ISSN : 2580-3220, E-ISSN : 2580-4588
J. Mandiri., Vol. 6, No. 1, Juni 2022 (1 - 16)

DOI: https://doi.org/10.33753/mandiri.v6i1.191

Analysis of SWOT Strategy in Sustainable Management of Mangrove Ecosystems in Kaliwlingi Village, Brebes Sub-district, Brebes District

Mohamad Qomar Syarifudin
Fakultas Ilmu Sosial dan Ilmu Politik, Universitas Hang Tuah
mqsyarifudinuht698@gmail.com
Budi Rianto
Fakultas Ilmu Sosial dan Ilmu Politik, Universitas Hang Tuah
budi.rianto@hangtuah.ac.id
Nuhman
Fakultas Ilmu Sosial dan Ilmu Politik, Universitas Hang Tuah
uhtnuhman@gmail.com

Abstract

This study aims to obtain a strategy for managing sustainable mangrove ecosystems in Kaliwlingi Village, Brebes Sub-district, Brebes District. This study uses qualitative research with phenomenological methods. The data needed in this research is primary data obtained directly from respondents and secondary data obtained from data sources that do not directly provide data. The analytical method used in this research is the analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT), and Quantitative Strategic Planning Matrix (QSPM) to determine the right strategy in managing sustainable mangrove ecosystems. The results of the Internal Factor Evaluation (IFE) calculation have a score of 2.21, which is below the average score of 2.50, indicating a less strong internal position. The results of the External Factor Evaluation (EFE) calculation show that the total score of 2.03 is below the average score of 2.50, indicating a less strong external position. The integration stage of IFE and EFE uses a SWOT matrix. The results of the combined score between IFE and EFE are 2.21; 2.03 in the first quadrant position, which is a favorable situation. The results of the QSPM show the Total Attractiveness Score (TAS) of strategy I as much as 6,009 has the highest TAS value and is the chosen alternative priority strategy. The results of the study show that the expansion strategy that must be taken by the Brebes Regency Government is to provide opportunities for the community to manage the mangrove ecosystem independently with assistance from the Government of Brebes District.

Keywords: Management Strategies, Mangrove Ecosystems, Sustainable Management, SWOT Analysis

INTRODUCTION

Sustainable mangrove ecosystem management is an important policy of the Government of Brebes District. The policy is based on the idea that ecologically well-maintained mangrove ecosystems can maintain the sustainability of the coastal areas where they live, and economically have the potential to be developed and utilized for the welfare of the community. The Government of Brebes District has tried to implement policies to

maintain the mangrove ecosystems and manage existing resources in a sustainable manner. One of the efforts to maintain the preservation of the damaged mangrove ecosystems is by way of rehabilitation.

According to field cited by Akbar (Akbar et al., 2017), there are three approaches to rehabilitating mangroves based on their objectives, namely:

1. conservation methods and landscape formation aimed at restoring the conservation value or landforms of an area.
2. A multipurpose system method for yield sustainability, this approach is only carried out if the degradation of the mangrove forest has affected the land use.
3. Coastal protection methods in the form of planting mangrove forests in areas prone to storms, hurricanes, tides, and erosion to maintain land stability and coastal protection.

Law Number 27 of 2007 mandates that the government and regional governments are required to manage and update data and information on coastal and small islands periodically and be documented as an official public document for use by any person or other stakeholders by considering all aspects of sustainability (Muhsimin et al., 2018). The government, especially the Government of Brebes District, in developing, constructing, and utilizing coastal areas, especially mangrove ecosystems, must be based on and on applicable laws and regulations which aim to improve the welfare of the community. In 2015, Indonesia had the largest mangrove forest ecosystems in the world, covering approximately 3,489,140.68 ha consisting of well-conditioned mangrove forests covering an area of 1,671,140.75 ha and damaged conditions covering an area of 1,817,999,999.93 ha, as well as the highest biodiversity (Rahmah et al., 2019).

Mangrove forest destruction can be caused by two factors, namely natural factors and human factors. Damage to mangrove forests is caused by natural factors, such as sedimentation, abrasion, drought, and attacks by pests such as crabs, spiders, termites, caterpillars and ants. Damage to mangrove forests is caused by human factors such as environmental pollution, forest encroachment, and excessive land use conversion into aquaculture areas for the cultivation of fish, shrimp, crabs, and salt. According to Toknok, as quoted by Susilawati et al. Damage to mangrove ecosystems is generally caused by physical environmental factors and socio-economic factors of the community (Susilawati et al., 2018).

According to Sugiarto, as cited by Tambunan (Tambunan et.al, 2005) , Mangroves have several functions, namely:

1. Ecological function, mangrove forests with root systems and their growth can function to protect the coast, retaining mud and sediment transported by surface water flows.
2. Economic function, mangrove forest as a producer of wood for household, industrial, and its leaves as raw material for medicines.
3. In a biological function, mangrove forest is a place for spawning, a place for care, a place for foraging for food, and from its fallen leaves it can be a producer of food ingredients for marine life.

Increased activities in the coastal area of the Brebes District increase the need for land, which results in conflicts of interest among various actors in the coastal area of the Brebes District and has an impact on the management of the coastal area. Problems with the development of coastal areas in the Brebes District have resulted in environmental damage to coastal areas such as abrasion and sedimentation. From 2000-to 2008, there was an abrasion that submerged the coastal area in the Brebes District, reaching approximately 640.45 ha and accretion covering an area of 815.76 ha (Dinas Perikanan dan Kelautan Kabupaten Brebes, 2008).

Based on the description above, the purpose of this study is to obtain the strategy of the Government of Brebes District in managing sustainable mangrove ecosystems in the coastal area of the Brebes District so that the socio-economic benefits can be felt by the surrounding community. The SWOT analysis is used to obtain strategies for sustainable management of mangrove ecosystems in the coastal area of the Brebes District.

METHODS

Research Types

This type of research uses qualitative research with the phenomenological method. The phenomenological method is used with the aim of capturing a phenomenon, event or symptom that occurs from experience by ignoring presumptions that may occur so that the essence of the phenomenon appears naturally. Littlejohn, as cited by Hasbiyansyah, explains the phenomenology of the study of knowledge that comes from consciousness or how to understand an object or event by experiencing it consciously (Hasbiansyah, 2008).

The research location in Kaliwlingi Village, Brebes Sub-district, Brebes District was deliberately chosen because it had experienced severe damage to the mangrove ecosystem as a result of the conversion of mangrove forest land into large-scale aquaculture lands. The known population is 25 people who are estimated to be able to actively participate in helping the research run smoothly and the degree of accuracy is 0.05. The number of respondents was determined using the Slovin formula (Supriyanto et.al, 2017), as follows:

$$s = \frac{N}{1+N.e^2}$$

Information:
s = Sample Quantity
N = Population Number
e = Error Tolerance Limit

Based on the Slovin formula above, the number of respondents can be calculated, as follows:

$$s = \frac{25}{1 + 25 \times 0{,}05^2} = \frac{25}{1{,}0625} = 24$$

So, the number of samples or respondents needed in this research is 24 people.

Data Collection Stage

According to Siyoto, data collection in research needs to be monitored so that the data obtained can be maintained at the level of validity and reliability (Siyoto et.al, 2015). The data collection and analysis technique used in this study is the triangulation method. According to the Institute of Global Technology, as quoted by Bachri, the triangulation method is a combination of various methods used to examine interrelated phenomena by testing information by collecting data through different methods, by different groups and in different populations (Bachri, 2010).

In this study, the focus of research is the most appropriate strategy so that the management of mangrove ecosystems can run sustainably in Kaliwlingi Village, Brebes Sub-district, Brebes District. The focus of the research aims to limit the problem based on the limitations of the author in terms of energy, time, opportunities, and funds. The sampling technique used is purposive sampling, which is the intentional taking of respondents who can provide data, information, and explanations tailored to the purpose of data collection based on criteria determined by the researcher. According to Sugiyono, as cited by Mukhsin, the purposive sampling method, namely the sampling technique by determining certain criteria (Mukhsin et al., 2017).

The resources of data used in this study are primary data and secondary data. Primary data sources are data sources that directly provide data to data collectors, and secondary data sources are data sources that indirectly provide data to data collectors (Hardani et al., 2020).

Data Analysis Stage

Analysis of strengths, weaknesses, opportunities, and threats (SWOT) is a method for systematically identifying various factors to formulate corporate strategy. This analysis is based on a logic that can maximize strengths and opportunities, but at the same time minimize weaknesses and threats (Astuti et.al, 2020). In-depth, SWOT analysis is also used to systematically analyze various internal and external factors so that they can determine the

right strategy for managing sustainable mangrove ecosystems. The sustainable management of mangrove ecosystems aims to secure, protect and make the best use of the mangrove ecosystem to maintain its sustainability.

According to Koster cited by Rahmayati, defining a SWOT analysis is an assessment of the overall strengths, weaknesses, opportunities, and threats (Rahmayati, 2015). Meanwhile, David as quoted by Sari explained that the relationship between internal factors and external factors is described in the SWOT matrix after knowing the strengths, weaknesses, opportunities, and threats to obtain alternative strategies that can be formulated by combining SO, ST, WO, and WT (I. D. O. Sari, 2019).

The SWOT analysis in this study was used with an Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) approach based on the consideration that it could maximize strengths and opportunities at the same time as well as create weaknesses and threats. Thus, in determining a sustainable mangrove ecosystem management strategy, it is necessary to analyze the strengths, weaknesses, opportunities, and threats in the conditions that exist in the field. Based on the description above, the authors are interested in researching SWOT analysis concerning sustainable mangrove ecosystem management strategies in Kaliwlingi Village, Brebes Subdistrict, Brebes District.

Validity Test

Sugiyono in Sari explains that when researchers collect data by actual triangulation, the researchers at the same time test the validation of the data collected with different data collection techniques to obtain data from the same source (M. Sari et al., 2018). Figure 1, which shows a flow diagram of the triangulation form of data collection techniques, is presented below:

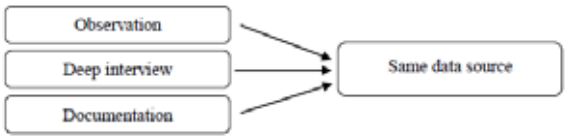


Figure 1. Triangulation of data collection techniques
Source: M. Sari et al., (2018).

Figure 2, which shows a flow diagram of the triangulation form of data collection sources, which is presented in the following sections:

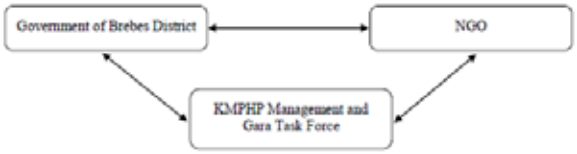


Figure 2. Triangulation of data collection sources
Source: M. Sari et al., (2018).

Figure 3, which shows a flow diagram of the triangulation form, the data collection procedure is presented below:

Figure 3. Triangulation of data collection procedures
Source: M. Sari et al., (2018).

RESULTS

There are two stages of SWOT analysis conducted in this study. The first, determine factors that affect the management of sustainable mangrove ecosystems such as existing natural resources, human resources that manage, supporting facilities and infrastructure, and regulations applicable in the region. The second, determine, analyze, and evaluate the significance of each internal and external policy factor obtained through a combination of interviews, observations, and secondary data collection documentation. Table 1, wich shows the SWOT matrix diagram, is presented below:

Table 1. SWOT matrix diagram

Internal / External	Strength (S) Determining the internal strength factor	Weakness (W) Determining Internal weakness
Opportunity (O) Determining External opportunity factors	Strategy S-O The strategy of using strength to take advantage of opportunities	Strategy W-O Strategies to minimize weaknesses and to take advantage of opportunities
Threat (T) Determining External threat factors	Strategy S-T The strategy of using strength to overcoming threats	Strategy W-T Strategies to minimize weaknesses to avoid threats

Respondents in this study were deliberately selected. As many as 24 people, consisting of 14 people (58%), were KMPHP administrators, and 10 people (42%) were members of the Gara Task Force. The initial assumption (H0) is that the respondent has no significant relationship between the respondent and the sustainable management of mangrove ecosystems. The second assumption (H1) is that the choice of the respondent has a significant relationship between the respondent and the sustainable management of mangrove ecosystems.

All respondents have the same drive to manage the mangrove ecosystem in their consciousness and will. Respondents' participation in sustainable mangrove ecosystem management for reasons to protect settlements and aquaculture areas from waves that cause abrasion and seawater tidal flooding.

The depreciation of mangroves in the coastal area of the district of Brebes occurs very fast. In 1983, the existing mangrove area reached 2,370 ha, rising to 505 ha in 2002. This shows that the average decline is 101.22 ha each year. Even between 2000 and 2002, the decrease has been increasing, reaching an average of 129.38 ha each year (Suyono et al., 2015).

The uncontrolled use of mangrove forest areas is fatal because the mangrove forests that function as land protectors are completely cleared. Since 1985, one by one, the ponds of the population have been submerged by abrasion and tidal waves. In 1995, there was the most severe abrasion and tidal flooding that drowned hundreds of hectares of ponds for the residents of Kaliwlingi. Table 2, which shows the shrinkage of the pond in the village of Kaliwlingi because of the abrasion, is presented below:

Table 2. Depreciation of Kaliwlingi Village's Aquaculture Area Due to Abrasion

Number	Year	Area of Depreciation (Ha)	Average Depreciation (Ha)
1	1992-2007	590	98,3
2	2008-2012	300	60
Amount		890	81

Source: Kompas.com (2012).

In 2005, the people of Kaliwlingi Village, spearheaded by members of the KMPHP and Gara Task Force, began to realize the importance of mangrove ecosystems for the preservation of the coastal area. The community began to rehabilitate mangrove forests to restore the mangrove ecosystem, protecting coastal areas from the brunt of waves and abrasion.

Efforts to deal with abrasion have been made by the local community by replanting mangroves into old ponds. Table 3, which shows mangrove planting in the village of Kaliwlingi from 2005 to 2019, is presented below:

Table 3. Mangrove Planting in Kaliwlingi Village 2005 to 2019

Number	Planting Year	Number of Mangroves (Stems)	Mangrove Area (Ha)
1	2005-2010	950.000	75,5
2	2011-2015	1.050.000	98
3	2016-2019	1.431.000	148
Amount		3.431.000	321,5

The factors that influence a person's participation are divided into two, namely internal factors and external factors.

Internal Factors

Internal factors include the internal characteristics of respondents that may influence and encourage engagement. Table 4, which shows the distribution of internal factors, is presented below:

Based on table 4, it shows the distribution of respondents' age, education level, and income level are not related and have a significant effect on the level of participation of respondents. The main factors that encourage respondents to actively participate in the management of mangrove ecosystems are a distance from their homes, land ownership, and length of stay. This is the negative impact of the damage to the mangrove ecosystem that is felt directly by the respondents.

Table 4. Distribution of internal factors

Internal Factors		Number of KMPHP	%	Number of Gara Task Forces	%
Age	< 25 years old	0	0	0	0
	25-50 years old	8	57,1	5	50
	> 50 years old	6	42,9	5	50
level of education	Primary School	9	64,3	8	80
	Junior/Senior	4	28,6	2	20
	High School University	1	7,1	0	0
level of income	< 1 million	0	0	0	0
	1-3 million	8	57,1	9	90
	> 3 million	6	42,9	1	10
house distance	< 1 kilometers	0	0	0	0
	1-3 kilometers	4	28,6	2	20
	> 3 kilometers	10	71,4	8	80
land ownership	< 1 hectares	11	78,6	10	100
	1-2 hectares	2	14,3	0	0
	> 2 hectares	1	7,1	0	0
length of stay	< 5 years	0	0	0	0
	5-10 years	0	0	0	0
	> 10 years	14	100	10	100

The method of determining the internal strategic factors in managing sustainable mangrove ecosystems in Kaliwlingi Village, Brebes Sub-district, Brebes District is:

a. Determine the factors that constitute the strengths and weaknesses of sustainable management of the mangrove ecosystems.
b. Giving weight to each factor according to its importance or usefulness.
c. Provide a suitable value for each factor based on its influence on sustainable management of the mangrove ecosystem.
d. Gives a weighted score for each factor.

According to Fred R. David, as cited by Ningsih (Ningsih & Hamamah, 2014) in determining the weighted average Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) as follows:

a. If the total weighted average IFE is less than 2.5, this indicates a trend to a low internal position because the strength factors have not been fully used. If the total IFE weighted average is greater than 2.5, this indicates a strong internal position because the strength factors have been used to the maximum to overcome existing weaknesses.
b. If the total weighted average of EFE is below 2.5, this indicates a trend toward a weak external position because the opportunity factors have not been fully used. If the total weighted average of EFE is greater than 2.5, this indicates a strong external position because opportunity factors have been optimally used to overcome existing threats.

Table 5, which shows the IFE matrix of sustainable management of mangrove ecosystems strategies, is presented below:

Table 5. IFE Matrix of sustainable mangrove ecosystem management

	Main Internal Factors	Weight	Rating	Total Score
Strenghts				
1	Good social relationships	0,115	3,0	0,35
2	Awareness of the mangrove ecosystem	0,210	3,5	0,74
3	Ban people cutting down mangroves	0,125	3,0	0,38
4	Benefits of the mangrove ecosystem	0,125	3,5	0,44
5	Mangrove conservation community groups	0,200	3,5	0,70
	Sub Total Strength	0,775		2,59
Weakness				
1	Low education level in the community	0,040	1,5	0,06
2	Low-income level	0,045	1,5	0,07
3	Lack of awareness of the affected community	0,050	1,5	0,08
4	The size of the area affected by abrasion	0,050	2,0	0,10
5	Limited rehabilitation budget	0,040	2,0	0,08
	Sub Total Weakness	0,225		0,38
FI tendencies towards management strategy (X axis)		1,000		2,21

Based on table 5, the results of the IFE calculation show the tendency of internal factors toward sustainable mangrove ecosystem management strategies to have a score of 2.21, which is below the average score. These results indicate a less strong internal position because the existing strength factors in society have not been utilized optimally to overcome existing weaknesses.

External Factors

External factors are third parties coming from outside the individual that can affect community participation. The third parties studied are the Government of Brebes District, local NGO, NGO, university, and limited liability companies that are actively assisting the management of the mangrove ecosystems. The involvement of third parties as sponsors, especially the Government of Brebes District, in the form of projects that are directly or indirectly related to the management of the mangrove ecosystems that are carried out continuously to make the process run smoothly and sustainably. Table 6, which shows the involvement of external factors, is presented below.

How to determine external strategic factors in the sustainable management of the mangrove ecosystems, as follows:

a. Determine the factors that become opportunities and threats to the sustainable management of the mangrove ecosystems.
b. Giving weight to each factor according to its importance or usefulness.
c. Provide a suitability value for each factor based on its influence on sustainable suitable management of the mangrove ecosystems.
d. Gives a weighted score for each factor.

The level of participation of respondents in the management of mangrove ecosystems can be carried out at the decision-making stage, implementation stage, enjoying results, and evaluation stage. Some respondents followed all stages of about seventeen people (70.8%), who followed three stages of about six people

Table 6. External factor engagement

Number	External Factors	Number of Activities	Measurement Parameters
1	The Government of Brebes District		
	- low	0	1-2 activities
	- currently	0	3-5 activities
	- high	20	5 > activities
2	Local NGO		
	- low	0	1-2 activities
	- currently	0	3-5 activities
	- high	8	5 > activities
3	NGO		
	- low	0	1-2 activities
	- currently	0	3-5 activities
	- high	5	5 > activities
4	University		
	- low	0	1-2 activities
	- currently	5	3-5 activities
	- high	0	5 > activities
5	Limited company		
	- low	0	1-2 activities
	- currently	0	3-5 activities
	- high	10	5 > activities

(25%), who followed two stages of about one person (4.2%), and none of the respondents only participated in one stage of participation. Table 7, which shows the distribution of the level of participation of respondents, is presented below.

The form of participation carried out by respondents in managing mangrove ecosystems in the form of thoughts, energy, expertise, goods, and money. Respondents who participated in all forms of participation were 17 people (70.8%), followed four forms of participation and as many as seven people (29.2%), and there were no respondents who only participated in 3, 2, or 1 forms of participation. Table 8, which shows the distribution of the form of participation of respondents, is presented below.

Based on the results of data processing obtained in the field, then identification, assigning a weight, and assigning a rating value to each of these factors is carried out. Table 9, which shows the EFE matrix of sustainable management of mangrove ecosystems strategies, is presented below.

Based on table 9, the results of the EFE calculation show a total score of 2.03, which is below the average score of 2.50. This result indicates that the external position is less strong because the opportunity factors have not been utilized optimally to overcome the existing threats.

Table 7. Distribution of Respondents' Participation Level

Number	Participation Rate	Respondent				Parameter
		KMPHP	%	Gara Task Forces	%	
1	Stage of decision making					DF=2,P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	0	0	0	CSH= 8,765
	- high	10	71,4	7	70	> 4 activities
2	Stage of implementation					DF=2, P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	0	0	0	CSH= 12,333
	- high	14	100	10	10	> 4 activities
3	Stage of enjoying the results					DF=2, P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	0	0	0	CSH= 12,333
	- high	14	100	10	100	> 4 activities
4	Stage of evaluation					DF=2, P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	5	0	0	CSH= 12,043
	- high	14	100	9	90	> 4 activities

Notes: DF= degree of freedom, P= probability, CST= chi-square table, CSH= chi-square count.

Table 8. Distribution of respondents' participation forms

Number	Participation Rate	KMPHP	%	Gara Task Forces	%	Parameter
1	Thought					DF=2,P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	0	0	0	CSH= 12,333
	- high	14	100	10	100	> 4 activities
2	Power					DF=2, P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	0	0	0	CSH= 12,333
	- high	14	100	10	100	> 4 activities
3	Skill					DF=2, P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	0	0	0	CSH= 8,765
	- high	10	71,4	7	70	> 4 activities
4	Goods					DF=2, P= 0,05
	- low	0	0	0	0	CST=5,991
	- currently	0	5	0	0	CSH= 12,333
	- high	14	100	10	100	> 4 activities

Notes: DF= degree of freedom, P= probability, CST= chi-square table, CSH= chi-square count.

Table 9. EFE Matrix of sustainable mangrove ecosystem management

Main External Factors	Weight	Rating	Total Score
Opportunities			
1. High support from the Government of Brebes District	0,200	3,5	0,70
2. High support from Local NGOs, NGOs, and university	0,140	3,0	0,42
3. Making mangrove ecotourism	0,125	3,5	0,44
4. Adequate infrastructure and facilities	0,150	3,0	0,45
5. People's desire to participate	0,135	3,5	0,47
Total	0,750		2,48
Threats			
1. Sedimentation and water pollution	0,45	1,5	0,07
2. Abrasion that erodes the land	0,45	2,0	0,09
3. Seawater intrusion into land	0,55	1,5	0,08
4. Illegal logging and timber theft	0,55	2,0	0,11
5. Pests that attack mangrove treess desire to participate	0,50	2,0	0,10
Total	0,250		0,45
FE tendency towards strategy (Y axis)	1,00		2,03

DISCUSSION

The results of the analysis of internal factors and external factors are combined by using the SWOT matrix to obtain the best alternative strategy that can be used. Table 10, which shows the SWOT matrix for the sustainable management of mangrove ecosystems, is presented below.

Based on table 10, internal factors and external factors that have been identified are in quadrant I. Figure 4, which shows the four quadrants in the SWOT analysis, is presented below.

Table 10. SWOT matrix for sustainable mangrove ecosystem management

Internal / **External**	**Strength (S)** 1. Good social relationships 2. Awareness of the mangrove ecosystem 3. Ban people cutting down mangrove 4. Benefits of the mangrove ecosystem 5. Mangrove conservation community groups	**Weakness (W)** 1. Low education level in the community 2. Low-income level 3. Lack of awareness of the affected community 4. The size of the area affected by abrasion 5. Limited rehabilitation budget
Opportunities (O) 1. High support from the Government of Brebes District 2. High support from local NGO, NGO and university 3. Making mangrove ecotourism 4. Adequate infrastructure and facilities 5. People's desire to participate	Strategy SO 1. Provide opportunities for the community to manage the mangrove ecosystem independently so that they can participate directly in the sustainable management of the mangrove ecosystem with assistance from the local government 2. Utilizing the potential of the mangrove ecosystem by involving the community directly so that they awareness can maintain and supervise sustainable mangrove ecosystems	Strategy WO 1. Provide socialization about the importance of mangrove ecosystems and make it ecotourism that can increase community participation in mangrove ecosystem management 2. Increase community income by making the mangrove ecosystem ecotourism and providing opportunities for them to manage
Threats (T) 1. Sedimentation and water pollution 2. Abrasion that erodes the land 3. Seawater intrusion into land 4. Illegal logging and timber theft 5. Pests that attack mangrove trees	Strategy ST 1. Planting and maintaining sustainable mangroves independently along the coastline, areas of former abraded ponds, and around ponds 2. Protecting and supervising the mangrove ecosystem from damage caused by pests by providing insecticides and by providing strict sanctions	Strategy WT Provide socialization about the role and importance of mangrove ecosystems so that they can improve sustainable mangrove ecosystem management strategies and guard against damage caused by pests and humans

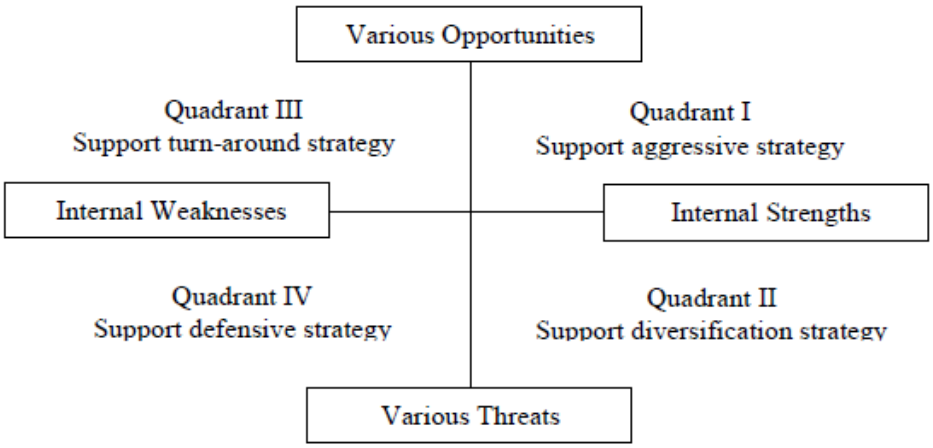
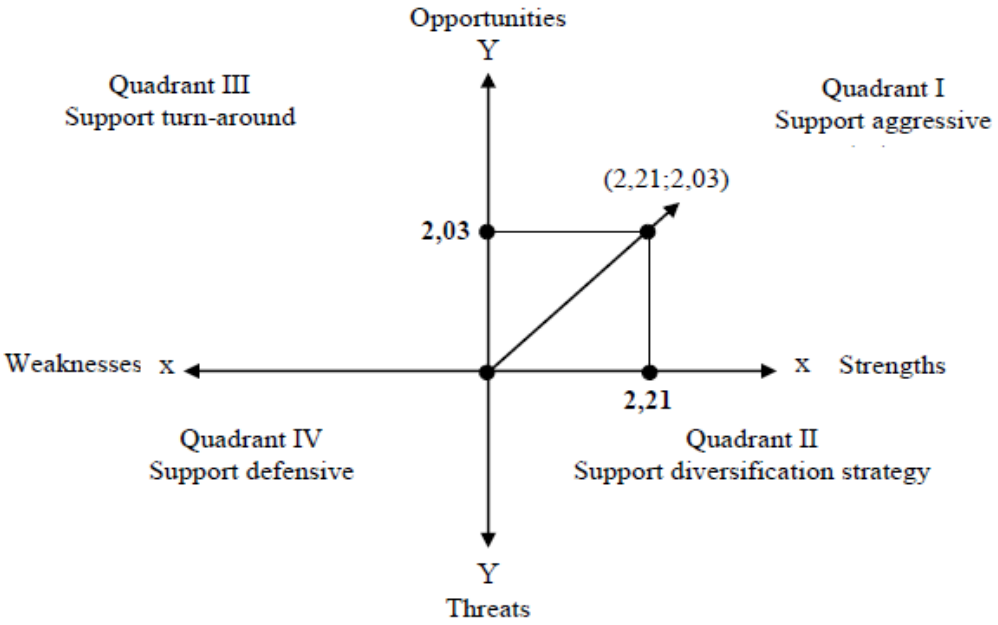


Figure 4. Four quadrants in SWOT analysis
Source: Rangkuti (2016).

Based on Figure 4, which shows the results of the combination of strengths and opportunities in the quadrant I is a profitable position. The strategy applied is aggressive. Figure 5, which shows the strategic position of the sustainable management of mangrove ecosystems, is presented below:



Based on figure 5, it shows the result of the matching score between internal factors and external factors at (2,21;2,03). It is in the position of quadrant I. This position is a favorable situation, meaning that community participation in sustainable mangrove ecosystem management in Kaliwlingi Village is in a strong position. In quadrant I, the development strategy applied is aggressive, namely enlarging and accelerating the rehabilitation and management of sustainable mangrove ecosystems more broadly. Community participation in the sustainable management of mangrove ecosystems must also avoid factors that are threats and weaknesses, develop and take advantage of existing opportunity factors as well as possible by using the strengths of the community.

There are two SO strategies that may be applied for the development of community participation in the sustainable management of the mangrove ecosystem, namely:

a. Strategy I: Provide opportunities for communities to manage mangrove ecosystems independently so that they can participate directly in the sustainable management of the mangrove ecosystems with assistance from the Government of Brebes District.
b. Strategy II: Harnessing the potential of mangrove ecosystems by involving the community directly so that those with their awareness can maintain and supervise mangrove ecosystems sustainably.

Result Validation Test

Quantitative Strategic Planning Matrix (QSPM)

The decision-making stage is carried out using the Quantitative Strategic Planning Matrix (QSPM) approach. The QSPM is a systematic strategic approach to evaluating alternative strategies and helping to decide on the most suitable strategy based on input from internal and external factors. The QSPM approach is an attempt to objectively select the best strategy using management techniques. According to David, as quoted by Sari, QSPM is a tool that allows strategists to objectively evaluate alternative strategies based on previously identified internal and external success factors (I. D. O. Sari, 2019).

The specialty of using the QSPM approach is that the series of strategies can be observed sequentially and simultaneously. Strategists may include external and internal factors to analyze and determine the chosen strategy. The QSPM matrix has limitations in drafting because it requires intuition and fundamental assumptions, while the provision of attractiveness score (AS) must be based on objective information. The AS value shows the level of relative attractiveness that has been determined and then multiplies it by the weight to produce a Total Attractiveness Score (TAS). Table 11, which shows the results of the QSPM TAS matrix alternative strategies I and II, is presented below:

Main Factor	Weight	Strategic Alternative I		Strategic Alternative II	
		AS	TAS	AS	TAS
Internal factors					
Strengths					
1. Good social relationships	0,115	3,0	0,345	3,0	0,345
2. Awareness of the mangrove ecosystems	0,210	3,9	0,819	3,7	0,777
3. Ban people cutting down mangroves	0,125	3,0	0,375	3,0	0,375
4. Benefits of mangrove ecosystems	0,125	3,8	0,475	3,5	0,438
5. Mangrove conservation community groups	0,200	3,9	0,722	3,6	0,666
Weaknesses					
1. Low education level in the community	0.040	1,5	0,068	1,5	0,068
2. Low-income level	0.045	1,5	0,075	1,5	0,075
3. Lack of awareness of the affected community	0,050	1,5	0,075	1,5	0,075
4. The size of the area affected by abrasion	0,050	1,5	0,075	2,0	0,100
5. Limited rehabilitation budget	0,040	1,5	0,068	2,0	0,090
Total	1,000				

External Factors					
Opportunities					
1. High support from Government of Brebes District	0,200	3,7	0,722	3,5	0,683
2. High support from local NGOs, NGOs and university	0,140	3,5	0,420	2,5	0,300
3. Making mangrove ecotourism	0,125	3,5	0,403	3,0	0,345
4. Adequate infrastructure and facilities	0,150	2,8	0,322	2,8	0,322
5. People's desire to participate	0,135	3,5	0,368	2,8	0,289
Threats					
1. Sedimentation and water pollution	0,045	1,5	0,113	1,5	0,113
2. Abrasion that erodes the land	0,045	2,5	0,188	2,5	0,188
3. Seawater intrusion into land	0,055	1,5	0,083	1,5	0,083
4. Illegal logging and timber theft	0,055	2,1	0,158	2,1	0,158
5. Pests that attack mangrove trees	0,050	2,0	0,140	2,0	0,140
TAS			6,009		5,626
Selected Strategy Priority			I		II

Based on table 11, the results of the QSPM matrix show that TAS strategy I is 6,009 and strategy II is 5,626. Thus, the strategy I has the highest TAS value and becomes the preferred alternative priority strategy. The sustainable management of mangrove ecosystems strategy by providing opportunities for communities to manage mangrove ecosystems independently so that they can participate directly in sustainable mangrove ecosystem management with assistance from the Government of Brebes District. Community empowerment strategies to manage mangrove ecosystems independently with the assistance of the Government of Brebes District are important because the mangrove ecosystem is an asset to the village, and the community must be responsible for maintaining its sustainability.

CONCLUSION

Based on the results of the study, it was found that the integration score between internal factors and external factors SWOT analysis was (2.21; 2.03) in the position of quadrant I. In quadrant I, the development strategy applied is aggressive, namely enlarging and accelerating the rehabilitation and sustainable management of mangrove forests more broadly. The results of the QSPM matrix show that TAS strategy I has the highest score of 6.009, and it is the chosen alternative priority strategy. The Sustainable management of the mangrove ecosystems strategy by providing opportunities for communities to manage mangrove ecosystems independently so that they can participate directly in the sustainable management of the mangrove ecosystems with assistance from the Government of Brebes District.

Mangrove ecosystem management strategy based on local community participation is carried out as an effort so that mangrove ecosystem management can run sustainably. The assistance program by the Government of Brebes District can increase community participation in the management of mangrove ecosystems in the mangrove ecosystem area of Kaliwlingi Village, Brebes Sub-district, Brebes District, so that the existence of mangrove ecosystems has a positive impact on local communities. The role of local government also needs to be improved through community empowerment programs, especially infrastructure development programs in the mangrove ecosystem area of Kaliwlingi Village. Thus, community participation can increase, and the existence of mangrove ecosystems in a sustainable manner can improve people's living standards.

ACKNOWLEDGEMENT

Praise and gratitude, researchers pray to Allah Subhanahu Wa Taala for His mercy and grace so that researchers can complete this

research entitled "Analysis of SWOT Strategy in Sustainable Management of Mangrove Ecosystems in Kaliwlingi Village, Brebes Sub-district, Brebes District". The researcher realizes that this research would not be possible without the help, guidance, and support of all parties, both morally and materially. The researcher would like to thank all those who have helped with the smooth running of this research, either directly or indirectly, which cannot be mentioned one by one, for their encouragement, motivation, assistance, and prayers.

REFERENCES

Akbar, A. A., Sartohadi, J., Djohan, T. S., & Ritohardoyo, S. (2017). Erosi Pantai, Ekosistem Hutan Bakau dan Adaptasi Masyarakat Terhadap Bencana Kerusakan Pantai Di negara Tropis (Coastal Erosion, Mangrove Ecosystems and Community Adaptation to Coastal Disasters in Tropical Countries). Jurnal Ilmu Lingkungan, 15(1), 1. https://doi.org/10.14710/jil.15.1.1-10.

Astuti, A. M. I., & Ratnawati, S. (2020). Analisis SWOT Dalam Menentukan Strategi Pemasaran (Studi Kasus di Kantor Pos Kota Magelang 56100). Jurnal Ilmu Manajemen, 17(2), 58–70.

Bachri, B. S. (2010). Meyakinkan Validitas Data Melalui Triangulasi Pada Penelitian Kualitatif. Jurnal Teknologi Pendidikan, 10(1), 46–62.

Dinas Perikanan dan Kelautan Kabupaten Brebes. (2008). Penyusunan Rencanan Tata Ruang Pesisir Kabupaten Brebes. 56 p.

Hardani, Auliya, N. H., Helmina Andriani, Fardani, R. A., Ustiawaty, J., Utami, E. F., Sukmana, D. J., & Istiqomah, R. R. (2020). Metode Penelitian Kualitatif & Kuantitatif (Kesatu, Issue Maret). CV. Pustaka Ilmu Group Yogyakarta.

Hasbiansyah, O. (2008). Pendekatan Fenomenologi : Pengantar Praktik Penelitian dalam Ilmu Sosial dan Komunikasi. Jurnal Mediator, 9(1), 163–180.

Kompas.com. (2012). Tambak Dijadikan Tempat Budidaya Kerang. Kompas. Com. https://regional.kompas.com/read/2012/11/27/05115877/tambak.dijadikan.lahan.budidaya.kerang.

Muhsimin, M., Santoso, N., & Hariyadi, H. (2018). Status Keberlanjutan Pengelolaan Ekosistem Mangrove di Wilayah Pesisir Desa Auni Kecamatan Tinanggea Kabupaten Konawe Selatan. Journal of Tropical Silviculture, 9(1), 44–52. https://doi.org/10.29244/j-siltrop.9.1.44-52.

Mukhsin, R., Mappigau, P., & Tenriawaru, A. N. (2017). Pengaruh Orientasi Kewirausahaan Terhadap Daya Tahan Hidup Usaha Mikro Kecil dan Menengah Pengolahan Hasil Perikanan di Kota Makassar. Jurnal Analisis, 6(2), 188–193.

Ningsih, K., & Hamamah, H. (2014). Matriks Internal Factor Evaluation (IFE) dan External Factor Evaluation (EFE) Buah Naga Organik (Hylocereus Undatus). Jurnal Agromix, 5(1), 12–21.

Rahmah, D. D. N., P, S. A., Reski, A. A., & Syahadata, J. (2019). Sanitasi Lingkungan Dalam Menjaga Kualitas Hidup Pada Ekosistem Hutan Mangrove. Psikostudia : Jurnal Psikologi, 7(2), 48. https://doi.org/10.30872/psikostudia.v7i2.2405.

Rahmayati. (2015). Analisis SWOT dalam Menentukan Strategi Pemasaran Udang Beku PT. Mustika Mina Nusa Aurora Tarakan, Kalimantan Utara. Jurnal Galung Tropika, 4(1), 60–67. https://jurnalpertanianumpar.com/index.php/jgt/article/view/28.

Rangkuti, F. (2016). Teknik Membedah Kasus Bisnis Analisis SWOT: Cara Perhitungan Bobot, Rating dan OCAI. Kompas Gramedia, Jakarta.

Sari, I. D. O. (2019). Analisis Faktor Eksternal dan Internal Sebagai Dasar Perumusan Strategi Bisnis UD Sekar Jati Star Jombang. Jurnal Akuntansi AKUNESA, 53(9), 1689–1699.

Sari, M., Mintarti, S., & Fitria, Y. (2018). Akuntabilitas pengelolaan keuangan organisasi keagamaan. Kinerja, 15(2), 45. https://doi.org/10.29264/jkin.v15i2.4029.

Siyoto, Sandu dan Sodik, M. A. (2015). Dasar Metologi Penelitian (Cetakan 1). Literasi Media Pablishing, Yogyakarta.

Supriyanto, W., & Iswandari, R. (2017). Kecenderungan Sivitas Akademika dalam Memilih Sumber Referensi untuk Penyusunan Karya Tulis Ilmiah di Perguruan Tinggi. Jurnal Berkala Ilmu Perpustakaan Dan Informasi, 13(1), 79–86. https://doi.org/10.22146/bip.26074.

Susilawati, N. G. K., Toknok, B., & Korja, I. N. (2018). Faktor Penyebab Kerusakan Hutan Mangrove di Desa Buranga Kecamatan Ampibabo Kabupaten Parigi Moutong. Jurnal Forest Sains, 15(2), 91–99.

Suyono, Supriharyono, Hendrarto, B., & Radjasa, O. K. (2015). Pemetaan Degradasi Ekosistem Mangrove dan Abrasi Pantai Berbasis Geographic Information System di Kabupaten Brebes-Jawa Tengah. Jurnal Oseatek, 9(Vol 9, No 01 (2015): Juni), 90–102.

Tambunan, Ridwan & Harahap, R. Hamdani & Lubis, Z. (2005). Pengelolaan Hutan Mangrove di Kabupaten Asahan. Jurnal Studi Pembangunan, 1(1), 55–69.