The Effect of Production and Price on the Income of Seaweed Farmers in Tadui Village, Mamuju District

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ABSTRACT

This study aims to analyze the influence of production and price on the income of seaweed farmers in Tadui Village, Mamuju District. Seaweed is a leading commodity in the fisheries and agriculture sectors, which plays an important role in supporting food security, industrial raw materials, and exports. A quantitative approach is used with the help of the SPSS application to identify the relationship between independent variables (production and price) to dependent variables (income). Data was collected through a survey of seaweed farmers using purposive sampling techniques. The results of the analysis show that production and price variables partially and simultaneously have a significant influence on farmers' income. Production has a positive influence, where each increase in production increases farmers' income significantly. Prices also have a significant impact, showing the importance of price stability in improving farmers' welfare. These findings underscore the need for policies that support increased productivity and seaweed price stability to encourage economic growth of coastal communities in Tadui Village. Optimization of cultivation technology and government intervention in price stabilization are the main recommendations of this study.

INTRODUCTION

Seaweed is one of the leading commodities in the fisheries and agriculture sectors, both at the local and national levels. As an archipelagic country with a long coastline, Indonesia has great potential in the development of seaweed cultivation. According to the Central Statistics Agency (2022), Indonesia is one of the world's main producers of seaweed, contributing more than 60% to global production. This commodity not only supports food security, but also becomes an important raw material in various industries, such as food, cosmetics, and pharmaceuticals. Seaweed derivative products such as gelatin, carrageenan, and alginate are widely used in the food industry for stabilizers and thickeners, which contribute greatly to Indonesia's exports to various countries (Ministry of Maritime Affairs and Fisheries, 2021).

In addition, seaweed has a significant role in boosting the economy of coastal communities, including in Tadui Village. In this region, seaweed is the main source of income for most farmers, helping to reduce unemployment and improve their standard of living. According to research by Susanti et al. (2020), seaweed cultivation in coastal areas not only has a direct economic impact but also opens up business opportunities in supporting sectors such as seed suppliers, cultivation tools, and transportation. In Tadui Village, the contribution of seaweed to the local economy can be seen from the increasing income of farmers involved in the supply chain of this commodity. Through sustainable management, seaweed can continue to be a strategic commodity that supports regional economic growth, while strengthening Indonesia's position as a major exporter in the global market. Seaweed plays an important role in supporting food security, providing industrial raw materials, and increasing Indonesia's exports. As a source of dietary fiber, seaweed contains carrageenan, agar, and alginates which are beneficial for

digestive health and can lower blood cholesterol levels, potentially reducing the risk of heart disease. In addition, seaweed is rich in bioactive components such as phenolic compounds and natural pigments, which makes it a potential ingredient for functional foods. In industry, seaweed is used as a raw material in the manufacture of food products such as meatballs, nuggets, syrups, ice cream, yogurt, juices, and jellies. In the non-food sector, seaweed is utilized in the production of paints, textiles, toothpaste, cosmetics, and pharmaceuticals, including the manufacture of capsule shells and agar media. This utilization shows the diversification of seaweed use in various industries. From an export perspective, Indonesia is one of the world's main producers of seaweed. In 2020, the export value of Indonesia's seaweed processing industry reached USD96.19 million with a production volume of 26,611 tons. However, more than 60% of seaweed exports are still in raw or dried form, showing great potential to increase added value through downstreaming. Overall, seaweed plays an important role in food security through the provision of fiber and essential nutrients, being a vital raw material for various industries, and contributing significantly to Indonesia's export revenues. Optimizing the use and processing of seaweed can strengthen Indonesia's position in the global market and support sustainable economic development.

Tadui Village, located in Mamuju Regency, West Sulawesi, is known as one of the significant seaweed production centers. According to data from BLU LPMUKP (2022), this village is able to produce around 12,746.95 tons of dried seaweed per year, with an area of 117.4 hectares of cultivated land. The dominant cultivated type of seaweed is Kappaphycus alvarezii, which has high economic value and stable market demand. The cultivation techniques applied by farmers in Tadui Village include the method of removing the base and longline (long rope), which is adjusted to the local water conditions. However, seaweed farmers in Tadui Village face various challenges in an effort to increase productivity. One of the main challenges is the suboptimal quality of seedlings, which can affect growth and crop yields. In addition, limited access to modern cultivation technology hinders the efficiency and effectiveness of the cultivation process. Environmental conditions, such as changes in water temperature and pest infestation, are also factors that affect seaweed productivity. For example, research by Widya Utami (2023) shows that the depth of planting affects the performance of Kappaphycus alvarezii cultivated in the waters of Tadui, Mamuju Regency. To overcome these challenges, collaborative efforts are needed between the government, research institutions, and local farmers in providing quality seeds, training in cultivation technology, and sustainable environmental management. This approach is expected to increase the productivity and welfare of seaweed farmers in Tadui Village.

RESEARCH METHOD

This study uses a quantitative approach with the help of the SPSS application to analyze the data. This approach aims to understand the relationship between production volume, types of seaweed cultivated, and cultivation techniques on the income of seaweed farmers in Tadui Village, Mamuju Regency. The data was collected for three months, from July to September 2024, through a structured survey with questionnaires as the main instrument. The respondents consisted of seaweed farmers in Tadui Village, who were selected purposively to obtain relevant data. The data collected includes production volume, types of seaweed cultivated, cultivation techniques applied, and farmers' income. Data analysis was carried out using SPSS to identify the relationship between the independent variable (production volume and price) and the bound variable (farmer income). The analysis process includes validity and reliability tests to ensure data quality, descriptive analysis to describe data characteristics, and linear regression analysis to see the influence of independent variables on bound variables. The study also tested statistical assumptions, such as normality, multicollinearity, and heteroscedasticity, to ensure the accuracy of the analysis results. With this approach, the research is expected to provide a clear quantitative picture of the factors affecting the income of seaweed farmers in Tadui Village. The results of this study are

expected to provide useful input for farmers, the government, and other stakeholders in developing the seaweed sector in a sustainable manner.

RESULTS AND DISCUSSION

This section presents the results of research obtained based on data analysis using a quantitative approach with the SPSS application. The results of this study are focused on the relationship between production and price to the income of seaweed farmers in Tadui Village, Mamuju District. The discussion was carried out in depth to interpret the data that had been analyzed, by relating it to the theoretical framework and previous findings. In addition, this section also identifies factors affecting production, prices, and revenues, and explores practical implications for the development of the seaweed sector. It is hoped that these results and discussions can contribute to optimizing the welfare of farmers, supporting local policies, and advancing the fisheries and agriculture sectors in the area. The r-count value is the result of a correlation test performed for each statement against the total score in the research instrument. This value reflects how strong the relationship between the statement and the total score of the variables measured. Meanwhile, the r-table value is a critical value that is used as a reference to determine validity. In this study, with a significance level of 0.05 and a certain number of samples, the r-table was set at 0.361. A statement is considered valid if the value of r-count is equal to or greater than the value of the r-table (r-count ≥ r-table). This validity shows that the statements in the research instrument can effectively measure the variables in question, making them feasible for further data analysis.

Table 1. Validity Test Results

No	Statement	r-count value	r-table values	Information
1	X1.1 Statement	0,925	0,361	Valid
2	X1.2 Statement	0,919	0,361	Valid
3	X1.3 Statement	0,934	0,361	Valid
4	X1.4 Statement	0,874	0,361	Valid
5	X2.1 Statement	0,832	0,361	Valid
6	X2.2 Statement	0,84	0,361	Valid
7	X2.3 Statement	0,893	0,361	Valid
8	X2.4 Statement	0,863	0,361	Valid
9	X2.5 Statement	0,792	0,361	Valid
10	X2.6 Statement	0,838	0,361	Valid
11	Y1 Statement	0,889	0,361	Valid
12	Y2 Statement	0,845	0,361	Valid
13	Y3 Statement	0,815	0,361	Valid
14	Y4 Statement	0,791	0,361	Valid
15	Y5 Statement	0,781	0,361	Valid
16	X3.1 Statement	0,85	0,361	Valid
17	X3.2 Statement	0,86	0,361	Valid

Source: Data Processing, 2024

Based on the results of the validity test, it can be concluded that all instruments for each item in the statement of the independent variable (X) production and price, as well as the dependent variable (Y) of farmer income, have a correlation coefficient value greater than the table (0.361). This means that all instruments submitted meet the requirements and are declared valid.

Table 2. Reliability Test Results

Variabel	*Cronbach's alpha*	Number	Information
Production (x1)	0,932		Reliabel
Price (x2)	0,915	0,60	Reliabel
Revenue (Y)	0,879		Reliabel

Source: Data Processing, 2024

The following is a narrative based on the reliability test table: The reliability test was carried out to measure the internal consistency of the research instrument. The test results showed that all variables had Cronbach's alpha value above 0.60, which is the minimum limit to be considered reliable (Sugiyono, 2020). The Production variable (X1) has a Cronbach's alpha value of 0.932, which indicates a very high level of reliability. The Price variable (X2) has a value of 0.915, also in the reliable category. Meanwhile, the Revenue variable (Y) obtained a value of 0.879, which indicates good internal consistency. With these results, all research instruments are declared reliable and can be used for further analysis. Based on table 2, it is obtained that the Cronbach's alpha value of each variable is greater than 0.60, so it can be stated that all the statement elements used in each variable in this study are reliable to be a research measurement tool

Table 3. Multiple Linear Regression

Coefficients[a]						
		Unstandardized Coefficients		*Standardized Coefficients*		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	3.643	2.853		1.277	0.213
	Production	0.589	0.204	0.458	2.894	0.007
	Price	0.315	0.128	0.392	2.473	0.020

a. Dependent Variable: Pendapatan

Source: Data Processing, 2024

The multiple linear regression equations obtained from the calculation analysis are obtained:

$$\mathbf{Y = 3{,}643 + 0{,}589X1 + 0{,}315X2 + e}$$

From the regression equation, it can be interpreted: (The Constant value (a) is 3.643 or the state when the farmer's income variable has not been influenced by other variables, meaning that if there is no change in the production and price variables, then the value of the income of seaweed farmers in Tadui Village, Mamuju District, is 3.643 rupiah. Coefficients Production regression with a positive direction of 0.589. It shows that the production variable has a positive influence on the income of seaweed farmers in Tadui Village, Mamuju District, meaning that every increase of one rupiah of the production variable will affect the income of seaweed farmers by 0.412 rupiah. Coefficients Regression selling price with a positive direction of 0.315. It shows that the price variable has a positive influence on the income of seaweed farmers in Tadui Village, Mamuju District, meaning that every increase of one rupiah of the price variable will affect the income of seaweed farmers, by 0.315 rupiah.

Partial testing was carried out to determine the influence of each independent variable on the dependent variable individually. This analysis uses decision-making criteria based on the comparison between t-count and t-table values, with a significance level of 5% or 0.05. The t-table value was calculated using a significance of 0.05 divided by half (0.025) and a degree of freedom of 27 (N - K - 1 =

30 - 2 - 1), resulting in a t-table of 2.052. The results of the analysis show that the Production variable has a t-count of 2.894, which is larger than the t-table (2.894 > 2.052), with a significance level of 0.007, so it is stated to have a significant influence on Income. Similarly, the Price variable has a t-count of 2.473, which is also greater than the t-table (2.473 > 2.052), with a significance level of 0.020, so it is declared to have a significant effect on Revenue. Thus, the two independent variables, Production and Price, partially have a significant influence on Income, where Production shows a greater contribution to influence than Price.

The results of the partial test of production variables are seen in table 24 above, showing that the tcal value of 2.894>ttable 2.052 is interpreted as having a partial effect, the coefficients value of production regression with a positive direction of 0.589 while the significance value of 0.007<0.05 is interpreted as significant. The results of the analysis were interpreted that "production has a positive and partially significant effect on the income of seaweed farmers in Tadui Village, Mamuju District". This has answered the researcher's initial perception, in other words the first hypothesis proposed in this study was accepted. The results of the partial test of the price variable are seen in table 24 above, showing that the tcal value of 2.473>ttable 2.052 is interpreted as having a partial effect, the value of price coefficients with a positive direction is 0.315 while the significance value of 0.020<0.05 is interpreted as significant. The results of the analysis are interpreted that prices have a positive and partially significant effect on the income of seaweed farmers in Tadui Village, Mamuju District". This has answered the researcher's initial perception, in other words the second hypothesis proposed in this study is accepted

Simultaneous statistical testing or simultaneous testing is carried out with the aim of describing all the capabilities of independent variables included in the model that has a simultaneous influence on dependent variables. The hypothesis testing criteria are simultaneously carried out by comparing fcal with ftable. the significance level used is 5% or 0.05.

Table 4. Results of the Research Hypothesis Questionnaire Test

ANOVA[a]					
Model	***Sum of Squares***	***df***	***Mean Square***	**F**	**Sig.**
1 Regression	129.698	2	64.849	19.219	.000[b]
Residual	91.102	27	3.374		
Total	220.800	29			

a. Dependent Variable: Pendapatan
b. Predictors: (Constant), Harga, Produksi

Source: Data Processing, 2024

The results of the ANOVA test show that the regression model is significant in explaining the influence of independent variables (Production and Price) on dependent variables (Income). The F-calculated value is 19.219 with the degree of freedom (df) for regression of 2 and residual of 27. The value of this F-count is greater than the F-table of 3.354, so it can be concluded that the regression model is statistically significant. This is reinforced by a significance value of 0.000, which is well below the significance level of 0.05. The Sum of Squares value for regression of 129.698 shows the contribution of independent variables in explaining the variation in farmers' income. Meanwhile, the Residual Sum of Squares value of 91.102 reflects variations that cannot be explained by the model. The total Sum of Squares of 220,800 indicates the overall variation in the data. Thus, this ANOVA test indicates that the Production and Price variables together have a significant influence on Income, supporting the hypothesis that the two independent variables simultaneously contribute to the dependent variable. These results provide strong evidence that the regression model used is valid and reliable for further analysis.

In the context of this study, the results of this simultaneous test indicate the importance of seaweed production management and selling price as two main factors that can increase farmers' income. Higher

production, supported by efficient cultivation techniques and the availability of quality seeds, allows farmers to increase the amount of yield, which ultimately impacts their income. On the other hand, stability and price increases also play an important role in ensuring crop yields can provide optimal profits. These results also reflect the need for more targeted policies and interventions to support increased productivity and price stability in the fisheries sector, especially in seaweed cultivation. Governments and other stakeholders can use these findings as a basis for designing programs that can improve farmers' welfare, such as training in cultivation techniques, subsidizing agricultural inputs, and developing markets for seaweed commodities. Overall, these results suggest that a holistic approach that considers production and price factors simultaneously can be an effective strategy to support the sustainability of the fisheries sector and improve the well-being of coastal communities.

CONCLUSION

This research demonstrates that production and price significantly influence the income of seaweed farmers in Tadui Village, Mamuju Regency. The study's findings reveal that production has the most substantial impact, where each increase in production directly correlates with higher farmer incomes. Similarly, price stability and increments significantly affect income, emphasizing the critical role of market dynamics in supporting farmer welfare. These results highlight the importance of efficient cultivation practices, availability of quality seeds, and adoption of modern techniques to enhance productivity. Additionally, price stabilization policies are vital to ensure that farmers can maximize their profits, thereby improving their living standards. The findings underline the need for government and stakeholder interventions to promote both productivity and market stability for the sustainable growth of the seaweed sector. The simultaneous analysis of production and price underscores their combined impact on income, signifying the necessity of a holistic approach to address the challenges faced by seaweed farmers. Efforts such as training programs on advanced cultivation methods, subsidizing farming inputs, and establishing robust market mechanisms are essential for boosting farmer incomes. Moreover, partnerships between the government, research institutions, and local communities are critical in overcoming environmental and technological challenges that limit productivity. This study provides valuable insights for designing targeted policies to enhance the welfare of seaweed farmers, strengthen the local economy, and ensure the sustainable development of Tadui Village as a significant center for seaweed production.

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