Commodity Financial Analysis from Peatland Mapping Results to Encourage Regional Economic Growth

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Abstract. Mapping the economic sector in the regions aims to create regionally superior products, increase income, and improve people's welfare with conditions that must be carried out optimally by the community together with the local government. This research was conducted in Rengat District, Riau Province, where the dominant area is peatland. Based on the research results for mapping the potential of peatlands using the Analytical Hierarchy Process method, which was carried out previously, the agricultural sector has the potential to fulfill local food consumption. These commodities are corn, vegetables, bananas, pond fish, and rice. Financial analysis is carried out by looking at the revenue and profit generated from the commodity being cultivated. Corn is a very economically profitable commodity when grown on peatlands. Corn produces good yields and sales value, market share is available, the planting process is efficient and effective, and it is more pest-resistant. In the results of the financial analysis by calculating the R/C ratio, it was found that corn has the highest value, namely 2.70, which means above 1, which is feasible to develop on peat land in Rengat District, while rice with an R/C value <1 is not feasible to develop.

Keywords: Financial Analysis; Peatland; Commodities

1. Introduction

Sustainability in development is important because achieving a certain level of welfare requires continuous effort on a balanced and proportional scale. In principle, sustainable development is the process of meeting the needs of the present without compromising the needs of future generations. Sustainable development will encourage national and regional economic growth. Environmental sustainability as an environmentally sustainable system must be able to maintain stable resources, avoid exploitation of natural resources, and absorb environmental functions. The problems faced in economic development are trade-offs between fulfilling development needs and efforts to maintain environmental sustainability [1]. Basically, the development of the sustainable economic sector is the implementation of the concept of sustainable development, which aims to increase economic growth, which in this case is in the form of increasing people's income and welfare.

Increasing economic growth can be done through increasing commodity production (quantity and quality) while still paying attention to the preservation of natural resources and the environment, which in this case are land resources. The development of the economic sector is expected to be carried out in a balanced manner and adjusted to the carrying capacity of the

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ecosystem so that production continuity can be maintained in the long term while reducing the level of environmental damage as little as possible. Financial analysis is important after determining the potential or specialization of economic sectors or commodities in an area. The creation of a specialization of the economic sector based on the current regional land conditions is very important because, apart from being able to support the economy, it can also preserve the ecosystem of the land.

Specialization in the economic sector will give birth to a brandmark or characteristic of a product or commodity in an area, which will increase its selling value and bargaining power in the market. With specialization in the production of a product, absolute profit will be more easily achieved [2]. This also applies to areas that have peatlands. Peatland areas can have unique products that can drive the regional economy while maintaining the balance of the peat ecosystem. Peatland, as an essential wetland ecosystem, is formed by peat soil with a decomposed organic layer [3] under conditions of waterlogging and lack of oxygen [4]. Its unique ecosystems with complex hydrological systems play an important role as providers of ecosystem services such as carbon sequestration and storage and the protection of biodiversity [5].

Peatlands also bring benefits through their economic resource capabilities. Riau Province is the second province that has the largest peatland in Indonesia, with an area of 3,864,414 ha, or 60.1% of the peatland on the island of Sumatra. With an estimated peat thickness of less than 300 cm covering an area of 1,417,762 ha (36.7%) and a thickness of more than 300 cm covering 2,449,652 ha (63.3%) [6]. The rapid expansion of commercial agriculture and industrial plantations is placing intense pressure on Indonesia's peatlands. The clearing of peat causes the peat to dry out because it can no longer absorb water and becomes more vulnerable to fire [7]. Rengat District is one of the sub-districts in Indragiri Hulu Regency, where most of its area is peatland. The thickness of the peat here ranges from 0.5 - > 7 meters.

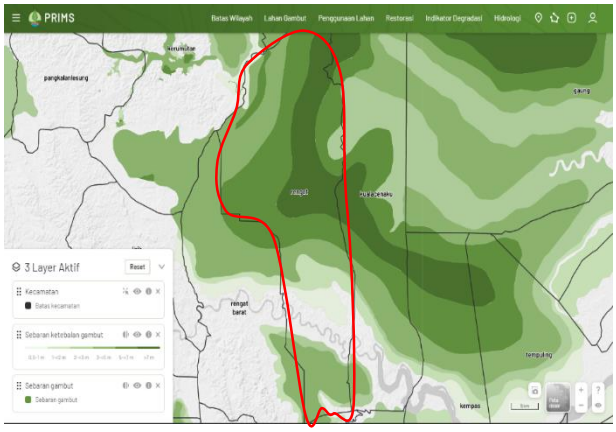

Fig. 1. Peat Distribution and Thickness Map of Rengat District, Indragiri Hulu Regency

Rengat District has 16 (sixteen) sub-districts or villages, the majority of which are peatlands with varying thicknesses. The economic activities carried out on the peatlands are in the form of agricultural activities, animal husbandry, trading businesses, and workshop businesses. [8]. From the previous research, the research team found that the commodities and sectors that have the potential to be developed in Rengat District are contained in the form of

potential mapping images. The following is a picture of the results of the mapping of potential commodities and economic sectors:

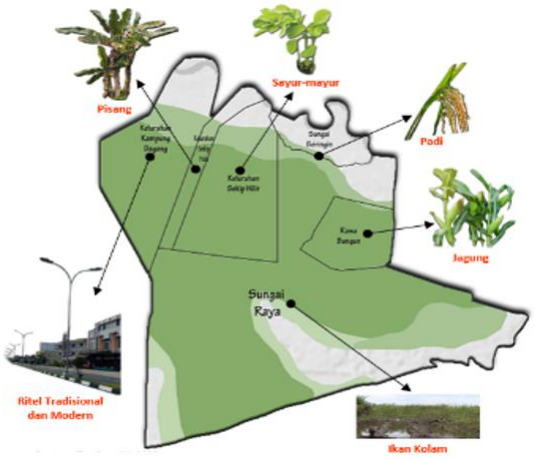

Fig. 2. Mapping the Potential of the Peatland Economic Sector in Rengat District

In the economic sector mapping image above, it is found that each village or kelurahan has commodities that should be optimally developed by the community and must be supported by the local government. This optimization aims to create regionally superior product specialization and can increase the income and welfare of the community. 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) [8].

Fig. 3. Condition of Peat Land in Rawa Bangun Village and Sekip Hilir Village, Rengat District

This research will conduct further studies on the financial analysis of commodities resulting from mapping the potential of the peatland economic sector, which is expected to increase regional economic growth and can improve the welfare of its people. Based on the

results of previous research conducted, the economic sectors and commodities that have the potential to be developed in Rengat District are corn in Rawa Bangun Village, rice in Sungai Beringin Village, vegetables in Sekip Hilir Village, bananas in Sekip Hulu Village, and pond fish in Sungai Raya Village and traditional and modern retail in Kampung Dagang Village. This financial analysis was carried out to see how the prospects for commodities resulting from mapping the potential of the economic sector in Rengat District in the future, whether they have the potential to continue to be developed from an economic perspective.

2. Literature Review

2.1 Regional Economic Growth

Regional economic development is an ongoing process when the government and the community jointly manage the available resources in the area and form a pattern of partnership between the local government and the private sector to create new jobs and stimulate the development of economic activities to support the region's economic growth. The main problem in regional development lies in emphasizing or implementing development policies based on regional uniqueness or local wisdom that are closely related to the potential use of human, institutional, and natural resources and the environment in the area. Consideration of this indicator directs input originating from the area to support the development process to create new job opportunities and stimulate increased economic activity [9].

Regional economic growth is an increase in the amount of production of goods and services in an area whose purpose is to increase economic development or to equalize the income distribution of the population in that area. One important factor in economic growth is the availability of natural resources as the main capital for carrying out economic activities in the area. Natural resources include land, forests, water, and mineral resources. [10].

2.2 Peatland

Tropical peatlands have very diverse physical and chemical properties. Its characteristics are largely determined by the thickness of the peat, the substratum, the mineral soil beneath it, its maturity, and the presence or absence of enrichment from overflowing rivers in the vicinity. The characteristics of peatlands are usually used as a reference in their utilization to achieve high and sustainable productivity [11]. 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 dead plants, weathered or not, due to water-saturated environmental conditions. In this regard, peatlands are often found in flood plains, back swamps, shallow lakes, or basins with poor drainage. The process of forming peat begins with inundation in back swamp areas, shallow lakes, or basin areas, which are slowly overgrown by aquatic plants and wetland vegetation. [12].

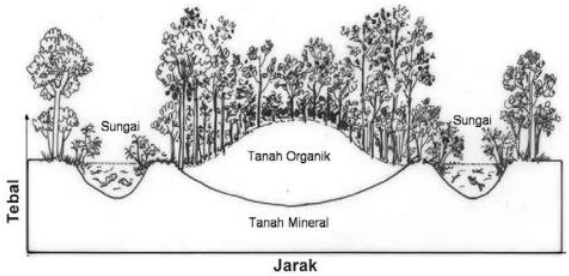

Fig. 4. Illustration of Peatland

Riau Province has the largest peat hydrological area on the island of Sumatra. The condition of Riau Province's peat areas is currently mostly well managed by the forestry, plantation, and agricultural sectors. Over the last 10 years, there have been frequent forest and land fires, especially in peatlands. In addition, there is frequent flooding during the rainy season and drought during the dry season. Apart from that, climate change (temperature and humidity) has also occurred due to the shrinking of peat forest area cover and the reduction or decrease in biodiversity due to the extinction of natural resources and germplasm in peat areas. [13].

Based on the depth of the peat, it is divided into: a. shallow peat (50–100 cm); b. medium peat (100–200 cm); c. deep peat (200–300 cm); and d. very deep peat (> 300 cm). In accordance with the direction of the Ministry of Agriculture, peatland that can be used for food crops is recommended on shallow peat (< 100 cm). The basic consideration is that shallow peat has a relatively higher level of fertility and lower environmental risks than deep peat. Peatlands with a depth of 1.4–2 meters are classified as marginal for various types of food crops. The main limiting factors are the condition of the root media and nutrients that do not support plant growth. Food crops that are able to adapt include rice, corn, soybeans, cassava, long beans, and various other types of vegetables. Peatland with a thickness of between 1.4 and 2 meters is classified as marginally suitable for several annual crops such as rubber and oil palm, while thin peat is quite suitable. Peat with a thickness of 2–3 m is not suitable for annual crops unless there is the insertion or enrichment of soil layers or mineral mud. [14].

3. Methodology

This research was conducted in Rengat District, Indragiri Hulu Regency, and Riau Province. Rengat District has 16 (sixteen) villages or kelurahan, all of which are on peat land. The thickness of the peat varies in each village or kelurahan. The samples in this study amounted to six economic and commodity sectors, namely corn, traditional and modern retail, bananas, vegetables, pond fish, and rice. To answer the problems in this study, respondents were taken from sample areas in previous studies, namely Kampung Dagang Village, Sekip Hulu Village, Sekip Hilir Village, Sungai Beringin Village, Sungai Raya Village, and Rawa Bangun Village. Respondents are people who are running a business in the economic or commodity sector that has the potential to be developed in previous studies.

Financial analysis is carried out on quantity data in the form of the level of revenue or income earned and profit achieved from the potential mapping results of commodities that are being cultivated by the community. Financial analysis, or income analysis, is obtained by: [15]

1. Calculating the Total Cost of Commodity Business
   To calculate the total cost using the formula :
   TC (total cost) = TFC (total fixed cost) + TVC (total variable cost)
   The costs referred to in this study are operational costs, excluding plant investment costs.
2. Calculating Commodity Business Revenue To calculate acceptance using the formula:
   TR (total revenue) = P (price) x Q (quantity)
3. Calculating Commodity Business Income Commodity operating income is the result of deducting the total revenue from the total cost using the formula:
   Π (Profit) = TR (Total Revenue) - TC (Total Cost)
4. Analysis of the R/C Ratio R/C Ratio analysis is used to determine the feasibility of the commodity business being carried out, which is a comparison between total revenue and total costs during the study period with the following formula:
   R/C Ratio: TR (total revenue) / TC (total cost)

Description of the results: if R/C < 1, then the commodity business is not feasible to be continued and developed. If R/CR/C1, then the business is neither profitable nor loss-making. R/C > 1, the business is feasible to continue and develop.

4. Results and Discussion

The costs calculated in this study are fixed and variable. Fixed costs are costs incurred by farmers or business actors that are fixed in nature, do not affect the amount of production produced, are not used up in one growing season, and are valued in rupiah units (Rp). Variable costs are costs incurred by farmers or business actors whose amount depends on the amount of goods produced, are used up in one growing season, and are valued in rupiah units (Rp). The fixed and variable costs used in carrying out business on peatlands are as follows:

Table 1. Total Commodity Production Cost Result of Peat Land Potential Mapping in Rengat District per Hectare (Ha)

No	Commodity	Total Fixed Cost (Rp)	Total Variable Cost (Rp)	Total Cost (Rp)
1	Corn	405.000	2.900.000	3.305.000
2	Vegetables	810.000	21.750.000	22.560.000
3	Banana	100.000	3.050.000	3.150.000
4	Pond Fish	735.000	6.150.000	6.885.000
5	Traditional and Modern Retail	2.560.000	10.550.000	13.110.000
6	Rice	560.000	7.300.000	7.860.000

The highest costs incurred for the development of food commodities are for medicines and fertilizers. The processing of peat soil is actually not as heavy as clay, but the nutrients it contains are very minimal, so if farmers want to use peat soil for gardening, they must provide sufficient amounts of manure and artificial fertilizers. Based on the information obtained from the respondents, corn plants are not complicated to plant on peatlands. Simply cared for by providing fertilizers and simple drugs, protected from pest attacks, easy maintenance, and promising results. Growing corn has enormous advantages. In addition to corn kernels as the main product, corn stalks are a very potential animal feed ingredient, so in the cultivation of corn, apart from getting corn seeds or cobs, they are also added to the stove, which also has high economic value. In terms of management, the advantage of planting corn is the ease of cultivation. Corn plants are plants that do not require intensive care (they are not spoiled) and can be grown in almost all types of soil. The risk of failure to plant corn is generally very small compared to other crops.

Red chili farming is a business that requires high costs; this is proven by the amount of money that must be incurred by farmers in the peatlands of Rengat District. Planting chilies on peatlands is not easy and haphazard. We need knowledge so that the results can be satisfactory. Planting bananas is quite economical, but the benefits are quite promising. Rengat District is famous for its special food, banana chips. Of course, this is a very big opportunity to grow bananas as a raw material for these processed foods. Judging from the results of interviews with respondents, planting bananas is very easy and does not require special care. Banana plants can only be planted in shallow peat or saprock. Shallow peat soils (< 1 m) are still ideal for planting bananas because the restoration funds are still low, so they are considered profitable, while sapric peat soils already have characteristics like normal soil, so they are believed to be suitable for planting horticultural crops. If the peatland is not shallow and mature enough, it should not be used for planting bananas. Apart from requiring a large restoration cost, it is feared that the

results will not be optimal and even threaten growth failure. In addition to easy planting, easy maintenance of bananas can also be done by weeding, loosening, and watering. Weeding is done regularly to control weeds. The weeding process does not need to be done too deeply so as not to touch the banana roots. Weeding is done simultaneously with loosening the soil. Soil loosening is done to backfill the soil so that there will be more shoots.

Pond fish cultivated by respondents at the time of this study were catfish. This pond fish utilizes peat water that flows in canal blocks around residents' homes. This pond fish farming keeps the peatlands wet. Thus, reducing the potential for land fires due to drought, on the other hand, gives the community an opportunity to get a new source of income. The canal blocking the peat swamp location is a flow of water that is always stagnant and can be used as a location for fish cultivation. The bulkhead area is adjacent to residential areas, making it easier for residents to supervise fish farming activities that are being developed. Cultivating catfish provides benefits to the community because it increases income due to high demand.

Retail businesses in Rengat District are scattered throughout the region. In this study, the respondents were in accordance with the results of previous research; the focus was on Kampung Dagang Village, which is precisely around Danau Raja tourist attraction. Retail here is modern retail that sells souvenirs typical of Rengat. The characteristics of the retail business are selling products in units, dealing directly with consumers, and providing various types of products. The benefits of the retail business are meeting consumer needs as a supplier of goods and expanding business knowledge. Rice plants in Rengat District are cultivated by the community, especially in Sungai Beringin Village. These costs are quite high and not worth the results. At the time this research was conducted, there was a flood, and rice planting was not successful (harvest failure). Planting rice on peat is limited to shallow peat because thick peat is poor in nutrients, and there are several things that need attention.

From the description above, it can be seen that the total costs that must be incurred by farmers for cultivation and business with various land sizes and different village locations After calculating the costs, what needs to be calculated is the revenue from each business (crops that have been sold). The following table shows total revenue from six commodities and economic sectors.

Table 2. Total Revenue from Commodity Sales of Peatlands in Rengat District

No	Commodity	Yields (Kg)	Price per Kg	Total (Rp)
1	Corn	3.000	2.500	7.500.000
2	Vegetables	2.000	20.000	40.000.000
3	Banana	2.000	3.500	7.000.000
4	Pond Fish	420	20.000	8.400.000
5	Traditional and Modern Retail	Sales results		18.000.000
6	Rice	0	0	0

In the table above, it can be seen that vegetables generate the most revenue because the selling price per kg is also high. The costs or capital incurred by farmers are also high for chili plants. Rice plants do not get income because, at the time this research was carried out, there was a flood that soaked the rice and caused it to fail to develop and harvest. The difference between the costs and the receipts obtained is called profit. The business profit table can be seen in the table below:

Table 3. Profit of Peatland Commodity Business in Rengat District

No	Commodity	Total Revenue(Rp)	Total Cost (Rp)	Profit (Rp)
1	Corn	7.500.000	3.305.000	4.195.000
2	Vegetables	40.000.000	22.560.000	17.440.000
3	Banana	7.000.000	3.150.000	3.850.000
4	Pond Fish	8.400.000	6.885.000	1.515.000
5	Traditional and Modern Retail	18.000.000	13.110.000	4.890.000
6	Rice	0	7.860.000	(7.860.000)

Based on the table above, high profits are obtained from vegetable crops, which in this case are chili. The profits obtained are directly proportional to the risks faced by farmers. Chili is very vulnerable to pests and plant diseases. The high demand for chilies makes farmers, especially in peatlands, continue to innovate so that the yields are abundant with all the limited land. Starting from managing the land before planting, planting and caring for it require special methods learned by farmers based on knowledge and experience. For business feasibility and sustainability, what needs to be seen is the R/C ratio analysis. The following table analyzes the R/C ratio of the commodity business:

Table 4. R/C Ratio Analysis of Peatland Commodity Business in Rengat District

No	Commodity	Total Revenue (Rp)	Total Cost (Rp)	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	Pond Fish	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

From the table above, it is found that the crop with the highest R/C ratio is corn. The order based on the high R/C ratio is corn, bananas, vegetables, traditional and modern retail, pond fish, and rice. The R/C ratio rating category is R/C < 1, so the commodity business is not feasible to continue and develop, namely rice. For an R/C value > 1, a feasible business to continue and develop is corn, bananas, vegetables, pond fish, and traditional and modern retail. From the research results obtained, corn plants are the most feasible commodity to be developed in the peatlands of Rengat District.

When there is economic growth in the Rengat District area or an increase in the amount of production of goods because of the specialization of commodities developed on peatlands, it is expected to increase the income of the people. When people's income is high and they are able to meet the necessities of life, the economic development and welfare of society can be fulfilled. Financial analysis of the commodities and sectors resulting from the mapping of potential peatlands in Rengat District can provide an overview of the feasibility of the business and the level of profit to be gained if this commodity is developed.

5. Conclusion

Commodities and economic sectors that have the potential to be developed in the peatlands of Rengat District are corn, vegetables, bananas, pond fish, traditional and modern retail, and

rice. From the results of the financial analysis carried out in this study by looking at the revenue and profit generated from the commodity being cultivated, corn is a very economically profitable commodity when planted on peatlands. Corn produces good yields and sales value, market share is available, the planting process is efficient and effective, and it is more pest-resistant. In the results of the financial analysis by calculating the R/C ratio, it was found that corn has the highest value, namely 2.70, which means above 1, which is feasible to develop on peat land in Rengat District, while rice with an R/C value <1 is not feasible to develop.

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