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| **ARTICLE INFO** |  | **ABSTRACT** |
| *Article History:*  Received: 30 May 2024  Final Revision: 07 June 2024 Accepted: 09 June 2024  Online Publication: 11 June 2024 | This research aimed to evaluate risk factors and assess flood risk areas, including analysis guidelines for flood risk area management in Patong Municipality, Kathu District, Phuket Province. Factors affecting flood were rainfall, slope gradient, soil permeability, land use and water barrier. Weighting and rating factors were indicated, and a geographic information system for potential surface and overlay analyses was applied. The results revealed that Patong Municipality had a high-risk area of 2.17 km2 (11.39%). The flood risk area for moderate level accounted for 4.00 km2 (20.99%) and the low flood risk area for 12.89 km2 (67.62%). Guidelines for flood risk area management in Patong Municipality should focus on the principles of soil and water conservation, forest restoration and preservation in the upstream area, flow path and stream management, land use management, and ground cover planting to prevent soil erosion and maintain soil moisture. |
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# INTRODUCTION

## Research Background

Indonesia is an agricultural country, a country where the majority of the population makes their living as farmers. Apart from that, the agricultural sector is very important. So development priorities are placed on the agricultural sector to meet domestic food and industrial needs, increase exports, increase farmers' income and expand employment opportunities [1]. Food is a basic need for humans to be able to maintain life, and because sufficient food for everyone at all times is a human right that deserves to be fulfilled. Based on this, the problem of meeting the food needs of the entire population at any time in a region is a country's main target of food policy. Indonesia, as a country with a large population, faces very complex challenges in meeting the food needs of its population, so that the problem of food security has become a central issue in development and a focus in agricultural development [2].

One of the government's roles is to provide subsidies for the agricultural sector. Subsidies are a form of government assistance to reduce the burden on society by paying part of the price that should be paid by society or certain groups of society to provide goods or services related to the interests of many people's lives. One of the subsidies in the agricultural sector is fertilizer subsidies. Subsidized Fertilizer is goods under supervision whose procurement and distribution receive subsidies from the Government for the needs of farmer groups and/or farmers in the agricultural sector. Subsidized fertilizer is assistance issued by the government to farmers in order to improve the quality of agricultural or plantation products in Indonesia [3]. Fertilizer is organic or inorganic material containing nutrients that is added to planting media or plants to meet the nutritional needs of plants with the aim of maximizing growth and productivity. Fertilizer is needed to increase agricultural productivity. In fertilizer distribution, fertilizer prices are often unstable, so the government provides subsidies through subsidized fertilizer. The government pays close attention and supervision to subsidized fertilizer in its distribution in each region. The government provides subsidized fertilizers such as urea, SP 36, ZA, NPK and Organic. In reality, various problems are often encountered, such as a scarcity of subsidized fertilizer. Various government policies to support increasing productivity and quality of food commodities are continuously being implemented sources.

## Literature Review

Various government policies to support increased productivity and quality of food commodities continue to be implemented. This is to maintain domestic food availability or realize national food security. One of the government's policies is to provide fertilizer subsidies to farmers to reduce production costs.

**Table 1**. Price of rubber, production, revenue, cost of production and farmer income

|  |  |  |
| --- | --- | --- |
| No | Item | Rp/month |
| 1 | Price of rubber | 12.901 |
| 2 | Production | 309.21 |
| 3 | Revenue | 3.989.100 |
| 4 | Cost of production | 615.782 |
| 5 | Farmer income | 3.373.300 |

The fertilizer subsidy policy experiences pros and cons from year to year. On the one hand, the government is persisting with the fertilizer subsidy policy to maintain food security by maintaining production levels. Production can be maintained to meet food needs by providing good inputs, one of which is fertilizer. Adequate use of fertilizer in terms of quantity, quality and continuity is needed to reduce the decline in soil fertility and increase sustainable productivity [4], so if fertilizer subsidies are reduced it is feared that it will disrupt productivity. However, on the other hand, the budget allocation for the fertilizer subsidy policy is very large. The government must start cutting the fertilizer subsidy budget and divert it to other programs, especially investment in agricultural technology.

Farmers are complaining about this situation because the government is targeting an increase in production. Subsidized fertilizer is very limited, the amount is not much. So many farmers get non-subsidies, but in reality, it is also difficult to get them. The company distributes subsidized fertilizer according to the mechanism determined by the government. In 2021, PT. PUSRI is obliged to distribute 230,000 tons of subsidized urea and NPK fertilizer to 17 districts/cities in South Sumatra. Regarding farmers' needs, Pusri also provides non-subsidized fertilizer, with the company's production capacity guaranteed to meet South Sumatra's needs. Distribution of subsidized fertilizer is in accordance with the Electronic Group Definitive Needs Plan (e-RDKK) mechanism managed by the Ministry of Agriculture. Implementing the e-RDKK system can minimize fraud so that the distribution of subsidized fertilizer is right on target. In distributing subsidized fertilizer, Pusri refers to the Minister of Trade Regulation Number 15/M-DAG/PER/4/2013 concerning the Procurement and Distribution of Subsidized Fertilizer for the Agricultural Sector nationally starting from Line I to Line IV. So far, PT. PUSRI ensures that subsidized fertilizer stocks are available in accordance with the allocation determined by the government. Apart from ensuring the fulfillment of fertilizer stocks at retail kiosks, PT. PUSRI also ensures that in the distribution of subsidized fertilizer, there is no misuse or scarcity of fertilizer. Up to 8 February 2021, the distribution of subsidized urea fertilizer reached 11,607.30 tons and 10,657.55 tons of subsidized NPK fertilizer for the South Sumatra region. PT Pupuk Indonesia (Persero) has prepared a stock of subsidized fertilizer in the South Sumatra (Sumsel) region of as much as 18,482 tons to meet the October 2021-March 2022 planting season.



**Fig. 1**. Pretreatment of 2% NaOH: (A) Raw material, (B) Particle size (C) Common reed after 3 days, and (D) After mixed by a blender.

### Subsidized fertilizer

Subsidized fertilizer is fertilizer whose procurement and distribution receive subsidies from the government for farmers' needs which is carried out based on a government program. Companies that produce Urea, SP-36, ZA, NPK Phonska and organic fertilizers domestically are PT Pupuk Sriwidjaja, PT Pupuk Kujang, PT Pupuk Kalimantan Timur, PT Pupuk Iskandar Muda and PT Petrokimia Gresik. Distributors are legal business entities appointed by producers to purchase, store, sell and market subsidized fertilizers, in bulk to be sold to end consumers through retailers. Meanwhile, official retailers are individuals or business entities appointed by distributors whose main activity is selling directly to final consumers in small parties [11].

### The level of farmers satisfaction of UPPB

Satisfaction is the level of a person's feelings after comparing the performance or results he feels compared to his expectations. Rubber farmer satisfaction is an important factor that must be considered in business development. The level of farmer satisfaction with UPPB membership will positively impact the business's continuity. Farmers who feel satisfied tend to be enthusiastic and active in their membership.

Farmer satisfaction or dissatisfaction is related to the difference between expectations and performance received or felt by farmers [19]. The level of farmer satisfaction is assessed by looking at members' activeness in marketing rubber products at UPPB Sumber Rezeki, Mendala Village, Peninjuan District, OKU Regency. Farmer satisfaction is determined by five main factors and must be considered by UPPB Sumer Rezeki, namely:

## Research Objective

This study aims to analyze the factors of rice production and the relationship of subsidized fertilizer in Madang Suku I District of East OKU Regency.

# MATERIALS AND METHODS

The research was carried out in September 2023 in Madang Suku I District, East OKU Regency. Determining the research location was carried out purposively considering that Madang Suku I District, East OKU Regency, is a district that has an area of ​​rice fields and rice production and is related to fertilizer subsidies; the farmers involved are farmers who receive subsidized fertilizer. The method used in this research is the survey method. The sampling method used was a simple random sampling method from 9,335 farmers who received subsidized fertilizer; 95 people were taken as samples. The data analysis method uses multiple linear regression to analyze the factors influencing rice production in Madang Tribe I, East OKU Regency.

# RESULT AND DISCUSSION

## Factors affecting rice production

The factors thought to influence the increase in rice production in Madang Suku I District, East OKU Regency are land area (X1), labor (X2), seeds (X3), subsidized fertilizer (X4), and pesticides (X5). The results of data analysis carried out with SPSS software produced the following model:

Log Y = Log 7.198 + 0.642 LogX1 + 0.594 LogX2 + 0.325 LogX3 + 0.695 LogX4 + 0.636 LogX5

The multiple linear regression equation can be interpreted as follows:

1. The constant value is 7.198. This shows that if the variables land area (X1), labor (X2), number of seeds (X3), subsidized fertilizer (X4), and pesticide (X5) are zero, then the rice production in Madang Suku I District, East OKU Regency is equal to 7,198 units.
2. The land area coefficient value is 0.642, meaning that if the land area used by farmers to carry out rice farming activities increases by 0.642%, then rice production in Madang Suku I District, East OKU Regency will increase by 0.642% with the assumption that other variables are considered zero or constant.
3. The labor regression coefficient is 0.594, meaning that if the labor used by farmers to carry out rice farming activities increases by 0.594%, then rice production in Madang Suku I District, East OKU Regency will increase by 0.594% with the assumption that other variables are considered zero or constant.
4. The regression coefficient for the number of seeds is 0.325, meaning that if the number of seeds used by farmers to carry out rice farming activities increases by 0.325%, then rice production in Madang Suku I District, East OKU Regency will increase by 0.325% with the assumption that other variables are considered zero or constant.
5. The regression coefficient for subsidized fertilizer is 0.695, meaning that if the subsidized fertilizer used by farmers to carry out rice farming activities increases by 0.0.695%, then rice production in Madang Suku I District, East OKU Regency will increase by 0.695% with the assumption that the other variables are considered zero or constant.
6. The pesticide regression coefficient is 0.636, meaning that if the pesticides used by farmers to carry out rice farming activities increase by 0.636%, then rice production in Madang Suku I District, East OKU Regency will increase by 0.636% with the assumption that other variables are considered zero or constant.

The Adjusted R Square value was obtained at 0.873. The Adj R2 value means that 87.3% of rice production in Madang Suku I District, East OKU Regency, can be explained by the independent variables explained in the model, such as land area (X1), labor (X2), number of seeds (X3), subsidized fertilizer (X4), and pesticides (X5). Meanwhile, the remaining 13.7% is explained by other variables outside the research, such as weather, climate, farming experience, farmer age, technology and others [14]

The results of the F test show that the results of simultaneous testing of all estimated parameters at a confidence level of 95% show that the F table value > calculated F (34,767 > 2,330). It can be said that the independent variables which include land area (X1), labor (X2), number of seeds (X3), subsidized fertilizer (X4), and pesticides (X5) together have a significant effect on rice production in the District. Madang Tribe I East OKU Regency.

The results of the t-test show that the variables of land area (X1), labor (X2), number of seeds (X3) and subsidized fertilizer (X4) individually have a significant effect on rice production in Madang Suku I District, East OKU Regency. Meanwhile, the pesticide variable has no real effect on rice production in Madang Suku I District, East OKU Regency.

The land area has a calculated t value > t table, 3.057 > 1.991, which means the land area has a real effect on rice production in Madang Suku I District, East OKU Regency at a 95% confidence level. The land area coefficient value is 0.642, meaning that if the land area used by farmers to carry out rice farming activities increases by 0.642%, then rice production in Madang Suku I District, East OKU Regency, will increase by 0.642% with the assumption that other variables are considered zero or constant. These results align with research by [14] and [15], which states that land area factors directly influence rice production.

Labor has a value of t calculated < t table, namely 4,816 < 1.991, which means that labor has a real influence on rice production in Madang Suku I District, East OKU Regency at a 95% confidence level. The labor regression coefficient is 0.594, meaning that if the labor used by farmers to carry out rice farming activities increases by 0.594%, then rice production in Madang Suku I District, East OKU Regency, will increase by 0.594% with the assumption that other variables are considered zero or constant.

The labor variable significantly affects Madang Suku I District, East OKU Regency rice production. These results align with research by [16], which states that labor influences rice production. When the workforce decreases, rice production will decrease in Madang Suku I District, East OKU Regency. This is because the number of workers in producing rice plants in Madang Suku I District, East OKU Regency, is much needed due to the high productivity of rice in Madang Suku I District, East OKU Regency.

This is proven by the theory of the law of diminishing returns, which means that if we add one factor of production, in this case, labour, while the land area is considered constant, then productivity will decrease. This theory comes from David Ricardo's theory. According to Ref. [17], research shows that labour significantly affects rice production. These results align with the findings of [18] and [19], which stated that labour factors directly influence rice production.

# CONCLUSION

Land area, labour, number of seeds, subsidized fertilizer, and pesticides influence rice production in Madang Suku I District, East OKU Regency. The factor that has the most influence is land area, with a standard value of the partial regression coefficient (beta coefficient) of 0.567. The subsidized fertilizer policy, namely urea fertilizer (X1) and NPK fertilizer (X2), individually and simultaneously contributes to increasing rice production in Madang Suku I District, East OKU Regency. This is evident from the increase in rice production in East OKU which reached 689,678 tons of milled dry grain (GKG) or 811,385 tons of GKP from a planting area of ​​108,141 hectares (Ha). This production has increased by 20 per cent compared to 2021, and at the beginning of 2023, rice production in Ogan Komering Ulu Timu Regency was included in one of the districts with the highest rice production in South Sumatra province.

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