

Article

Measuring Productivity In Food Smme Using The Apc Method

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Abstract: This research was conducted due to the condition of the company which was only founded in June, so that in July the company received few orders and in the following month, namely August, the company received quite a lot of orders and so this research uses a base period in September because the company received 500 orders. pcs and in October the company received a decrease in orders so it experienced a decrease in profits. Therefore this research aims to measure the company's productivity and profitability based on changes in labor, material, energy, capital and total input at UD. Lontong Irfan. The method used involves calculating productivity and profitability indices as well as evaluating price improvement indices to evaluate the impact of changes in input costs. The analysis results show that labor productivity remains stable despite an increase in wages, while material profitability has increased but productivity has decreased. Energy and capital productivity remained stable with no decline in profitability. Although total input productivity decreased, profitability increased, highlighting the complexity of the influence of input variables on a company's overall performance.

Keywords: Productivity, Fishbone Diagram, American Productivity Center

1. Introduction

Productivity is a key pillar for the survival of a company, which means that improving productivity refers to efforts to enhance efficiency and outcomes in an activity or process, reflecting the success of the company in carrying out its production processes. The level of productivity reflects how effectively the company utilizes resources and funds to produce products. In a highly competitive business environment, productivity becomes a key factor for companies. Productivity is closely related to a company's ability to effectively and efficiently utilize resources (inputs) to generate outputs[1].

Measuring productivity plays a crucial management role at various economic levels. In general, productivity measurement can be categorized into three types of comparisons: first, a comparison between current performance and past performance. Second, the comparison of performance between different units, such as labor, materials, energy, and capital, which reflects relative achievements; third, the comparison between current performance and the established targets[2]. Measuring productivity is the first step in the productivity cycle aimed at assessing the current level of the company's productivity. The next step is productivity evaluation, which is the process of evaluating the results of productivity measurement. At this evaluation stage, comparisons are often made between the company's productivity levels from one period to the next, or comparisons between the factors that influence productivity values. The goal is to identify the root causes of the decline or increase in the company's productivity levels. Through this productivity evaluation, an analysis of the company's productivity development from one period to the next will be produced[3]. Total productivity describes the output of all the elements

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used in creating the final result, including raw materials, labor, energy, capital, and other components involved in the process[4].

Micro Enterprises refer to something owned by individuals or individual business entities that meet the requirements set forth in the law[5]. One of the food SMEs is UD. Lontong Irfan, which produces lontong located in Desa Durung Bedug rt 9 rw 2, Candi, Sidoarjo. This rice cake is quite popular among the local community and beyond, due to the presence of several kupang rice cake vendors. One of the factors contributing to the issues within this MSME is suspected to be the lack of overall productivity, which includes labor, materials, capital, and energy. This partner has 10 workers and receives 500 pieces of lontong daily with 26 working days. Over the past two months, the partner experienced a 50% decrease in profit. In October 2023, the partner earned a profit of 7,466,000, while the standard for normal monthly profit is 14,849,000. Based on the problem, an analysis of the issues that occurred is needed.

Several previous studies used to support this research include Setiawan's study[6]. Implementation of the Objective Matrix (OMAX) Method for Measuring Productivity at PT.ABC. Research by Novrigent[7]. Application of the APC (American Productivity Center) Model as a Determinant of Productivity Improvement Focus. Research by Kusumanto[8]. Analysis of Productivity at PT. Perkebunan Nusantara V (PKS) Sei Galuh Using the American Productivity Center (APC) Method. The result of the productivity measurement shows that the company's productivity index has decreased. This is due to the amount of inputs used in the production process being significantly higher than the production output. Therefore, the company needs to optimize the production process so that the increase in processed Fresh Fruit Bunches (TBS) is directly and positively proportional to the production output. The OMAX method itself is only used to calculate partial productivity, so this research cannot use the OMAX method but instead uses the APC method because this research discusses total productivity, including labor, capital, energy, and raw materials.

2. Materials and Methods

This research was conducted at UD. Lontong Irfan located in Desa Durung Bedug rt 9 rw 2, Candi, Sidoarjo. The research was conducted over a period of 6 months. In this research, data collection was conducted using quantitative methods to address the case study carried out at UD Lontong Irfan, which provided information that became the focus of this research. Observation was conducted by paying attention to every action taken in the field, recording data from those observations, and identifying the focal points of the research to obtain the necessary data, including productivity data and analyzing opportunities. Through that observation, the aim is to measure productivity in MSMEs. Interviews were conducted with employees. The selection of informants in the interview process is those who are directly involved in the issues that are the focus of this research. Interviews are conducted by presenting a series of questions, and the information obtained from the interviews is recorded as relevant data. The data from the interviews includes information about productivity and the types of threats that occur to the increase in productivity in MSMEs. The secondary data required involves a literature review, which is conducted by gathering all information related to the research problem from various theories and literature that can be used as references.

A. American Productivity Center (APC)

The American Productivity Center (APC) model indicates that to generate a productivity index, the amount of output and input per period is multiplied by the base period price. Meanwhile, to create a measure of profitability, the amount of output and input for each period is multiplied by the prices prevailing in that period. Meanwhile, to create a price improvement measure, the cost per unit and prices each year are multiplied by the output and input quantities for the relevant period[6]. The reason for choosing and

using the APC method is that it can determine three productivity metrics, namely the productivity index, profitability index, and price improvement index, and it can provide more detailed information about the origins of the company's profitability increase[9].

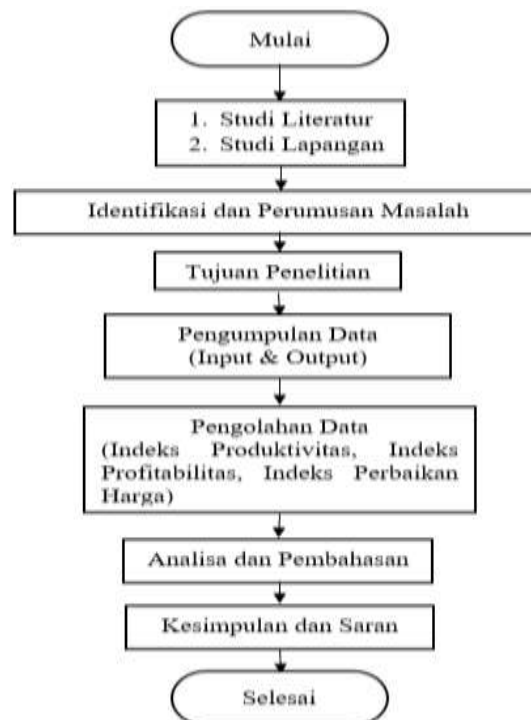


Figure 1. Research Flowchart

Calculating the productivity rate is done by comparing the total output with the total input. Input consists of main raw materials and production inputs, while output includes production results measured in rupiah value. The calculation of the company's total productivity level is carried out using the following equation.:

$$\text{Total Productivity Index} = \frac{\text{Total Output}}{\text{Total Input}} \times 100\% \quad (1)$$

Source: [10]

Calculating profitability with productivity and factor (price adjustment) through the following formula:

$$\text{Profitability} = \frac{\text{Sales Revenue}}{\text{Total Cost}} \% \quad (2)$$

Source: [10]

$$\text{Profitability} = \frac{\text{Number of Output} \times \text{price per unit}}{\text{Number of Input} \times \text{cost per unit}} \% \quad (3)$$

Source: [10]

$$\text{Profitability} = \frac{\text{Number of Output}}{\text{Number of Input}} \times \frac{\text{Price}}{\text{Cost}} \quad (4)$$

Source: [10]

In the APC method, there are several important things to know involving the following steps:

1. The total output and input each year are multiplied by the base year prices to create a productivity index.
2. Prices and costs per unit each year are multiplied by the amount of output and input in the specific year, resulting in a price improvement index for that year. This price improvement index provides an overview of changes in input costs relative to the company's output prices. The relationship between these measures is found in the following formula:

$$\text{Productivity index (IP)} = \frac{\text{Profitability Index (IPF)}}{\text{Price Improvement Index (IPH)}} \quad (5)$$

Source: [11]

$$\text{Profitability Index (IPF)} = \frac{\text{Total Output}}{\text{Total Input}} \times 100\% \quad (6)$$

Source: [12]

$$\text{Price Improvement Index (IPH)} = \frac{\text{Profitability Index}}{\text{Productivity Index}} \quad (7)$$

Source: [13]

3. The cost per unit of labor, raw materials, and energy is calculated directly, while the calculation of capital input involves a combination of total depreciation and relative profit against the total assets (including fixed assets and working capital) used. Thus, the capital input for a given period can be calculated as the result of combining total depreciation and relative profit against the total amount of assets used during that period, namely:

Input modal = Depreciation for that period + (Return on Basic Asset x Current Assets Used))

Return of Asset (ROA) in the base period is determined as follows:

$$\text{ROA} = \frac{\text{Profit in base period}}{\text{Total price in base period}} \quad (8)$$

Source: [14]

$$\text{ROA} = \frac{\text{Profit in base period}}{(\text{Fixed price} + \text{Working Capital}) \text{ in base period}} \quad (9)$$

Source: [15]

3. Results

A. Output, Input, and Productivity Index for the September - October period

To determine the output index, input index, and productivity index for the months of September and October by inputting the calculated data for Output, Input, and Productivity Index as follows.

1. Measuring the output, input, and productivity index for the months of September and October.

Table 1. Output, Input, and Productivity Index for the September - October period

		At Constant Prices		Indeks Number		Change
Description		Period 1	Period 2	Period 1	Periode2	Period 2-Period 1
Output Total	Output Total	Rp 20.321.000,-	Rp 21.014.400,-	1,000	1,034	+0,034
	Labour Input	Rp 10.400.000,-	Rp 11.440.000,-	1,000	1,100	+0,100
	Input Material	Rp 9.386.000,-	Rp 9.625.000,-	1,000	1,025	+0,025
	Input Energy	Rp 570.000,-	Rp 694.400,-	1,000	1,218	+0,218
	Entrada Modal	Rp 45.000,-	Rp 755.000,-	1,000	16,778	+15,778
	Input Total	Rp 20.321.000,-	Rp 21.014.400,-	1,000	1,034	+0,034
Productivity	Labour	1,000	1,000	100,00%	1	0,000
	Material	0,968	0,967	100,00%	1	-0,001
	Energy	1,000	1,000	100,00%	1	0,000
	Modal	1,000	1,000	100,00%	1	0,000
	Total	0,985	0,972	100,00%	1	-0,014

Based on the calculations from Table 1, labor productivity in October did not experience an increase or decrease (0,000) due to an increase in labor input by (0,100). Material productivity also experienced a decrease of (0,001) due to an increase in material input by (0,025). Energy productivity did not experience an increase or decrease due to an increase in energy input by (0,218). Capital productivity also did not experience an increase or decrease (0,000) because capital input saw a significant increase of (15,778). Meanwhile, total input productivity experienced a decrease of (0,014) due to a total input value of (0,034).

B. Output, Input, and Profitability Index for the September-October period

To determine the output index, input, and profitability index for the months of September and October by entering the calculated data for output, input, and profitability index as follows.

1. Measuring the output, input, and profitability index for the period of September and October.

Table 2. Output, Input, and Profitability Index for the September - October Period

		At Constant Prices		Indeks Number		Change
Description		Period 1	Period 2	Period 1	Periode 2	Period 1
Output Total	Output Total	Rp 20.321.000,-	Rp 21.014.400,-	1,000	1,034	+0,034
	Labour Input	Rp 10.400.000,-	Rp 11.440.000,-	1,000	1,100	+0,100
	Input Material	Rp 9.386.000,-	Rp 9.625.000,-	1,000	1,025	+0,025
	Input Energy	Rp 570.000,-	Rp 694.400,-	1,000	1,218	+0,218
	Entrada Modal	Rp 45.000,-	Rp 755.000,-	1,000	16,778	+15,778
	Input Total	Rp 20.321.000,-	Rp 21.014.400,-	1,000	1,034	+0,034
Profitability	Labour			84,996	84,996	0,000
	Material			87,763	87,879	0,115
	Energy			84,996	84,996	0,000
	Modal			85,00	84,996	0,000
	Total			86,247	87,444	1,197

Based on the calculations from Table 2, the labor profitability in October did not experience any increase or decrease (0,000) due to the labor input increasing by (0,100). The material profitability also experienced a decrease of (0,015) due to an increase in material input by (0,025). The energy profitability did not experience any increase or decrease due to the energy input increasing by (0,218). The capital profitability also did not experience any decrease or increase (0,000) because the capital input experienced a significant increase of (15,778). Meanwhile, the total input profitability experienced a decrease of (1,197) due to the total input value being (0,034).

C. Profitability, Productivity, and Price Improvement Index for the September-October period

To determine the output index, input index, and Price Improvement Index for the months of September and October by inputting the calculated data for Output, Input, and Price Improvement Index as follows.

1. Measuring the indices of Profitability, Productivity, and Price Improvement for the Period of September and October

Table 3. Profitability Index, Productivity Index, and Price Improvement Index for the Period September - October

No (1)	Input Faktor (2)	Profitability Index (3)	Productivity Index (4)	Improvement Index (5) = (3) / (4)
1	Labour	84,996 (0,000)	100 (0,000)	99,150 -(0,850)
2	Material	87,763 (+0,115)	99,999 (-0,001)	99,094 -(0,906)
3	Energy	84,996 (0,000)	100 (0,000)	99,150 -(0,850)
4	Modal	85,000 (0,000)	100 (0,000)	99,150 -(0,850)
5	Input Total	86,247 (+1,197)	99,986 (-0,014)	99,125 -(0,875)

Based on the calculations in table 3, it can be seen that the performance of UD. Lontong Irfan did not experience a decrease in productivity in the labor factor. Although labor wages increased in the month of October and the same results were obtained in the profitability and productivity indices, a price improvement index of (0,850) was achieved.

For material profitability, there was an increase of (0,115) due to the rise in raw material costs, while the material factor saw a decrease in the productivity index value of (0.001). The decline in productivity was indicated by the price improvement index value of the material input at (0,906), resulting in a productivity decrease of 0,001%.

Energy productivity did not decline during the October period, and the profitability index for energy also did not decline, resulting in a price improvement index value of (0,850).

In the capital factor, there was also no increase or decrease in the profitability or productivity indices. Thus, a price improvement index value of (0,850) was obtained.

On the last factor, total input experienced a decrease in productivity of (0,014), while the profitability index saw an increase of (1,114), indicated by a price improvement value of (0,875).

D. Fishbone Diagram

To identify the factors causing fluctuations in productivity achievements in a company, a fishbone diagram, also known as a Fishbone Diagram, was created as follows.

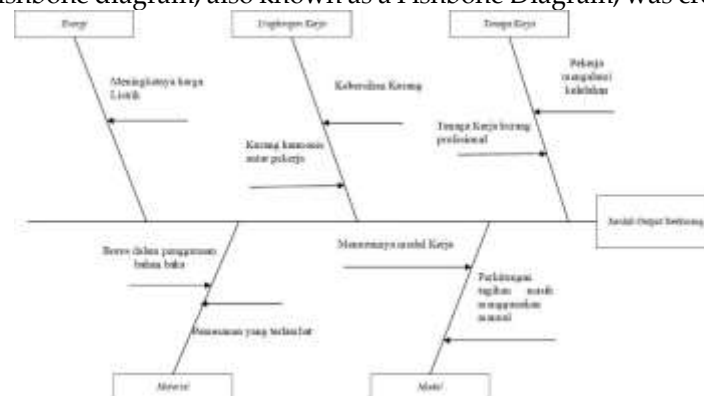


Figure 2. Fishbone Diagram

Based on the diagram above, it can be concluded that the factors that need to be improved and addressed to enhance productivity are that workers often underestimate work discipline, and the company is expected to plan for working capital expenditures. So that the company's productivity can improve over time.

E. Proposal for improving productivity

The following are suggestions for improvement to increase productivity in a company.

1. Provide guidance to workers to pay more attention to work discipline.
2. The company is urged to plan working capital expenditures to prevent a decline in capital.

4. Discussion

Based on the analysis of productivity and profitability indices from September to October, it can be observed that the total output increased slightly. However, this increase was accompanied by higher input costs in several areas, particularly in labor, materials, energy, and capital. Labor productivity remained unchanged despite an increase in labor input, indicating that the output generated did not grow proportionally. Material productivity experienced a slight decline due to increased input costs, while energy and capital productivity remained constant even though their inputs significantly increased, especially in capital.

In terms of profitability, there was no improvement in labor, energy, or capital profitability, while material profitability showed a slight improvement. However, when comparing productivity to profitability through the price recovery index, most inputs indicated negative values. This suggests that the company was unable to fully recover the increased costs through higher output value, implying a need for efficiency improvements.

The Fishbone Diagram highlights that the primary internal causes of low productivity were employee discipline and unplanned capital expenditures. These factors significantly impacted the company's overall productivity and profitability. To address these issues, it is recommended that the company focus on improving employee discipline through training and clear work standards, and ensure better financial planning, especially for capital expenditures, to avoid unanticipated cost increases.

5. Conclusion

Based on the calculation of labor productivity in October, there was no increase or decrease (0.000) due to an increase in labor input by (0.100) because some workers requested a salary increase. The productivity of materials also decreased by (0.001) due to an increase in material input by (0.025) because of the rise in material prices. The productivity of energy did not increase or decrease due to an increase in energy input by (0.218) because of the rise in electricity prices. The productivity of capital also did not increase or decrease (0.000) due to a significant increase in capital input by (15.778) caused by the rise in raw material prices and a decrease in orders. Meanwhile, the total input productivity decreased by (0.014) due to a total input value of (0.034). Based on the calculations of labor profitability in October, there was no increase or decrease (0.000) caused by an increase in labor input by (0.100) due to some workers expecting a salary increase. The profitability of materials also decreased by (0.015) due to an increase in material input by (0.025) caused by a rise in material prices. The profitability of energy did not experience an increase or decrease due to an increase in energy input by (0.218) caused by rising electricity prices. The profitability of capital also did not experience an increase or decrease (0.000) due to a significant increase in capital input by (15.778) caused by rising capital prices and a decrease in orders. Meanwhile, the profitability of total input decreased by (1.197) due to a total input value of (0.034). Based on the calculations in Table 3, it can be seen that the performance of UD. Lontong Irfan did not experience a decline in productivity in the labor factor. Although labor wages increased in the month of October and the same results were obtained in the profitability and productivity indices, a price improvement index of (0.850) was achieved.

For material profitability, there was an increase of (0.115) due to the rise in raw material costs, while the material factor saw a decrease in the productivity index value of (0.001). The decline in productivity was indicated by the price improvement index value of the material input at (0.906), resulting in a productivity decrease of 0.001%.

Energy productivity did not experience a decline in the October period, and the profitability index value for energy also did not decline, resulting in a price improvement index value of (0.850).

In the capital factor, there was also no increase or decrease in either the profitability or productivity index. Thus, the price improvement index value obtained is (0.850).

On the last factor, total input experienced a decrease in productivity of (0.014), while the profitability index increased by (1.114), indicated by a price improvement value of (0.875).

Based on the fishbone diagram, it can be concluded that the factors that need to be improved and addressed to enhance productivity are that workers often underestimate work discipline, and the company is expected to plan for working capital expenditures. So that the company's productivity can increase over time. Providing guidance to workers to pay more attention to work discipline and urging the company to plan working capital expenditures so that there is no decrease in capital.

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