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Palm Oil Farmers' Welfare: A Geographical Information System Approach

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ABSTRACT

This study analyzes the welfare paradox in Rokan Hulu Regency, where abundant natural resources coexist with low community welfare. Using the Lorenz curve and Gini index, spatial mapping was employed to create a socio-demographic map. Primary data were analyzed with the Slovin method and Gini index models. Results show high inequality, with Gini index values of 0.81 (income-based) and 0.84 (expenditure-based). To address this, the government can support oil palm farmers through policies on fertilizer subsidies, worker wage regulation, and standardized palm oil pricing, aiming to improve the economic conditions of the farming community.

Keywords: Livelihood; Income; Comsumption Pattern; geographical information system

INTRODUCTION

Socio-economic welfare is a condition and order of a prosperous socio-economic life. In this case the fulfillment of the needs for clothing, food, shelter, health, and education is a benchmark in socio-economic welfare issues. Welfare can be seen in terms of livelihoods, income, consumption patterns and geographical conditions of an environment or region. Every society has different welfare factors depending on the achievement of welfare according to what they want.

It can be seen that households that are not too well off often succumb to the driving factors that make them diversify due to fulfilling the need for survival. Meanwhile, more affluent households take advantage of external factors that create opportunities for wealth (Watete et al., 2016). Livelihood diversification is able to build an increase in various asset capabilities and activities needed to support life (Abdullahi, 2018). Nevertheless, some jobs tend to be associated with each existing class. For example, in the Philippines, shellfish collectors and fishermen, food sellers and abaca peelers are common livelihoods in households with low purchasing power (Lopez & San Juan, 2019). In contrast, in Bangladesh, the fishing business makes a significant contribution to various aspects of society equally (Sadekin et al., 2018). Then the tea industry in India has provided jobs to the labor force evenly where the research that is now contributing is aimed at developing welfare aspects for workers (Gayathri & Arjunan, 2010). Meanwhile, the forest timber industry in Pakistan is considered capable of reducing poverty levels (Ullah et al., 2021a).

Rokan Hulu Regency, the capital city of Pasir Pengaraian, Riau Province, was formed as a result of division from Kampar Regency. Agriculture is a sector that contributes greatly to regional economic growth. The leading product in

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the plantation sector that supports the people's economy is oil palm. This superior commodity has the potential to be developed in Rokan Hulu Regency, because the climate of the Rokan Hulu area is very supportive plus it is very attractive to farmers, but the wealth of natural resources does not fully provide welfare to the community. This is due to the large level of people's income which is categorized as low so that consumption patterns in general only meet basic needs. This means that the standard of living of the existing people is still below standard. This study has the objective of identifying the socio-economic conditions of the community and identifying the welfare of the farming community in Rokan Hulu Regency.

Structural transformation causes changes in the income ratio between sectors which causes inequality between social sectors (Ryan et al., 2021). Some literature confirms that inequality is more significant in the non-agricultural sector than in the agricultural sector (Phillips et al., 2021). As this problem is believed to be the root of the mismatch of income distribution. The classic pattern of structural transformation in developed countries shows a move from the agricultural sector to the industrial sector, then switching to the service sector (Dartanto et al., 2017). The lack of revenue generation in rural areas is likely to result from a lack of services resulting in funding through user charges and/or lower levels of per capita income. So that it leads to inequality in the distribution of income between developing countries to developed countries, as well as between urban and rural areas.

On the other hand, socio-economic and socio-demographic variables tend to be highly correlated, depending on the specific variable and the area/individual studied. In this case social demography refers to many aspects, reviewing variations from the social demography itself (Mensah, 2012).

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RESEARCH METHODS

The primary data is the result of a survey regarding the income and consumption expenditure of the community based on their livelihood as plantation farmers. The data used to calculate income distribution by calculating the Gini Ratio uses data on the amount of income earned by residents and data on the number of residents in the area. The Gini index can show changes in income distribution within a country over a certain period, so that it can show an increase or decrease in income inequality in a country or region. The Gini coefficient sees a relationship between the amount of income received by the whole family or individual with total income. Therefore, the gini coefficient or gini number is often used to measure the level of income distribution gap. The Gini Ratio as a measure of income distribution has an interval between 0 and 1. If the Gini Ratio is close to zero, it indicates low inequality, and if the Gini Ratio is close to one, it means high inequality. It can be said that the smaller the value of the Gini coefficient indicates a more even distribution of income; conversely, the greater the value of the Gini coefficient indicates a more unequal distribution (gap) between groups of income recipients. Gini Ratio Formula as follows:

$$\mathbf{GR = 1 - 1 -} \sum \boldsymbol{fi}\,[\boldsymbol{Yi} + \boldsymbol{Yi} - \mathbf{1}] \qquad (1)$$

Information:
GR = Gini Ratio
fi = Amount percent (%) of class i income earners
Yi = Cumulative amount (%) of income in class I
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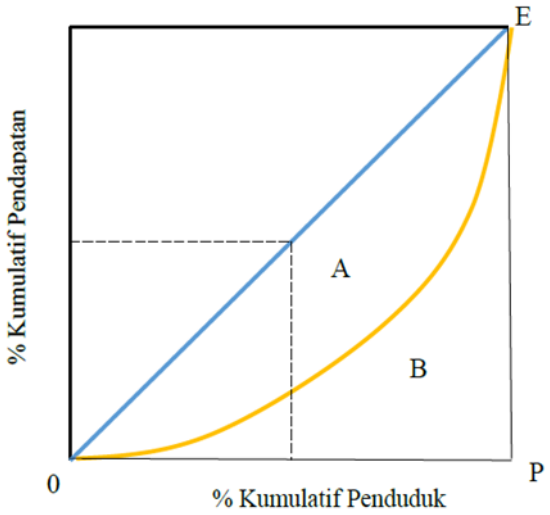


Figure 1
Kurva Lorenz

Gini value between 0-1. If GR = 0, income inequality is perfectly even. If GR = 1, it means that income inequality is perfectly unequal. Meanwhile, to measure inequality using the Lorenz Curve because the Lorenz Curve describes the national cumulative distribution among the population. The Lorenz curve is in a square where the vertical side represents the cumulative percentage of income and the horizontal side represents the cumulative percentage of the population as income recipients.

Determination of the poverty level of inequality Lorenz curve can be seen from the distance of the curved line to the diagonal line. Because when the curved line gets closer to the diagonal line, it means that the distribution of income is more even, conversely, if the curved line is further away from the diagonal line, the inequality in that area is further away from the diagonal line, so the inequality in that area is getting worse. Therefore, it can be concluded that the distribution of income is said to be more even if the Gini coefficient is close to zero (0), while the more unequal the distribution of income the Gini coefficient is closer to one (1). The criteria for inequality based on the Gini Coefficient is as follows.

- Value 0 – 0.4 is a low level of inequality
- A value of 0.4 – 0.5 is a moderate level of inequality
- A value of more than 0.5 is high inequality

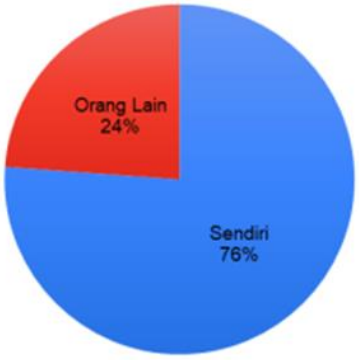
We employ the Geographic Information System (GIS) approach in this research. GIS is a computer-based information system, designed to work with data that has spatial information (spatial reference). GIS technology integrates common database operations, such as querying and statistical analysis, with the unique visualization and analysis capabilities of mapping. The analysis technique used in this study is to determine the characteristics of land use patterns in the area of social demographic mapping. This analysis uses software tools, especially ArcGIS. In this study, there is one type of spatial used, namely spatial mapping. Spatial mapping is a depiction of existing conditions onto a map, resulting in a socio-demographic map in Rokan Hulu Regency.

ANALYSIS AND DISCUSSION

Research Description

The results of an online survey conducted among the people of Rokan Hulu district amounted to 130 respondents. The community is smallholders where 76% of the respondents are smallholders on their own land while 24% of the other respondents are smallholders owned by other people. The majority of oil palm farmers in Rokan Hulu Regency work on oil palm plantations which are their own.

Respondent data stated that the age characteristics of oil palm smallholders in Rokan Hulu Regency were dominated by farmers under 20 years of age. This shows that most of the smallholders are young millennials. The data also shows that the majority of smallholders are direct owners of the oil palm plantations they cultivate. Through the data collected, it is known that the number of family members in each family for respondents shows a figure of 51 percent for families with 5-6 members, 32 percent of respondents have 3-4 family members. There are 10 percent of respondents who have family members of more than 7 people and there are 7 percent of respondents who have family members less than or equal to 2 people.



Source : Data Processing, 2022

Figure 2
Palm Oil Ownership in Rokan Hulu Regency.



Source: Data Processing, 2022

Figure 3
Number of Family Members in Rokan Hulu Regency

Oil palm ownership is also explained in the distribution through the map. Based on the map of palm oil ownership per sub-district, most of the respondents per sub-district answered that the status of oil palm ownership was

their own. Sub-districts with respondents who mostly answered their own palm oil, namely North Tambusai, Kefulan, Tambusai, KeKefulan, Kunto Darussalam, Kefuluhan Hulu, Rambah Hilir, Bangunpurba, Rambah, Rambah Samo, Ujungbatu, Rokan IV Koto, and Pendalian IV Koto. Meanwhile, the sub-districts where the majority of respondents answered that ownership status of palm oil belonged to other people, namely Tandun, Kabun and Pagaran Tapah Darussalam Sub-Districts.

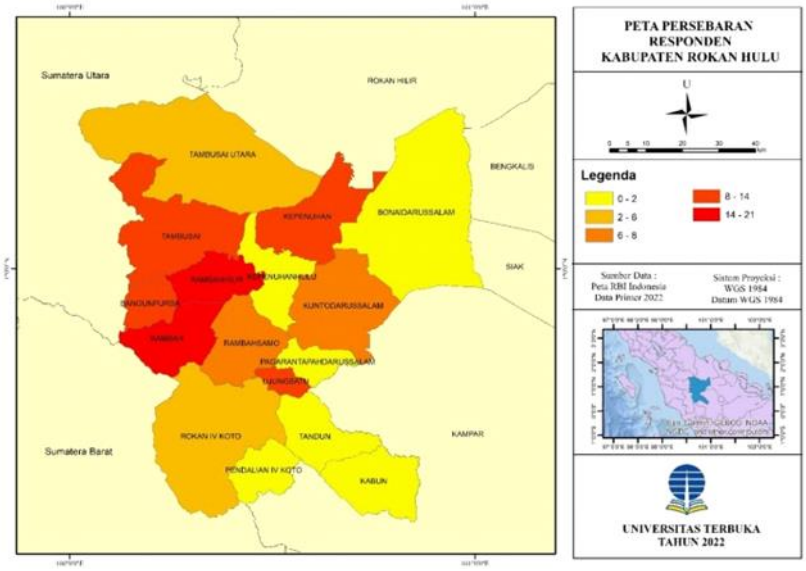
Respondents came from various sub-districts in Rokan Hulu Regency. Of the total respondents, the 4 largest sub-districts with the percentage of respondents in the study were Rambah sub-district with 16 percent of respondents, Rambah Hilir Sub-district with 14 percent of respondents, and Bangun Purba and Ujung Batu sub-districts with 11 percent of respondents in each sub-district in this study. Respondents also came from other sub-districts in Rokan Hulu Regency, such as the Kepuhan, Tambusai, Kunto Darussalam, Rambah Samo, and others, as shown in the following graph.



Source : Data Processing, 2022

Figure 4
Number of Respondents

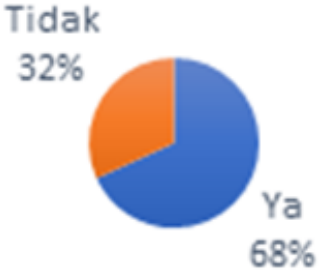
The distribution of respondents can also be seen through the Map of the Distribution of Respondents in Rokan Hulu Regency. The districts with the most respondents were Rambah Hilir and Rambah districts with a range of 14-21 respondents. Meanwhile, the smallest respondents were in Kefuluhan Hulu, Pagaran Tapah Darussalam, Tandun, Pendalian IV Koto, and Kabun with a range of 0-2 respondents. The sub-district where there were no respondents was the Bonai Darussalam sub-district.



Source : Data Processing, 2022

Figure 5
Distribution Map of District Respondents

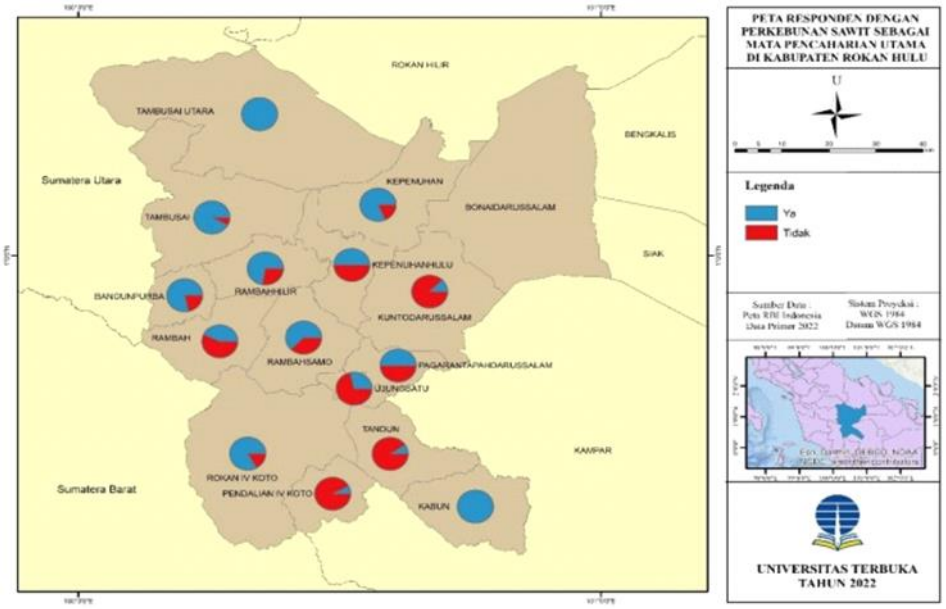
Social and Economic Conditions



Source : Data Processing, 2022

Figure 6
Main Livelihoods Diagram

As an area with a high number of oil palm plantations and agriculture, residents in Rokan Hulu Regency also work in other fields, both as side jobs and as main workers. The data shows that most of the respondents have a main job as a farmer. This is evidenced by survey results which show that 68 percent of respondents depend on income from oil palm plantations as a source of livelihood. Respondents have varied jobs, namely students, housewives, civil servants, entrepreneurs and others.



Source : Data Processing, 2022

Figure 7
Map of Distribution of Respondents

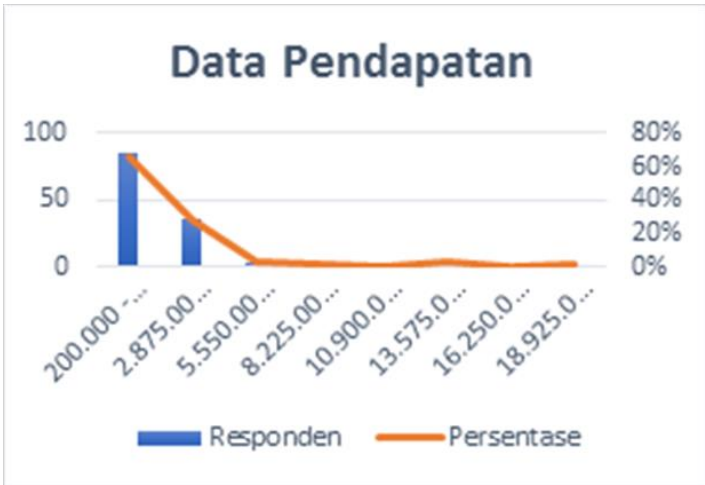
In addition to the graph, the distribution of respondents with oil palm plantations as their main livelihood can also be seen on the map. Based on this map, it can be seen that there are respondents who mostly answered oil palm plantations as their main livelihood and not based on the sub-district. The sub-districts with the majority of respondents responding to oil palm plantations as their main livelihood were the sub-districts of Tambusai, Kefulan, Tambusai Utara, Rambah Hilir, Bangunpurba, Rambah Samo, Rokan IV Koto, and Kabun. Meanwhile, the majority of respondents answered that oil palm plantations were not their main livelihood, namely in Kunto Darussalam, Rambah, Ujungbatu, Tandun, and Pendalian IV Koto.



Grafik Hasil Sawit
Data Processing, 2022

Chart 1
Palm Oild Yield

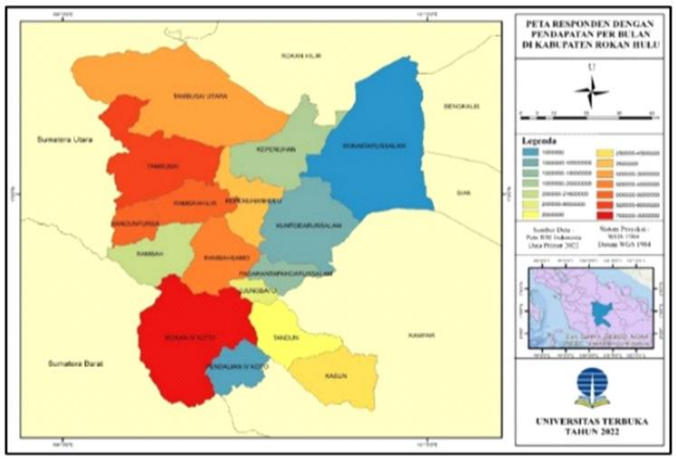
The survey results stated that the community, the majority of whom are oil palm farmers, felt that 27 percent of respondents agreed that the results from oil palm farming were able to meet their needs and another 10 percent felt strongly agreed. Meanwhile, 22 percent of respondents stated that they disagreed and 9 percent stated that they strongly disagreed and 32 percent of respondents stated that they were neutral.



Source: Data Processing, 2022

Chart 2
Revenue Data

Based on the data, the income level of respondents has an uneven distribution. In the income range of 200,000 rupiah to 2,875,000 rupiah, there are 65 percent of respondents. As many as 27 percent of respondents have income in the vulnerable range of more than 2,875,000 rupiah to 5,550,000 rupiah. The higher the income range, the smaller the percentage of respondents. This shows a quite significant gap that occurs in the distribution of income.

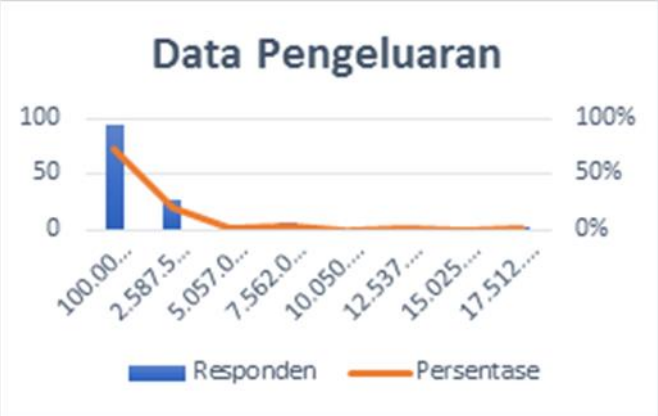


Source: Data Processing, 2022

Figure 8
Revenue Map

The distribution of respondents' monthly income can be seen through the Map of Respondents with Monthly Income in Rokan Hulu Regency. Respondents who answered income per month with the highest range were in the District of Rokan IV Koto Rp. 7,000,000.00-Rp. 30,000,000.00. Meanwhile, the respondents who answered the lowest opinion per month were IDR 1000,000.00, namely in the Koto IV Pendalian.

In the expenditure range of 100,000 rupiah to 2,587,000 rupiah, there are 73 percent of respondents. As many as 21 percent of respondents have expenses in the range of 2,587,000 rupiah to 5,057,000 rupiah. In the next expenditure vulnerability, the percentage of respondents is increasing, which also shows inequality in the distribution of expenditure.



Source: Data Processing, 2022

Chart 3
Expenditure Data

The map distribution of respondents with monthly income in Rokan Hulu shows that the numbers vary in each sub-district. The sub-district with the most respondents answering spending was in the Kefulan District with a range of IDR 9,000,000.00-IDR 150,000,000.00. Meanwhile, the subdistrict with respondents who answered the smallest expenses, namely Tandun and Pendalian IV Koto, amounted to IDR 1,000,000.00.

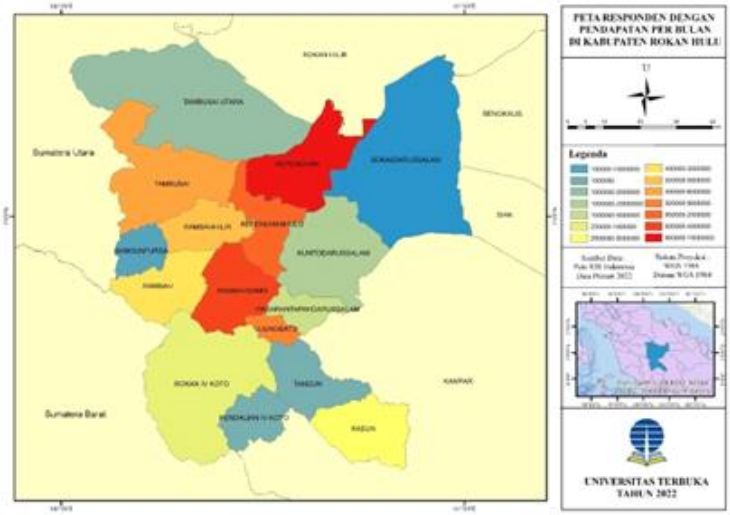
Distribution of Income and Expenditures

Income distribution is a description of the distribution of income in society, this also applies to the distribution of expenditure. The Gini index is used to determine the distribution of income and expenditure among the people who own oil palm plantations in Rokan Hulu Regency.

The index value is calculated using household income and expenditure data provided by the respondents. Based on the results of data processing for the Gini index, it is stated that people in Rokan Hulu Regency have a high category of inequality, both in calculations using the income and expenditure approaches. The lowest income based on data shows a nominal value of 200,000 rupiah and the highest income is at 21,600,000 rupiah. In the respondent's expenditure data, the lowest expenditure is worth 100,000 rupiah and the highest expenditure is 20,000,000 rupiah.

Respondents' income shows a large value with a significant difference. This also happened to the expenditures made by the people in Rokan Hulu Regency. There are people who have income and expenses with a value that stands out among the income and expenses of the people in Rokan Hulu Regency.

Inequality that occurs is the result of an uneven distribution of income and expenditure. In terms of income, this is due to differences in ability to manage oil palm land. For owners of oil palm plantations which are also the main source of income, palm oil income is the main support for the family economy. This needs to be a concern so that oil palm smallholders can increase expenditure and earn higher income. Subsidy policies can be carried out by the government to help increase income and help household expenses for oil palm farmers. Subsidies can also be made for supporting medicines, such as pesticides, vitamins and so on.



Source: Data Processing, 2022

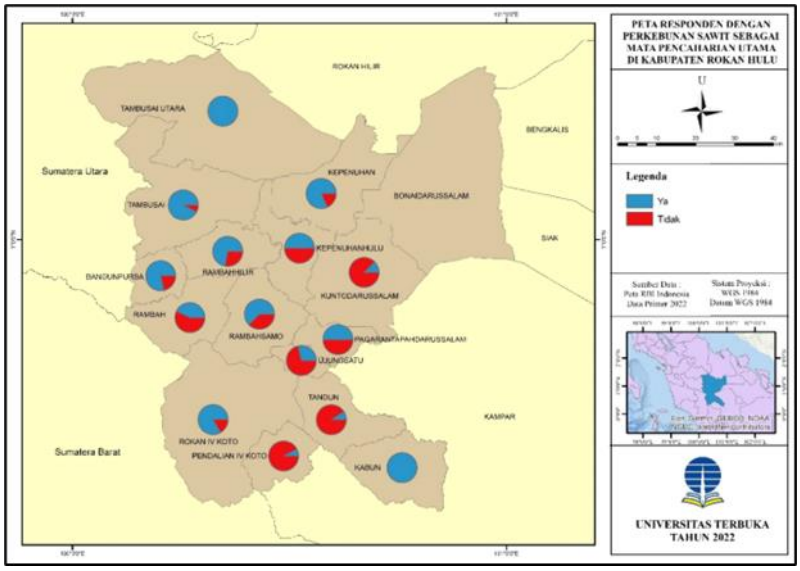
Figure 9
Map of Respondents Based on Income

Social and Economic Conditions

As an area with a high number of oil palm plantations and agriculture, residents in Rokan Hulu Regency also work in other fields, both as side jobs and as main workers. The data shows that most of the respondents have a main job as a farmer. This is evidenced by survey results which show that 68 percent of respondents depend on income from oil palm plantations as a source of livelihood. Respondents have varied jobs, namely students, housewives, civil servants, entrepreneurs and others.

In addition to the graph, the distribution of respondents with oil palm plantations as their main livelihood can also be seen on the map. Based on the map, it can be seen that there are respondents who mostly answered oil palm plantations as their main livelihood and not based on the sub-district. The sub-districts with the majority of respondents responding to oil palm plantations as their main source of livelihood were the sub-districts of Tambusai, Kefulan, Tambusai Utara, Rambah Hilir, Bangunpurba, Rambah Samo, Rokan IV Koto, and Kabun. Meanwhile, the majority of respondents

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Source: Data Processing, 2022

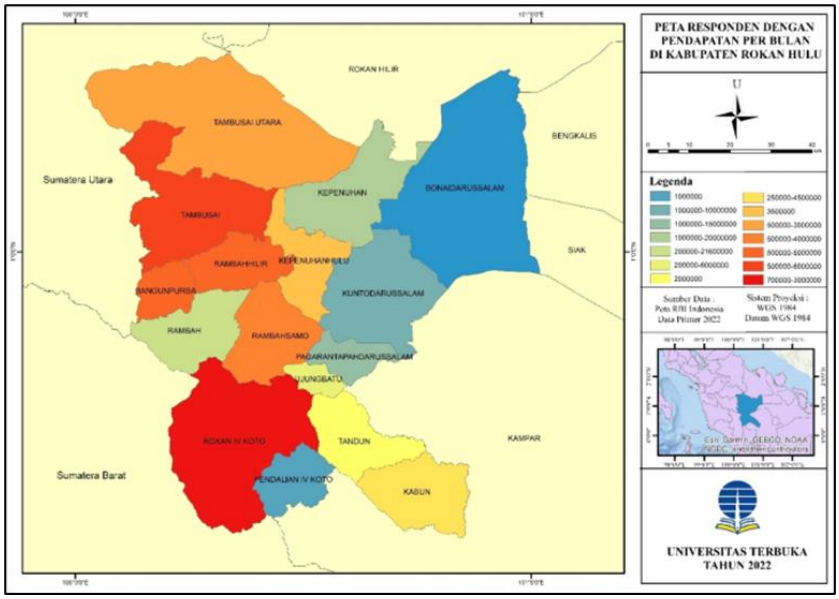
Figure 10
Map of Respondents with Oil Palm Plantations as the Main Livelihood in Rokan Hulu Regency.

The survey results stated that the community, the majority of whom are oil palm farmers, felt that 27 percent of respondents agreed that the results from oil palm farming were able to meet their needs and another 10 percent felt strongly agreed. Meanwhile, 22 percent of respondents stated that they disagreed and 9 percent stated that they strongly disagreed and 32 percent of respondents stated that they were neutral.

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In the expenditure range of 100,000 rupiah to 2,587,000 rupiah, there are 73 percent of respondents. As many as 21 percent of respondents have expenses in the range of 2,587,000 rupiah to 5,057,000 rupiah. In the next expenditure vulnerability, the percentage of respondents is increasing, which also shows inequality in the distribution of expenditure.

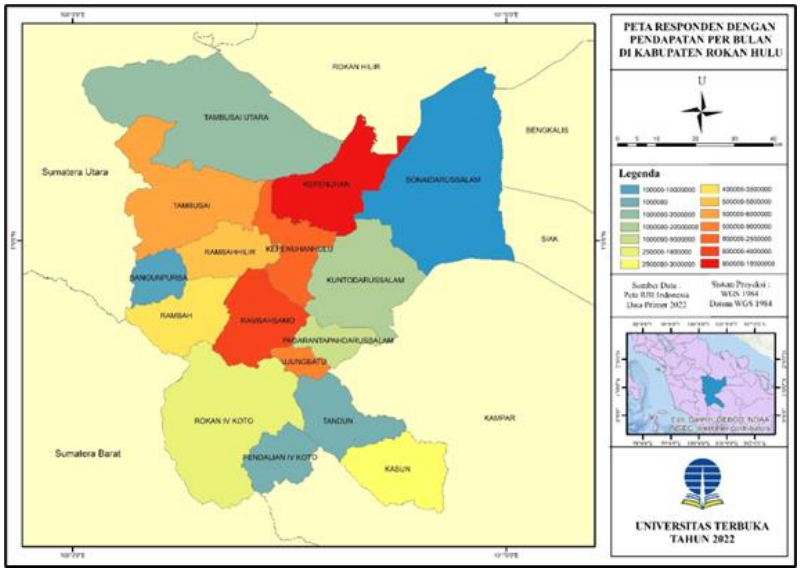


Source: Data Processing, 2022

Figure 11

Map of Respondents with Monthly Income in Rokan Hulu Regency

Map distribution of respondents with expenditure per month in Rokan Hulu shows the numbers vary in each sub-district. The sub-district with the most respondents answering spending was in the Kefulan District with a range of IDR 9,000,000.00-IDR 150,000,000.00. Meanwhile, the subdistrict with respondents who answered the smallest expenses, namely Tandun and Pendalian IV Koto, amounted to IDR 1,000,000.00.



Source: Data Processing, 2022

Figure 12

Map of Respondents with Monthly Income in Rokan Hulu Regency

Distribution of Income and Expenditures

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Table 1
Gini Index

Gini Index Income Approach	0,81
Gini Index Expenditure Approach	0,84

Source: Data Processing, 2022

The index value is calculated using household income and expenditure data provided by the respondents. Based on the results of data processing for the Gini index, it is stated that people in Rokan Hulu Regency have a high category of inequality, both in calculations using the income and expenditure approaches. The lowest income based on data shows a nominal value of 200,000 rupiah and the highest income is at 21,600,000 rupiah. In the respondent's expenditure data, the lowest expenditure is worth 100,000 rupiah and the highest expenditure is 20,000,000 rupiah.

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CONCLUSIONS AND SUGGESTIONS

Rokan Hulu is an area with large areas of oil palm plantations. Research shows that people in Rokan Hulu District depend on palm oil for their livelihood. This is indicated by the majority of the community's main occupation being oil palm farmers. The community stated that the results of palm oil were able to meet the needs of life and their daily expenses. However, the distribution of income and income in society shows a high inequality phenomenon. The disparities that occur are calculated using the Gini index with the approach and spending. The results of calculating the Gini index using the income and expenditure approach show that there is inequality on a large scale in the people of Rokan Hulu Regency.

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