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Estimated Profits of Rengginang Lorjuk Madura by used Comparison of Holt-Winter and Moving Average

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***Abstract*—Rengginang Lorjuk is a typical Madura food that is ordered more by SMEs and is found in Sumenep Regency and several other areas in Madura. This product is made for supplies and orders, where demand will surge at certain times. Therefore, SMEs of Rengginang Lorjuk is required to have good planning in determining the selling price in accordance with the revenue target obtained. Considering that the main raw materials used are sticky rice and ensis leei (lorjuk) are raw materials that have fluctuating prices, this studio compares forecasting methods namely Holt Winter (HW) and Moving Average (MA), supported by MSE and MAPE, in order to obtain accurate forecasting results. These forecasting results show that HW has better accuracy than the MA, which is then used to calculate the cost of production with an Activity-Based Costing system, which requires charging costs for all activities carried out in production, namely the cost of raw materials, direct labor costs, and overhead factory fee. Using MAPE values, this study yields 4 estimates of production costs in accordance with changes in raw material costs.**

Keywords—component, formatting, style, styling, insert

I. INTRODUCTION

The increase in the number of business actors is not matched by an increase in knowledge about good entrepreneurship. Business actors in regions, especially SMEs, generally only focus on the stages of the production process that must be carried out and the marketing techniques that will be used. On the other hand, SMEs should conduct evaluations in various aspects, carry out proper planning and create a competitive advantage to remain sustainable in the business world. Planning in the field of management will create a business in an area such as Rengginang Lorjuk which is typical of Madura, has a competitive advantage, both in terms of selling prices, product quality, and market segmentation.

The high level of competition of Rengginang products from various regions in Indonesia, resulting in changes in product selling prices will have a significant impact on total sales. Therefore, the product selling price is the most important factor and must continue to be considered. However, the problem that often occurs due to high levels of competition is that business actors tend to choose to set the same selling price as their competitors. While all activities that should incur costs are not considered [1]. The selling price of the product itself should not be too low to cover all costs incurred during the production process and be able to provide the desired benefits, but also not too high so that consumers do not turn to competitors.

In this case, the mark up of the production costs can be used to determine the selling price [2], so that an accurate calculation of the production costs is also needed. Production costs are closely related to the inventory system, while the selling price is set, will affect the demand [3]. Demand tends to increase when the selling price is set low, and vice versa high selling prices will reduce demand [4]. Therefore the calculation of production costs is important, where costs are the main driving component of competitive decision making [5].

One of the measurement tools for production costs that have high accuracy is Activity-Based Costing (ABC), where the cost planning system is developed to anticipate the weaknesses contained in conventional cost accounting systems. The main concern of ABC is company activities, which incur costs. Thus the ABC system makes it easy to calculate the cost of production thereby increasing the effectiveness of management decisions [6], [7]. Therefore, accurate information on cost based on production processes and activities through the ABC system will provide many benefits [8], [9].

To improve the accuracy of the calculation of production costs, this study adds the element of forecasting the price of raw material Rengginang products as a form of anticipation of the determination of the selling price, especially Rengginang which is produced by order. This anticipation is needed so that SMEs of Rengginang Lorjuk Madura can evaluate the selling price that is set so that the benefits obtained are more optimal. The price of raw materials that will be predicted is white sticky rice and ensis leei (lorjuk) which have a fluctuating and seasonal trend of price changes. Forecasting is an important tool in planning an effective and efficient future, using and considering data from the past.

Several forecasting methods have been developed in many previous studies. One accurate forecasting tool for trend and seasonal patterned time series data is Exponential Smoothing (ES) [10]. ES is a forecasting method used to predict the future by conducting a smoothing process by producing forecast data that is smaller in error value. In ES there are one or more

smoothing parameters that are explicitly determined and the choice results determine the weights imposed on the observation value [11]. So far, ES has been widely adopted in solving forecasting problems in business [12]. To solve the problem of forecasting prices with the trend and seasonal patterns, the ES method that can be used is Holt-Winter (HW). In HW, determining the initial trend value is very influential on the accuracy of the resulting estimate [13].

But considering lorjuk is a fishery product whose price is generally not patterned, so a comparison of forecasting results with other methods is needed, namely Moving Average (MA). In MA, the average of the time series data is moved across the whole data [14], where the fields of statistics and economics have widely applied MA [15]. Comparison of the two forecasting methods namely HW and MA is expected to answer the need for accurate forecasting methods according to existing data patterns. To find out the accuracy of each forecasting method, the calculation of Mean Squared Error (MSE) and Mean Absolute Percentage Error (MAPE) is calculated. With the forecasting of material prices, it is expected that if there is a change in material prices, the selling price can be evaluated and decisions can be determined more quickly.

II. RESEARCH METHOD

A. Input Data

Some of the data needed in this study are the data of raw materials used in the production of Rengginang Lorjuk Madura consisting of main raw materials (white sticky rice and lorjuk) and other supporting raw materials. Recapitulation of the average purchase price of materials for 18 months (July 2018 - December 2019), will be used in the process of forecasting material prices. Data on the number of purchases of main raw materials are used to calculate the Raw Material (RM) cost, while the cost of supporting materials is used to calculate the group activity costs in factory overhead. In addition, all business activities in the SMEs of Rengginang Lorjuk Madura will be used to calculate Direct Labor (DL) costs and Factory Overhead (FO) costs. The actual data on raw material prices for 18 months can be seen in Table I.

TABLE I. ACTUAL DATA OF RAW MATERIAL PRICES

Period	Raw Material Cost (IDR)	
	Sticky rice	***Ensis leei (Lorjuk)***
1	24,000	50,000
2	24,500	35,000
3	24,500	55,000
4	24,800	45,000
5	26,000	55,000
6	27,000	80,000
7	25,000	75,000
8	25,000	65,000
9	25,000	60,000
10	25,000	57,000
11	26,000	55,000
12	26,500	70,000
13	24,000	60,000
14	25,000	40,000
15	25,500	40,000
16	26,500	55,000
17	26,500	75,000
18	28,000	65,000

Work activities will be in two cost groups. Work carried out by workers whose numbers are adjusted to the number of hours worked, will burden DL costs, while activities that require supporting costs such as the purchase of auxiliary materials (salt, garlic, flavoring), electricity costs, water costs, equipment maintenance, costs fuel, and pulses will cost FO. To clarify the flow of determining production costs using ABC and forecasting methods, the flow diagram is explained in Fig. 1.

B. Determination of Material Prices by the Forecasting Method

Forecasting is one of the decision tools methods that are widely used for effective and efficient planning. the function of forecasting is to predict events or data in the future [16]. This technique has been widely developed, one of which is to estimate the optimal inventory of both raw materials and products, to meet the needs of consumers or customers and optimum production targets, so that the maximum benefit is obtained [17]. Forecasting is also widely used to predict prices, agricultural production, drought, service time and other fields.

1. Holt-Winter's Model

This study uses Holt-Winter's Model with the systematic component of demand is the level, trend, and seasonal factors. Before making a forecast, an initial estimate is required for the Level (L_0), Trend (T_0) and seasonal factors (S_1,... S_p), where p is the request period. Estimates of levels and trends in the initial period (0) are carried out by taking into account deseasonalized demands, which are caused by seasonal fluctuations [18]. Periodic p is the number of periods in a seasonal cycle iteration. Deseasonalized demand is calculated by the formula:

$$\overline{D_t} = \left[D_{t-(p/2)} + D_{t+(p/2)} + \sum_{i=t+l-(p/2)}^{t-1+(p/2)} 2D_i\right]/2p \quad (1)$$

Furthermore, period and deseasonalized demand are used to calculate L_0 and T_0 using linear regression where the value of a is the Level while the value of b is the trend. While the estimation of seasonal factors is calculated with the formulation as follows:

$$\bar{S}_t = D_t/\overline{D_t} = \left[\sum_{j=0}^{r-1} \bar{S}_{jp+i}\right]/r \quad (2)$$

where D_t is the actual request, and $\overline{D_t}$ is *deseasonalized demand*.

In the period t, given the estimated level (L_t), Trend (T_t) and seasonal factors (S_t, ..., S_{t+p-1}), estimates for the coming period are given as follows:

$$F_{t+1} = (L_t + T_t)\, S_{t+1} \quad (3)$$

On observing demand for the $t + 1$, estimates for levels, trends and sessions are as follows:

$$L_{t+1} = \alpha\,(D_{t+1}/S_{t+1}) + (1 - \alpha)\,(L_t + T_t) \quad (4)$$

$$T_{t+1} = \beta\,(L_{t+1} - L_t) + (1 - \beta)\,T_t \quad (5)$$

$$S_{t+1} = \gamma\,(D_{t+1}/L_{t+1}) + (1 - \gamma)\,S_{t+1} \quad (6)$$

Where α is the smoothing constant for Level ($0<\alpha< 1$), β is the smoothing constant for Trend ($0<\beta<1$), and γ is the smoothing constant for seasonal factors ($0<\gamma< 1$).

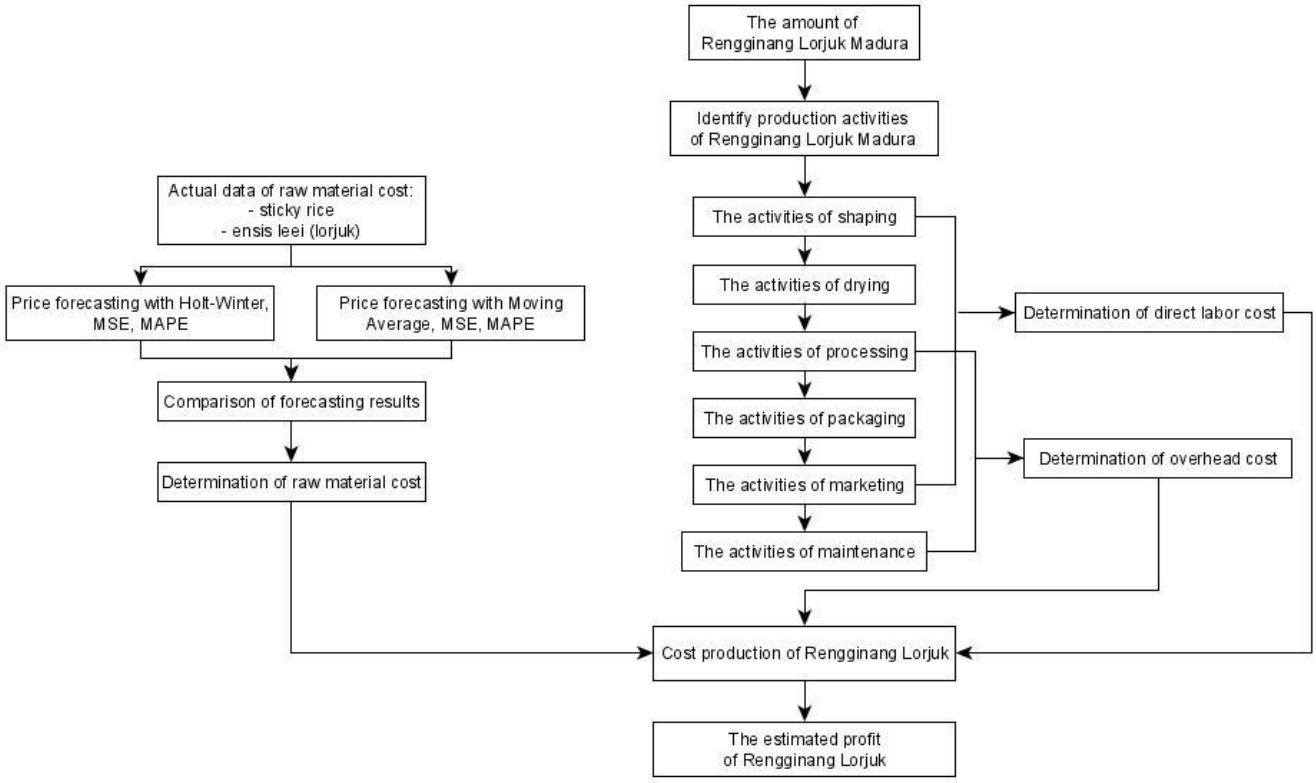

Fig. 1. Research framework.

2. Moving Average's Model

The Moving Average (MA) model states the relationship between the observed value of successive present and past forecasting errors [19]. MA is an indicator that is often used in technical analysis that determines the average value of data during a specified period. The averaged data is data that requires time (time series). Time Series is a collection of observational data, in which each data is examined within a certain time that opposes discrete [20].

In this method, the estimate of the level in the period as the average demand over the most recent N periods. N-periods in the moving average is represented as follows:

$$L_t = (D_t + D_{t-1} + \ldots + D_{t-N+1})/N \quad (7)$$

$$L_{t+1} = (D_{t+1} + D_t + \ldots + D_{t-N+2})/N \quad (8)$$

The Level calculation is then used to determine forecasting in future periods. The forecast value of a period is the same as the estimated level in the previous period. The forecast is stated as follows:

$$F_{t+1} = L_t \quad (9)$$

$$F_{t+1} = L_{t+(n-1)} \quad (10)$$

3. Mean Squared Error (MSE)

Mean Square Error (MSE) is used to evaluate a forecasting method. The results of the error will be squared. MSE is the average difference between the squares predicted and observed [21]. The formula for calculating MSE is as follows:

$$MSE_n = \frac{1}{n}\sum_{t=1}^{n} E_t^2 \quad (11)$$

4. Mean Absolute Percentage Error

To calculate the difference between actual data and forecasting results, one of the methods used is the Mean Absolute Percentage Error (MAPE) method. The difference or error is absolute, which is then changed in percent form. The average yield of this percentage is the MAPE value. The MAPE value will be in a good category if it is between 0 to 20% [22]. The equation for calculating MAPE is as follows:

$$MAPE_n = \frac{\sum_{t=1}^{n}\left|\frac{E_t}{D_t}\right|100}{n} \quad (12)$$

C. Determination of Production Costs with ABC

Production costs are the accumulation of all costs that must be incurred by the company or business actor to process and make raw materials into finished products that are ready for sale. The elements in the cost of production [22] are Raw Material (RM) Cost; Direct Labor (DL) Cost; and Factory Overhead (FO) Cost.

Incorrect charging of costs will result in distortion of costs, resulting in the imposition of factory overhead costs that originate from one cost driver, namely the units produced. Factory overhead costs vary from product to product even though the types of products are the same. Incorrect calculation of overhead costs is very influential in making wrong decisions on the determination of the selling price of products, so the calculation of production costs with the ABC system is more accurate in calculating the cost of production and the determination of the selling price of the product [23].

ABC system can be defined as a system approach to calculating costs based on activities in the company and imposes costs on cost objects such as products and services based on the activities needed to produce each product and service [24]. In this system, the first step in the process of calculating Rengginang Lorjuk production costs is to determine the raw material cost, namely white sticky rice and lorjuk based on price predictions with HW and MA to get the

actual material prices, taking into account MAPE and MSE to calculate the accuracy of forecasting.

Whereas direct labor cost can be calculated through the work done to produce and send goods to consumers, distributors, and agents. The activities carried out are processing, shaping, drying, packaging, and marketing. However, the main focus of ABC is the company's activities that incur costs, one of the parts that are considered in the ABC method is the cost driver, the activity or transaction that causes the cost of producing goods or services [25]. In this study, there are 2 types of Rengginang Lorjuk products, namely, type A (large size) and type B (small size).

Cost drivers are defined as factors used to measure how costs are incurred or ways to impose costs on activities or products. Cost drivers are used to determining the consumption of costs by activities and consumption of activities by-products. Practically speaking, cost drivers indicate where costs are to be charged and how much they cost. Cost drivers are the cause of costs, while activity is the impact. In ABC systems, several cost drivers are used, whereas in conventional cost systems only one particular cost driver is used as a basis. The calculation of ABC system production costs is obtained by the following formula [1].

$$Cost\ production = RM + DL + FO \quad (13)$$

The final part of this study is to calculate the profit of Rengginang Lorjuk by calculating the difference between the selling price and the production cost. Because the cost of RM is obtained from forecasting results, it is necessary to calculate some of the possible benefits obtained following the MAPE calculation in the forecasting process.

III. Result and Discussion

The initial step of this study is to predict changes in the price of RM using the Holt-Winter and Moving Average. In the HW method, the smoothing constant (α) is 0.05, the constant for trend (β) is 0.1, and the constant for seasonal (γ) is 0.1. To determine the initial level value (L0) and trend value (T0) linear regression analysis is used from the actual data in Table I. From the actual data, it can be seen that for sticky rice, trends and seasonal patterns occur with a span of 6 months. While in Lorjuk, patterned trends, but the seasonal data tend to be uneven. From a number of experiments, the seasonal time span on lorjuk is set for 6 months. The results of determining L0, T0, S1, S2, S3, S4, S5, and S6 are shown in Table II.

Similar to the calculation of HW, in MA the determination of Lt s based on the highest material prices in each period, ie the first 6 months (L1 sampai L6). The average price of material for 6 months will be the forecast value the following month (F7) and so on (eq.10). The results of forecasting the two methods are HW and MA, then calculated the level of accuracy using MSE and MAPE in eq.11 and eq.12. The results of the forecast of the price of both material prices are sticky rice and lorjuk are shown in Table III.

TABLE II. Level, Trend, and Seasonal Pada Holt-Winter

Raw Material	L0	T0	S1	S2	S3	S4	S5	S6
Sticky rice	24,389	116	0.97	0.98	0.98	1	1.02	1.05
Ensis leei (Lorjuk)	53,033	482	1.09	0.82	0.91	0.9	1.05	1.22

TABLE III. The Comparison of Forecasting Results using HW and MA Methods

Raw Material	Holt Winter Method			Moving Average		
	Forecast	*MSE*	*MAPE*	*Forecast*	*MSE*	*MAPE*
Sticky rice	25,621	242,143	1.58%	25,917	958,356	2.91%
Ensis leei (Lorjuk)	67,904	105,110,774	16.17%	55,833	165,979,167	18.90%

Based on Table III, it can be seen that the results of forecasting on HW and MA show not too much difference in sticky rice, but there is a considerable difference in ensis leei (lorjuk). To be able to know the forecasting results which have greater accuracy, it can be analyzed that on sticky rice, the MSE value on HW is 242,143 or smaller when compared to the MSE value on MA that is equal to 958,356. MAPE value on HW is 1.58%, and smaller than MAPE value on MA that is 2.91%. Thus it can be concluded that the Holt-Winter method has better accuracy than the Moving Average method.

In Ensis leei (lorjuk), the MSE value in HW is 105,110,774 or smaller when compared to the MSE value in MA which is 165,979,167. MAPE value on HW is 16.17%, and smaller than MAPE value on MA that is 18.90%. thus it can be concluded that the Holt-Winter method has better accuracy than the Moving Average method. The result of sticky rice price forecasting was IDR 25,621, and ensis leei price of IDR 67,904 then used to calculate the cost of production. The difference in the results of the two methods is shown in Fig. 2 and Fig. 3.

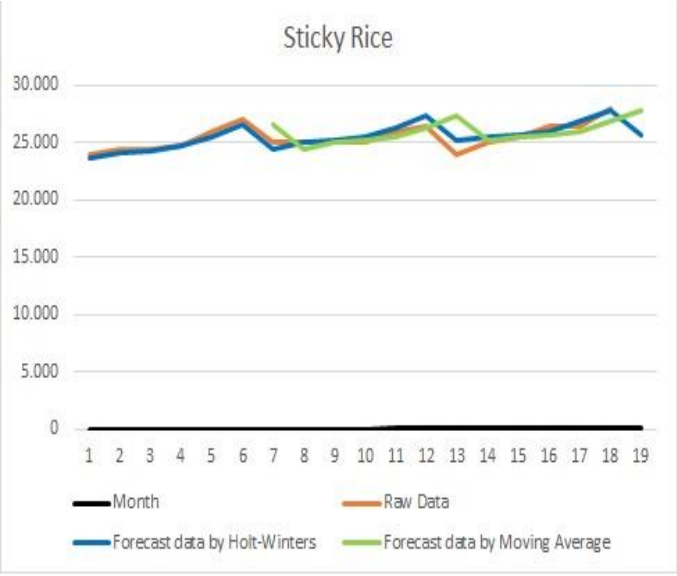

Fig. 2. Graph of actual data and results of sticky rice forecasting.

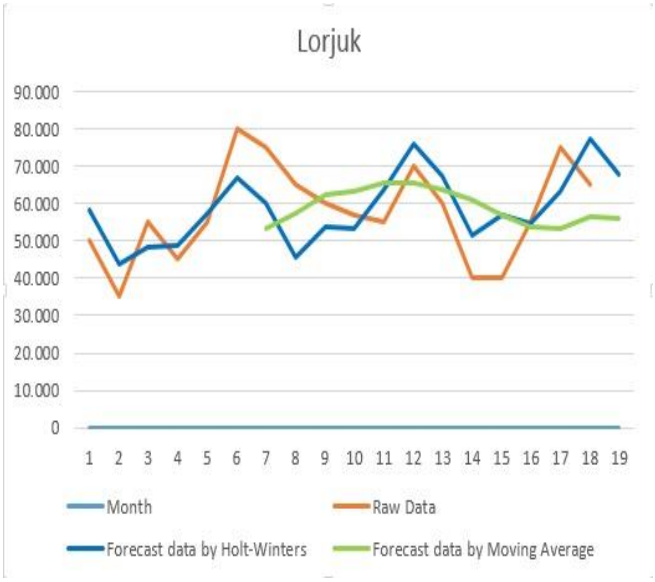

Fig. 3. Graph of actual data and results of ensis leei (lorjuk) forecasting.

Determination of production costs using the ABC method on Rengginang Lorjuk Madura products, starting with determining the cost of RM, DL, and FO. Basically, the ABC system is a method of calculating production costs based on the activities carried out. The activities that cause costs (cost drivers) in producing Rengginang Lorjuk which includes FO costs, including processing, packaging, maintenance of tools, and marketing. Table IV shows the charge for each group with the ABC system. For the purchase of type A materials, sticky rice used in January 2020 was 300 kg, while ensis leei (lorjuk) was 20 kg. For Rengginang Lorjuk type B, purchase 200 kg sticky rice, and 15 kg ensis leei (lorjuk).

In the FO cost group, the pool rate for each activity is as follows: processing activities for type A and type B are IDR 1,411; packaging activities for type A and type B are IDR 448 and IDR 248 respectively; maintenance of tools activities on type A and type B are IDR 78 each; and marketing activities for type A and type B amounting to IDR 72 each.

From the overall production financing, the cost of RM as the biggest cost of this product is 83.6% for Rengginang Lorjuk type A, and 83.4% for Rengginang Lorjuk type B. Three cost groups namely RM cost, DL cost, and FO cost are accumulated according to eq.13, to get the production costs for each type of Rengginang Lorjuk along with the benefits, and is presented in Table V.

TABLE IV. ACTIVITY POOL AND COST DRIVER OF RENGGINANG LORJUK WITH ABC SYSTEM

Cost Group	Activity Pool	Cost Driver	Rengginang Lorjuk (IDR)	
			Type A	*Type B*
Raw Material Cost	Warehousing: Sticky rice	Purchasing cost	7,686,224	1,358,087
	Ensis leei (lorjuk)	Purchasing cost	5,124,150	1.018,565
Direct Labor Cost	Processing	Number of work	240,000	160,000
	Shaping	Number of work	300,000	200,000
	Drying	Number of work	180,000	120,000
	Packaging	Number of work	240,000	160,000
	Marketing	Number of work	90,000	60,000
Factory Overhead Cost	Processing	Number of material	423,270	282,180
	Packaging	Number of unit product	224,000	148,800
	Maintenance of tools	Number of unit product	39,000	46,800
	Marketing	Number of unit product	36,000	43,200

TABLE V. PROFIT CALCULATION OFRENGGINANG LORJUK MADURA

Type of Product	Number of units	RM Cost (IDR)	DL Cost (IDR)	FO Cost (IDR)	Total Production Cost (IDR)	Production Cost (IDR/unit)	Selling Price (IDR/unit)	Profit (IDR/unit)
Rengginang Lorjuk type A	500	9,044,311	1,050,000	722,270	10,816,581	21,633	25,000	3,367
Rengginang Lorjuk type B	600	6,142,715	700,000	520,980	7,363,695	12,273	16,000	3,727

Table V shows the advantages of each type of product, where Rengginang Lorjuk type A produces 500 units of product, while Rengginang Lorjuk type B produces 600 units of product. The profit of each product per unit is IDR 3,367 and Type B IDR 3,727.

Based on the MAPE values from each of the results of forecasting on sticky rice and ensis leei, we get the following estimated total of raw material cost:

- Estimation 1

$RM\ cost = RM_f + (1.58\% \times RM_s) + (16.17\% \times RM_e)$

- Estimate 2

$RM\ cost = RM_f - (1.58\% \times RM_s) + (16.17\% \times RM_e)$

- Estimate 3

$RM\ cost = RM_f - (1.58\% \times RM_s) - (16.17\% \times RM_e)$

- Estimate 4

$RM\ cost = RM_f + (1.58\% \times RM_s) - (16.17\% \times RM_e)$

Where RM_f is the cost of purchasing raw material based on the results of forecasting, RM_s is the cost of sticky rice raw material, and RM_e is the cost of raw material ensis leei (lorjuk). Estimation calculation results are shown in the following tables.

TABLE VI. ESTIMATION 1: PROFIT OF RENGGINANG LORJUK MADURA

Estimation to	Type of Product	Number of units	RM Cost (IDR)	DL Cost (IDR)	FO Cost (IDR)	Total Production Cost (IDR)	Production Cost (IDR/unit)	Selling Price (IDR/unit)	Profit (IDR/unit)
1	Rengginang Lorjuk type A	500	9,385,356	1,050,000	722,270	11,157,626	22,315	25,000	2,685
	Rengginang Lorjuk type B	600	6,388,378	700,000	520,980	7,609,358	12,682	16,000	3,318
2	Rengginang Lorjuk type A	500	9,142,471	1,050,000	722,270	11,255,786	21,829	25,000	3,171
	Rengginang Lorjuk type B	600	6,226,455	700,000	520,980	7,693,098	12,412	16,000	3,588
3	Rengginang Lorjuk type A	500	8,703,266	1,050,000	722,270	10,816,581	20,951	25,000	4,049
	Rengginang Lorjuk type B	600	5,897,051	700,000	520,980	7,363,695	11,863	16,000	4,137
4	Rengginang Lorjuk type A	500	8,946,151	1,050,000	722,270	10,816,581	21,437	25,000	3,563
	Rengginang Lorjuk type B	600	6,058,974	700,000	520,980	7,363,695	12,133	16,000	3,867

Lorjuk type A of IDR 25,000; Rengginang Lorjuk type B is IDR 16,000, the benefits of each estimate can be known. Based on Tables VI, VII, VIII, and IX, it can be seen the range between the minimum and maximum limits of profits obtained by the results of forecasting the raw material prices that have been carried out previously. The minimum profit is in estimation 1, which is IDR 2,685 (type A) and IDR 3,318 (type B). The maximum profit is in estimation 3, where type A will get a profit of IDR 4,049 and type B for IDR 4,137.

In general, testing using the ABC method has the highest level of accuracy with more detailed calculations of indicators that affect production costs. The ABC method breaks down activity levels into 3 parts: unit level (main raw material costs, supporting materials), batch level (labor costs) and facility level (maintenance and marketing costs). By separating activities into several levels, the cost driver can be determined, where the cost driver has an important role in determining the pool rate and the number of costs allocated to each group of activities in each type of product produced.

This study discusses two types of Rengginang Lorjuk which have the same production process but have different product sizes. In the determination and calculation of overhead, 1 activity is influenced by the amount of material used, 3 other activities are influenced by the number of product units. However, the error in determining the cost driver and unit driver, especially for more than one type of product, will result in calculation errors on the cost of FO.

Through the implementation of forecasting methods to predict the price of raw materials, it will help business owners calculate the cost of production, but it will be more appropriate to be applied to products that are produced by order. The calculation of production costs using price predictions might contribute better if implemented on products that have fluctuating prices, such as processed seafood, the furniture industry and so on. To avoid mistakes in price predictions, the method used must be by the data patterns owned.

This study uses the Holt Winter model in which the increase in material prices follows a trend data pattern that tends to increase over time and is influenced by seasonal factors. But to prove the accuracy of the forecasting method used, this study compares with other forecasting methods namely Moving Average, and completes it with MSE and MAPE. There is a difference in profits obtained by determining the cost of production through the prediction of material prices with no predictions [23].

This system has left difficult manual calculations and burdensome business owners in calculating the actual production costs. This system can also be used as a guide to financial statements, as well as monitoring profits per month, due to changes in material costs that tend to increase over time. With this system, the opportunity for business owners to incorrectly predict selling prices, especially for orders in the following months, can be said to be quite small, so it is expected to avoid the risk of loss due to sales made.

IV. CONCLUSION

Based on the results of data processing in the previous discussion, it was found that the price prediction using the HW method has a better level of accuracy than using the MA method. The prediction results are by material price trends that have a pattern of increasing over time and are influenced by seasonal factors. Forecasting results on white sticky rice using HW and MA have a slight difference due to changes in prices on raw materials is not too significant. Unlike the case with ensis leei, which the results of forecasting have a significant difference, considering that this raw material is very volatile in price changes. Determination of cost drivers in the Activity-Based Costing (ABC) system in each activity is different, depending on the processes that occur in each type of Rengginang Lorjuk and the inherent costs. There are four cost drivers used, namely purchasing cost, number of jobs, number of materials, and number of product units. The proposed method has advantages with a more detailed calculation of each activity undertaken in producing of Rengginang Lorjuk. Four estimated benefits of Rengginang Lorjuk products are obtained and can provide an overview of the lower and upper limits of the benefits that may be obtained due to changes in raw material prices.

This research is focused on calculating the production cost of Rengginang Lorjuk Madura using the ABC system and forecasting method by considering the level of accuracy with MSE and MAPE. Based on the scope of the discussion, this study has several limitations. Therefore it is hoped that further studies can complement or provide solutions to other, better, effective, and efficient solutions. The scope of the discussion can be added by adding income statements to the system so that the contribution made can be even more.

As a study material, a similar study can be done again by comparing several methods of calculating production costs, to evaluate some of these methods so that which method is found by the case chosen. The results of the comparative method of calculating production costs can be used as a guideline for further studies in determining the right method so that the calculation results have good accuracy. For marine products such as ensis leei and others, it is necessary to forecast prices with data mining by variables that affect price changes. In addition to data mining, determining patterns for forecasting goods or prices that are volatile and difficult to predict, is very good to do in the future.

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