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Strategy For Developing A Sustainable Seaweed Cultivation Industry In The Kotania Bay Area, Maluku

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Abstract—Seaweed cultivation business provides good prospects for national and international trade. Sustainable area management in terms of economics, human resources and social culture. The aim of this research is to analyze the potential and strategy for developing a sustainable seaweed cultivation industry in the Kotania Bay area, West Seram, Maluku. The research was carried out from March to June 2023. The methods used in this research were survey methods, interviews, discussions, and focus group discussions, as well as field studies in the Katonia Bay seaweed cultivation area. Determining the sample using purposive sampling. Data analysis was carried out using quantitative and qualitative descriptive methods using Excel software and the SWOT method (Strengths, Weaknesses, Opportunities, Threats). Based on the results of the SWOT analysis, the priority seaweed cultivation development strategy that must be carried out is to formulate a seaweed cultivation business development strategy by applying intensive cultivation technology. Utilization of new land to increase production and meet market needs.

Keywords— Seaweed; strateg;, production; Kotania.

I. INTRODUCTION

The potential of Indonesian seaweed is very promising and can become a commodity that plays a very important role in the movement of national economic progress. Evidently, Indonesia is one of the largest producers of Eucheuma Cotonii seaweed and controls 50% of the world market share to meet export market demand from the cosmetics and pharmaceutical industries. However, 80% of the products exported are still in the form of raw materials, namely dried seaweed. Even though Indonesia has quite developed marketing and seaweed cultivation efforts, it has not been balanced with adequate processing development. This can be seen from the fact that only around 20% of national seaweed production can be absorbed and processed by domestic industry.

Kotania Bay is one of the bays in the waters of West Seram Regency, with a water area of 470,999 km2 and a depth of 0-200m.

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(Nanlohy et al, 2013) consists of three sub-districts Piru, Waesala and Huamual and the center for seaweed cultivation is Wael Hamlet, Piru District. Kotania Bay is a semi-enclosed water area and has the potential for important coastal resources, namely mangrove, seagrass and coral reef ecosystems. In this ecosystem there is a rich diversity of marine biological resources such as fish, molluscs, echinoderms, crustaceans and macro-algae which have economic and non-economic value (Nanlohy, 2014; Huliselan, et al, 2017). Sustainable management in an area consists of technology, economics and social. economic, social and environmental fields (WCED, 1987) Unsustainable development will result in temporary benefits and losses that can result in the closure of the business.

One area that is ecologically very potential for seaweed cultivation is in the waters of Kotania Bay, West Seram Regency. Seaweed cultivation businesses in general have never carried out a business feasibility analysis. So this can affect the sustainability of their seaweed cultivation business. In relation to the reasons stated above, this paper aims to conduct a feasibility analysis of seaweed cultivation in the waters of Kotania Bay, West Seram Regency.

Cultivation of seaweed of the Eucheuma cottonii type is a superior commodity in West Seram Regency which has received government support in its development in the form of assistance with production facilities, counseling and assistance. Katonia Bay has also been used as a pilot seaweed cultivation center project.

The results of the study of production factors show that the level of utilization of land that is declared suitable for seaweed cultivation is still very low. Materials and supporting facilities as well as seeds are available and quite easy to obtain. Human resources for cultivators are available and dominated by a relatively low level of education, namely elementary school. The development of production volume shows that in 2016 - 2020 the trend of seaweed cultivation itself has decreased over the last 5 years, namely between 2016 - 2020, namely in 2016 it was 11,050,301 tons, 2017 it was 10,547,552 tons, 2018 10,320,297 tons, 2019 amounting to 9,918,455 tons and in 2020 amounting to 9,923,259 tons per year based on the 2020 Annual Report of the Ministry of Maritime Affairs and Fisheries

The decline in environmental quality is caused by management of aquaculture waste that has not been implemented optimally, environmental pollution from housing waste, tourism and port development. Various obstacles in its development include adequate capital, namely quite high investment and operational costs, regulations and legislation, facilities and infrastructure, human resources, social culture, technology and others. In this regard, to optimize sustainable production, a development strategy is needed. Based on this, this research takes the title Strategy for Sustainable Seaweed Cultivation Industry Development in the Kotania Bay Area, Maluku.

The aim of the research is to analyze strategies for developing sustainable seaweed cultivation in the Katonia Bay area. The research was carried out from March to June 2023 in the waters of the Katonia Bay area, West Seram, Maluku..

II. RESEARCH METHODS

The methods used in this research were observation, focus group discussions, questionnaires, interviews and field studies in seaweed cultivation areas. The number of cultivators in this area is 151 people. The determination of the sample of respondents was in accordance with Isaac and Michael (1981), taking as a sample 105 people from the population of seaweed cultivators. The population in this study is classified as homogeneous so that sampling uses a purposive sampling method or deliberate sampling. Purposive sampling is the selection of samples based on certain characteristics that are considered to be related to previously known population characteristics (Umar, 2005). The research location is as shown in Figure 1.

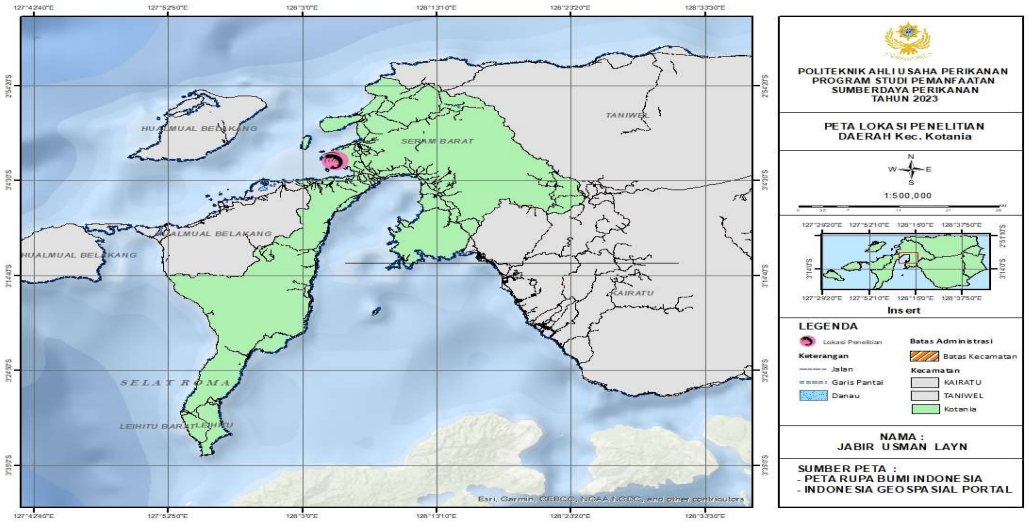

Figure 1. Research location

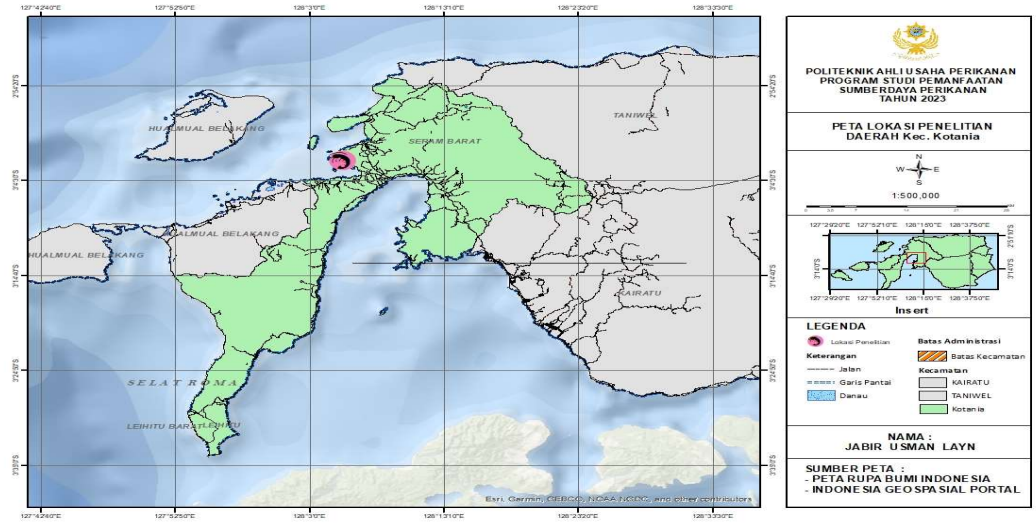

Figure 2. Suitability of land in Kotania Bay, Maluku

Data analysis

The data collected was analyzed quantitatively. Data were analyzed using descriptive statistical analysis and SWOT analysis (Strengths, weaknesses, opportunities, threats). Data analysis was processed using Microsoft Excel software. The collected research data was then analyzed using descriptive analysis and SWOT. This activity was carried out to see the level of strengths, weaknesses, opportunities and threats faced in seaweed cultivation. Furthermore, it is predicted that the possibility of developing a seaweed cultivation business in the Katonia Bay area is predicted. The results of the processed data are displayed in the form of tables and diagrams and then analyzed descriptively. The stages of the SWOT analysis procedure are carried out through the following stages:

1. Determine internal (strengths and weaknesses) and external factors (opportunities and threats)

2. Determine the weight and rating for each internal factor and external factor.

3. Determine the weighted score by multiplying the weight value x rating. The SWOT assessment criteria for an activity can continue if the total IFAS score is > 2 and the total EFAS score is > 1.

4. Develop an Internal Strategic Factors Analysis Summary (IFAS) matrix and an External Strategic Factors Analysis Summary

(EFAS) matrix.

5. Develop SWOT diagrams and matrices.

III. Results and Discussion

Based on the results of research on Eucheuma cottonii seaweed cultivation using descriptive statistical analysis methods and SWOT, it can be seen that the preparation process in planning strategies was obtained through three stages of analysis, namely: a. Data collection stage (information on external and internal factors) b. Analysis stage (internal external matrix, Cartesian diagram, SWOT matrix) c. Decision making stage. The data collection stage is an activity to collect data as well as clarify the events being studied. The analysis stage is the stage after collecting supporting data. After all the information has been collected, you can continue to enter all the information into the SWOT analysis. After the data is analyzed, several decisions can be made that suit the conditions.

Production Development

The development of dried seaweed production volume in SBB Regency during the period 2017 to 2022 is presented in Figure 3.

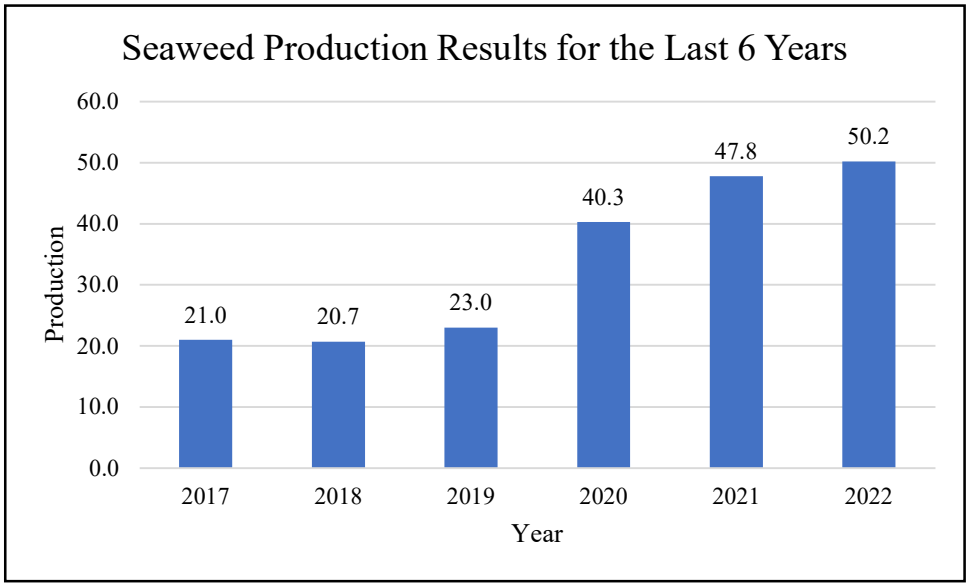

Figure 3. Seaweed Production Results for the Last 6 Years

SWOT analysis

Data is processed using SWOT to determine policy materials used for decision making. The seaweed cultivation strategy in the Katonia Bay Area is carried out by analyzing strategic factors for cultivation businesses through SWOT analysis, namely analyzing strengths, weaknesses, opportunities and threats. These four factors form the acronym SWOT (strengths, weaknesses, opportunities and threats). Internal factors and external factors are analyzed using cultivation and development techniques to obtain conclusions. A well-targeted development and management strategy can have an impact on social and economic improvement for seaweed cultivators in Katonia Bay. Analysis of the seaweed cultivation industry system to carry out comprehensive identification so that the right strategy for sustainable management and development can be selected. Discussion of the current status of Eucheuma cottonii seaweed cultivation is important to provide an appropriate assessment of seaweed industry activities.

1. Data Collection

The number of samples taken was 105 people who formed each SWOT variable. This number consists of 3 policy makers from the Fisheries Service, 2 people from the Transportation Service, 3 people from KKP fisheries instructors, 2 people from Village Apparatus, 4 traders and 91 cultivators. The amount of data is then tabulated in a table that forms Strengths, Weaknesses, Opportunities and Threats. The results can be seen in Table 1 below.

Table 1. Internal Factor Variables

No	Strenghts	No	Weakness
S1	The natural potential for seaweed cultivation in Katonia Bay is large	W1	**Low access to capital**
S2	Cultivation business technology is simple and cheap	W2	**Lack of business partner development**
S3	Good community relations	W3	**Lack of promotion of seaweed processing products**
S4	Marketing is easily available	W4	**Product drying still relies on nature depending on the weather**
S5	Sea transportation and marketing are available	W5	**Weak post-harvest processing technology**
S6	Regulations and policies support seaweed businesses	W6	**The bargaining position regarding low prices depends on the buyer**
S7	Seaweed products are long lasting	W7	**Processing of seaweed derivative products is weak**
S8	Seaweed seeds are easy to get	W8	**Cultivation management is still conventional**
S9	Labor is easy to obtain from family and community	W9	**The institutional organizational structure has not intensively handled seaweed**
S10	There are institutions that support business	W10	**Resistant to pest and disease attacks**
S11	**Harvest and maintenance periods can be set**	**W11**	**Seaweed trade monopoly**

Table 2. External Factor Variables

No	*opportunities*	No	Threath
O1	Government assistance in growing and developing this business	T1	**Global economic crisis or pendemik yang mempengaruhi usaha**
O2	The seaweed market is well available	T2	**Prices often fluctuate**
O3	Working capital is available in various forms of capital schemes	T3	**There are changes in current patterns that cause damage to cultivation**
O4	Prospects for superior products are good	T4	**There is no spatial planning or planting season schedule**
O5	Expansion of new territories is very possible	T5	**Increase in fuel oil for ships**
O6	Research on seaweed cultivation in this area is increasing	T6	**Environmental pollution in seaweed cultivation areas**
O7	Seaweed cultivation business is very profitable	T7	**The generation of seaweed cultivators is increasingly unpopular**
O8	**Training as needed**	**T8**	**The carrying capacity of land decreases which can cause a decrease in production**

Note: the variables in Table 1 and table 2 are data validity and reliability test data.

The rating value in the statement table is based on the following information

Scale 4: If this factor has a very strong influence on the company (very good)

Scale 3: If the factor has an influence on the company (good)

Scale 2: If the factor has little influence on the company (fair)

Scale 1: If the factor has very little influence on the company (not enough)

2. Validity and Reliability Test

The validity test is to determine whether the respondent's data is declared valid or invalid, while reliability is the measurement results that can be trusted. The software used for testing is SPSS version 25. Validity and reliability test with a sample size of 105 people. The results of the validity test of the questionnaire regarding the perception of the strength of the seaweed cultivation strategy stated that all the data was valid.

3. Reliability test

Reliability test using SPSS version 25 and the results are shown in the table below.

Table 3. Statistical Reliability

Cronbach'sAlpha	N of Items
712	29

Based on the table above, it can be concluded that the reliability test obtained a Cronbach's Alpha value of 712 or 71.2%. According to Nunnally's criteria, if the Cronbach's Alpha value is greater than 60%, then the questionnaire or indicator is declared reliable. So, the table above shows that the Cronbach's Alpha value of 71.2% > 60% is declared reliable.

Valid data is used as questionnaire material for rating data for each factor. Next, tabulation is carried out as in the table below.

Table 4. Internal Factor Rating

No	**Strenghts**	**Rating**			
		1	2	3	**4**
1	The natural potential for seaweed cultivation in Katonia Bay is large	9	15	37	**44**
2	Cultivation business technology is simple and cheap	13	23	29	**40**
3	Good community relations	10	25	32	**38**
4	Marketing is easily available	11	17	36	**41**
5	Sea transportation and marketing are available	15	24	29	**37**
6	Regulations and policies support seaweed businesses	15	20	30	**40**
7	Seaweed products are long lasting	12	25	33	**35**
8	Seaweed seeds are easy to get	13	22	34	**36**
9	Labor is easy to obtain from family and community	14	20	30	**41**
10	There are institutions that support business	30	40	25	**10**
11	Harvest and maintenance periods can be set	20	45	20	**20**
No	**Weakness**				

1	Low access to capital	12	13	35	**45**
2	Lack of business partner development	10	25	34	**36**
3	Lack of promotion of seaweed processing products	6	38	30	**31**
4	Product drying still relies on nature depending on the weather	10	38	37	**20**
5	Weak post-harvest processing technology	14	25	36	**30**
6	The bargaining position regarding low prices depends on the buyer	39	25	20	**21**
7	Processing of seaweed derivative products is weak	15	20	32	**38**
8	Cultivation management is still conventional	14	21	40	**30**
9	The institutional organizational structure has not intensively handled seaweed	13	20	31	**41**
10	Resistant to pest and disease attacks	10	40	35	**20**
11	**Seaweed trade monopoly**	**15**	**20**	**29**	**41**

In the calculation table above is data on the number of respondents who filled in the rating value scale for each statement. Example of statement number 1. The natural potential of seaweed cultivation in Katonia Bay is strategic, with 9 respondents filling in rating value 1, 15 respondents with rating value 2, 37 respondents with rating value 3 and 44 respondents filling in rating value 4.

Table 5. External Factor Ratings

No	**Opportunities**	**Rating**			
		1	2	3	**4**
1	Government assistance in growing and developing this business	14	37	34	**20**
2	The seaweed market is well available	15	24	33	**33**
3	Working capital is available in various forms of capital schemes	35	28	32	**10**
4	Prospects for superior products are good	13	36	30	**26**
5	Expansion of new territories is very possible	17	20	33	**35**
6	Research on seaweed cultivation in this area is increasing	10	22	39	**34**
7	Seaweed cultivation business is very profitable	16	25	30	**34**
8	Training as needed	13	23	31	**38**
No	**Treath**				
1	Global economic crisis or pendemik yang mempengaruhi usaha	10	21	40	**34**
2	Prices often fluctuate	13	37	30	**25**
3	There are changes in current patterns that cause damage to cultivation	36	27	11	**31**
4	There is no spatial planning or planting season schedule	15	22	38	**30**
5	Increase in fuel oil for ships	14	39	29	**23**
6	Environmental pollution in seaweed cultivation areas	12	20	40	**33**
7	The generation of seaweed cultivators is increasingly unpopular	30	10	35	**30**
8	**The carrying capacity of land decreases which can cause a decrease in production**	**18**	**22**	**35**	**30**

This table is data from the questionnaire results which are added up from the total ratings filled in by respondents.

4. **Calculation of Internal & Eksternal Factor Weights**

Internal factors originating from within the Katonia Bay seaweed cultivating environment in the form of strengths and weaknesses are then calculated based on the level of importance or treatment starting from a scale of 0.00 (not important) to

1.00 (very important) and where the weights are added up. does not exceed a total score of 1.00. The following is a table for calculating internal factor weights.

5. Calculation of Weights and Rating Matrix

Internal Strategic Factors Analysis Summary (IFAS) Matrix Analysis

The IFAS matrix calculation is a calculation to determine weights, ratings and scores where the total weight does not exceed 1.00, and calculates the rating value for each factor by giving a scale of 1 (below average/not important) to 4 very good.

Table 6. Internal Strategic Factor Analysis Summary (IFAS) Matrix Calculation

No	Strenghts	Weight	Rating	Skor
1	The natural potential for seaweed cultivation in Katonia Bay is large	0.1004	3.1047	**0.3117**
2	Cultivation business technology is simple and cheap	0.0942	2.9142	**0.2746**
3	Good community relations	0.0948	2.9333	**0.2782**
4	Marketing is easily available	0.0976	3.0190	**0.2947**
5	Sea transportation and marketing are available	0.0917	2.8380	**0.2604**
6	Regulations and policies support seaweed businesses	0.0939	2.9047	**0.2728**
7	Seaweed products are long lasting	0.0927	2.8666	**0.2657**
8	Seaweed seeds are easy to get	0.0933	2.8857	**0.2692**
9	Labor is easy to obtain from family and community	0.0948	2.9333	**0.2782**
10	There are institutions that support business	0.0692	2.1428	**0.1484**
11	Harvest and maintenance periods can be set	0.0769	2.3809	**0.18**
Total		1.00		**3,00**
No	**Weakness**			
1	Low access to capital	0.1004	3.0761	**0.3088**
2	Lack of business partner development	0.0951	2.9142	**0.2772**
3	Lack of promotion of seaweed processing products	0.0920	2.8190	**0.2593**
4	Product drying still relies on nature depending on the weather	0.0861	2.6380	**0.2271**
5	Weak post-harvest processing technology	0.0907	2.7809	**0.2524**
6	The bargaining position regarding low prices depends on the buyer	0.0724	2.2190	**0.1607**
7	Processing of seaweed derivative products is weak	0.0941	2.8857	**0.2717**
8	Cultivation management is still conventional	0.0920	2.8190	**0.2593**
9	The institutional organizational structure has not intensively handled seaweed	0.0963	2.9523	**0.2845**
10	Resistant to pest and disease attacks	0.0854	2.6190	**0.2238**
11	Seaweed trade monopoly	0.0951	2.9142	**0.2772**
Total		1,00		**2.8025**
Total internal factors (IFAS)		**2,00**		**5.8025**

The rating calculation for the strength opportunity factor was obtained from the total number of answers from 105 respondents divided by the number of respondents. The score calculation for the strength factor is obtained from multiplying the weight and rating.

External Matrix Analysis Strategic Factors Analysis Summary (EFAS)

The calculation of the EFAS matrix is the same as the IFAS matrix, namely to determine the weights, ratings and scores where the total weight does not exceed 1.00, and calculate the rating value for each factor by giving a scale of 1 (below average/not important) to 4 Very good. The following is a table of EFAS matrix calculation results. Strength and weakness rating values are always opposite, as are opportunities and threats. The analysis results from EFAS can be seen in the following table.

Table 7. External Matrix Analysis Strategic Factor Analysis Summary (EFAS)

No	Opportunities	Weight	Rating	Skor
1	Government assistance in growing and developing this business	0.1189	2.5714	0.3059
2	The seaweed market is well available	0.1295	2.8	0.3628
3	Working capital is available in various forms of capital schemes	0.1000	2.1619	0.2162
4	Prospects for superior products are good	0.1229	2.6571	0.3267
5	Expansion of new territories is very possible	0.1304	2.8190	0.3677
6	Research on seaweed cultivation in this area is increasing	0.1353	2.9238	0.3955
7	Seaweed cultivation business is very profitable	0.1286	2.7809	0.3578
8	Training as needed	0.1339	2.8952	0.3879
	Total	1,00		**2.7209**
	Treath			
1	Global economic crisis or pendemik yang mempengaruhi usaha	0.1361	2.9333	0.3994
2	Prices often fluctuate	0.1224	2.6380	0.3230
3	There are changes in current patterns that cause damage to cultivation	0.1091	2.3523	0.2568
4	There is no spatial planning or planting season schedule	0.1295	2.7904	0.3614
5	Increase in fuel oil for ships	0.1198	2.5809	0.3092
6	Environmental pollution in seaweed cultivation areas	0.1343	2.8952	0.3891
7	The generation of seaweed cultivators is increasingly unpopular	0.1215	2.6190	0.3184
8	The carrying capacity of land decreases which can cause a decrease in production	0.1268	2.7333	0.3468
	Total	1,00		**2.7043**
	Total faktor eksternal (EFAS)	**2,00**		**5.4252**

Example of calculating weights, ratings and opportunity scores in No. 1: Calculation of weights for opportunity factors obtained from the total answers of 105 respondents divided by the total calculation of IFAS and EFAS questionnaire data.

6. **Cartesian SWOT diagram**

The Cartesian SWOT Analysis Diagram is created after getting the difference in scores between strengths and weaknesses, and opportunities and threats, then the results of the difference in scores are applied to the Cartesian SWOT Analysis Diagram, so that the quadrant position of the score is known.

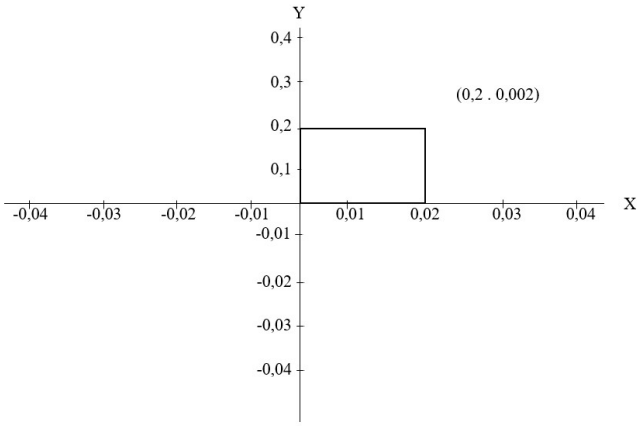

Figure 4. cartesian diagram

The calculation of the IFAS and EFAS matrix scores is as follows

Total strength score (strengths) = 3.

Total weakness score = 2.8025

Total opportunity score (opportunities) = 2.7209

Total threat score = 2.7043

The ordinate score on the Cartesian diagram = S-O= 3-2.8025 = 0.2

Abscissa score on the Cartesian diagram = O-T = 2,720-2,704= 0.02

Cartesian diagram coordinates are (0.2, 0.02)

Based on the analysis of the Cartesian diagram above, it is known that the variables in quadrant I include aggressive strategies. This can be interpreted as a very profitable situation. Seaweed cultivation areas have opportunities and strengths so that they can take advantage of existing opportunities. The strategy that can be implemented is one that can support aggressive growth policies (growth, oriented strategy).

7. SWOT Matrix

The tool used to formulate alternative company strategies is the SWOT matrix. The total value of internal and external factors can be depicted on the SWOT analysis diagram and the SWOT matrix combination formula. The formulation of strategic alternatives is an alternative used for companies running business in the future. The following are the results of a combination of matrices obtained from indicators and a combination of internal and external factors.

Table 8. SWOT Matrix Strategy Combination

IFAS	**Strength (S)**	**Weakness (W)**
	S1 The natural potential for seaweed cultivation in Katonia Bay is large	W1 Low access to capital
	S2 Cultivation business technology is simple and cheap	W2 Lack of business partner development
	S3 Good community relations	W3 Lack of promotion of seaweed processing products
	S4 Marketing is easily available	W4 Product drying still relies on nature depending on the weather
	S5 Sea transportation and marketing are available	W5 Weak post-harvest processing technology

EFAS	S6 Regulations and policies support seaweed businesses S7 Seaweed products are long lasting S8 Seaweed seeds are easy to get S9 Labor is easy to obtain from family and community S10 There are institutions that support business S11 Harvest and maintenance periods can be set	W6 The bargaining position regarding low prices depends on the buyer W7 Processing of seaweed derivative products is weak W8 Cultivation management is still conventional W9 The institutional organizational structure has not intensively handled seaweed W10 Resistant to pest and disease attacks W11 Seaweed trade monopoly
Opportunity (O) O1 Government assistance in growing and developing this business O2 The seaweed market is well available O3 Working capital is available in various forms of capital schemes O4 Prospects for superior products are good O5 Expansion of new territories is very possible O6 Research on seaweed cultivation in this area is increasing O7 Seaweed cultivation business is very profitable O8 Training as needed	a. Maximizing strategic potential in developing seaweed cultivation businesses for the community (S1, O3, O4, O5, O6, O7). b. Make efforts to market seaweed products so that they are easily available (S4, O5, O6, O8) c. Optimizing cooperation and relationships between communities so that good familiarity is established (S3, O5, O5, O6, O8). d. Make good efforts so that there is positive attention from local governments in providing infrastructure and improving human resources for cultivators (W6, O1, O4, O7, O8)	a. increase access to capital through assistance from related parties (W1, O2, O6, O8) b. Expanding business partner development efforts (W2, O3, O5, O8) c. make efforts to maintain the product in terms of drying seaweed seeds so that processing is maintained (W4, W7, O3, O4)
Threats (T) T1 Global economic crisis or pendemik yang mempengaruhi usaha T2 Prices often fluctuate T3 There are changes in current patterns that cause damage to cultivation T4 There is no spatial planning or planting season schedule T5 Increase in fuel oil for ships T6 Environmental pollution in seaweed cultivation areas	a. Monitoring the fluctuations in the rupiah exchange rate, fuel prices which influence raw material prices (T2, T5). b. Carrying out good cooperation to obtain assistance with infrastructure and skills improvement (S3, W6, W10, O1, O3, O8). c. Continuously innovate product functions at appropriate prices (S4, S7, W3, W5, W7).	a. Maximizing the development of business partners in the capital process so that they can improve conventional cultivation management (T1, T2, T8) b. Support government policy in marketing seaweed products so that price stability is maintained (W4, W6, W10, T2). c. Maintain product quality so that the quality of seaweed products remains safe. (T3, T7)

T7 The generation of seaweed cultivators is increasingly unpopular T8 The carrying capacity of land decreases which can cause a decrease in production		

After carrying out the SWOT matrix, then make a quantitative model analysis as a basis for the total score values for each factor in each S-O, W-O, S-T and W-T strategy. The following is a table of quantitative models for strategy formulation.

Table 9. Quantitative Strategy Combination Planning Matrix

IFAS / EFAS	*Strength* (S)	*Weakness* (W)
Opportunities (O)	S-O Strategy: using strengths to take advantage of opportunities = 5.7209	W-O Strategy: minimize weaknesses by exploiting them odds = 5.5414
Treaths (T)	S-T Strategy: use power to overcome threats = 5.7043	W-T strategy: minimize weakness and avoiding threats = 5.5248

a. Calculation for S-O

Total Strength score (S) + total Opportunities score (O) = 3 + 2.7209 = 5.7209

b. Calculation for S-T:

Total Strength score (S) + total Threat score (T) = 3 + 2.7043 = 5.7043

c. Calculation for W-O:

Total Weakness score (W) + total Opportunities score (O) = 2.8205 + 2.7209 = 5.5414

d. Calculation for W-T

Total Weakness score (W) + total Threat score (T) = 2.8205 + 2.7043 = 5.5248

Based on the internal (IFAS) and external (EFAS) strategy factor matrix for the development of seaweed cultivation businesses in Katonia Bay, Maluku, it was found that the total value of internal strategy factors so that if included in the external internal matrix, seaweed cultivation businesses are in the position of cell quadrant I, which means that the seaweed cultivation business in Katonia Bay, Maluku is in a relatively stable condition and growth is possible.

INTERNAL STRATEGY

TOTAL VALUE OF INTERNAL STRATEGY FACTORS

I S-O 1st place: SO Strategy (Strengths/Opportunities) weighted value 5.7209	**II** S-T 2nd place: ST Strategy (Strengths/Threats) weighted value 5.7047
III W-O 3rd place: WO strategy (Weaknesses / Opportunities) weighted value 5.5414.	**IV** W-T 4th place: WT Strategy (Weaknesses/Threats) weighted value 5.5248

Figure 5. Illustration of Internal External Matrix for Seaweed Cultivation Business

8. Seaweed Cultivation Development Strategy

Based on the weighted values of the internal and external factors of the SWOT analysis of the development of seaweed cultivation businesses in Katonia Bay, Maluku, the results of calculating the ranking of alternative development strategies are obtained as follows;

1. 1st place: SO strategy with a weighted total of 5.7209
2. 2nd place: ST strategy with a weighted total of 5.57047
3. 3rd place: WO strategy with a weighted total of 5.5414
4. 4th place: WT strategy with a weighted total of 5.5248

1st place: SO Strategy (Strengths/Opportunities) weighted value 5.7209

- Increasing grass production by exploiting the potential of natural resources for seaweed cultivation through land clearing with the intensive application of seaweed cultivation technology
- Development of seaweed marketing products to meet sufficient market demand requires government support
- Increased cooperation between cultivators and the government needs to be increased so that it is necessary to increase the competency of cultivators

2nd place: ST Strategy (Strengths/Threats) weighted value 5.7047

- Development of seaweed cultivation by paying attention to government product marketing policies and institutional strengthening.
- Providing assistance to groups to improve technology by taking into account the carrying capacity of the environment

- Application of appropriate technology in seaweed cultivation to overcome the decline in environmental carrying capacity
- 3rd place: WO strategy (Weaknesses/Opportunities) weighted value 5.5414.
- Management of seaweed cultivation requires access to sufficient capital through assistance from related parties
- Strengthening cultivator groups through developing business partners
- Developing efforts to maintain the product in terms of hanging seaweed so that its survival is maintained.
- 4th place: WT Strategy (Weaknesses/Threats) weighted value 5.5248
- Development of business partners in the capital process so that conventional cultivation management can be improved.
- Implementation of government policies in marketing seaweed products so that price stability is maintained. quality of seaweed products to keep them safe
- Development of seaweed cultivation by keeping seaweed products safe.

Based on this analysis, the priority strategy for developing seaweed cultivation that needs to be implemented is the application of intensive cultivation technology. Opening new land to increase production and meet market needs. Spatial planning and water channels. Expanding the green belt to prevent abrasion. The need for regulations as guidelines in requiring sustainable seaweed cultivation activities.

5. It is necessary to provide assistance to groups to improve technology by paying attention to the carrying capacity of the environment through the Community Economic Empowerment Program specifically for seaweed cultivators.
6. It is necessary to develop and implement integrated development of the coastal area of Katonia Bay, Maluku, which is considered quite successful, but needs to be developed.
7. It is necessary to develop environmentally friendly seaweed cultivation, involving seaweed farmers.
8. It is necessary to reforest beaches and seaweed cultivation areas. This activity needs to be carried out continuously.
9. Counseling, skills training and field meetings for seaweed cultivators to apply environmentally friendly technology and these activities need to be continued.

IV. CONCLUSION

Based on the discussion above, several conclusions can be drawn as follows:

1. The potential land of Katonia Bay which is very suitable for seaweed cultivation activities is 6,025.85 Ha and the current condition is that it has been used for seaweed cultivation covering an area of 138.62 Ha with a production of 50.2 tons. The potential productivity of Kotania Bay is 2,182 tons.
2. Based on IFAS and EFAS calculations, the strategy taken is to increase grass production by exploiting the potential of natural resources for seaweed cultivation through land clearing with the application of intensive seaweed cultivation technology with a value of 5.7209. Development of seaweed cultivation by paying attention to government product marketing policies and institutional strengthening. The Cartesian diagram shows quadrant 1 which can be interpreted as a seaweed cultivation area that has opportunities and strengths so that it can take advantage of existing opportunities. The strategy that can be implemented is one that can support aggressive growth policies (growth, oriented strategy).

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