AGROMIX, Volume 15 Number 1 (2024), Pages 59-66

AGROMIX
pISSN (Print): 2085-241X; eISSN (Online): 2599-3003
Website: https://jurnal.yudharta.ac.id/v2/index.php/agromix

# Development strategies for sustainable smallholder coffee plantations in Wagir District, Malang Regency

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**Original article**

**Article history**
Received : July 7, 2023
Accepted : March 25, 2024
Published : March 31, 2024

**Keyword**
SWOT;
Smallholder coffee plantation;
Sustainability;

**ABSTRACT**

**Introduction:** The coffee plantation subsector is one of the most significant subsectors in Wagir District, Malang Regency. Sustainable practices are critical to the success of smallholder coffee crops. This research aims to create a sustainable plan for smallholder coffee crops in Wagir District, Malang Regency. **Methods:** Twenty farmers and five experts chosen by purposive sampling participated in the study, which was carried out in the Wagir District of Malang Regency. A questionnaire was utilized to interview participants to capture the phenomenon. Data analysis employs a hybrid approach that combines SWOT and AHP. **Results:** Six strategic priorities are identified by the study findings following the identification of internal and external factors in the SWOT and AHP analyses. Limitations - Second Opportunity (WO2) The most important strategy to be put into practice based on the situation on smallholder coffee plantations in Wagir District is the one with a score of 1.135. **Conclusion:** To have a more widespread and long-lasting impact, the primary tactic to increase the sustainability of smallholder coffee plantations in Wagir District, Malang Regency, is to work with multi-stakeholders like the local government, academic institutions, and research centers to directly educate the community or serve as resource persons in capacity building for agricultural extension workers.

**Cite this article:**
Parmawati, R., Wardana, F. C., Hardiansyah, R., Rahmawati, N. O., Gunawan, F. K., & Ashari, F. M. (2024). Development strategies for sustainable smallholder coffee plantations in Wagir District, Malang Regency. *Agromix, 15*(1), 59-66. https://doi.org/10.35891/agx.v15i1.4060

## INTRODUCTION

Indonesia's agricultural land area is still growing, with 10.45 million hectares (an increase of 20.87 thousand hectares from 2021 to 2022) in 2022. This indicates the potential worth of the agricultural sector in Indonesia (Parmawati *et al.*, 2022; BPS, 2023). In addition, this industry holds great promise for Indonesia's future, particularly in terms of supplying the country's food needs. To keep the agriculture industry stable, harmony is essential. This is a result of the agricultural sector's heterogeneity, which is comprised of five sub-sectors: plantations, forestry, fisheries, livestock, food crops, and horticulture. Thus, to strengthen the agriculture sector, its subsectors must receive sufficient attention. A high agricultural land area can promote ecosystem sustainability provided it is managed sustainably, according to Paquetter & Messier (2010). Out of the five sub-sectors that are currently in place, the agricultural sector's plantation sub-sector has the most potential to boost employment and strengthen the national economy (Ruslan & Prasetyo, 2021). Aside from that, it is anticipated that the development of agricultural goods will give top priority to the management of human resources, natural resources, and infrastructure and facilities in compliance with the guidelines outlined in Law Number 39 of 2014 concerning Plantations.

Discussions related to superior commodities from the plantation sub-sector which are currently experiencing an increase in both supply and demand cannot be separated from Indonesian coffee commodities which are currently traded widely both on local and international markets. This commodity plays an important role in increasing the country's foreign exchange, increasing farmers' income, absorbing labor, and even preserving the environment (Kembaren & Windirah, 2021; Farlian & Masthura, 2021; Fatkurrohin *et al.*, 2022). Indonesia is one of the largest coffee-producing countries in the world (Ministry of Foreign Affairs of the Republic of Indonesia, 2023), ranking fourth globally after Brazil, Colombia, and Vietnam (Purnamasari *et al.*, 2014; Fortunika *et al.*, 2021; Apriani *et al.*, 2022). According to the Directorate General of Plantations, Indonesia experienced an increase in coffee export volume from 2013-2021 of around 5.56% per year. The increase in exports was triggered by an increase in coffee consumers in the

world so that world demand for coffee from Indonesia increased significantly. Indonesian coffee production is worth developing because many coffee shops have emerged as a means of entertainment for the lower middle-class generation (Adiwinata *et al.*, 2021). Still inconsistent in terms of quality, Indonesian coffee's current state is inversely correlated with it (Sunarharum *et al.*, 2021). One of the reasons Indonesian coffee qualities varies so much is that farmers and processors who mostly employ traditional methods still have limited expertise in post-harvest coffee handling and coffee plant processing (Bahtiar *et al.*, 2023). In terms of how the coffee plantation system is distributed in Indonesia, community plantations make up 96% of the system, with government and private farms making up the remaining 4% (Harum 2022; AEKI, 2023).

People's coffee plantations which are spread widely in Indonesia also play a role in supporting increased production of coffee commodities, one of which is in Malang Regency, East Java Province. This region is included in the areas that contribute to the increase in coffee commodities in Indonesia (As'ad & Aji, 2020), and it is also estimated that total coffee production in Malang Regency will reach 10,000 tons in 2018 (BPS, 2019). Among the coffee-producing areas in Malang Regency, Wagir District has high potential in terms of developing coffee commodities, because 60% of the area is dominated by scattered smallholder coffee plantations with land areas that vary between individuals (Utami *et al.*, 2021). Geographically, Wagir District has an area of 75.43 km2 and is located around the foot of Mount Kawi which is dominated by a hilly topography with a slope of >40% (Madani, 2023) which is very suitable as a location for coffee plantations. The agricultural sector is a supporting sector for the local community's economy with one of its superior commodities being coffee which is grown using the community coffee plantation system. Observations carried out in Wagir District still show that traditional post-harvest management has the potential to produce inconsistent coffee bean products both in terms of quality and quantity. This can lead to a decrease in the demand side due to quality not being maintained which will affect the welfare of local farmers in Wagir District. This has encouraged researchers to formulate a strategy for developing the management of smallholder coffee plantations in Wagir District so that they can be more sustainable.

## METHODS

### Research location

Wagir District, spanning 75.43 km2, is a subdistrict of Malang Regency. Coffee plantation commodities, which are still mostly produced on small-scale farms using conventional processing methods, are one of the prospective commodities. The acreage of coffee plantations in Wagir District grew by 288% from the original 52 hectares to roughly 220 hectares, according to data from BPS (2021). This shows that Wagir District is one of the potential districts for developing coffee commodities to support the economy of the surrounding community, as well as the economy of Malang Regency.

### Research sample

This research is qualitative in nature using the method of distributing questionnaires and interviews according to the components to be studied (Table 2). Respondents in this study were divided into two, namely coffee farmers in Wagir District and key informants. The selection of respondents in this study used a purposive sampling method which was then combined with snowball sampling with the following respondent criteria: a) are coffee farmers who own land and b) have been coffee farmers for approximately 5 years. Researchers have determined 20 respondents from among coffee farmers who then also gathered 5 expert respondents consisting of representatives of the Food Crops, Horticulture and Plantation Service (1 person), the Coffee and Cocoa Research Institute (1 person), Academics (2 people), BAPEDDA (1 person).

### Data analysis

To generate appropriate strategies, this research uses hybrid analysis methodologies to analyze field phenomena in greater detail and achieve its intended goals. The analytical tool utilized is AHP-SWOT analysis, which combines the SWOT (Strengths, Weaknesses, Opportunities, and Threats) and AHP (Analytic Hierarchy Process) methods (Kangas *et al.*, 2001). The hybrid analysis's output will yield recommendations for strategies through SWOT analysis, which in turn establishes the hierarchy of each strategy. Thus, methods can be developed by the circumstance or phenomenon found in the study setting. According to Kurtila *et al.* (2000), this analysis consists of three steps:

(1) Carrying out a SWOT analysis,
(2) Conduct pairwise comparisons between SWOT factors and categories using AHP,
(3) The results of the comparison will be used in strategy formulation and evaluation.

The AHP-WOT method has been widely used by other researchers for several sectors such as forestry (Pesonen *et al.*, 2001), agriculture (Shresta *et al.*, 2004), and tourism (Nikolic *et al.*, 2015; Bianco *et al.*, 2019). In this research, the implementation of the AHP-SWOT method is focused on being able to develop appropriate strategies in the

agricultural sector, especially smallholder coffee plantations so that they can achieve sustainability by optimizing existing environmental conditions.

## RESULTS AND DISCUSSION

### Internal and external components of SWOT

After conducting interviews with respondents consisting of 20 coffee farmers and also conducting FGDs with 5 experts related to the research. In the hybrid A'WOT method (AHP and SWOT), the first step that must be taken is to identify the internal factors and external factors from the SWOT framework. More clearly, the factors of this SWOT can be seen in Table 2 below.

Table 2. SWOT Internal and external factors

| INTERNAL FACTORS | |
|---|---|
| Strengths (S) | Weaknesses (W) |
| Availability of coffee plantation land (S1) | Not yet implementing GAP and GHP optimally (W1) |
| Farmers' experience in cultivating coffee (S2) | Low education level (W2) |
| Awareness of pesticide use (S3) | Still low market reach (W3) |
| Distinctive robusta coffee taste (S4) | Lack of product processing capabilities (W4) |
| Active participation in counseling (S5) | Institutions that are still weak (W5) |
| EXTERNAL FACTORS | |
| Opportunities (O) | Threats (T) |
| Increasing market demand for robusta coffee (O1) | The generation's interest in becoming coffee farmers decreases (T1) |
| Have adequate marketing channels (O2) | Increasingly tight local market competition (T2) |
| Potential partnerships with stakeholders (O3) | Change of function of coffee plantation land (T3) |
| There are academic & R&D institutions (O4) | Entry of international coffee into the local market (T4) |
| Government policy support (O5) | Climate change (T5) |

Source: Primary data processed, 2023

After knowing the internal and external factors that can describe the research phenomenon and help in formulating strategies, the next step is to calculate the priority scale of importance for each factor and category in SWOT. This is done by making each component in the SWOT factor into a questionnaire question which will then be distributed to experts who can then calculate the priority scale. The results of calculating this priority scale can be seen in Table 3 below.

Table 3. Priority scale and factors and categories

| Category | Priority for categories | Factor | Priority for factor | Category | Priority for categories | Factor | Priority for factor |
|---|---|---|---|---|---|---|---|
| Strengths (S) | 0.287 | S1 | 0.159 | Weaknesses (W) | 0.168 | W1 | 0.143 |
| | | S2 | 0.170 | | | W2 | 0.301 |
| | | S3 | 0.177 | | | W3 | 0.125 |
| | | S4 | 0.178 | | | W4 | 0.125 |
| | | S5 | 0.316 | | | W5 | 0.190 |
| Opportunities (O) | 0.339 | O1 | 0.117 | Threats (T) | 0.207 | T1 | 0.286 |
| | | O2 | 0.104 | | | T2 | 0.109 |
| | | O3 | 0.136 | | | T3 | 0.350 |
| | | O4 | 0.272 | | | T4 | 0.095 |
| | | O5 | 0.372 | | | T5 | 0.160 |

Source: Primary data processed, 2023

Based on Table 3, shows that the category of active participation in taking part in counseling (0.316) has the highest priority value among the others. This is because the training and outreach activities carried out focus on post-production strengthening such as marketing and opportunities to improve quality, as well as licensing, which will have a very positive impact on market demand and improve the quality of coffee production in Wagir District, Malang Regency. Based on research from Sidauruk *et al.* (2016), coffee farmers realize that extension activities are important, so the level of participation of coffee farmers regarding extension is high. In the opportunity category, factors in the form of government policy support (0.372) and the existence of academic and R&D institutions for the development of robusta coffee (0.272) have high priority values. The government's role in developing coffee plantation potential is because East Java is one of the leading provinces with high coffee production (Hakim, 2017; Hakim, 2022).

Apart from that, in the weakness category, the low education level factor (0.301) has a high priority scale. This is because the processing of people's coffee plantations is still traditional and the lack of interest of young people to continue plantation activities in Wagir District, Malang Regency, has resulted in a decline in the number of workers of productive age which has an impact on decreasing the quantity and quality of production due to limited labor. In the threat category, the conversion of coffee plantation land (0.350) and the decreasing interest of the younger generation in becoming coffee farmers (0.286) are included in the two priority factors in the threat category. There are many land conversion factors because the area of smallholder coffee plantations for each small farmer is converted into land for growing other crops which are considered more productive and have a higher selling price.

In Table 3 above, the strength factors (Strength) have a score value of 0.287, while the weakness factors (Weakness) have a score value of 0.168, meaning that coffee farmers in Wagir District, Malang Regency have higher strengths than weakness factors in determining their competitive strategies. Furthermore, opportunity factors (Opportunities) have a score of 0.339, and threat factors (Threats) have a score of 0.287. This means that to determine the competitive strategy of coffee farmers in Wagir District, Malang Regency, they have quite large opportunities compared to the threats that arise. From the results of internal and external factors, IFAS and EFAS values can be calculated which can later be used as coordinate points in the SWOT quadrant.

The calculation of the IFAS value is based on the difference between the strength and weakness factors which will produce the X coordinate point. The results of the IFAS value calculation are as follows:

IFAS (X Coordinate) = Strength - Weakness

= 0,287 - 0,168

= 0,119

The EFAS value calculation is based on the difference between the opportunity and threat factors which will produce the Y coordinate point. The results of the EFAS value calculation are as follows:

EFAS (Y Coordinate) = Opportunity - Threat

= 0,339 - 0,287

= 0,052

Thus, it is evident that the coordinates in the SWOT quadrant, which are shown in Figure 1 below, are (0.119; 0.052) in the form of x values and y values.


Figure 1. SWOT analysis quadrant
Source: Primary data processed, 2023

The Rapid Growth Strategy can be used to maximize opportunities and strengths to support the sustainability of smallholder coffee plantations in Wagir District, Malang Regency. This is because the IFAS value is greater than the EFAS, as indicated by the results of the SWOT analysis, which is displayed in Figure 1. Rapid Growth Strategy: To optimize monitoring of all chances that assist people's coffee plantations in Wagir District, people's coffee plantations need to raise the growth rate of coffee farming in a faster amount of time while maintaining quality. A rapid Growth Strategy is designed to achieve growth, in asset sales, profits, or a combination of the three. This can be achieved by reducing prices, developing new products, increasing the quality of products or services, or increasing access to a wider market. Efforts that can be made are to minimize costs so that they can increase profits (Rangkuti 2008).

**Developing a sustainable livelihood strategy based on the analytic hierarchy process (AHP)**

With the aid of a matrix, the outcomes of a SWOT mapping process are broken down into several strategic options by emphasizing opportunities and strengths and reducing threats and weaknesses. As shown in Table 4 below, the solutions for the sustainability of smallholder coffee plantations in Wagir District, Malang Regency, were prioritized by assigning weights to each component of the strategy's internal and external influences.

Table 4. Development and priority scale based on AHP analysis for strategy recommendations

| SWOT Elements | Interrelationship | Total Weight | Ranking based on AHP-SWOT |
|---|---|---|---|
| *Strength - Opportunities* 1 Strategy | S1: Availability of coffee plantation land<br>S4: Distinctive robusta coffee taste<br>O1: Increasing market demand for robusta coffee<br>O2: Have adequate marketing channels | 0.558 | 5 |
| *Strength - Opportunities* 2 Strategy | S3: Awareness of pesticide use<br>O1: Increasing market demand for robusta coffee<br>O5: Government policy support | 0.666 | 4 |
| *Strength - Threat* 1 Strategy | S4: Distinctive robusta coffee taste<br>T2: Increasingly tight local market competition<br>T4: Entry of international coffee into the local market | 0.382 | 7 |
| *Strength - Threat* 2 Strategy | S2: Farmers' experiences in cultivating coffee<br>S5: Active participation in counseling<br>T1: The generation's interest in becoming coffee farmers decreases<br>T3: Change of function of coffee plantation land | 1.122 | 2 |
| *Weakness - Opportunities* 1 Strategy | W1: Not yet implementing GAP and GHP optimally<br>O4: There are academic & R&D institutions<br>O5: Government policy support | 0.787 | 3 |
| *Weakness - Opportunities* 2 Strategy | W2: Low education level<br>W5: Institutions that are still weak<br>O4: There are academic & R&D institutions<br>O5: Government policy support | 1.135 | 1 |
| *Weakness - Threat* 1 Strategy | W3: Still low market reach<br>T5: Climate change<br>T4: Entry of international coffee into the local market | 0.329 | 8 |
| *Weakness - Threat* 2 Strategy | W2: Low education level<br>W5: Institutions that are still weak<br>T1: The generation's interest in becoming coffee farmers decreases | 0.536 | 6 |

Source: Primary Data Processed, 2023

Based on the results of the AHP-SWOT analysis in the table, it can be seen that six potential strategies are by the internal factors and internal factors of SWOT. Based on the priority scale, the potential strategy to be implemented in the sustainable development of People's Coffee plantations in Wagir District is the Weakness - Opportunities 2 (WO2) Strategy with a total weight of 1,135. This strategy intersects with several internal and external components, namely low education levels (W2), weak institutions (W5), the existence of academic & R&D institutions (O4), and government policy support (O5). So based on this, the WO2 strategy is a strategy with the main focus to improve the quality and quantity of field education related to the sustainable community coffee plantation development program by educating on important aspects of sustainable agriculture to increase farmers' capabilities to support optimal implementation, apart from that. also strengthening farmer institutions so that they can be competitive and support the coffee plantation activities carried out. This is expected to have an impact on increasing the capacity and strengthening of farmers' institutions to be competitive in the market. The results of other research stated by Satria *et al.* (2015), that field instructors play an important role in developing people's coffee farming businesses starting from fertilization, and managing pests and diseases to disease control. Strengthening farmer institutions can be done by bargaining positions, maintaining coffee quality and uniformity in coffee quality through farmer groups, and building business partnerships with PT. Asal Jaya as an exporter with farmer groups to increase marketing efficiency.

The second strategic priority is the Strength - Threat 2 (ST2) Strategy which is a combination of components of farmer experience in coffee cultivation (S2), active participation in extension (S5), declining generational interest in becoming coffee farmers (T1), and conversion of coffee plantation land. (T3) with a weight of 1.122. The main focus of

this Strategy is to increase coffee farming activities based on farmers' experience in cultivating coffee on suitable and available land to reduce the rate of land conversion and commodity transfer. This is by data from Lailada *et al.* (2020), many farmers' experience has been obtained from their ancestors so that farmers can apply good and correct coffee farming management. Mature experience in managing coffee farming will certainly have a positive impact on improving quality in the future. Previous research from Sudirman (2020), shows that farming experience increasingly has an impact on farmers' interest in changing the function of land, either in the form of residential yards, etc.

The third alternative formulated by the community plantation sustainability strategy for coffee is Weakness - Opportunities (WO1) with a weight value of 0.787. This can be done by improving the quality of Robusta coffee by increasing farmer awareness to consistently apply Good Agricultural Practices (GAP) and Good Handling Practices (GHP) for coffee with support from academic, research, and government institutions. The fourth priority strategy, namely Strength - Opportunities (SO2), is a combination of factors S3, O1, and O5 with a weight value of 0.666. The SO2 strategy involves increasing environmental sustainability in coffee cultivation to meet global market demand for environmentally friendly coffee products. This strategy is carried out by increasing farmers' understanding and awareness to preserve the environment and reduce land degradation and water pollution.

Strength - Opportunities (SO1), which weighs 0.558, is the fifth priority strategy. Its goal is to meet market demand by expanding Robusta coffee production and productivity through intensification and extensification efforts. Educating coffee farmers and implementing the principles of Good Agricultural Practices (GAP) are some of the steps that can be taken; these include improving cuttings (form cutting and post-harvest cutting), creating trenches (rorak), fertilizing according to dosage, and implementing integrated pest control; 2) Cloning coffee plants using superior varieties that are recommended and appropriate for the Wagir area's agricultural climate, increasing the population of coffee plants to 1600 plants in 1 hectare, and replanting old or less productive coffee plants; and 3) Rehabilitating coffee plants with suggested grafting activities of superior plant material. The success of coffee post-harvest handling is largely dependent on the availability of education and the application of expected Good Agricultural Practices (GAP) and Good Handling Practices (GHP). This is a determining factor that makes the entire process beneficial to the productivity, efficiency, and environmental friendliness of smallholder plantations. This is because high-quality coffee beans are produced by processing coffee fruit well (Mayrowani, 2019).

The sixth strategy choice is Weakness - Threat (WT2) with a weight value of 0.536. The aim is that the development of coffee plantations can increase the interest of the younger generation in coffee farming and coffee product businesses. This development can be carried out by conducting comprehensive outreach regarding the potential of coffee commodities to young people. Based on data from the International Coffee Organization (ICO), world coffee consumption needs are estimated to increase by 1.7% or the equivalent of 178.5 million bags (in the form of 60 kg). This possibility may serve as a catalyst to pique young people's curiosity about managing coffee estates. Aside from that, to educate human resources in the Wagir District and improve people's abilities to manage coffee plantations and post-harvest coffee, high-quality coffee beans must be produced, and the role of extension workers and cross-sector collaboration is crucial.

The seventh strategy choice for sustainability is Strength - Threat (ST1) with a weight value of 0.382. Possible threats can be minimized by expanding the marketing network through collaboration between farmers, stakeholders, and business actors through business partnerships and encouraging farmers to improve the quality assurance of Robusta coffee through government facilitation to obtain organic certification, geographical indication, and 4C certification. ST1 strategy has a relationship with the SO2 strategy. Facilitation of certification aims to increase the added value and competitiveness of Robusta coffee. The dominant farmer group in Gombengsari Village is one of the groups that has been granted assistance for organic coffee certification by the East Java Provincial Plantation Service. Further research Rosiana (2020) demonstrates that the pricing of coffee is influenced by marketing institutions that are now in place, which corroborates the findings of the previous study. A poorly managed farmer group could have detrimental effects from this circumstance. Coffee producers will no longer be able to negotiate effectively and will only be able to accept prices.

The eighth strategy is Weakness - Threat (WT1) with a weight value of 0.329. The threats faced will be adjusted to the weaknesses. This strategy is to improve sectoral coordination through policies for managing market access for farmers and protecting domestic products. This is in line with the results of research from Smith *et al.* (2022), cross-sector and cross-disciplinary collaboration can directly have the potential to improve the long-term sustainability of the coffee industry by reducing challenges in the form of miscommunication between institutions. The WT1 strategy is related to the WO2 and ST1 strategies. For the sustainability of local coffee plantations in Wagir District, the WT1 strategy essentially aims to increase sectoral collaboration between public and private sector organizations. Using the idea of a "green economy," smallholder coffee plantations can increase their sustainability. It is anticipated that this strategy will boost coffee's competitiveness and contribute to Indonesia's coffee industry's sustainable growth.

## CONCLUSION

The primary approach to enhancing the sustainability of individual coffee plants in Wagir District involves optimizing internal elements, such as vulnerabilities, and external factors, such as opportunities. The Wagir District's

low human resource education level and weak institutions can be improved by working with multiple stakeholders, including the local government, academic institutions, and research centers, to directly educate the community or serve as resource people for agricultural extension workers' capacity building. This will have a more widespread and long-lasting effect. The government and bolstering academic institutions should work with agricultural instructors to help coffee growers in Wagir District develop their soft skills, particularly in marketing, post-harvest management, and land management. It is hoped that in the future, people's coffee plantations in Wagir District will be able to produce high-quality, high-production coffee while still adhering to sustainable practices by improving the caliber and volume of field counseling and fortifying farmer institutions to enable them to compete and be focused on the market with the help of researchers, academics, government agencies, and coffee marketers.

The discovery of enabling elements for each internal and external component is something that can be explored through this research to determine the source of the most prevalent issue using field data. This research's drawback stems from the underutilization of specialists in identifying the best course of action, which leaves the strategy's formulation dependent only on data collected and observations from a narrow vantage point.

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