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Research Article

Joint Production Cost Allocation in Determining Cost of Goods Production to Optimize Profits

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Abstract
PT Kemang Food utilizes the selling price method and the average per unit method for allocating joint production costs to its main products and by-products. The company produces sausages, burgers, delicatessen, meatballs, and a by-product consisting of beef and MDM (Mechanically Deboned Meat) from chicken esophagus, breastbone, and thigh. The study reveals that, according to the profit achievement policy and the targeted cost calculation, the selling price method is more profitable than the average per unit method. The profit obtained through the selling price method exceeds that of the average per unit method. Despite this, both methods experienced a decline in profits in 2020 due to the COVID-19 pandemic, as evidenced by trend analysis. Managerial implications stress the significance of accurate cost determination for optimizing company profits, especially during challenging times such as the pandemic. This underscores the need for adaptability in cost allocation strategies to maintain financial health and achieve optimal production costs in the face of external disruptions. The findings emphasize the importance of strategic decision-making in managing joint production costs for sustainable profitability.

Keywords: Analysis, Allocation of Joint Production Costs, Cost of Goods, Company Profit

JEL Classification: D21, M21, L22

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1. Introduction

Calculating the cost of production is very important, considering that the benefit of information on the cost of production is to determine the selling price of the product, which will be presented in the report on financial position. Every manufacturing company must calculate the cost of production correctly and accurately. In calculating the cost of production, the information needed is information regarding raw material costs, labor costs, and factory overhead costs. These three types of costs must be determined carefully, both in recording and classifying them (Saefudin, 2013).

The cost of PT Kemang Food Industri's raw materials is the largest cost element in calculating the cost of the product. Below, a table of production costs for PT Kemang Food Industri's main and side products for 2018-2020 is presented.

Table 1. PT Kemang Food Industri Production Costs 2018 – 2020 (IDR)

No	Information	Periode		
		2018	2019	2020
1	List of Raw Materials and Auxiliary Materials			
	1a. Number of Raw Material List	45.972.672.000	50.197.548.019	48.171.547.020
	1b. Number of List of Auxiliary Materials	11.681.351.330	12.855.670.000	12.126.025.000
2	List of Direct Labor Costs and Indirect Labor Costs			
	2a. Direct Labor	22.630.800.000	23.196.570.000	24.356.398.500
	2b. Indirect Labor	2.056.000.000	2.107.400.000	2.212.770.000
3	List of Factory Overhead Costs			
	Factory Overhead Costs	24.430.809.960	25.163.736.278	25.918.648.307
	Total Production Costs	106.771.633.290	113.520.924.297	112.785.388.827

Source: Profit and Loss Report of PT. Kemang Food Industry (2018-2020)

From the table above, there has been an increase and decrease in total production costs over three years. Therefore, joint cost allocation needs to be done to achieve optimal profits for the company. PT. Kemang Food Industry (KemFood) is a pioneer of the processed meat industry in Indonesia, which is in the Pulo Gadung industrial area. PT. Kemang Food Industry produces various types of processed meat such as sausages, burgers, meatballs, and delicatessen. To maintain good quality and quality, all products produced by PT. KemFood is produced with high production standards by applying production standards according to Halal standards from the Indonesian Ulema Council and is BPOM certified.

According to (Pinuji, 2009), the faster and more accurate information reaches prospective investors and is reflected in the stock price, the more relevant the capital market is. The company's ability to generate profits in its operational activities is the main focus in evaluating the company's achievements because the company's profits will be able to know the company's ability to fulfill obligations for its investors and is also an important element in creating corporate value that shows its prospects in the future. The level of profitability of the company can be seen from the financial statements that are periodically updated as one of the obligations of public companies listed on the Indonesia Stock Exchange. This system is useful for overcoming the weaknesses of traditional systems made specifically by industrial companies (Martusa et al., 2010). Joseph et al. (2019) gave a result that modern costing, such as Activity Based Costing (ABC) systems, can optimize the benefits of techniques that enable them to identify, accumulate and manage the costs of company activities to ensure accuracy in decision-making and produce business excellence and customer satisfaction.

Costs are the basic price or part of which is used or consumed to obtain income (Rahmadani et.al. 2016). Costs represent the sacrifice of economic resources to obtain goods/services that are useful for the present or the future (Siregar, 2013), (Siby et al., 2018). The grouping of costs over all existing cost elements into certain groups that are more concise and can provide more concise and important information is called cost classification. It is commonly used in the classification of costs related to products, production volumes, departments, cost centers, accounting periods, and decision-making (Siby et al., 2018). According to (Carter, 2012), the cost classification is based on (Palupi et al., 2016), (1) costs with products that include manufacturing and commercial costs, (2) production volumes which include variable costs, fixed costs, and semi-variable costs, (3) production department which includes the department of production, services, and joint costs and, (4) accounting period and a decision.

Based on the results of previous research (Pricilia et al., 2014) and (Syaputra et al., 2018) in

determining the cost of production, especially joint products, companies still do not understand how to classify joint costs for each product, so they are often an error occurred in allocating joint costs, such as setting the same raw material costs for each product without considering shipping costs for each product during the production process. Apart from that, the distribution of costs for using machines directly during the production process is different from the burden on the three joint products. The company still needs to implement a method of allocating joint costs for the three joint products produced, so there are still costs that need to be accurately calculated as costs incurred by the product when it is produced. With this problem, of course, there is a discrepancy in determining the cost of products, especially when producing joint products, so it needs to be clarified what the costs incurred for each product are and the actual cost of production. This will result in company management needing to know the exact contribution of each joint product. So, it is necessary to calculate the joint cost allocation using the joint cost allocation method in determining the correct product cost price.

2. Literature Review and Hypothesis

Cost

Cost is a very important thing and cannot be separated in determining the cost of production. Running a business requires costs that must be paid so that the company can continue to have quality. With costs, companies can also determine the profits earned by the company.

Cost accounting

According to (Mulyadi, 2013), Cost accounting is the process of recording, classifying, summarizing, and presenting costs, manufacturing, and selling products or services in certain ways, as well as interpreting them.

Cost of goods sold.

The application of the cost of production to determine the cost per unit of product to be sold, so that when the product is delivered, the company can know the profit or loss that the company will receive after deducting other costs. Dunia and Abdullah (2013) state that the cost of production is the costs incurred in connection with production, namely the total costs of direct materials and direct labor.

Understanding Joint Products and By-Products

A joint product is several products produced simultaneously or simultaneously through one or a series of production processes, where each product produced will have a value in accordance with the processing results. In a product process that produces various types of products, products whose value is relatively large and in greater quantity are referred to as main products. In contrast, products whose value is relatively small are referred to as side products.

Joint Cost Allocation Method for By-Products

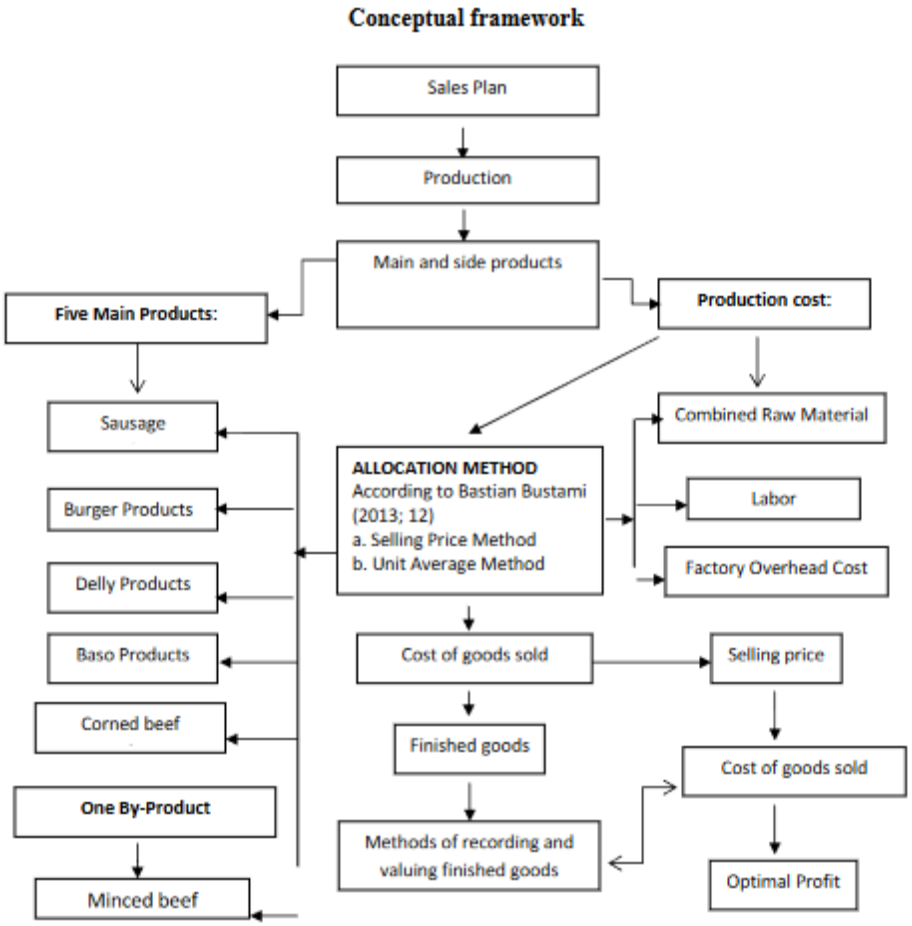
With the combined cost allocation method, the by-products receive a cost allocation from the combined costs before being separated from the main product. The costs of the by-products consist of the combined costs allocated to the by-products plus the costs incurred for further processing of the by-products after the separation point if there are any. The methods generally used are the replacement cost method and the market price method or reversal cost method.

Financial Report Analysis

According to (Julita et al., 2014), the analysis of company financial reports is basically the calculation of ratios to assess the company's financial condition in the past, present, and future. Meanwhile, according to (Harahap, 2016), financial report analysis means breaking down financial report accounts into smaller pieces of information and looking at their relationships, which are significant or have meaning between one another, both quantitative data and non-quantitative data, with the aim of seeing deeper financial conditions that are very important in the process of making the right decisions. Based on the two definitions above, a financial report analysis is an analysis carried out to assess the financial condition of a company in the past and future with the aim of finding out the financial condition in more depth.

Conceptual framework

This research aims to prove how these theories can influence the allocation of production costs in quantity in companies operating in the manufacturing sector with the relative selling value method applied to PT companies. Kemang Food Industry. Thus, the framework for thinking in this research is as follows:



Source: data processed by the author(2022)

Before starting the production process, a sales plan or target for goods to be sold is always made. The production results in this shared cost raw material allocation method include five main products, namely sausage products, burger products, Delly products, meatball products, corned beef products, and one by-product, namely minced beef products, which are calculated using the cost of production formula:

Formula 1

Total production costs + opening work-in-process inventory balance
production – ending balance of inventory of goods in the process of production.

Production costs consist of raw material costs, labor costs, and factory overhead costs. To determine optimal profit by comparing the results of gross profit calculations with the optimal profit target for each product. Gross profit is calculated using the formula:

Formula 2

Gross Profit = Sales Revenue – Cost of Goods Sold

3. Data and Method

Method of collecting data

There are two types of data sources in research, namely internal data and external data. However, in this research, I only used internal data sources because all data was obtained only from the company that was the object of research. There are two types of data sources in research, namely internal data and external data. However, in this research, I only used internal data sources because all data was obtained only from the company that was the object of research. In compiling this research, the author obtained the necessary data in the following way: Library study (library research).

In this research, data collection was carried out by reading books, articles and other data sources that were relevant to the research used to support the presentation of theory and solving the problems discussed. Field study (field research) data collection was obtained by conducting in-depth observations and interviews as well as observing data in the production and accounting section of PT Kemang Food Industri. Observations were carried out to obtain the required data by carrying out observations directly to the object under study, an Interview, namely a guided interview method, because research with a qualitative approach requires in-depth interviews as a way of collecting data. Just like a questionnaire, the structure of an interview guide really depends on the research need for answers to questions and comfort in the interview process.

Data analysis uses a comparative method.

This comparative method compares the calculation of the cost of production according to the joint cost allocation approach based on the selling price method with the average unit method. The steps for using the comparative method are as follows: Identifying and classifying production costs, raw material costs for main products and by-products, direct labor costs, and factory overhead costs (indirect production costs), Calculating the allocation of joint production costs using the price method sales and average unit method, Calculating the percentage of profit before tax that occurred in 2018 to 2020 at PT Kemang Food, Analyzing the results of a comparison of the allocation of joint production costs using the selling price method and the average unit method and the profit that occurred. The data analysis used is a quantitative analysis technique. Quantitative analysis is a way to analyze data in the form of numbers relating to the allocation of joint costs in determining the cost of production. The variables used in this research are cost of production and Gross Profit. The measurements used by PT Kemang Food calculate the allocation of joint production costs using the selling price method and the average unit method using trend analysis.

Research Instrument

In this research, the author used a qualitative method with internal data, namely the profit and loss report of PT Kemang Food from 2018 to 2020, using the calculation of the joint production cost allocation method, namely comparing the selling price method and the average unit method. The selling price method has indicators of the selling price, selling value, percentage of joint cost allocation, joint cost allocation, and product cost per unit. Meanwhile, the average unit method has indicators of the selling price, selling value, percentage of joint cost allocation, joint cost allocation, and cost price. product per unit. Gross profit calculations use sales indicators and cost of production. The cost of production consists of raw material costs, labor costs, and factory overhead costs.

4. Results

To obtain optimal production costs, PT Kemang Food produces five main products and one by-product in a joint production process. In the joint production process, five primary products are produced such as sausages, burgers, delicatessen, meatballs, corned beef, and one secondary product, minced beef, which uses shared raw materials including beef, frozen broiler chicken, mechanically deboned meat (MDM), namely the meat attached to the chicken's esophagus, breastbone, and thighs. The product produced is the product of a production process that is continuous every day. Production costs are divided into three categories: raw material costs, direct

labor costs, and factory overhead costs. The company determines the policy for determining selling prices at PT Kemang Food Industri. For the cost of production at the firm, the selling price method and the average unit method are used.

Raw Material Costs

The raw materials that this company considers producing finished products are chicken and beef which are obtained through imported purchases. Purchases of raw materials for chicken and beef are made in cash and within 14 days. The purchase price of inventory or inventory costs must include all purchase costs, conversion costs, and other costs incurred until the inventory is ready to be sold and used. Details of the raw materials used for the production process at PT Kemang Food Industri are in Table 1 below:

Table 1. List of Raw Materials and Auxiliary Materials for Production in 2018-2020 (IDR)

No	Name	Period		
		2018	2019	2020
1	Local Raw Materials	12.254.008.000	13.784.925.000	13.124.250.000
2	Imported Raw Materials	33.718.664.000	36.412.621.000	35.047.295.000
	Amount	45.972.674.018	50.197.548.019	48.171.547.020
	List of Auxiliary Materials			
1	Chemical Auxiliaries	2.030.000.000	2.243.640.000	2.134.880.000
2	Coloring Auxiliary Material	4.838.100.000	5.050.950.000	4.696.100.000
3	Auxiliary Ingredients for Seasoning	2.699.610.000	3.135.480.000	3.010.125.000
4	Casing Auxiliary Material	2.113.650.000	2.425.600.000	2.284.920.000
	Amount	11.681.360.000	12.855.670.000	12.126.025.000
	Grand Total	57.654.034.018	63.053.218.019	60.297.572.020

Source: PT Kemang Food profit and loss report for 2018-2020

Direct labor costs

Based on the relationship with production process activities, labor can be classified into direct labor and indirect labor. Direct labor costs at PT Kemang Food are remuneration paid for the hard work that has been carried out for 30 days paid to workers related to production process activities carried out by the PT Kemang Food company. Direct labor is labor directly involved in production process activities that process raw materials into finished products. Meanwhile, indirect labor is labor that indirectly participates in facilitating production process activities that process raw materials into finished products. In recording labor costs, PT Kemang Food Industri has separated direct labor costs (direct wages) and indirect labor costs (salaries).

Table 2. Direct and Indirect Labor Costs for Production Year 2018-2020 (IDR)

No	Information	Period (Year)		
		2018	2019	2020
1	Direct labor costs	22.630.800.000	23.196.570.000	24.356.398.500
2	Indirect Labor Costs	2.056.000.000	2.107.400.000	2.212.770.000
	Total BTKL and BTKTL	24.686.802.018	25.303.972.019	26.569.170.520

Source: PT Kemang Food Profit and Loss Report for 2018-2020

Factory Overhead Costs (Indirect Production Costs)

Indirect production costs or factory overhead costs are costs that are related to the product produced. However, the relationship is relatively large or a relationship that indirectly influences the smooth running of the production process, namely managing raw materials into finished products. Indirect production costs or factory overhead costs, which are considered in determining the cost of production prepared by the company, include all costs related to production process activities apart from raw material costs and direct labor costs. Indirect production costs or factory overhead costs, the firm's indirect production costs charged during 2018, are listed in Table 4 as follows:

Table 3. Factory Overhead Costs for the 2018-2020 Period (IDR)

No	Information	2018	2019	2020
1	Adjuvant	4.774.447.230	4.917.680.647	5.065.211.066
2	Transportation	821.543.000	846.189.290	871.574.969
3	food	63.745.000	65.657.350	67.627.071
4	Employee uniform	12.638.000	13.017.140	13.407.654
5	Social Security	71.597.000	73.744.910	75.957.257
6	Treatment	6.193.000	6.378.790	6.570.154
7	Employee uniform	43.949.000	45.267.470	46.625.494
8	Building shrinkage	350.000.000	360.500.000	371.315.000
9	Machine depreciation	244.187.750	251.513.383	259.058.784
10	Equipment depreciation	40.279.800	41.488.194	42.732.840
11	Motor depreciation	6.928.500	7.136.355	7.350.446
12	Factory inventory shrinkage	7.650.000	7.879.500	8.115.885
13	Machine maintenance	1.879.650.000	1.936.039.500	1.994.120.685
14	Equipment maintenance	2.307.650.000	2.376.879.500	2.448.185.885
15	Motorcycle maintenance	78.500.000	80.855.000	83.280.650
16	Building maintenance factory	350.750.000	361.272.500	372.110.675
17	Equipment maintenance factory	5.765.000	5.937.950	6.116.089
18	Fuels and lubricants	6.125.755.200	6.309.527.856	6.498.813.692
19	Electricity and water	1.356.856.000	1.397.561.680	1.439.488.530
20	Stationery and prints	60.256.400	62.064.092	63.926.015
21	Factory equipment	836.560.750	861.657.573	887.507.300
22	Inventory maintenance office	6.340.500	6.530.715	6.726.636
23	Telephone, telex, and fax	326.530.530	336.326.446	346.416.239
24	Fire insurance	215.675.250	222.145.508	228.809.873
25	Factory equipment	1.425.667.400	1.468.437.422	1.512.490.545
26	Installation maintenance	1.350.252.700	1.390.760.281	1.432.483.089
27	Workshop equipment	715.827.400	737.302.222	759.421.289
22	Inventory maintenance office	6.340.500	6.530.715	6.726.636
23	Telephone, telex, and fax	326.530.530	336.326.446	346.416.239
24	Fire insurance	215.675.250	222.145.508	228.809.873
25	Factory equipment	1.425.667.400	1.468.437.422	1.512.490.545
26	Installation maintenance	1.350.252.700	1.390.760.281	1.432.483.089
27	Workshop equipment	715.827.400	737.302.222	759.421.289
28	Factory lighting	62.745.750	64.628.123	66.566.966
29	Safety and cleanliness	7.049.500	7.260.985	7.478.815
30	Pallet	875.819.300	902.093.879	929.156.695
Total factory overhead costs		24.430.809.960	25.163.736.278	25.918.648.307

Source: PT Kemang Food Industri Profit and Loss Report (2018-2020)

Analysis of Research Results

Below are the results of percentage calculations in the production cost report using Trend analysis,

and 2018 is used as the basis for calculations (100%) for Trend analysis:

Table 4. Recapitulation of Production Costs for 2018-2020 with Trend Analysis

No	Information	Periode		
		2018	2019	2020
1	List of Raw Materials and Ingredients Servant			
	1a. Number of Raw Material List	100%	109%	105%
	1b. Number of Lists Adjuvant	100%	110%	104%
2	List of Direct Labor Costs and Indirect Labor Costs			
	2a. Direct Labor	100%	103%	108%
	2b. Indirect Labor	100%	103%	108%
3	List of Factory Overhead Costs			
	Factory Overhead Costs	100%	103%	106%
	Total Production Costs	100%	106%	106%

Source: PT Kemang Food Industri Profit and Loss Report (2018-2020)

Below is a description of the percentage calculation for the production cost recapitulation report for 2018 to 2020 using the Trend analysis method: Percentage of Current Assets:

(comparative year: base year) x 100%: (IDR.50,197,548,019: IDR.45,972,672,000) x 100%: 109%

Joint costs consist of raw material costs, direct labor costs, and factory overhead costs. In this study, researchers compared methods for allocating joint production costs to each product, using the selling price method and the average unit method, and in each method, a trend analysis was carried out.

5. Discussion

Cost Analysis Calculations in Joint Cost Allocation

Determining the right selling price has a good influence on optimal profits and the company's name. Determining prices that are lower than competitors' prices has a significant influence on product demand. Meanwhile, a high selling price will result in relatively reduced demand for a product. Second, this has an optimal effect on the total income obtained by the company. The author believes that companies can determine optimal profits. Joint production costs are allocated for each product produced using the physical unit allocation method of raw materials used and the average unit allocation method per unit. This cost can have an impact on increasing company profits, as well as being able to compare the gross profit results for each product produced.

Analysis of Cost and Profit Calculation Results in Joint Cost Allocation

Determining the right selling price will have a good influence on optimal profits and the company's name. Setting a price that is lower than competitors' prices will have a significant influence on product demand. Meanwhile, a high selling price will result in relatively reduced demand for a product. These two things will optimally influence the total income obtained by the company. So that companies can determine optimal profits, joint production costs are allocated to each product produced using the selling price allocation method or the average unit allocation method. This will influence increasing company profits, as well as being able to compare the profits of each product produced. The following is an analysis of the comparison results between sales targets and sales realization from 2018 to 2020.

As in the targeted sausages product beginning sale from the company of 779,935kgit turns out realization sales in the exceed sales target that is of 780,200kg. So, the calculated profit with the

selling price method should be the profit target of Rp45,167,250,599. It has experienced an increase because of total increased sales, so the profit earned is as big as IDR 45,230,151,339. Whereas calculated profit with method raverageunit that should be profit target of Rp44,182,190,760 and profit earned as big as IDR 44,241,189,030. In 2019, PT Kemang Food Industri increased its sales target for every year's product because the sales target in 2018 was achieved everything on every sale type product and the price for every product because the price of ingredients rising standard.

In the year of this, comparison between sales targets with realization sale every product more diverse. For example, the product type of sausages whose sales have increased compared to 2018 is 802,500kg but still needs toll needs to achieve the expected target from the company of 803,200kg. So, that calculated profit with the selling price method should be the profit target of Rp47,459.991,576. It decreased because total sales have not yet achieved the target, so the profit earned is as big as IDR 47,364,406,241. Whereas calculated profit with the method average unit should be a profit target of Rp 46,289,658,787 and the profit earned. as big as Rp 46,206,510,269. Not all types of products experience Things like that, as in the product the type of burger that sells increased compared to 2018 and exceeded the sales target of 920.120kg becomes 921,100kg. That calculated profit with the selling price method should be the profit target of Rp53,042,570,510. It is a drop because of the price of burger products. In 2018, Rp. 79,680 to IDR 80,000, so that profit earned as big as Rp 53,038,346,130.

Whereas calculated profit with the method experiences, the increase should be the profit target of Rp51,187,699,297 and profit earned as big as Rp 51,193,085,494. Pit's 2020, we all know that the COVID-19 pandemic is happening all over the world, even part of Indonesia world, which resulted in a weakened economy. Until the year, PT Kemang food Industry experienced a drop in sales of every type of product, such as the target of selling sausages, which was the initial target sale from the company in the year before, 810,200kg.

Tin fact realization sales in 2020 experienced COVID-19, namely of 760,5g. That calculated profit with the selling price method should be the profit target of Rp48,474,976,131. Experience heavy falling sales due to the COVID-19 pandemic, so that profit. Earned as big as Rp 43,406,651,558. Whereas calculated profit with an average method should be a profit target of Rp47,302,099,532 and a profit earned as big as IDR. 42,105,172,418. A few possibilities for the reason the products did not reach the sales target in 2019 and 2020 with the use method price selling and unit average method:

1) The increase in the price of each product from the previous year.
2) Raise the price of ingredients so that price sales go up.
3) The COVID-19 pandemic caused the economy to decline in 2020.

Consumers from PT Kemang Food Industri, such as retail, supermarkets, minimarkets, and Horeka (Hotels, Restaurants, and Cafes), are closed due to the COVID-19 pandemic.

6. Conclusion

The conclusions reached from the results of the analysis regarding the allocation of joint costs in determining the cost of goods sold to optimize the company's net profit at PT Kemang Food Industri can be seen from 2018 to 2019. From the results of this research, it can be concluded that Based on profit achievement policies and targeted calculation methods, the allocation of joint product costs using the selling price method is better and more profitable than the average unit method because, with the selling price method, the profit obtained is higher compared to calculations using the average unit method. However, based on trend analysis, these two methods both experienced a decline in profits in 2020 due to the Covid-2019 pandemic. So, the author calculates according to events that occurred in that year.

The results of calculating the profit realization report using trend analysis using the selling price method, namely, in 2018, it was 100%; in 2019, it was 104%, and in 2020, it was 92%. Meanwhile, in the average unit method in 2018, it was 100%; in 2019, it was 104%, and in 2020, it was 92%.

These two methods have the same percentage from 2018 to 2020 but are different in terms of target amounts and realized profits. In 2020, both methods were below 100% because that year, the Covid19 pandemic occurred. The managerial implications underscore the importance of accurate cost information in strategic decision-making. By adopting this approach, companies can enhance their competitiveness and financial performance in a dynamic business environment.

Recommendation

Based on the conclusions above, suggestions for companies and researchers are put forward as follows: Allocation of production costs should be carried out with more detailed calculations to determine the cost of production for each product, and the selling price should be set close to a reasonable price, to increase sales targets. Each year it must be based on the increase per product in the previous year because some products have a small increase, but the sales target for the following year increases quite high. For further research using the joint production cost allocation method, you can detail or separate the elements of labor costs and factory overhead costs., not only raw material costs.

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