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Production Results Forecasting Using Linier Regression Methods In UMKM KWT Suka Maju

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Abstract

Kelompok Wanita Tani (KWT) SUKAMAJU is a women's association in Palihan village, Bambanglipuro sub-district. The KWT activities include monthly social gatherings, savings, and loans, gardening by growing vegetables and family medicinal plants in the KWT Sukamaju garden, regular monthly meetings for agricultural extension agents, and food production. The community service team assists in the form of increasing production by supporting production equipment which is considered to be still long for large quantities of products and multimedia and internet-based marketing as a means of establishing marketing communications for the group of craftsmen for processing banana tree food made by KWT Sukamaju. Amid the physical distancing period of the Covid-19 pandemic, community visits to the field as the only marketing communication channel must stop. The use of internet marketing means to spur production to be fast and in large numbers. The difficulty of producing such large quantities is constrained by the tools and the processing time that must be fast due to a large number of orders from the internet. Data retrieval is taken from the use of production equipment for 30 days. Every day with an intensity of 3 times every 3 until 4 hours for 6 months. The total sample is 180 data samples every three times to 540 data. The test using linear regression before and after adding equipment for the production of KWT UMKM has an average result of 56.54% of the estimate after being given additional equipment of 55.63%. The result is between estimation and reality after using production tools, after and before using the tool close to an accurate estimate of between 56, 5% with 55.6% have only a 0.9% difference in error. Based on the results of the prediction of KWT production rates using simple linear regression, it can be concluded that the addition of the data production tools used to produce has a big effect, and predictions are close to accuracy using time series data, which greatly affect the accuracy of prediction calculations.

Keywords: forecasting, produce, craftsmen, linear regression, internet

I. INTRODUCTION

Palihan Hamlet is a hamlet in Sidomulyo Village, Bambanglipuro District, Bantul Regency. This hamlet has 4 RTs, and there are many banana plants. One of the efforts of the Sukamaju Farmers' Group (KWT) in Palihan Hamlet is making processed products like banana trees.

To improve the household economy, every member of the family is required to be able to work productively to increase household income. As family members who have productive potential to

increase income, women as housewives are required to play a role in various other business fields (Dewi, 2011). The demands of the role of women make empowerment efforts or interventions carried out to improve family welfare need to be focused on increasing women's abilities. (Ekaningdyah, 20015). One of the steps to increase the capacity of women in agriculture is the formation of the Women Farmers Group (KWT). KWT is a form of farmer institution that seeks to empower us to intervene in women's abilities in agricultural activities.

KWT Suka Maju produces a variety of snacks and agricultural drinks. Snacks from the KWT Suka Maju production business include processed food from a banana tree, namely from weevils, banana leaves, banana hearts, and ripe bananas. Banana cobs can be made of hump crackers, hump chips, gudeg humps, and bonggol jerky. Banana leaves can be made as a natural dye for dawet made from banana flour. A banana heart can be made of banana heart chips and heart lodeh vegetables. Banana fruit can be made of banana dodol, sale banana, and banana flour. KWT Suka Maju has experienced an increase in the production of various snacks and drinks; this is in line with the increasing number of requests from online orders and large quantities require equipment that can speed up production.

Predictions to calculate the time for adding tools and manually are still not suitable and stable, so it is necessary to calculate the correct prediction for adding existing tools to meet the online market share. The prediction is made by using the linear regression method.

II. LITERATURE REVIEW

A linear regression method is a statistical tool used to determine the effect of one or more variables on one variable. The benefits of linear regression include regression analysis that is more accurate in carrying out correlation analysis because the analysis is difficult to show the degree of change of a variable to another variable (slop) can be determined. Research on predicting coffee production levels using linear regression resulted in tests using MSE and MAPE where MSE values were 43.112% and MAPE 20.001%, so testing using MAPE was much better in calculating the accuracy of coffee production predictions (Petrus Katemba, 2017). Research on the prediction of the implementation of the simple linear regression method in presenting the results of the prediction of clean water use in the PDAM, with the results of the functional testing of the system states that 89% of the user's needs are met and 11% need improvement. (Astria Hijriani, 2016).

III. RESEARCH METHODOLOGY

Simple linear regression is a statistical method that functions to test the extent of the causal relationship between the causal factor (X) variable on the effect variable. Causative factors are generally denoted by x or also known as predictors, while consequent variables are denoted by y or also known as a response.

Simple Linear Regression Regression analysis is a statistical method that examines the relationship between the dependent variable Y and a series of independent variables X1,…, XP. The purpose of this method is to predict the Y value for a given X value. The simple linear regression model is the simplest regression model, which only has one independent variable, X. Regression analysis has several uses, one of which is to predict the dependent variable Y [4]. The equation for the simple linear regression model is written in equation 1.

$$Y = a + bX \quad (1)$$

Y is the dependent variable predicted by the dependent variable, X is the independent variable or independent variable, a is a constant or intercept, b is the slope of the variable coefficient X. The coefficients a and b are the regression coefficients where the a and b values can be found using the following equation.

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - \left(\sum X\right)^2} \quad (2)$$

$$a = \frac{\sum Y \sum X^2 - \sum X \sum XY}{n.\sum X^2 - \left(\sum X\right)^2}$$

or

$$a = \frac{\sum Y - b(\sum X)}{n} \quad (3)$$

The value of a is the slope, b is the intercept, and n is the amount of data used in the calculation.

IV. FINDING AND DISCUSSION

Result forecasting explains how to predict production using simple linear regression using production data for the last six months per day.

During the pandemic period, it is shown in the percentage table before using the tool and after using the tool. The average workmanship hasn't used tools for 3 to 3.5 hours while using tools is 1.7 to 2 hours of the collection during March, April, May, June, July, August 2020. Data retrieval is taken from the use of production equipment for 30 days. Every day with an intensity of 3 times every 3 until 4 hours for 6 months. The total sample is 180 data samples every three times to 540 data.

Table 3.1 Daily data before and after the tool

Day	before (hours)	After (hours)
1	3.40	2.00
2	3.50	1.90
3	3.15	1.90
4	3.20	1.80
5	3.30	1.90
6	3.50	1.78

In table 3.1, sampling data is taken every day for one month, and sampling is carried out for six months during the Covid-19 pandemic from March, April, May, June, July, and August 2020.

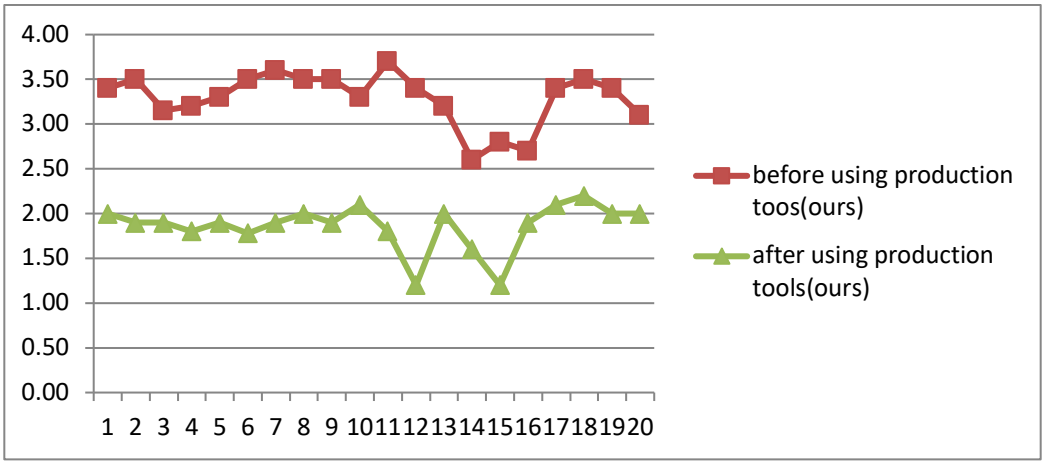

Figure. 3.1 The use of tools

The use of tools before and after for one month shows that there are significant differences as shown in Figure 3.1.

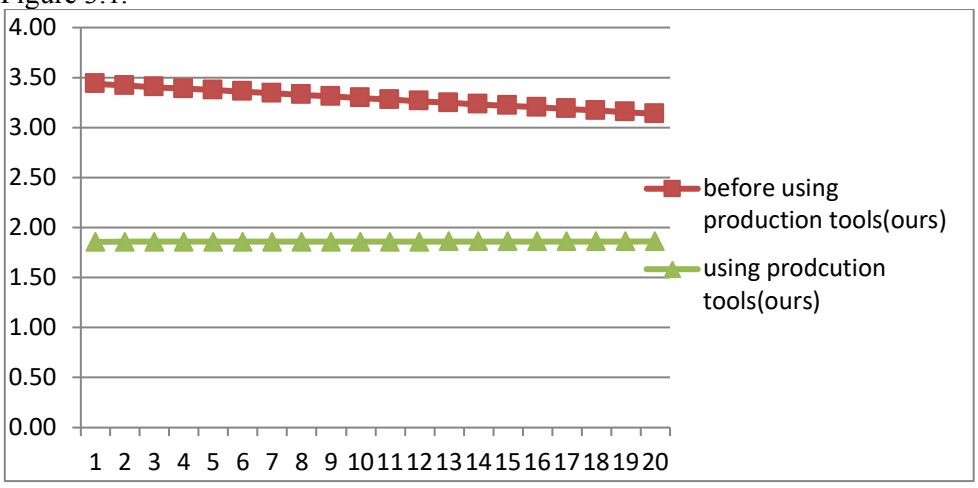

Figure 3.2 Prediction before and after using the tool

In Figure 3.2, a predictive test was carried out for one month using tools and not using tools. It seems that time has decreased so that the right number of tools is needed to speed up production. The percentage calculated for six months is shown in Table 3.2 that the average difference during the use of tools and before using the tools is up to 56.54%. The results of the table show significant results if using the right number of tools can speed up production time. Table 3.2 performs the use of tools and without tools for six months.

Table 3.2 Average usage of tools and without tools

		Reality Average (hours)	
Number	month	before usage of tools	after usage of tools
1	March	3.20	2.10
2	April	3.20	1.70

3	May	3.42	1.83
4	June	3.30	1.65
5	July	3.40	2.00
6	August	3.20	1.90
		3.29	1.86
	average	3.29	1.86
		Percentage	56.54%

The percentage calculated for six months is shown in Table 3.3 that the average difference between the use of tools and the use of tools is up to 56.54%. The results of the table show significant results if using the right number of tools can speed up production time.

Table 3.3 Percentage, the difference between using the tools and not

Infor motion	Before Usage of tools (hours)	Usage of tools (hours)	Difference (hours)	Percentage (%)
Average	3.29	1.86	1.43	56.54

The percentage of predictions was also tested for six months as shown in table 3.3 shows the results of forecasting using production tools and not using production tools, there is an average difference of up to 56.54 percent.

Table 3.4 Average prediction of the using production tools and without production tools

		Prediction Average (hours)	
Number	month	before using production tools	after using production tools
1	March	2.55	1.60
2	April	2.50	1.30
3	May	2.50	1.40
4	June	3.00	1.30
5	July	2.50	1.40
6	August	2.30	1.50
		2.55	1.42
	Average	2.55	1.42
		Percentage	55.63%

The prediction in table 3.4 using tools and without tools is carried out to produce an average percentage of 55.63%.

Table 3.5 Percentage prediction, difference using tools and not

Information	Prediction			
	Before using production tools (hours)	Using production tools (hours)	difference (hours)	Percentage (%)
Average	2.55	1.42	1.13	55.63

Based on the results in the field, the percentage of using tools and not using tools is significant at 56.54%, and the percentage using predictions with tools and without significant tools is 55.63%, meaning that the difference of 0.9% (accurate 99,1%) from the prediction results states that the predictions are very close to reality in the field.

Research and discussion on the prediction of KWT production rates using simple linear regression, it can be concluded that the addition of the data tools used to produce has a big influence, and predictions are close to accuracy using time series data, which greatly affect the accuracy of prediction calculations.

V. CONCLUSION AND FURTHER RESEARCH

The conclusion from this research is that testing before and after adding equipment or without equipment for the production of KWT UMKM has an average result of 56.54% which is very significant with the addition of tools. Meanwhile, the prediction calculation test after being given additional equipment and without an average of 55.63%. The result is between estimation and reality after using the tool and without using the tool only has a difference of 1% error. Based on the results of research and discussion of prediction of KWT production levels using simple linear regression, it can be concluded that the data used to predict is time-series data, which greatly affects the accuracy of the prediction results.

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