Development Strategy Potential Economic Sectors of Peatland Rengat Subdistrict

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Abstract. Rengat sub-district is one of the sub-districts in Indragiri Hulu Regency where most of the area is peatland. The thickness of the peatland here ranges from 0.5 - > 7 meters. The approach taken to solving this problem was to use qualitative analysis and SWOT analysis. To answer the problems in this study, respondents is key informant whose daily life is related to peatlands in Rengat sub-district. The results of the SWOT analysis for the development of commodities resulting from mapping the potential of the peatland economic sector in Rengat sub-district are in quadrant I, this means that commodities that have the potential to be developed on the land have a combination of strengths and opportunities that allow a strong strategy to effectively manage commodities and the peatland.

Keywords: Development Strategy, Potential Economic Sectors, Peatland

1 Introduction

Peatlands play a very important role both locally and globally. Besides having ecological functions to maintain biodiversity, store carbon, produce oxygen and water, it also has economic and socio-cultural functions, including as a source of community livelihoods, ecotourism, and a place for education and research. The rapid expansion of commercial agriculture and industrial plantations created intense pressure on Indonesia's peatlands. Peatland clearing causes peat to dry out as it can no longer absorb water and becomes more susceptible to fires [5]. Rengat sub-district is one of the sub-districts in Indragiri Hulu Regency where most of the area is peatland. The thickness of the peatland here ranges from 0.5 - > 7 meters. Rengat sub-district has 16 villages, the majority of which have peatlands of varying thickness [6]. The economic activities carried out on the peatland are in the form of agriculture, livestock, trade, and workshops [7]. From the previous research, the research team simplified the research results for commodities/sectors that have the potential to be developed and analyzed for sustainability (economic side) in Rengat Sub-district in the form of a potential mapping picture [8]. The following is a picture of the mapping of potential commodities/sectors of the economy:

No	Commodity	Total Revenue (IDR)	Total Cost (IDR)	R/C Ratio
1	Corn	7.500.000	3.305.000	2,70
2	Vegetables	40.000.000	22.560.000	1,77
3	Banana	7.000.000	3.150.000	2,22
4	Fish Pond	8.400.000	6.885.000	1,22
5	Traditional and Modern Retail	18.000.000	13.110.000	1,37
6	Rice	0	7.860.000	0

Source : Data Processed, 2023

Source: Research Team, 2023

Fig 1. Mapping of Potential Economic Sectors and Revenue/Cost Ratio Results of Peatland Commodity Businesses in Rengat District

The economic sector mapping above shows that each village has commodities that should be optimally developed by the community, and should be supported by the local government. This optimization aims to create a specialization of regional superior products and can increase the income and welfare of the community [9]. Of course, this potential is not only limited to the main product, but can continue to be developed into derivative products through micro, medium and large-scale industrial activities. This economic development is based on community participation and land suitability (sustainable peatland development) [7]. From the results of the revenue/cost ratio calculation in the sustainability analysis that has been carried out, corn is the commodity that has the highest profit level in nominal money and is also easy to plant/maintain.

This research will conduct a further study on commodity development strategies resulting from the potential mapping and sustainability analysis of the peatland economic sector in Rengat Sub-district. This research is carried out to formulate strategic steps that can be taken to develop potential commodities in the peatlands of Rengat Sub-district with the aim of increasing the income and welfare of the community. The approach taken to solving this problem was to use qualitative analysis and SWOT analysis. Qualitative analysis was carried out on quality data in the form of interpretation or descriptive interpretation of commodity development strategies carried out by economic actors in peatlands, as well as the role of institutions in commodity development as a result of potential mapping and sustainability analysis in Rengat Sub-district. Quantitative analysis was conducted on quantity data in the form of a SWOT analysis of commodity development strategies.

2 Literature Review

2.1. Development Strategy

There are various factors that influence farmers to carry out development strategies for their agricultural commodities [10]. External factors are characteristics that pressure a person who

comes from outside himself, which is one of the important factors in order to find out a person's efforts to do a business. The definition of external factors in this study is the circumstances/events that influence farmers that come from outside themselves, such as: land, interaction with extension workers, production facilities, involvement in farmer groups and access to credit. There are two tiered empowerment subjects that can be implemented in parallel, namely the empowerment of farmers, farmer groups, and farming corporations. The objectives of this empowerment are to (a) increase the ability to farm efficiently, including through increased access to technology, production facilities, production infrastructure (water, alsintan) and capital and increased efficiency in its utilization; and (b) increase the ability of farmers and farmer groups to adopt superior technology individually and in groups [11].

2.2 Peatlands

Tropical peatlands have very diverse physical and chemical properties. Their characteristics are determined by the thickness of the peat, the substratum, the underlying mineral soil, its maturity, and whether or not there is enrichment from the overflow of nearby rivers. Peatland characteristics are usually used as a reference in its utilization to achieve high and sustainable productivity [12]. Peatland is land that has a layer of soil rich in organic matter with a thickness of 50 cm or more. The organic matter that makes up peat soil is formed from the remains of plants that have died, whether they have rotted or not, due to the water-saturated environmental conditions. For this reason, peatlands are often found in floodplains, back swamps, shallow lakes or poorly drained basins. The process of peat formation begins with inundation in back swamps, shallow lakes or depressions that are slowly overgrown by aquatic plants and wetland vegetation [13].

Riau Province has the largest peat hydrological area on the island of Sumatra. Most of Riau Province's peatlands are currently managed by the forestry, plantation and agriculture sectors. Over the last 10 years, forest and land fires have occurred frequently, especially in peat areas. In addition, there are frequent floods during the rainy season and droughts during the dry season. In addition, climate change (temperature and humidity) has occurred due to the shrinkage of peat forest cover and the shrinkage/decline of biodiversity due to the extinction of natural resources and germplasm in peat areas [14]. Peatlands with a thickness of between 1.4-2 meters are classified as marginally suitable for some annual crops such as rubber and oil palm, while thin peat is classified as moderately suitable. Peat with a thickness of 2-3 m is not suitable for annual crops unless there is an insertion/enrichment layer of soil or mineral mud [15].

3 Research Method

This research was conducted in Rengat Sub-district, Indragiri Hulu Regency, Riau Province. To answer the problems in this study, respondents is key informant whose daily life is related to peatlands in Rengat sub-district. This research is descriptive qualitative research with data sources consisting of primary data and secondary data. Data collection techniques are carried out by means of intensive observation, in-depth interviews, documentation techniques and literature review. This research uses data analysis techniques qualitative descriptive analysis and SWOT analysis.

4 Discussion

Quantitative analysis was conducted on quantitative data in the form of a SWOT analysis of commodity development strategies. In this research, various indicators were obtained that became internal strategic factors and external strategic factors of commodities resulting from the mapping of the potential of the peatland economic sector in Rengat District.

Table 1. Internal Strategic Factors Analysis Summary Potential Commodities of Peatland Economic Sector in Rengat District

No	Internal Strategic Factors	Weight	Rating	Score
	Strength			
1	Availability of land suitable for agriculture is still plentiful	0,10	3	0,30
2	High productivity of certain crops	0,15	4	0,60
3	Local wisdom-based management	0,10	3	0,30
4	Intercropping crops can be developed	0,10	2	0,20
5	Adequate water availability	0,15	4	0,60
No	Weakness			
1	Diverse peat thickness	0,10	2	0,20
2	Low fertility	0,10	2	0,20
3	High acidity/pyrite layer (FeS2)	0,10	1	0,10
4	Quartz sand in subsoil substratum (below peat)	0,05	2	0,10
5	Land subsidence (degradation)	0,05	2	0,10
	Total	1,00		2,70

Table 2. External Strategic Factors Analysis Summary Potential Commodities of Peatland Economic Sector in Rengat District

No	External Strategic Factors	Weight	Rating	Score
	Opportunity			
1	Increasing food demand	0,15	4	0,60
2	Growing local varieties	0,05	3	0,15
3	Government regulations governing land management	0,10	2	0,20
4	Land management technology that is increasingly environmentally friendly	0,05	3	0,15
5	Commodity cultivation that can increase economic value	0,10	3	0,30
No	Threat			
1	Peatland fires	0,15	1	0,15
2	Community knowledge is lacking about proper land management	0,15	1	0,15
3	Land drainage before economic activities are carried out	0,10	2	0,20
4	Carbon emission	0,05	2	0,10
5	Natural disasters (drought and flood)	0,10	2	0,20
	Total	1,00		2,20

In the external strategic factors, there are various opportunities that can be utilized to develop commodities resulting from the mapping of the potential of the peatland economic sector in Rengat District. These opportunities are the increasing need for food, growing commodity

varieties, government regulations governing land management, land management technology that is increasingly environmentally friendly and peat-friendly, and commodity cultivation that can increase economic value [16]. In addition to opportunities, there are also threats, including the high potential for peatland fires, lack of knowledge about proper land management, land drainage before economic activities are carried out, carbon emission and natural disasters (droughts and floods) [17].

Developing peatlands for agriculture can provide significant economic benefits, such as increased income for farmers and job creation. It can also improve the food security of a region. However, it is important to consider that not all peatlands can be converted into sustainably productive agricultural land. In many cases, maintaining peatlands as natural ecosystems or using them for environmentally friendly agricultural activities may be a better option. Some of the crops in this study, namely bananas, vegetables, corn and rice, are agricultural commodities that have been proven to have relatively high productivity on peatlands. There are several things that must be considered in developing these commodities. For example, several rice varieties have been developed specifically to grow on peatlands. Proper water and nutrient management techniques can increase their productivity. Secondary crops such as corn have good adaptation to certain peatland conditions, where fertilizer management and soil pH are crucial factors. For horticultural crops, such as bananas, vegetables and fruits can be grown on peatlands with proper agricultural techniques [18].

Peat subsidence is a serious problem that occurs in peat swamp areas. It occurs when natural peat layers experience a gradual decline in ground level. The impacts of subsidence on peatlands can be devastating. For example, peat swamp areas that experience subsidence tend to be more susceptible to flooding as the lowered ground surface no longer acts as a natural receptacle for excess rainwater. In addition, subsidence can result in damage to infrastructure such as roads, buildings or irrigation canals that sit on top of them. Increasing food demand is a complex global challenge, especially with Indonesia's continued population growth and changing consumption patterns. Despite increases in global food production, there are still gaps in access to sufficient, safe and nutritious food in some regions. Therefore, peatlands with proper management can be an alternative in fulfilling food needs [19].
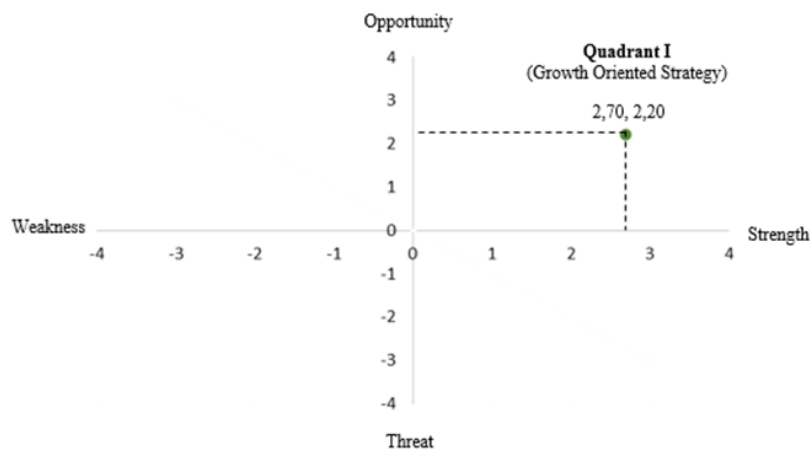

Fig 2. Diagram SWOT Analysis

Based on the results of the SWOT analysis that has been carried out, a strategy matrix is obtained for the development of commodities from the mapping of the peatland economic sector in Rengat District. The following is the strategy table.

Table 3. SWOT Matrix of Commodity Development Strategies Result of Mapping the Potential of Peatland Economic Sector Rengat Sub-district

External Factors / Internal factors	Strength (Strength)	Weakness
	1. There is still a lot of land available for agriculture 2. High productivity of certain crops 3. Management based on local wisdom 4. Intercrops (intercropping) can be developed 5. Availability of adequate water	1. Peat thickness varies 2. Low fertility 3. High acidity/pyrite layer (FeS2) 4. Quartz sand on subsoil substratum (under peat) 5. Land subsidence (degradation/subsidence/subsidence)
Opportunities	**SO (Strength-Opportunity) Strategy**	**WO (Weakness-Opportunity) Strategy**
1. Food needs are increasing 2. Commodity varieties are increasingly developing 3. Government regulations governing land management 4. Land management technology that is increasingly environmentally friendly 5. Cultivation of commodities that can increase economic value	1. Collaboration and partnership from all stakeholders in planning and implementing sustainable peatland management strategies 2. Encourage innovation in agricultural technology and practices on peatlands 3. Increase public education and awareness about the importance of peatland sustainability 4. Develop main commodities and intermediary crops that have high economic value 5. Preparation of special regional government programs and policies regarding peatland management	1. Encourage research and innovation to develop better agricultural technologies and practices suited to the unique conditions of peatlands 2. Increase community education and knowledge about the vulnerability of peatlands 3. Collaborating with global parties to manage peatlands to make them more productive and more sustainable 4. Development of superior varieties that can grow well on peatlands 5. Preparation and implementation of programs to prevent peatland degradation or subsidence
Threats	**ST (Strength-Threat) Strategy**	**WT (Weakness-Threat) Strategy**
1. Peatland fires 2. Community knowledge is very lacking regarding proper land management 3. Drying of land before economic activities are carried out 4. Carbon emissions 5. Natural disasters (drought and flood)	1. Monitoring and evaluating the impact of agricultural and management activities carried out on peatlands 2. Adopt the latest technology in agriculture and peatland management to increase resource efficiency and reduce environmental impacts 3. Carry out a peatland restoration program involving all relevant parties 4. Increasing literacy programs for local communities and communities living around the area about the importance of protecting peatlands 5. Increasing disaster mitigation efforts on peatlands is carried out comprehensively and involves various parties	1. Encourage research and development of new technology to improve peatland management in a sustainable and adaptive manner to climate change 2. Adopting peatland management technology to improve the community's economy in an environmentally friendly manner 3. Increasing community literacy programs about peatlands starting from elementary school level 4. Optimizing derivative programs from the central government to prevent carbon emissions 5. Increasing comprehensive community involvement to protect peatlands

The commodities resulting from the mapping of the potential of the peatland economic sector in Rengat District have opportunities and strengths so that they can take advantage of existing opportunities. The strategy that must be applied in this condition is to support aggressive growth policies (growth oriented strategy) or in quadrant I. The results of the SWOT analysis for the development of commodities resulting from mapping the potential of the peatland economic sector in Rengat sub-district are in quadrant I, this means that commodities that have the potential to be developed on the land have a combination of strengths and opportunities that allow a strong strategy to effectively manage commodities and their peatlands.

The results of IFAS and EFAS for peatland management in Rengat Sub-district are in quadrant I, which means a combination of strengths and opportunities in peatland management. The strengths of peatland are that it can be used to develop commodities that have the potential to improve the community's economy because peatlands have the potential for significant carbon storage and high biodiversity. There is also a growing body of knowledge and technology in peatland management such as managed drainage systems and ecosystem restoration. Knowledge about peat ecosystems and best practices in their management has also been widely carried out through research and the emergence of innovations. Public awareness and education on environmental awareness about the importance of peatland conservation has begun to be promoted at various levels in society. Current government regulations that already exist also support this quadrant I aggressive growth policy strategy.

1.2 Commodity Development Strategy of Economic Sector Mapping Results in Rengat District Peatland

a. SO (Strength-Opportunity) Strategy

The strengths of the peatland economic sector in Rengat Sub-district are the availability of suitable land for agriculture, the high productivity of certain crops, especially horticultural crops that can live on peatlands, the management of the economic sector based on local wisdom that has been traditionally practiced by communities living on peatlands, intercropping crops that can be developed between popular crops developed by the community, such as oil palm, and the availability of adequate water for the agricultural sector. Opportunities that can be utilized in order to develop the economic sector in peatlands are the increasing need for food, the growing variety of commodities, various government regulations governing land management, peatland management technology that is increasingly environmentally friendly and commodity cultivation that can increase economic value.

Based on the existing strengths and opportunities, the strategies that can be carried out for commodity development as a result of mapping the potential of the peatland economic sector in Rengat Sub-district are collaborating and partnering with all stakeholders in planning and implementing sustainable peatland management strategies, encouraging innovation in technology and agricultural practices on peatlands, increasing community education and awareness about the importance of peatland sustainability, developing main commodities and intercrops that have high economic value and preparing local government programs and policies specifically on peatland management.

b. ST (Strength-Threat) Strategy

Based on the strengths previously described, there are various threats that pose challenges to the development of commodities resulting from the mapping of potential economic sectors in the peatlands of Rengat Sub-district, namely the vulnerability of peatland fires, lack of community knowledge about proper land management, land drainage before economic activities are carried out, the release of carbon substances (carbon emissions) and the occurrence of natural disasters, namely droughts and floods. For this reason, strategies that can be carried out by looking at strengths and threats are monitoring and evaluating the impact of agricultural activities and management carried out on peatlands, adopting the latest technology in agriculture and peatland management to increase resource efficiency and reduce environmental impacts, conducting peatland recovery programs by involving all parties involved, increasing literacy programs for local communities and communities living around the area about the importance of protecting peatlands and increasing disaster mitigation efforts on peatlands carried out comprehensively and involving various parties.

c. WO (Weakness-Opportunity) Strategy

The weaknesses faced in developing commodities resulting from the mapping of the potential of the peatland economic sector in Rengat Sub-district are the varying thicknesses of peat with low fertility, high acidity/pyrite ($FeS2$), the presence of quartz sand in the subsoil substratum (below the peat) and subsidence. This is coupled with strengths such as high productivity of certain crops, especially horticultural crops that can live on peatlands, management of the economic sector based on local wisdom that has been traditionally practiced by communities living on peatlands, intercropping can be developed between crops that are popularly developed by the community, such as oil palm, and there is adequate water availability for the agricultural sector.

Strategies for the development of these commodities include encouraging research and innovation to develop technologies and agricultural practices that are better suited to the unique conditions of peatlands, improving community education and knowledge about the vulnerability of peatlands, collaborating with global parties to manage peatlands to make them more productive and more sustainable, developing superior varieties that can grow well on peatlands, and developing and implementing programs to prevent peatland degradation or subsidence. Implementing these strategies is expected to increase the productivity and sustainability of peatland agriculture while reducing the negative impacts of existing weaknesses.

d. WT (Weakness-Threat) Strategy

In combination with the weaknesses and threats previously described, the strategies that can be carried out for the development of commodities resulting from this mapping are encouraging research and development of new technologies to improve peatland management in a sustainable and adaptive manner to climate change, adopting peatland management technology to improve the economy of environmentally friendly communities, increasing community literacy programs about peatlands starting from the elementary school level, optimizing derivative programs from the central government to prevent carbon emissions, and increasing comprehensive community involvement to protect peatlands. By combining strategies to overcome weaknesses and face existing threats, it is expected to optimize sustainable peatland management while increasing resilience to natural disasters and environmental change.

Support in the form of government policies and regulations that support the protection and management of peatlands, such as a moratorium on peatland clearing, has been carried out evenly throughout Indonesia in order to preserve the peatlands themselves, despite the upheaval

that exists in the community. Through Presidential Instruction (Inpres) Number 5 of 2019 concerning the Termination of the Granting of New Licenses and the Improvement of Governance of Primary Natural Forests and Peatlands, it is expected to be able to preserve primary natural forests and peatlands. However, there is a trade off between the implementation of this moratorium and the economy of communities located on peatlands. This Presidential Instruction has various economic impacts that need to be considered, both in the short and long term. The positive impacts of the Presidential Instruction are improved environmental quality, improved soil and water quality, sustainable economic development, increased sustainability of the forestry sector through legal certainty, and support for carbon programs and green finance. In addition to the positive impacts of this Presidential Instruction, there are also negative impacts, namely limitations on the expansion of the industrial sector, causing a decrease in expansion opportunities.

5 Conclusion

Rengat sub-district is one of the sub-districts in Indragiri Hulu Regency where most of the area is peatland. The thickness of the peatland here ranges from 0.5 - > 7 meters. The approach taken to solving this problem was to use qualitative analysis and SWOT analysis. To answer the problems in this study, respondents is key informant whose daily life is related to peatlands in Rengat sub-district. The results of the SWOT analysis for the development of commodities resulting from mapping the potential of the peatland economic sector in Rengat sub-district are in quadrant I, this means that commodities that have the potential to be developed on the land have a combination of strengths and opportunities that allow a strong strategy to effectively manage commodities and the peatland.

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