

## Analysis of the Impact of Labor on Seaweed Farming Income in Ghone Bhalano Village, Duruka District, Muna Regency

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### Abstract

*This study aims to: 1) Determine the number of seaweed farming labor hours in Ghone Bhalano Village, 2) Determine the total income from seaweed farming in Ghone Bhalano Village, and 3) Analyze the influence of labor on seaweed farming income in Ghone Bhalano Village. This research was conducted from May to June in Ghone Bhalano Village, Duruka District, Muna Regency. The research location was determined purposively. The sample in this study consisted of 34 farmers and was determined using the census method. Data analysis used HKP analysis, simple linear regression analysis, and income analysis. The results showed that labor had a real and significant effect on income. The average income of seaweed farmers during one growing season is IDR 1,799,448.*

**Keywords:** *Labor, Income, Seaweed Farming.*

### INTRODUCTION

The marine and fisheries sector plays a strategic role in the national economy, particularly in providing employment and supporting food security. This is reflected in the positive growth trend of the fisheries sector's Gross Domestic Product (GDP), which reached 2.25 percent in the third quarter of 2024, the highest growth in the last five years. In addition, the fisheries sector's contribution to the national GDP reached 2.54% or Rp 407 trillion (KKP, 2024).

One marine and fisheries resource with great potential for development is seaweed. Seaweed in Indonesia is widely used in the food and cosmetics industries. Data from the Indonesian Ministry of Marine Affairs and Fisheries (2022) shows that seaweed production has



had a positive trend in the 2017–2021 period. This condition is a good opportunity for farmers and related industries to develop seaweed farming to increase community income. Southeast Sulawesi Province is an archipelago with enormous marine potential. Based on data from the Southeast Sulawesi Central Statistics Agency (BPS) in 2024, the province's marine area covers approximately 114,879 km<sup>2</sup> with a coastline length of ±1,740 km and consists of 590 islands, making it the province with the eighth largest number of islands in Indonesia. These geographical conditions support the development of the fisheries sub-sector, particularly seaweed farming. Seaweed production in Southeast Sulawesi during the 2017–2022 period showed fluctuating dynamics. In 2017, production reached 827,172 kg, then declined to 272,325 kg in 2020. However, in 2021 and 2022, production recovered to 296,748 kg and 313,104 kg, respectively, indicating the potential for sustainable seaweed farming in this region.

Muna Regency is an archipelagic regency with a coastline of 337 km and a sea area of 2,559.4 km<sup>2</sup>. The potential for developing the aquaculture industry, particularly seaweed farming, is supported by its geographical conditions. One of the areas for seaweed farming development in Muna Regency is Duruka District, which consists of seven villages, namely Banggai, Lasunapa, Ghonsume, Wapunto, Ghone Bhalano, Lagasa, and Palangga. This district has an area of 11.52 km<sup>2</sup> with lowland topography. Seaweed farming is the main livelihood of the community in several villages, especially Ghone Bhalano Village (BPS Muna Regency, 2024).

Seaweed farming in Ghone Bhalano Village has been going on since 2008 and uses the long line method with a main line stretched horizontally across the sea surface. The commodity cultivated is a type of red algae (*Eucheuma cottonii*), which is known as a source of carrageenan and is widely used in various industries. Based on survey results, the production costs required range from IDR 1–1.6 million per production cycle with a planting period of around 45 days. The selling price of seaweed ranges from IDR 10,000 to IDR 24,000 per kilogram, with an average land area managed by farmers of 0.076 hectares.

According to Indra (2018), seaweed farmers can earn around IDR 1–2 million per month. In farming activities, most farmers utilize family labor, although on a larger scale of production, additional labor is used. The number of workers employed ranges from 1 to 7 people per farmer, involving men, women, and even children with different roles at each stage of production. This division of roles reflects the characteristics of seaweed farming, which is labor-intensive and family-based.

Labor plays an important role in supporting increased production and income in seaweed farming. The involvement of labor across generations makes seaweed farming a sector that is able to absorb labor from various age groups, both as a main job and as a source of additional



income. Therefore, this study is important to understand the effect of labor on the income of seaweed farming in Ghone Bhalano Village, considering previous research findings that show that labor has a significant effect on the production and income of seaweed farmers.

## METHOD

This study was conducted in Ghone Bhalano Village, Duruka Subdistrict, Muna Regency, which was selected purposively because it is one of the seaweed producing areas, thus enabling research on seaweed farming. Farmers in the study location generally cultivate red algae (*Eucheuma cottonii*) with an average land area of 0.076 ha and a total production ranging from 180 to 280 kg per planting season. This study was conducted from May to June 2025. The population in this study consisted of all seaweed farmers actively farming in Ghone Bhalano Village, totaling 34 people. Given that the population size was relatively small and could be reached in its entirety, the sampling method used was a census, which involved taking the entire population as respondents, resulting in a sample size of 34 seaweed farmers.

The data collection techniques used in this study included observation, which is the collection of data through direct observation and recording of symptoms in the field related to the research objectives; interviews, which is the collection of data by obtaining information directly from respondents using questionnaires to explore data in accordance with the research objectives; and documentation, which is a data collection technique in the form of written notes, photos, and videos related to research activities.

The first objective was to conduct an analysis of HKP (Man-Days). According to Hernanto (1991), agricultural labor can be divided into three categories, namely male, female, and child labor. Labor potential can be measured in terms of man-days (HKP). To determine the role of farm labor, the following formula can be used:

$$\text{HKP} = \frac{? \text{ tenaga kerja} \times ? \text{ jam kerja} \times ? \text{ hari kerja} \times \text{jenis tenaga kerja}}{7}$$

Where:

Male Labor: 1 HKP

Female Labor: 0.8 HKP

Child Labor: 0.5 MWD

The second objective is to analyze income. Income is the amount remaining after costs, i.e., all input values for production, whether actually paid or only calculated, have been deducted from revenue (Soekartawi, 1995). Income analysis can be calculated using the following formula:

$$\pi = TR - TC$$

Explanation:

$\pi$  = *Income* (Revenue) (Rp/MT)

TR = *Total* Revenue (Rp/MT)

TC = Total Cost (Rp/MT)

The third objective is to conduct a simple linear regression analysis to test the effect of labor on farm income. The regression model used is:

$$Y = a + bX + e$$

Explanation:

Y : Seaweed farming income

a : Constant/intercept

b : regression coefficient

X : Labor

e : Error

After that, a classical assumption test was conducted to determine the normality of residuals, multicollinearity, and heteroscedasticity in the regression model.

## RESULTS AND DISCUSSION

### Total Seaweed Farming Income

#### Seaweed Farming Costs

Costs are objects that are recorded, classified, summarized, and presented by cost accounting. Farming costs are sacrifices made by producers (farmers) in managing their businesses to obtain maximum results (Rahim and Hastuti, 2008). The costs referred to in this study are all expenditures incurred by the respondent farmers in cultivating seaweed. These costs include fixed and variable costs.

**Table 1. Average Variable and Fixed Costs of Seaweed Farming in Ghone Bhalano Village**

| Type of Cost   | Description | Average Cost (Rp) |
|----------------|-------------|-------------------|
| Variable Costs | Seedlings   | 1,094,118         |
|                | Labor Costs | 78,182            |

|             |                       |           |
|-------------|-----------------------|-----------|
|             | Worker Consumption    | 26,364    |
|             | Green Tama Fertilizer | 4,706     |
|             | Average               | 1,203,369 |
| Fixed Costs | Stretch Cord          | 5,412     |
|             | Branch Rope           | 8,312     |
|             | Floating Rope         | 9,787     |
|             | Seed Rope             | 24,430    |
|             | Floats                | 4,591     |
|             | Knife                 | 1,681     |
|             | Basket                | 2,096     |
|             | Boat                  | 10,613    |
|             | Drying area           | 7,800     |
|             | Tarpaulin             | 19,202    |
|             | Drum                  | 2,510     |
|             | Work Shed             | 0         |
|             | Tension Cable         | 5,412     |
|             | Branch Rope           | 8,312     |
|             | Floating Rope         | 9,787     |
|             | Total                 | 96,435    |

Table 1 shows that the lowest average variable cost is in the use of Green Tama fertilizer, with a cost of Rp 4,706, while the highest variable cost is in the use of seeds, amounting to Rp 1,094,118, with an average variable cost of Rp 1,203,369. The variable costs incurred by the respondent farmers are in accordance with the needs of the land they own. Meanwhile, for variable costs, it shows that there are 12 types of tools used by the respondent farmers in cultivating their seaweed crops. The total fixed costs in one planting season are 96,435. The level of tool depreciation costs depends on the use and duration of use of these tools.

### Selling Price, Revenue, and Farm Income

Price is one of the elements of the marketing mix that generates income. From the consumer's point of view, price is an expense or sacrifice that must be made to obtain the

desired product to meet their needs and desires (Nuryadin, 2007). Simply put, the term price can be defined as the amount of money (monetary unit) and/or other aspects (non-monetary) that have a certain utility or usefulness required to obtain a service (Amanah, 2010).

Agricultural revenue is the product of the volume of production obtained and the selling price (Soekartawi, 2006). This means that revenue can be calculated by multiplying the volume of goods produced or sold by the price per unit of the product. The higher the production volume and unit price of the product, the greater the agricultural revenue. Conversely, if the production volume is low and the unit price of the product is low, the agricultural revenue will be smaller.

Farm income or revenue is the final result obtained by farmers after receipts are reduced by all costs incurred during the production process. In other words, farm income is the difference between receipts and total costs (Soekartawi, 2006).

Based on the results of research in Ghone Bhalano Village, the selling price of dried seaweed is uncertain because it is influenced by fluctuations in market demand and supply, which directly affects the amount of revenue and income from seaweed farming, which is determined by the amount of production and the prevailing selling price. For more details, see Table 2 below.

**Table 2. Average Selling Price, Revenue, and Income from Seaweed Farming in Ghone Bhalano Village**

| Variable      |               | Amount (Rp/Kg) |
|---------------|---------------|----------------|
| Selling Price | Selling Price | 14,000         |
| Revenue       | Lowest        | 2,520,000      |
|               | Highest       | 3,920,000      |
|               | Average (Rp)  | 3,088,235      |
| Income        | Lowest        | 1,353,625      |
|               | Highest       | 2,500,827      |
|               | Average       | 1,799,448      |

Based on Table 2 above, the average selling price, revenue, and income from seaweed farming in Ghone Bhalano Village can be described as follows:

- 1) For the selling price of seaweed. The selling price set by the market price is IDR 14,000. In determining the selling price, the price is determined by market demand, where the price will rise when demand is high and supply is limited, and conversely, the price will fall when demand is low and supply is abundant.



- 2) For the respondents' income from their seaweed farming in one harvest. Based on the results of the study and the data processed, the lowest income from seaweed farming in Ghone Bhalano Village is IDR 2,520,000, while the highest income is IDR 3,920,000, with an average income of IDR 3,088,235. The amount of income varies depending on the amount of production and the selling price.
- 3) The income from seaweed farming in Ghone Bhalano Village in one planting season ranged from a minimum of IDR 1,353,625 to a maximum of IDR 2,500,827, with an average of IDR 1,799,448. This income is obtained after deducting variable and fixed costs during the seaweed farming production process in one planting season.

## The Effect of Labor on Seaweed Farming Income

To analyze the impact of labor on income, an HKP (Man-Day) analysis was first conducted to determine the role of labor used in each stage of farming, which was then analyzed using simple linear regression. Where the variable (Y) is income and the independent variable (X) is labor.

## Normality Test

The normality test aims to test whether the regression model, confounding variables, or residuals have a normal distribution. In this study, the normality test used the *Kolmogorov-Smirnov* (K-S) test. The *Kolmogorov-Smirnov* (K-S) test was used to determine whether the data distribution was normal or not based on whether the significance value (Sig) or probability was  $< 0.05$ , in which case the data distribution was not normal and H1 was rejected, or whether the significance value (Sig) or probability was  $> 0.05$ , in which case the data distribution was normal and H1 was accepted.

After conducting the normality test with the *Kolmogorov-Smirnov* test in this study, the significant value was 0.200, which means that the value is greater than 0.05. Therefore, it can be concluded that the residuals from the regression model in this study are normally distributed and the normality assumption in the regression analysis is fulfilled.

## Multicollinearity Test

The purpose of multicollinearity testing is to test whether there is correlation between independent variables in a regression model. Multicollinearity can be seen from the *tolerance* value and its counterpart, the *variance inflation factor* (VIF), because both values indicate independent variables that are explained by other dependent variables. If the tolerance value





is  $> 0.10$ , there is no multicollinearity in the regression model, and if the tolerance value is  $\leq 0.10$ , there is multicollinearity in the regression model.

After testing for multicollinearity between the independent variables in the regression model in this study, it was found that the regression model did not experience multicollinearity problems, because the VIF was  $\leq 0.10$  and the tolerance was  $> 0.10$ . The VIF value was 1.000, which was still within the safe limit (VIF  $\leq 0.10$ ). This indicates that there are no multicollinearity problems in this regression model.

### Heteroscedasticity Test

The heteroscedasticity test aims to test for inequality in the regression model in *the variance* of the residuals from one observation to another. It is called heteroscedasticity if *the variance* of the residuals from one observation to another is different. A regression model can be said to be good if there is no heteroscedasticity. The presence or absence of heteroscedasticity can be detected by looking at a plot graph such as the prediction of the dependent variable, namely ZPRED, with the residual SRESID. The basis of analysis used in the heteroscedasticity test is that the occurrence of heteroscedasticity can be indicated by certain patterns, such as points that form a regular pattern (wavy, widening then narrowing). Meanwhile, the absence of heteroscedasticity is indicated by the absence of a clear pattern of points scattered above and below the number 0 on the Y-axis.

After conducting a heteroscedasticity test by looking at the prediction plot graph of the dependent variable, ZPRED, with the residual SRESID in this regression model, it shows that the labor variable has a significant value by looking at the pattern of regular, wavy, widening, then narrowing points. This shows that the regression model used meets the assumption of heteroscedasticity.

### t-test

The t-test was conducted to determine the effect of the independent variables studied individually on seaweed farming income in Ghone Bhalano Village. Based on the provision that a significant value  $< 0.05$ , the independent variable has a significant effect on the dependent variable. Meanwhile, a value  $> 0.05$  means that the variable has no effect on the dependent variable.

S After conducting a t-test, the regression coefficient for the labor variable was  $0.000 < \alpha 0.05$ . This shows that the labor variable has a significant effect on seaweed farming income in Ghone Bhalano Village. The positive coefficient direction means that the more labor used, the





higher the seaweed farming income. Research conducted by Prastyo (2017) states that increased labor productivity will encourage increased production, which will in turn increase income. This study is in line with the research conducted by Nayaka and Kartika (2018), which states that labor has a significant effect on income. Labor is an important factor that affects income. Labor is a driving factor for other *inputs*. The more laborers there are, the higher the farmers' income will be.

## CONCLUSION

Based on the results of the discussion described above, it can be concluded that the labor variable has a significant effect on the income of seaweed farming in Ghone Bhalano Village, Duruka District, Muna Regency.

The highest number of labor hours used by seaweed farmers in Ghone Bhalano Village during one planting season per hectare was 37 labor hours and the lowest was 19 labor hours, with an average of 27 labor hours. The level of labor use is influenced by the number of family members involved in the farming process and the number of seaweed farming processes carried out.

The income from seaweed farming in one planting season per hectare is the lowest at IDR 1,353,625, while the highest income is IDR 2,500,827, with an average of IDR 1,799,448. This income is obtained after deducting the total costs during the seaweed farming production process in one planting season from the revenue.

Based on the results of research on labor and seaweed farming income in Ghone Bhalano Village, it is recommended that the local government pay more attention to the development of seaweed farming, particularly through the provision of technical and managerial training for farmers and policies that support seaweed price stability. In addition, farmers are expected to optimize the use of labor according to the real needs at each stage of farming in order to increase work efficiency and income.

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