



(RESEARCH ARTICLE)



Strategic optimization of community development and empowerment programs (PPM) to Support Agricultural Sustainability in Mining Areas: A SWOT Approach

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World Journal of Advanced Research and Reviews, 2026, 30(02), 589-598

Publication history: Received on 16 March 2026; revised on 02 May 2026; accepted on 05 May 2026

Article DOI: <https://doi.org/10.30574/wjarr.2026.30.2.1100>

Abstract

The Mining Community Development and Empowerment Program (PPM) is an obligation of mining companies to improve the quality of life, independence, and economy of communities in the vicinity of their operational areas. The objectives of this study are to formulate strategies to optimize the Community Development and Empowerment Program (PPM) so that it is more effective and sustainable in supporting the agricultural sector of the community in West Merapi District, Lahat Regency. The sample was determined using stratified random sampling with a sample size of 150 farmer respondents in 3 selected villages, namely Merapi, Telatang, and Kebur villages. The analysis methods used is SWOT analysis. The results of the study show that the most appropriate strategy for optimizing the Community Development and Empowerment Program (PPM) in supporting the agricultural sector in West Merapi District, Lahat Regency, is the W-O (Weakness–Opportunities) strategy, which is a strategy that utilizes external opportunities to overcome internal weaknesses in the program.

Keywords: Agriculture development; Community empowerment; Mining; PPM program; Optimization strategy

1. Introduction

The mining sector makes a major contribution to regional economic growth, especially through increasing Regional Original Revenue (PAD), job creation, and increasing Gross Regional Domestic Product [1][2]. However, extractive and non-renewable mining activities often pose various challenges to social, economic, and environmental sustainability [3]. Several previous studies have shown that the expansion of mining in rural areas can lead to changes in the economic structure of the community, decreased agricultural land productivity, and increased income inequality [4]. Therefore, the balance between mine-based economic growth and the sustainability of the agricultural sector is an important issue in regional development planning [5].

Lahat Regency in South Sumatra Province is one of the areas that has abundant natural resource potential, especially in the mining and agricultural sectors. Based on data from the Central Statistics Agency [6], The value of Lahat Regency's GDP on the basis of prices in effect in 2023 will reach 29.29 trillion rupiah. In nominal terms, the value of this GDP increased by 5.3 trillion rupiah compared to 2022 which reached 26.75 trillion rupiah. The increase in the value of GDP is influenced by increased production in several business fields and inflation. Based on constant prices in 2010, the GDP figure has also increased, from 13.92 trillion rupiah in 2022 to 14.88 trillion rupiah in 2023. This shows that during 2023 Lahat Regency experienced economic growth of around 6.73%, slightly slower than the previous year. The increase in the GDP rate was caused by increased production in several business fields, without being affected by inflation.

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This condition raises concerns about the sustainability of the regional economy. High dependence on non-renewable mining commodities has the potential to cause socio-economic problems in the future, such as increasing unemployment and declining people's purchasing power when mining resources are depleted or production is stopped due to global clean energy policies. Therefore, the agricultural sector as an environmentally friendly, renewable, and sustainable sector needs serious attention to strengthen the economic foundation of the community.

The Community Development and Empowerment (PPM) program implemented by mining companies is a strategic instrument to encourage the independence and sustainability of the local economy. The PPM program is part of corporate social responsibility (CSR) which aims to increase the capacity of the community, including local farmers, through training activities, the provision of agricultural production facilities, economic diversification, and technical assistance [7]. Through the empowerment approach, it is hoped that the community around the mining area will not only become passive beneficiaries, but also have the ability to innovate and adapt to economic changes.

However, the effectiveness of the PPM program of mining companies in improving the sustainability of the agricultural sector in West Merapi District, Lahat Regency is still not optimal. There are still various problems such as the low level of community participation, the lack of integration between company programs and the needs of farmers, and the lack of a sustainable optimization strategy. In fact, West Merapi District is the largest area covering the mining business license area (WIUP), so the existence of mining companies greatly affects the economic structure of the local community. On the other hand, the region also has great potential in agriculture, livestock, and fisheries that can be developed as an alternative sector when mining activities end. This condition shows the need for research to formulate optimization strategies so that the program can run more efficiently, participatory, and sustainable.

2. Material and methods

2.1. Research Location

The research will be focused on West Merapi District, Lahat Regency, South Sumatra. This area was chosen because it has coal mining potential and agricultural potential that needs to be studied by mining companies' contribution to the agricultural sector. This research will be conducted in October-November 2025.

2.2. Research Methods

This study will use a survey method, which is a method that takes a sample of the population to represent the whole with the aim of obtaining representative data [8]. Data collection was carried out through questionnaires as the main instruments, as well as in-depth interviews with farmers involved in the agricultural sector in West Merapi District, Lahat Regency. This approach allows researchers to evaluate the effectiveness of PPM programs, identify success factors, and formulate optimization strategies to support the sustainability of the agricultural business sector in areas affected by mining activities

2.3. Sample Withdrawal Method

The method to be used in this study is Stratified random sampling, with a proportional distribution based on the number of farmer households in 3 villages, namely Merapi, Telatang and Kebur. The method of sampling is to know in advance the location of the village which is in direct contact with the operations of mining companies and the diverse population of each village. The availability of time and resources to collect data, that sampling based on population can be done if the population is relatively moderate and it is not possible to take it entirely due to time, cost and effort limitations [9]. The total population targeted by the study was 150 house farmers stairs spread across 3 villages, namely Merapi, Telatang, and Kebur.

Table 1 Table of distribution of farmers in Merapi, Telatang and Kebur Villages

| No. | Village | Population | Sample | Percentage (%) |
|-----|------------------|------------|--------|----------------|
| 1. | Kebur Village | 86 | 50 | 29.66 |
| 2. | Telatang Village | 98 | 50 | 33.79 |
| 3. | Merapi Village | 106 | 50 | 36.55 |
| | Total | 290 | 150 | 100.00 |

The total number of samples studied in this study was 150 farmer respondents in 3 selected villages. Primary data of the study was collected from the 150 respondents through the distribution of questionnaires related to the implementation of the PPM Program.

2.4. Data Collection Methods

The data collection method in this study will use 2 types of sources, namely primary data and secondary data. Primary data was obtained through questionnaires and direct interviews with farmers in West Merapi District using questionnaire instruments to explore information related to the implementation of the PPM Program. Secondary data was collected from various related agencies such as the Plantation Office, Village Office, and the Central Statistics Agency of South Sumatra Province.

2.5. Data Analysis Methods

PPM program optimization strategy for the sustainability of the agricultural sector, is to use a SWOT matrix. A SWOT matrix is a strategic analysis tool used to systematically evaluate the internal conditions of an organization (strengths/Strengths and weaknesses/Weaknesses) and external conditions (opportunities/Opportunities and threats/Threats) that the organization is facing [10].

The optimization strategy of the Community Development and Empowerment Program (PPM) to support the sustainability of the agricultural sector in West Merapi District needs to be directed at utilizing the strengths and opportunities owned by the community and mining companies through a SWOT analysis approach. This strategy emphasizes the importance of synergy between the potential of local resources (strength) and corporate and government support (opportunities) to strengthen the capacity of farmers and expand access to technology and agricultural markets [10].

2.5.1. Identification of Internal and External Factors

The first step is to identify the internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats) which affects the success of the PPM Program in supporting the sustainability of the agricultural sector. Internal factors can include human resource capacity, institutional support, availability of agricultural facilities and infrastructure, and the level of community participation. External factors include local government support, partnership opportunities with companies, market conditions for agricultural products, and environmental and social policies [11].

2.5.2. Make a List and Weigh Each Factor

Next, make a list of all the Strengths, Weaknesses, Opportunities, and Threats factors. Then give weight to each factor (between 0.0 – 1.0) based on its importance to the research objective (e.g., sustainability of the agricultural sector), the sum of the total weights of internal factors = 1, as well as external factors = 1.

2.5.3. Calculate Score and Determine Average Score

Rate each factor (1–4) : for Strengths and Opportunities, a score of 4 indicates a very strong influence. For Weaknesses and Threats, a value of 1 indicates a very weak condition or a high threat. Multiply the weight × rating to get a weighted score. Add up all the scores to determine the position of the organization's strategy (in the SWOT quadrant).

2.5.4. Compile the SWOT Matrix (Diagram 2×2)

- Formulate Four Alternative Strategies
- Strategy Verification and Implementation

3. Results and discussion

The Community Development and Empowerment Program (PPM) implemented by mining companies in West Merapi District, Lahat Regency is one of the instruments of corporate social responsibility in supporting regional development. In areas that have a large dependence on the agricultural sector, the existence of the PPM program is expected to be a catalyst for increasing the capacity of farmers, strengthening local institutions, and improving community welfare in a sustainable manner.

The effectiveness of the program is not only measured by the absorption of the budget or the implementation of activities, but the extent to which the program is able to respond to the real needs of the community, increase

productivity, and strengthen the resilience of the agricultural sector to various external challenges such as fluctuations in commodity prices, climate change, and land conversion. Community empowerment essentially aims to improve the ability and independence of the community to be able to manage their resources optimally. Therefore, PPM optimization must be directed at strengthening capacity (*capacity building*), increasing access to resources, and creating sustainable support systems [12].

On the other hand, the agricultural sector in the area around mining faces complex dynamics, both from economic, social, and environmental aspects. Sustainability-oriented economic development requires a balance between industrial activities and the sustainability of primary sectors such as agriculture [13]. The PPM optimization strategy needs to be comprehensively prepared by considering the internal factors of the program as well as the external conditions of the strategic environment.

The strategy analysis approach is important to ensure that the PPM program is not short-term or simply fulfills regulatory obligations, but is truly a development instrument that is integrated with regional needs. Strategic analysis allows the identification of internal strengths and weaknesses of the program, as well as opportunities and threats from the external environment, so that the right alternative strategy can be formulated [11]. Thus, the analysis of the PPM optimization strategy in this study was carried out to formulate policy directions and strategic steps that can increase the effectiveness of program implementation and ensure its sustainability in supporting the agricultural sector in West Merapi District, Lahat Regency. Furthermore, the discussion will focus on the analysis of internal factors (IFE), external factors (EFE), and the preparation of a SWOT strategy matrix as the basis for the formulation of the most relevant and applicable strategies. The internal and external factors are as follows:

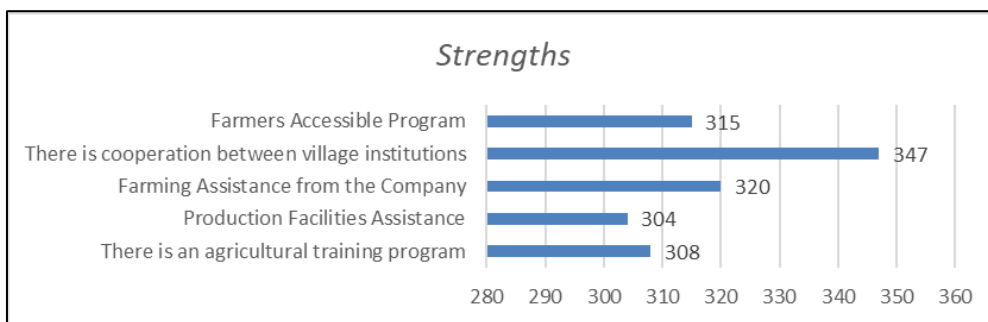


Figure 1 Strength category chart

Based on Figure 1, it shows the value of respondents' perception of the Strength factor in the implementation of the Community Development and Empowerment Program (PPM) in the agricultural sector in West Merapi District, Lahat Regency. Based on these results, the indicator with the highest score is that there is cooperation between village institutions with a score of 347, which shows that coordination and collaboration between village institutions are important factors in supporting the success of community empowerment programs. These results show that the main strength of the PPM Program lies in the institutional aspects, mentoring, and accessibility of programs that are able to support the development of the community's agricultural sector.

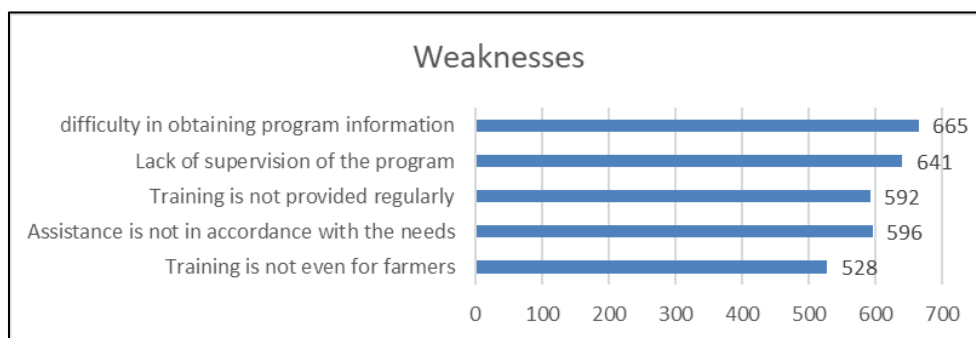


Figure 2 Weaknesses Category Chart

Based on Figure 2, it shows the value of respondents' perception of the Weaknesses factor in the implementation of the Community Development and Empowerment Program (PPM) in the agricultural sector in West Merapi District, Lahat Regency. Based on these results, the indicator with the highest score is the difficulty of obtaining program information with a score of 665, which shows that limited access to information is still the main obstacle for the public in knowing and utilizing the available programs. These results show that the main weakness of the PPM program lies in the aspects of information dissemination, program supervision, and the accuracy and equity of the implementation of empowerment activities.

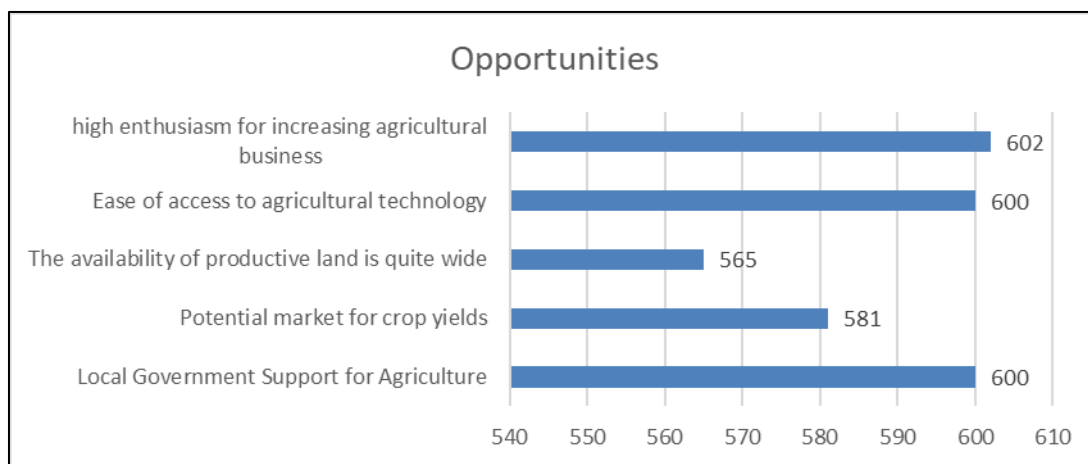


Figure 3 Opportunities Category Chart

Based on Figure 3, it shows the value of respondents' perception of the Opportunities factor that can support the implementation of the Community Development and Empowerment Program (PPM) in the agricultural sector in West Merapi District, Lahat Regency. Based on these results, the indicator with the highest score is the high enthusiasm of the community for the development of agricultural businesses with a score of 602, which shows that the community has great motivation and interest in increasing agricultural activities as a source of livelihood. These results show that the external environment still provides considerable opportunities for the development of the agricultural sector through institutional support, market potential, technological advancements, and active community participation.

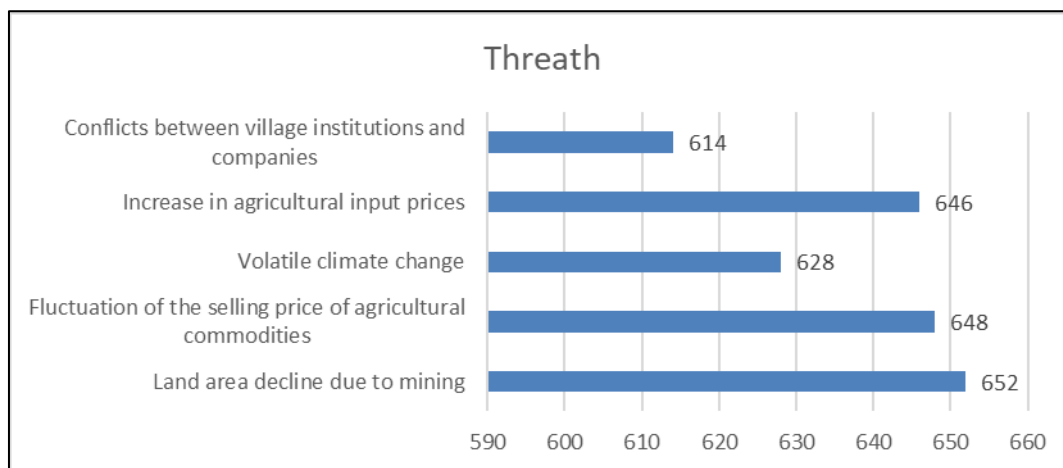


Figure 4 Threats Category Chart

Based on Figure 4. shows the value of respondents' perception of Threats factors that can affect the implementation of the Community Development and Empowerment Program (PPM) in supporting the agricultural sector in West Merapi District, Lahat Regency. Based on these results, the indicator with the highest value is the decrease in land area due to mining activities with a score of 652, which shows that the reduction of agricultural land is the main threat to the sustainability of community agricultural activities. These results show that the agricultural sector in the research area faces various pressures from environmental, economic, and institutional aspects that need to be anticipated through adaptive and sustainable program strategies.

3.1. Internal Factor Evaluation (IFE) Analysis

Internal factor analysis was carried out to identify and evaluate the various *strengths* and weaknesses owned by the Community Development and Empowerment Program (PPM) in supporting the agricultural sector in West Merapi District, Lahat Regency. Identifying these internal factors is important to know the extent to which the program's internal conditions are able to support the effectiveness of implementation and the long-term sustainability of the program.

The Internal *Factor Evaluation* (IFE) matrix is used to formulate internal strategic factors by assigning weights and ratings to each indicator, so that a score that reflects the program's internal position is obtained. Giving weight indicates the level of importance of each factor, while rating describes the condition or response of the program to that factor [11]. The results of the score calculation are then used as a basis for formulating program optimization strategies. The results of the analysis of internal strategic factors of the PPM Program can be seen in Table 2.

Table 2 Internal Strategic Factors of the PPM Program

| Internal Strategy Factors | | Weight | Rating | Score |
|---------------------------|---|--------|--------|-------|
| <i>Strength</i> | | | | |
| 1 | There is an agricultural training program | 0,7 | 4 | 0.27 |
| 2 | Production Facilities Assistance | 0.07 | 4 | 0.26 |
| 3 | Farming Assistance from the Company | 0.07 | 3 | 0.21 |
| 4 | There is cooperation between village institutions | 0.08 | 3 | 0.23 |
| 5 | Farmers Accessible Program | 0.07 | 4 | 0.27 |
| Strength Score | | | | 1.24 |
| <i>Weaknesses</i> | | | | |
| 1 | Training is not even | 0.11 | 2 | 0.23 |
| 2 | Assistance is not in accordance with the needs | 0.13 | 1 | 0.13 |
| 3 | Training is not provided regularly | 0.13 | 2 | 0.26 |
| 4 | Lack of supervision of the program | 0.14 | 2 | 0.28 |
| 5 | difficulty in obtaining program information | 0.14 | 3 | 0.43 |
| Weaknesses Score | | | | 1.32 |
| Differences | | | | -0.09 |

Based on the results of the IFE analysis, a Strength score of 1.24 and Weaknesses of 1.32 were obtained. This shows that internally the PPM Program has quite good strengths, but there are still relatively dominant weaknesses that need attention in strategy formulation.

This condition shows that the company has carried out an empowerment function through capacity building and the provision of production inputs. Theoretically, community empowerment aims to increase the capacity, access to resources, and economic independence of the community. With training and mentoring, farmers have the opportunity to increase productivity and efficiency of farming businesses. However, the weaknesses identified such as inequitable training, assistance that is not in accordance with needs, lack of supervision, and limited program information indicate that there is still a gap in implementation.

Internal weaknesses that are not immediately corrected can hinder strategy optimization and reduce program effectiveness. Thus, internally a strategy to improve program management is needed, especially in the aspects of need-based planning, monitoring and evaluation, and information transparency.

3.2. External Factor Evaluation (EFE) Analysis

External factor analysis aims to identify various opportunities and threats *originating from the outside environment of the program, both from economic, social, institutional, and environmental aspects.*

The external environment has an important role in determining the success of a program, because changes in market conditions, government policies, social dynamics of the community, and environmental factors can have a positive or negative impact on the implementation of the program. Therefore, a systematic analysis is needed to find out the extent to which opportunities can be utilized and threats can be anticipated strategically (Rangkuti, 2016).

The *External Factor Evaluation* (EFE) matrix is used to evaluate these factors through weighting and rating according to the level of importance and the program's response to existing external conditions. The results of the score calculation in this matrix will be the basis for the preparation of the PPM Program optimization strategy. The results of the analysis of external strategic factors can be seen in Table 3. follows.

Table 3 External Strategic Factors of the PPM Program

| External Strategy Factors | | Weight | Rating | Score |
|---------------------------|--|--------|--------|-------|
| <i>Opportunities</i> | | | | |
| 1 | OPD Support for Agriculture | 0.10 | 4 | 0.39 |
| 2 | Potential market for crop yields | 0.09 | 4 | 0.38 |
| 3 | The availability of productive land is quite wide | 0.09 | 3 | 0.28 |
| 4 | Ease of access to agricultural technology | 0.10 | 3 | 0.29 |
| 5 | high enthusiasm for increasing agricultural business | 0.10 | 3 | 0.29 |
| Opportunity Score | | | | 1.63 |
| <i>Threath</i> | | | | |
| 1 | Land area decline due to mining | 0.11 | 1 | 0.11 |
| 2 | Fluctuation of the selling price of agricultural commodities | 0.11 | 2 | 0.21 |
| 3 | Volatile climate change | 0.10 | 2 | 0.20 |
| 4 | Increase in agricultural input prices | 0.11 | 2 | 0.21 |
| 5 | Conflict between village institutions and companies | 0.10 | 1 | 0.10 |
| Threat Score | | | | 0.83 |
| Differences | | | | 0.80 |

The results of EFE's analysis showed an *Opportunities* score of 1.63 and *Threats* of 0.83. This indicates that the external environment provides a relatively greater opportunity than the threat. This condition is in line with the concept of sustainable agricultural development which emphasizes the importance of institutional support, market access, and technology adoption to increase competitiveness. Local government support and access to technology are important factors in strengthening the sustainability of the agricultural sector. Meanwhile, the threats faced include:

Land area decline due to mining activities, fluctuations in commodity prices, climate change, increase in input prices, and potential institutional conflicts. The threat shows that the agricultural sector is under structural and environmental pressure. External dynamics such as market changes and environmental conditions can affect the competitiveness of a sector, so adaptive and mitigating strategies are needed.

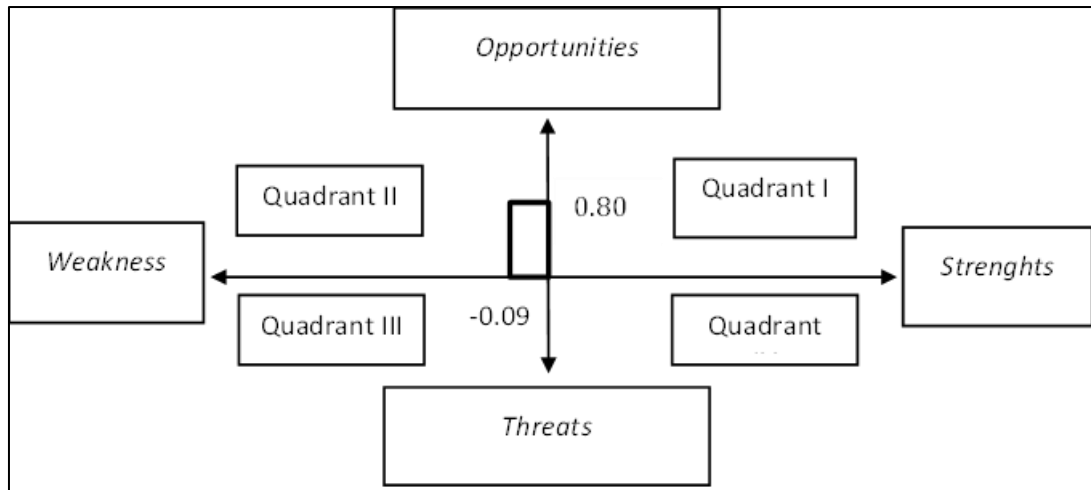


Figure 5 PPM Program Optimization SWOT Chart

Based on Figure 5, shows the strategic position of the Community Development and Empowerment Program (PPM) based on the results of a SWOT analysis that combines the value of internal and external factors. From the results of the calculation, an internal factor difference value of -0.09 was obtained which showed that the program's weaknesses were still slightly more dominant than its strengths, while the external factor difference value of 0.80 showed that the opportunities available in the external environment were greater than the threats faced. This position places the PPM Program in Quadrant II, which is a condition where the organization or program has great opportunities but still faces some internal weaknesses. This condition shows that the development of the PPM program still has considerable potential to be improved if existing opportunities can be optimally utilized to improve various weaknesses that still occur. In the context of the development of the agricultural sector in West Merapi District, Lahat Regency, opportunities such as local government support, market potential for agricultural products, availability of productive land, and ease of access to agricultural technology can be used to increase the effectiveness of the program. So the right strategy to be implemented is the W-O (Weakness-Opportunities) strategy, which is a strategy that focuses on efforts to overcome program weaknesses through the use of available opportunities, such as increasing the equity and sustainability of agricultural training, improving the system of disseminating program information to the community, and arranging program assistance that is more in line with the needs of farmers. With the implementation of this strategy, the PPM Program is expected to run more optimally, increase the capacity of farmers, and encourage the sustainability of the development of the agricultural sector in the research area.

3.3. Preparation of a Matrix of Development Program Optimization Strategy and Community Empowerment

SWOT analysis is a strategic analysis method used to formulate alternative strategies based on a combination of internal and external factors. This analysis integrates the strengths and weaknesses that come from the program's internal environment with opportunities and threats from the external environment. Through SWOT analysis, various alternative strategies can be formulated that can be used to optimize the implementation of the Community Development and Empowerment Program (PPM) to be more effective and sustainable in supporting the agricultural sector in West Merapi District, Lahat Regency.

3.4. SO (Strengths-Opportunities) Strategy

- Optimizing agricultural training programs by utilizing OPD support and access to agricultural technology to increase farmer capacity.
- Utilizing the assistance of production facilities and the market potential of crop products to increase productivity and competitiveness of agricultural products.
- Strengthening cooperation between companies, village governments, and OPDs in the development of agricultural empowerment programs based on local potential.

3.5. WO (Weaknesses-Opportunities) Strategy:

- Strengthening farming assistance so that farmers are able to adapt to climate change and fluctuations in commodity prices.
- Developing a more efficient agricultural system to anticipate the increase in production input prices.

- Improve coordination between village institutions and companies to minimize potential institutional conflicts.

3.6. ST Strategy (Strengths-Threats)

- Expand the distribution of agricultural training by utilizing local government support and agricultural extension technology.
- Planning programs based on the needs of farmers so that production facilities assistance is more on target.
- Increasing the dissemination of program information through village institutions and farmer groups so that community participation is more optimal.

3.7. WT (Weaknesses-Threats) Strategy:

- Improve the monitoring and evaluation system of the program to minimize the negative impact of changes in the external environment.
- Develop a transparent program information system to reduce potential conflicts and increase public trust.
- Encourage diversification of agricultural businesses to reduce dependence on commodities that are vulnerable to price fluctuations.

Based on the description above, the most relevant strategy to be applied in optimizing the Community Development and Empowerment Program (PPM) is a strategy that is able to take advantage of these opportunities to improve various weaknesses that still occur in the implementation of the W-O (*Weaknesses-Opportunities*) program or strategy.

One of the strategies that can be done is to expand the distribution of agricultural training by utilizing the support of the Regional Apparatus Organization (OPD) and easy access to agricultural technology. Local government support for the agricultural sector can be used to strengthen training and counseling activities for farmers. Through synergy between companies, local governments, and agricultural extension institutions, training activities can be carried out more evenly so that all farmers get the same opportunity to improve their capacity and skills in managing farming.

Program planning based on the needs of farmers (need assessment) also needs to be carried out so that the assistance of production facilities provided is more on target. So far, one of the weaknesses of the program is that assistance has not fully met the needs of farmers. By taking advantage of opportunities in the form of high enthusiasm for the community in developing agricultural businesses and the market potential of good crop yields, program planning can be prepared in a participatory manner by involving farmers and farmer groups. This approach is expected to increase the effectiveness of the use of assistance and encourage increased productivity of agricultural businesses.

Another W-O strategy is to increase the dissemination of program information through village institutions and farmer groups. Limited information about the program is one of the obstacles that cause not all people to access empowerment activities. The existence of village institutions, farmer groups, and local government support can be used as a means to expand the dissemination of program information. With a more open and structured information system, it will be easier for the community to know the various activities carried out in the PPM Program so that the level of community participation can increase. Easy access to agricultural technology can be used to introduce more efficient and productive cultivation innovations. This can also overcome weaknesses in the form of training that has not been carried out regularly, because the dissemination of information and training materials can be carried out through various digital media and field counseling activities. The implementation of the W-O strategy is expected to increase the effectiveness of the implementation of the Community Development and Empowerment Program (PPM) through improving the program's internal weaknesses by taking advantage of various opportunities available in the external environment. The empowerment program not only functions as a form of corporate social responsibility, but can also be a development instrument that is able to increase the capacity of farmers, strengthen community institutions, and encourage the sustainability of the agricultural sector in West Merapi District, Lahat Regency

4. Conclusion

The most appropriate strategy for optimizing the Community Development and Empowerment Program (PPM) in supporting the agricultural sector in West Merapi District, Lahat Regency is the W-O (*Weakness-Opportunities*) strategy, which is a strategy that utilizes external opportunities to overcome internal program weaknesses. Local governments are expected to play an active role in supervising and directing the implementation of the PPM program of mining companies to be in line with agricultural development programs in the regions. The government also needs to strengthen the role of agricultural extension and facilitate cooperation between companies, farmer groups, and other related institutions. Farming communities are expected to increase active participation in various empowerment

programs implemented and strengthen cooperation between farmers through farmer groups so that the development of the agricultural sector can run more effectively and sustainably.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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