Strategy Development of Agroforestry at Campus IV Khairun University, Bangko Hamlet, West Halmahera Regency

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Abstract. *This study aims to evaluate agroforestry development in Campus IV of Khairun University, Bangko Hamlet, West Halmahera. This research used SWOT analysis. The results of the study show that the potential for agroforestry development on this campus was is a large area of land and a variety of crops that can be planted. However, the main challenge is a lack of understanding of the benefits of agroforestry and suboptimal plant care. SWOT analysis shows that effective development strategies should take advantage of opportunities such as high market demand for agroforestry products and minimize threats such as climate change. Therefore, agroforestry development efforts on this campus need to focus on education, training, and cooperation with relevant stakeholders.*

Keywords: *Agroforestry, Development, Strategy, West Halmahera*

1. INTRODUCTION

The development of agroforestry in Indonesia still faces various challenges such as lack of knowledge and skills of farmers, lack of market and added value of agroforestry products as well as lack of involvement of the community and other stakeholders (Arifin *et al.* 2003). In addition, theproblem of land conversion and food availability is a national issue that needs to be considered. Land conversion causes forest land to decrease. One solution to overcome the problem of land conversion and food availability is the agroforestry system. According to Firgayantika, *et al* (2020) agroforestry as a solution for land use due to the large amount of development because it is tolerant of life.

Agroforestry system is a land management system that combines agricultural crops and forestry crops with a planting spacing regulation with the aim of reducing competition between plants (Figyantika, *et al.*, 2020). Basically, agroforestry consists of three main components, namely forestry, agriculture and livestock (Irawati, *et al.,* 2021). The way to arrange plant components in space and time is divided into several types, namely *alley cropping, taungya,* multistrata, silvopastura, agrosilvofishery and agrosilvopastura.

Agroforestry aims to ensure that existing resources can be utilized optimally and sustainably (Purba *et al*, 2020). Agroforestry has many benefits, namely maintaining biodiversity, absorbing carbon, adapting to climate change, maintaining soil fertility, reducing erosion and increasing farmers' productivity and income. This condition is in line with the research of Tamrin *et al* (2015) that agroforestry plays a role in improving community welfare by ensuring sufficient food availability and is able to act as a provider of raw materials for biofuels and ecological functions for the community.

The term agroforestry has been applied in Indonesia varies according to the culture and characteristics of the people in each region. Some examples of agroforestry terms in the eastern region of Indonesia in general are "dusung". "*Dusung"* Maluku, *Doro/Gura* in North Maluku is a term used in the Maluku and North Maluku regions to refer to an agroforestry system that grows fruit trees, nutmeg, cloves and other plants in forests, gardens or yards (Tamrin, *et al* 2015).

Campus IV of Bangko Hamlet is one of the locations for agroforestry development with a yard garden pattern. The yard garden is a mixture of annual plants and perennials and livestock that grow on the land around the house. This location is one of the alternatives as an economic, training and education source involving the surrounding community. Therefore, it is necessary to conduct research that can provide solutions for the development and increase adoption of agroforestry patterns in Indonesia. The purpose of the research is to find out the factors that affect the development of agroforestry and to look at strategies for agroforestry development.

2. RESEARCH METHODS

The research was carried out at Campus IV of Khairun University, Bangko. West Halmahera. The location selection was carried out deliberately or *purposive sampling* with the consideration that the location is the center of agricultural crop development, forestry and other crop development activities.

The data used to support the course of this research are primary data and secondary data. Primary data was obtained through in-depth interviews with landowner farmers and direct observation in the field to obtain more detailed information. Direct observation is a method of taking field data by carefully recording the study being studied. Field observation was carried out to determine the location of data collection and obtain actual data on the agroforestry development pattern used, and continued with structured interviews with the community and related parties.

Strategic analysis of agroforestry development is carried out using SWOT analysis (*strengths, weaknesses, opportunities and threats*). This step was taken to analyze the agroforestry development strategy. The next step is to compile a SWOT Matrix which is an important analysis tool that can be used in developing four types of strategies.

The SWOT matrix is built based on the results of the analysis of external and internal strategic factors which are compiled by four main strategies (Rangkuti 2006), namely: SO, WO, ST and WT.

3. RESULTS AND DISCUSSION

The types of agroforestry plants found at Unkhair Campus IV consist of 21 types of plants, namely 8 types of agricultural crops and 13 types of forestry plants.

Table 1. Types of Forestry Plants

No	Indonesian names	Individual	Presented (%)
1	Tabebuya	7	2,3
2	Gaharu	6	2,0
3	Ketapang kencana	21	6,9
4	Gosale	8	2,6
5	Balsa	7	2,3
6	Linggua	100	32,7
7	Pulai	3	1,0
8	Gamal	37	12,1
9	Gofasa	3	1,0
10	Jati	104	34,0
11	Cengkeh	3	1,0
12	Melinjo	4	1,3
13	Aren	3	1,0
Total		306	100

There are 13 types of forestry plants available at campus IV of Bangko Hamlet, including Tabebuya 7 individuals, gaharu 6 individuals, Ketapang kencana 21 individuals, gosale 8 individuals, balsa 7 individuals, linggua 100 individuals, Pule 3 individuals, gamal 37 individuals, gofasa 3 individuals, jati 104 individuals, Melinjo 4 individuals and aren 3 individuals.

Table 2. Types of Agricultural Crops

No	Indonesian names	Individual	Presented (%)
1	Kangkung	2	0,3
2	Peanut	232	30,2
3	Chili	21	2,7
4	Corn	200	26,1
5	Coconut	3	0,4
6	Pineapple	216	28,2
7	Banana	91	11,9
8	Papaya	2	0,3
Total		767	100

Types of Agricultural Crops that there are 8 types of agricultural crops in Campus IV of Bangko Hamlet, these plants include Chili 21 individuals, kangkung 2 individuals, Corn 200 individuals, Peanuts 232 individuals, Coconut 3 individuals, Pineapple 216 individuals, Bananas 91 individuals and Papaya 2 individuals

Factors Affecting Agroforestry Development

The factors affecting the development of agroforestry in Bangko Hamlet, Campus IV are arranged based on the variables summarized to obtain alternative development strategies through an internal-external matrix.

Internal Factors

Internal factor analysis is the first step in formulating a development strategy, this analysis is carried out to identify the factors that are the strengths and weaknesses of a business (Tamrin and Kamaluddin, 2020). The results of the identification of the strengths and weaknesses of a business can be used as a basis for determining a business development strategy so that opportunities can be used properly (Tamrin and Kamaluddin, 2020). Identify locations by involving several *experts* who are considered to

know about agroforestry management, weight assessment and internal factor ratings are displayed on the internal strategy factor matrix. The results of the analysis of internal factors for agroforestry development in Campus IV of Bangko Hamlet have 4 strength factors and 4 weakness factors

Table 3. Internal Factors

Variable	Weight	Rating	Score
Strength			
1. Potential commodities	0.15	3	0.49
2. Availability of labor	0.19	3	0.62
3. Relatively low cost	0.21	3	0.64
4. Sustainable income guarantee	0.20	4	0.75
Total	0.75	13	2.50
Weakness			
1. Small-scale cultivated commodities	0.28	3	0.85
2. Less intensive security controls	0.24	2	0.47
3. Suboptimal management	0.08	2	0.17
4. Sub-optimal land conditions that are not in accordance with the conditions for growing plants	0.09	2	0.19
Total	0.70	9	1.68

From the table of internal factors above, it can be seen that the weakness value of 0.85 is greater than the strength value of 0.49, this shows that the weakness factor can hinder the development of agroforestry in Campus IV Unkhair, Dusun Bangko.

External Factors

External factor analysis is aimed at identifying factors that are opportunities and threats faced by farmers. Opportunity is a business that is built profitably, while threats are challenges that arise due to environmental changes that can reduce the profits of a business (Tamrin and Kamaluddin, 2020).

Based on the results of field observations, the factors affecting the development of agroforestry are presented in the following table.

Table 4. External Factors

Variable	Weight	Rating	Score
Opportunities			
1. There is support from the government and academics (counseling)	0.19	3	0.49
2. Adoption of agricultural practices from migrant farmers	0.17	3	0.56
3. Land Availability	0.25	4	0.93
4. Market demand continues to increase	0.15	4	0.54
Total	0.75	13	2.52
Threat			
1. Pests and diseases on plants	0.29	3	0.77
2. Market price fluctuations	0.24	3	0.80
3. Land use change	0.48	2	1.11
Total			2.69

From the table of external factors above, it can be seen that the threat value of 1.11 is greater than the opportunity value of 0.93, this shows that the opportunity factor can hinder the development of agroforestry in Campus IV Unkhair, Dusun Bangko.

Agroforestry Development Strategy

Selection of alternative strategies that are in accordance with existing conditions by creating a SWOT matrix. The SWOT matrix is built based on the results of the analysis of external and internal strategic factors which are compiled from four main strategies, namely: SO, WO, ST and WT (Table 3.2). SWOT analysis that is used appropriately in a business shows various opportunities that can be used well, especially by developing supporting factors and utilizing opportunities into an effective force that can be relied on while overcoming a threat and minimizing weaknesses in the business (Amiluddin *et al,* 2023).

The determination of the agroforestry development strategy at Campus IV Unkhair Dusun Bangko began by making a SWOT diagram based on the scores on the IFAS and EFAS matrices. A

SWOT diagram consists of four quadrants that have a variety of different strategies. These strategies include *growth* strategies (*strenght opportunity*) in quadrant one, *stability* strategies (*weakness, opportunity*) in quadrant two, *defand* strategies (*weakness threats*) in quadrant three, and *diversification* strategies (*strenght threats*) in quadrant four. This is illustrated in the SWOT diagram as follows:

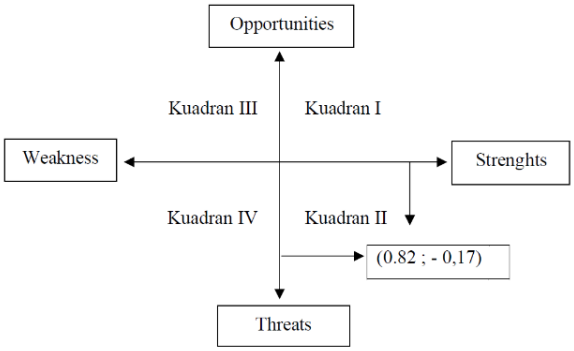

Figure 1. Quadrant Position

Based on the analysis, agroforestry in campus IV is in the second quadrant (0.82;–0.17). Quadrant II is the situation of farmers in facing threats, but farmers have strengths from an internal perspective, namely strategies that must be implemented by using strength to take advantage of existing opportunities (Tamrin & Kamaluddin, 2020).This quadrant shows that agroforestry managers at Bangko Campus IV face many threats but still have strength from an internal perspective. Based on the results of the analysis of the IFAS and EFAS SWOT matrices, the development strategy can be seen in the matrix below:

Table 5. SWOT Matrix

IFAS / EFAS	***Strengths* (S)** 1. Potential commodities 2. Availability of labor 3. Relatively low fees 4. Sustainable income generation
Treaths (T)	**ST Strategy**
1. Pests and diseases on plants	Preventing pests and diseases on plants (S1, T1)
2. Market price fluctuations	Make adjustments to agroforestry product yields in accordance with prevailing market prices (S2, T2)
3. Land use change	The need to prepare and strengthen policies related to land status for land protection (S3, T3)

Agroforestry development strategy at Campus IV of Khairun University, Dusun Bangko, West Halmahera:

1. *Preventing pests and diseases against plants*

Preventing pests and diseases against plants is very important to maintain plant health and increase crop yields as well as maintain agricultural sustainability. To realize this, it is necessary to rotate plants, namely avoid planting the same plants to inhibit the development of pests and diseases specific to certain plants. In addition, fertilize in a balanced manner and in accordance with the type of plant planted in order to help maintain the strength of the plant to fight pest and disease attacks. According to Gumilang et al, 2018. Pests and diseases in plants are one of the factors that can reduce the productivity of a cultivated plant. Therefore, pests and diseases need to be known for future pest control.

2. *Make adjustments to agroforestry product yields in accordance with prevailing market prices*

By adjusting the price of agroforestry products to the prevailing market price, agroforestry managers can maximize their potential profitability. By using information about the current market price, they can determine the optimal price for their product. The strategy used is to conduct market research related to market prices for agroforestry products produced. This information can help managers understand the current market price and make appropriate adjustments. Quoted from Yayasan Savekan Yaki Indonesia (2018) which states that the selling price must be adjusted to the prevailing price in the market in general by paying attention to the production cost of the resulting intervention product.

3. *The need to formulate and strengthen policies related to land status for protection*

Land functions play a key role in environmental sustainability such as environmental protection and food security. To realize this, it can be done by developing and strengthening regulations and regulations related to land use. Agricultural land that has been converted to other uses outside the agricultural sector will have very little chance of turning back into agricultural land. If this problem is not handled and paid special attention to, it will increase the high rate of land conversion and narrow agricultural fertile land in Sukoharjo Regency, especially Nguter District, which has a direct impact on food security (Dinaryanti, 2014).

4. CONCLUSION

Factors that affect the development of agroforestry at Campus IV Unkhair Dusun Bangko consist of internal and external factors. In terms of internal factors, it was concluded that the strength value of 2.50 was greater than the weakness value of 1.68. This shows that the value of strength is a supporting factor for agroforestry development. Then on external factors, it was concluded that the threat value of 2.69 was greater than the opportunity value of 2.52 which showed that the development of agroforestry at Campus IV of Khairun University, Dusun Bangko had a very large potential threat.

Quadrant II describes the situation of farmers in facing threats, but farmers still have strength from an internal perspective.

The strategy that can be taken based on the above case is a diversification strategy, which requires managers/communities to make changes to close their weaknesses and pursue available opportunities.

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