feed can be made from local ingredients	0.17	4.40	0.748
3	Market demand is stable	0.17	4.40	0.748
Total		0.52		2,306
Weaknesses				
1	Dependence on artificial feed	0.14	4.20	0.588
2	Susceptible to disease	0.17	4.47	0.759
3	Limited access to business capital	0.17	4.37	0.743
Total		1.48		2,090
Total IFAS		2		4,396
Source: *Processed Primary Data, 2025*				

After identifying the internal and external factors influencing the development of tilapia farming in Eka Marga Village, Lubuklinggau City, as stated in the SWOT matrix, the next step is to determine the quadrant coordinates (Table 11).

Table 11: Recapitulation of opportunity and threat calculation results

No.	External Factors	Weight	Rating	Score
Opportunities				
1	Government support	0.17	4.43	0.753
2	Open export market	0.16	4.27	0.683
3	Partnership with the private sector	0.17	4.40	0.748
Total		0.50		2,184
Threats				
1	Price competition in the market	0.17	4.43	0.753

No.	External Factors	Weight	Rating	Score
2	Climate change and environmental pollution	0.17	4.40	0.748
3	Feed price fluctuations	0.17	4.53	0.770
Total		0.51		2,271
Total EFAS		1		4,455
Source: *Processed Primary Data, 2025*				

Determination of the quadrant coordinate points is based on the recapitulation of the results of the weighting and rating of IFAS and EFAS. Determining the coordinate points of internal and external analysis by: the total score of strengths is subtracted from the total score of weaknesses for IFAS. For EFAS, the total score of opportunities is subtracted from the total score of threats (Table 12).

Table 12: Coordinate internal and external analysis

	X-Axis		Y-axis	
Strategic Factors	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Mark	2,306	2,090	2,184	2,271
Coordinate Points	**X-axis**	**Y-axis**		
	0.02	-0.09	Quadrant III	
Strategy			Turn Around strategy	
Source: *Processed research data 2025*				

Based on these calculations, the following diagram is produced (Figure 2).

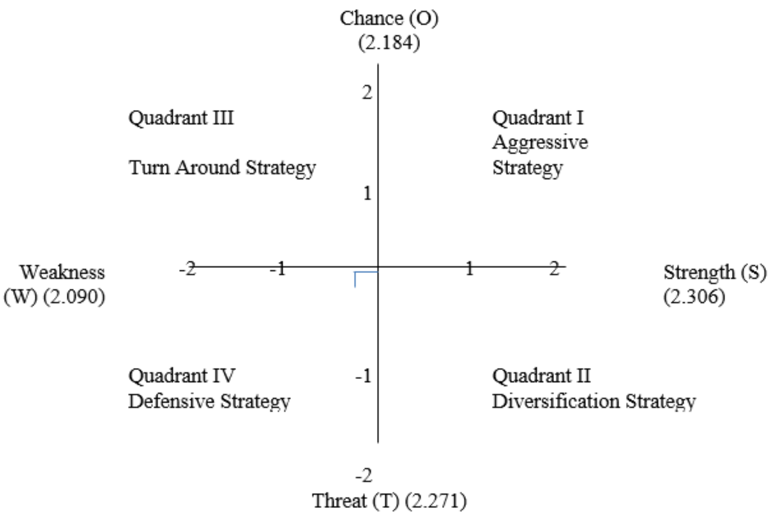

Figure 2: Cartesian SWOT diagram

Table 13 shows a SWOT analysis of tilapia farming. It lists internal assets, such as how easy it is to grow and how stable the market is, as well as weaknesses, such as how easily diseases spread and how much they depend on artificial feed. It also discusses external opportunities, such as government backing and export potential, as well as market competition and climate change. It gives suggestions for improvement for each of these.

Table 13: SWOT analysis results

Internal Factors / **External Factors**	**Strength (S)**	**Weakness (W)**
	1. Tilapia is easy to cultivate 2. Feed can be made from local ingredients 3. Market demand is stable	1. Dependence on artificial feed 2. Susceptible to disease 3. Limited access to business capital

Opportunity (O)	SO Strategy	WO Strategy
1. Government support 2. Open export market 3. Partnership with the private sector	1. Increase tilapia cultivation productivity by adopting advanced technologies and improving seed quality. 2. Increase cooperation with related industries, such as the feed and processing industries, to increase efficiency and productivity. 3. Developing tilapia exports to international markets to increase revenue and expand markets.	1. Developing collaboration with related industries, such as the feed and processing industries, to increase efficiency and productivity. 2. Develop an effective supply chain system to ensure the quality and availability of tilapia. 3. Developing better technology to increase the efficiency and productivity of tilapia cultivation.
Threat (T)	**ST Strategy**	**WT Strategy**
1. Price competition in the market 2. Climate change and environmental pollution 3. Feed price fluctuations	1. Motivating farmers by providing capital or feed requirements to support tilapia cultivation efforts. 2. Increase product and market diversification to reduce dependence on a single product or market.	1. Maximise the adequacy of targets and infrastructure, such as ponds, water systems, and processing facilities, to increase efficiency and productivity. 2. Improving access to capital for tilapia farmers, so they can scale up their businesses and adopt better technology.
Source: *Processed research data 2025*		

5.2. Explanation of SWOT Analysis Results

5.2.1. SO, Strategy

This is a very advantageous situation because the organisation has the opportunities and strengths to capitalise on them. The strategy that must be implemented is:

- Supporting an aggressive growth policy (growth-oriented strategy). Based on field research using questionnaire techniques, the strategy for developing tilapia fish farming is the SO (Strengths - Opportunities) model. Alternative strategies include increasing tilapia productivity through improved technology and improved seed quality. Increasing cooperation with related industries, such as the feed and processing industries, to increase efficiency and productivity. Developing tilapia exports to international markets to increase income and expand market share.

5.2.2. ST Strategy

Despite facing threats, tilapia fish farmers still have internal strengths. The strategy that must be implemented is to use strengths to take advantage of long-term opportunities by means of a verified strategy (product/market). Based on field research using a questionnaire, the strategy for developing tilapia fish farming in Eka Marga sub-district, Lubuklinggau City, is the ST (Strengths-Threats) strategy. This alternative strategy can be implemented by motivating farmers through capital or feed support for tilapia fish farming businesses. Increasing product and market diversification to reduce dependence on one type of product and market.

5.2.3. WO Strategy

Tilapia fish farmers face enormous opportunities but also several internal constraints/weaknesses. Based on the results of field research using questionnaire techniques, the strategy for developing tilapia fish farming in Eka Marga sub-district, Lubuklinggau City, the WO (Weaknesses-Opportunities) strategy is an alternative strategy that can be implemented, including: Developing cooperation with related industries, such as the feed and processing industries, to increase efficiency and productivity. Developing an effective supply chain system to ensure the quality and availability of tilapia fish. Developing better technology to increase the efficiency and productivity of tilapia fish farming.

5.2.4. WT Strategy

Farmers are in a very unfavourable condition, facing various threats and internal weaknesses. Farmers must implement a defensive strategy to ensure their businesses continue to exist by making various internal improvements to address future threats. An example of a defensive strategy: farmers reduce operating costs by reducing employees (rationalisation). Based on the results of field research using questionnaire techniques, the strategy for developing tilapia fish farming in Eka Marga Village, Lubuklinggau City, the WT (Weaknesses-Threats) strategy is an alternative strategy that must be implemented, including: Maximizing supporting facilities and infrastructure for tilapia fish farming, by providing facilities and infrastructure in the form of - Comfortable ponds for tilapia, with appropriate sizes and depths to provide sufficient space for tilapia to swim, grow, and develop. A good water management system to maintain water quality and provide sufficient oxygen for. Tilapia. Equipment for monitoring water quality, such as pH meters and oxygen meters.

Adequate transportation routes to facilitate the delivery of feed and harvested produce. Adequate lighting to facilitate supervision and maintenance. By having adequate facilities and infrastructure, tilapia cultivation can run smoothly and efficiently, thereby increasing productivity and the quality of the harvest. From the results of the formulation of the location of the quadrant coordinate points above, it can be concluded that the urgent strategy that needs to be implemented in the development of tilapia cultivation in Eka Marga Village is in Quadrant III, namely the WO (Weaknesses-Opportunities) strategy, alternative strategies that can be carried out include: Building good coordination and communication between tilapia cultivators and Feed and Seed Suppliers: Coordination with suppliers to ensure the availability of quality feed and seeds. Buyers: Coordination with buyers to understand market needs and determine competitive prices. Government Agencies: Coordination with relevant government agencies to comply with regulations and obtain the necessary support.

6. Discussion

Based on the data analysis, the plasma core system has a significant effect on the income of tilapia fish farmers in Eka Marga Village, Lubuklinggau City. This is evidenced by the calculated t-value being greater than the t-Table value, namely 10.181 > 0.683. In line with Ariadi et al. [4] research, which found that cooperative partnerships can provide mutual benefits for both parties by fulfilling each partner's rights and obligations. More broadly, this partnership pattern is considered capable of encouraging improvements across various aspects of the tilapia (O. niloticus) hatchery business, particularly in business management and technical cultivation operations during the partnership period. Likewise, the results of the 2022 Smart Fisheries Village (SFV) Activity successfully established a partnership through a core-plasma scheme, with BRPI as the core and farmer groups as the plasma. This program integrates research, training, and technology outcomes to form a connected fisheries ecosystem from upstream to downstream, supporting sustainable fisheries [16]. Furthermore, the cultivation development strategy has a significant influence on the income of tilapia fish farmers in Eka Marga Village, Lubuklinggau City, as evidenced by the calculated t-value (6.886) exceeding the t-Table value (0.683). This study supports the hypothesis. An appropriate tilapia cultivation development strategy can positively impact the income of tilapia farmers. By implementing the right strategy, tilapia farmers can increase productivity, quality, and selling price, thereby increasing their income. Here are some strategies that can increase the income of tilapia farmers:

- **Product Diversification:** By developing processed tilapia products, tilapia farmers can increase added value and diversify their products, thereby increasing income.
- **Quality Improvement:** Improving tilapia quality by focusing on water quality, feed, and fish health can raise tilapia prices and boost farmers' incomes. Market Development: Expanding the tilapia market into wider areas and increasing promotion can increase demand and tilapia prices, thereby increasing farmers' income.
- **Technology Application:** Implementing more modern cultivation technologies can improve the efficiency and productivity of tilapia cultivation, thereby increasing farmers' income.
- **Cooperation with Related Industries:** Developing partnerships with related industries, such as the feed and processing industries, can improve the efficiency and productivity of tilapia cultivation, thereby increasing farmers' income.

Based on research Eteke et al. [9], that there are six priority strategies identified for the development of tilapia (Oreochromis niloticus) cultivation, namely: (1) increasing human resource capacity, (2) utilizing financial institutions to support business development, (3) optimizing the use of cultivation land in floating net cages (KJA), (4) expanding market access, (5) improving seed quality and production quality, and (6) forming agreements between farmers in maintaining security in the KJA area. Likewise, the results of research. Said that the sustainability strategy of the partnership between plasma farmers and PT BGA Group is divided into four groups. The SO strategy includes cooperation with the Cooperative Service in plasma financial reporting, while the WO strategy involves farmers in plantation management through training from the Plantation Service. Core companies are also required to have ISPO and GAP certificates to ensure sustainability. Effective development strategies to increase farmers' income include building good coordination and communication between tilapia farmers and Feed and Seed

Suppliers. Coordination with suppliers to ensure the availability of quality feed and seeds. Buyers: Coordination with buyers to understand market needs and determine competitive prices. Government Agencies: Coordination with relevant government agencies to comply with regulations and obtain necessary support.

7. Conclusion and Suggestions

Based on research on the influence of the Plasma Core System and Cultivation Development Strategy on the Income of Tilapia Fish Farmers in Eka Marga Village, Lubuklinggau City, the results of this research can be concluded as follows:

- The plasma core system has a significant effect on the income of tilapia fish farmers in Eka Marga Village, Lubuklinggau City, as evidenced by the calculated t-value being greater than the t-table value: 10.181 > 0.683. The plasma core system can positively affect the income of tilapia fish farmers by increasing productivity, quality, and the selling price of tilapia. In addition, this system can also help reduce cultivation risks and increase access to better technology. Therefore, the plasma core system can be an alternative for tilapia fish farmers to increase their income.
- The cultivation development strategy has a significant effect on the income of tilapia fish farmers in Eka Marga Village, Lubuklinggau City, as evidenced by the t-value (6.886) exceeding the t-table value (0.683). An effective development strategy to increase farmers' income is to build strong coordination and communication between tilapia fish farmers and Feed and Seed Suppliers. Coordinate with suppliers to ensure the availability of quality feed and seeds. Buyers: Coordination with buyers to understand market needs and determine competitive prices. Government Agencies: Coordination with relevant government agencies to comply with regulations and obtain the necessary support.

7.1. Suggestion

Based on the results of research on the influence of the Plasma Core System and Cultivation Development Strategy on the Income of Tilapia Fish Farmers in Eka Marga Village, Lubuklinggau City, the researcher tries to provide suggestions from the results of his research to help increase the income of Tilapia Fish Farmers in Eka Marga Village, Lubuklinggau City, as follows:

- It is recommended that tilapia fish farmers, in coordination with the plasma core and the fisheries service, improve communication to work together effectively and increase their income in Eka Marga Village, Lubuklinggau City. There is a need for community empowerment in the Eka Marga Subdistrict, Lubuklinggau City, namely by increasing local communities' capabilities through business and service skills training and by providing facilities and infrastructure to support community business activities, specifically tilapia cultivation.

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