

# The Analysis of Company Productivity Measurement of ABD-Medan Inc. by Using Craig Harris Method

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**Abstract:-** The competitive ability of an industry also measured by its performance of the industrial system as a whole in the long term which is reflected in the profits earned, which can be reviewed for business development and the welfare of its workforce, through the effectiveness of the industry by means of continuous quality improvement. The research was conducted at to measure the value of its productivity using the Craig Harris method. The preliminary study revealed that the peanut bread production process experienced various obstacles. At the beginning of March 2020, the output produced was 8,500 packs with a difference of 7.8 % from February 2020, so that production decreased which resulted in a reduction of 75% of the workforce from the normal number or standard of labor use and the use of technology and production machines that were still manual, thus slowing the achievement of business production targets. Based on the results of the productivity measurement, during the measurement period by determining the acquisition value obtained from the measurement results, the highest labor costs occurred in February 2019 with a value of 2.66 factors causing the increase, namely normal working hours, stable salary and overtime and the lowest in the month March with a value of 1.42 the factors causing the decline were production operated for 5 days, the number of employees was reduced due to being laid off, and salaries did not match the minimum wage. The highest partial material productivity index was in June 2020 with a value of 4.89, the factor causing the increase was raw materials used more than usual and the lowest was in March 2020 with a value of 1.26, the factor causing the decline was smaller output. The highest capital partial productivity index was in January 2019 with a value of 2.07, the factor causing the increase was larger output and the lowest was in March 2020 with a value of 0.10 the factor causing the decline was smaller output. The highest partial productivity index of other costs was in January 2019 with a value of 121.53 the factors causing the increase were continuing to pay costs (electricity, water and vehicle maintenance costs) and the lowest was in March 2020 with a value of 12.07 contributing factors the decline is still paying the cost of electricity, water but using less energy and not doing maintenance on machines and vehicles.

**Keywords:-** Industry, Cost, Productivity, Index Score, Craig Harris Method

## I. INTRODUCTION

The competitive ability of an industry is not only measured by the advantages of its products in the market for a moment, but also the performance of the industrial system as a whole in the long term which is reflected in the profits obtained, which can be used for business development and the welfare of its workforce, through industry effectiveness and continuous quality improvement continuously. A company is required to maintain and always improve its competitiveness. In an effort to seize market share, ability is needed to be able to manage the company well [1].

The ABD-Medan Inc. is a company engaged in the food industry which is on a joint road, Bandar Selamat-Medan which has started its business from 2001. ABD-Medan Inc. provides various kinds of cakes, such as peanut bread, pia cakes, cut cakes, lie cakes, and various pastries. In the process of making peanut bread, there are several stages of the production process, including the first process of mixing, then forming or printing, baking and the third stage of packing and finally the finished goods are stored in the warehouse.

After conducting a preliminary study in the field, the concludes that peanut bread production process encountered various obstacles, such as a decline in production at the beginning of 2020 in March the output produced was 8,500 packs with a difference of 7.8% from February 2020, production decreased so that the reduction in labor was 75 % of the normal number or standard of labor use and the use of technology or production machines that are still very manual slows the achievement of business production targets. One way to measure and predict the level of effectiveness and efficiency of work is to apply the concept of productivity. In this case, productivity is needed to measure production costs precisely and accurately. The results of this measurement and evaluation will provide information to the company regarding the level of efficiency that has been achieved by the company in carrying out its activities, this is important so that the company can increase the competitiveness of the products it produces in a competitive global market.

From this description, it is necessary to conduct research on company productivity in an effort to increase company profitability. In this study, the productivity measurement method will be used using Craig Harris's calculation as a tool to analyze the productivity success of ABD-Medan Inc.

## II. LITERATURE REVIEW

Craig Harris' productivity measurement model is a total productivity measurement model that can describe the overall level of efficiency and growth of the company by assuming that the company's goals are maximum profit oriented [2]. Craig Harris more specifically defines the elements of the input. Input elements are divided into four groups, namely labor, capital, materials and other inputs. According to Craig and Harris [3], the total productivity is formulated as follows.

$$Pt = \frac{Ot}{(L+C+R+M)} \quad (1)$$

Where:

Pt= Productivities total      C= Capital  
 Ot= Output total              R= Raw material  
 L= Labor input                M= Miscellaneous

The value of partial productivity is measured based on each input used. The formulations are:

### 1. Partial productivity value for labor input

The following is the calculation of the partial productivity value for each labor input used, with the following formula:

$$\text{Labor Partial Productivity} = \frac{\text{Output}}{\text{Labor}} \quad (2)$$

### 2. Partial productivity value for capital input

The following is the calculation of the partial productivity value for each capital input used, with the following formula:

$$\text{Capital Partial Productivity} = \frac{\text{Output}}{\text{Capital}} \quad (3)$$

### 3. Partial productivity value for raw material input

The following is the calculation of the partial productivity value for each of the raw material inputs used, with the following formula:

$$\text{Raw Materials Partial Productivity} = \frac{\text{Output}}{\text{Raw Materials}} \quad (4)$$

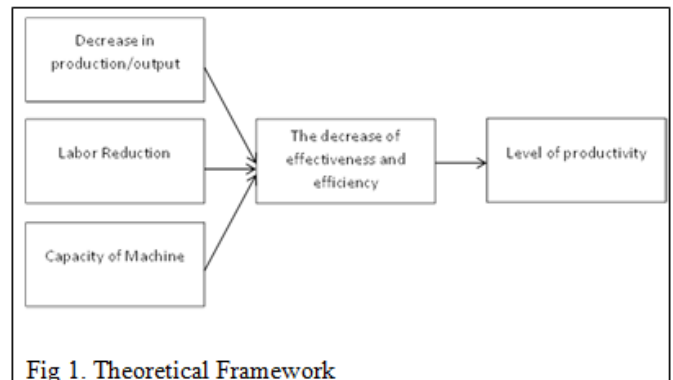
### 4. Partial productivity values for miscellaneous inputs

The following is the calculation of the partial productivity value for each of the other inputs used, with the following formula:

$$\text{Miscellaneous Partial Productivity} = \frac{\text{Output}}{\text{Miscellaneous}} \quad (5)$$

## III. METHODOLOGY

The research is a quantitative descriptive research, namely quantitative analysis techniques are used to calculate the productivity index and productivity values which will then be used to analyze productivity based on the Craig Harris method [4]. The dependent variable in this study is the decrease in the level of effectiveness and efficiency and the final value of the level of productivity after repair. The independent variables in this study are a decrease in production/output, a reduction in power and manual production machines slowing the achievement of production targets. Based on the nature of the relationship between factors in the concept of the Craig Harris method, the relationship between factors or variables developed into a theoretical framework for research can be arranged as shown in Fig.1.



## IV. RESULTS AND FINDINGS

The following will describe the data needed in data processing. The data collected including:

1. Factory hours start from January 2019 to December 2020.
2. Material costs, labor salaries, capital and other costs from January 2019 to December 2020.
3. The amount of output each month referred to as output is the amount of peanut bread production from January 2019 to December 2020.

Based on the data obtained from PT. ABD-Medan, factory processing hour data shown in Table I.

TABLE I. FACTORY WORK HOURS

Period	Total Hours	Period	Total Hours
Jan-19	268	Jan-20	224
Feb-19	240	Feb-20	224
Mar-19	260	Mar-20	66
Apr-19	220	Apr-20	16
May-19	176	May -20	40
Jun-19	128	Jun-20	152
Jul-19	216	Jul-20	176
Aug-19	224	Aug-20	228
Sep-19	232	Sep-20	216
Oct-19	248	Oct-20	228
Nov-19	224	Nov-20	218
Dec-19	144	Dec-20	112

Furthermore, Table II, III, IV, V, and VI show each of labor costs, material costs, capital, miscellaneous costs, and output data.

TABLE II. FACTORY LABOR COSTS

Period	Cost (IDR)	Period	Cost (IDR)
Jan-19	208.323.000	Jan-20	208.053.000
Feb-19	185.167.000	Feb-20	192.741.000
Mar-19	208.073.000	Mar-20	35.877.500
Apr-19	154.415.000	Apr-20	2.115.000
May-19	127.715.000	May -20	9.390.000
Jun-19	89.115.000	Jun-20	101.290.000
Jul-19	182.365.000	Jul-20	129.805.000
Aug-19	185.073.000	Aug-20	182.431.000
Sep-19	200.441.000	Sep-20	175.657.000
Oct-19	202.803.000	Oct-20	182.433.000
Nov-19	200.389.000	Nov-20	175.675.000
Dec-19	95.965.000	Dec-20	61.365.000

TABLE III. FACTORY MATERIAL COSTS

Period	Cost (IDR)	Period	Cost (IDR)
Jan-19	209.121.975	Jan-20	198.114.800
Feb-19	202.317.670	Feb-20	185.607.625
Mar-19	182.506.190	Mar-20	40.521.525
Apr-19	158.593.275	Apr-20	18.405.740
May-19	91.550.225	May -20	45.014.350
Jun-19	98.354.530	Jun-20	47.282.288
Jul-19	155.491.840	Jul-20	132.907.203
Aug-19	148.187.535	Aug-20	109.001.131
Sep-19	176.303.320	Sep-20	85.936.494
Oct-19	166.897.580	Oct-20	75.543.050
Nov-19	151.088.970	Nov-20	109.441.418
Dec-19	82.644.485	Dec-20	47.825.830

TABLE VI. FACTORY TOTAL OUTPUT

Period	Output		Period	Output	
	Pack	IDR		Pack	IDR
Jan-19	85.000	510.000.000	Jan-20	80.000	480.000.000
Feb-19	82.000	492.000.000	Feb-20	75.000	450.000.000
Mar-19	74.000	444.000.000	Mar-20	8.500	51.000.000
Apr-19	65.000	390.000.000	Apr-20	4.000	24.000.000
May-19	45.000	270.000.000	May -20	10.000	60.000.000
Jun-19	38.000	228.000.000	Jun-20	38.500	231.000.000
Jul-19	64.000	384.000.000	Jul-20	53.800	322.800.000
Aug-19	61.000	366.000.000	Aug-20	65.600	393.600.000
Sep-19	72.000	432.000.000	Sep-20	52.400	314.400.000
Oct-19	68.000	408.000.000	Oct-20	55.500	333.000.000
Nov-19	62.000	372.000.000	Nov-20	58.800	352.800.000
Dec-19	31.000	186.000.000	Dec-20	20.500	123.000.000

The Craig Harris method begins with calculating the value of partial productivity for each period for each input, including labor, material, capital or capital and other costs.

1. Partial Productivity Calculation

The partial productivity of each input component (labor, raw materials, capital and miscellaneous costs) is calculated every period from January 2019 to December 2020. The

TABLE IV. CAPITAL

Period	Cost (IDR)	Period	Cost (IDR)
Jan-19	246.379.350	Jan-20	246.379.350
Feb-19	246.379.350	Feb-20	246.379.350
Mar-19	246.379.350	Mar-20	246.379.350
Apr-19	246.379.350	Apr-20	246.379.350
May-19	246.379.350	May -20	246.379.350
Jun-19	246.379.350	Jun-20	246.379.350
Jul-19	246.379.350	Jul-20	246.379.350
Aug-19	246.379.350	Aug-20	246.379.350
Sep-19	246.379.350	Sep-20	246.379.350
Oct-19	246.379.350	Oct-20	246.379.350
Nov-19	246.379.350	Nov-20	246.379.350
Dec-19	246.379.350	Dec-20	246.379.350

TABLE V. FACTORY MISCELLANEOUS COSTS

Period	Cost (IDR)	Period	Cost (IDR)
Jan-19	4.196.500	Jan-20	2.796.500
Feb-19	3.846.500	Feb-20	3.446.500
Mar-19	3.846.500	Mar-20	4.226.500
Apr-19	3.846.500	Apr-20	1.583.250
May-19	3.713.250	May -20	2.523.250
Jun-19	3.033.250	Jun-20	2.613.250
Jul-19	3.846.500	Jul-20	3.446.500
Aug-19	3.846.500	Aug-20	3.446.500
Sep-19	3.846.500	Sep-20	7.476.500
Oct-19	3.846.500	Oct-20	3.846.500
Nov-19	3.846.500	Nov-20	3.846.500
Dec-19	2.133.250	Dec-20	2.128.250

results of all the calculation for every partial productivity as follows:

1. Table VII shows the results of the calculation of the partial productivity of labor cost for the period January 2019 to December 2020.

TABLE VII. LABOR PARTIAL PRODUCTIVITY

Period	Partial Productivity Index	Period	Partial Productivity Index
Jan-19	2,45	Jan-20	2,31
Feb-19	2,66	Feb-20	2,33
Mar-19	2,13	Mar-20	1,42
Apr-19	2,53	Apr-20	1,70
May-19	2,11	May -20	1,74
Jun-19	2,56	Jun-20	2,28
Jul-19	2,11	Jul-20	2,49
Aug-19	1,98	Aug-20	2,16
Sep-19	2,16	Sep-20	1,79
Oct-19	2,01	Oct-20	1,83
Nov-19	1,86	Nov-20	2,01
Dec-19	1,94	Dec-20	2,00

2. Table VIII shows the results of the calculation of the partial productivity of capital for the period January 2019 to December 2020.

TABLE VIII. CAPITAL PARTIAL PRODUCTIVITY

Period	Partial Productivity Index	Period	Partial Productivity Index
Jan-19	2,07	Jan-20	2,07
Feb-19	2,00	Feb-20	2,00
Mar-19	1,80	Mar-20	1,80
Apr-19	1,58	Apr-20	1,58
May-19	1,10	May -20	1,10
Jun-19	0,93	Jun-20	0,93
Jul-19	1,56	Jul-20	1,56
Aug-19	1,49	Aug-20	1,49
Sep-19	1,75	Sep-20	1,75
Oct-19	1,66	Oct-20	1,66
Nov-19	1,51	Nov-20	1,51
Dec-19	0,75	Dec-20	0,75

3. Table IX shows the results of the calculation of the partial productivity of material cost for the period January 2019 to December 2020.

TABLE IX. MATERIAL PARTIAL PRODUCTIVITY

Period	Partial Productivity Index	Period	Partial Productivity Index
Jan-19	2,44	Jan-20	2,44
Feb-19	2,43	Feb-20	2,43
Mar-19	2,43	Mar-20	2,43
Apr-19	2,46	Apr-20	2,46
May-19	2,95	May -20	2,95
Jun-19	2,32	Jun-20	2,32
Jul-19	2,47	Jul-20	2,47
Aug-19	2,47	Aug-20	2,47
Sep-19	2,45	Sep-20	2,45
Oct-19	2,44	Oct-20	2,44
Nov-19	2,46	Nov-20	2,46
Dec-19	2,25	Dec-20	2,25

4. Table X shows the results of the calculation of the partial productivity of miscellaneous costs for the period January 2019 to December 2020.

TABLE X. MISCELLANEOUS PARTIAL PRODUCTIVITY

Period	Partial Productivity Index	Period	Partial Productivity Index
Jan-19	121,53	Jan-20	121,53
Feb-19	127,91	Feb-20	127,91
Mar-19	115,43	Mar-20	115,43
Apr-19	101,39	Apr-20	101,39
May-19	72,71	May -20	72,71
Jun-19	75,17	Jun-20	75,17
Jul-19	99,83	Jul-20	99,83
Aug-19	95,15	Aug-20	95,15
Sep-19	112,31	Sep-20	112,31
Oct-19	106,07	Oct-20	106,07
Nov-19	96,71	Nov-20	96,71
Dec-19	87,19	Dec-20	87,19

2. Total Productivity Calculation

The total productivity calculation can be described the level of efficiency and growth of the company as a whole by assuming that the company's goals are oriented towards maximum profit. Table of 11 shows the results of total productivity calculations for each period from January 2019 to December 2020.

TABLE XI. TOTAL PRODUCTIVITY

Period	Output (IDR)	Input (IDR)	Total Productivity
Jan-19	510.000.000	668.020.825	0,76
Feb-19	492.000.000	471.060.220	0,77
Mar-19	444.000.000	1.084.805.040	0,69
Apr-19	390.000.000	563.234.125	0,69
May-19	270.000.000	469.357.825	0,58
Jun-19	228.000.000	196.882.379	0,52
Jul-19	384.000.000	342.082.936	0,65
Aug-19	366.000.000	583.486.385	0,63
Sep-19	432.000.000	626.970.170	0,69
Oct-19	408.000.000	619.926.430	0,66
Nov-19	372.000.000	601.703.820	0,62
Dec-19	186.000.000	427.122.085	0,44
Jan-20	480.000.000	655.343.650	0,73
Feb-20	450.000.000	628.174.475	0,72
Mar-20	51.000.000	327.004.875	0,16
Apr-20	24.000.000	280.483.340	0,09
May -20	60.000.000	328.306.950	0,18
Jun-20	231.000.000	306.403.888	0,58
Jul-20	322.800.000	512.538.053	0,63
Aug-	393.600.000	541.257.981	0,73

20			
Sep-20	314.400.000	515.449.344	0,61
Oct-20	333.000.000	508.201.900	0,66
Nov-20	352.800.000	535.342.268	0,66
Dec-20	123.000.000	357.698.430	0,34

## V. CONCLUSION

By using the Craig Harris method in an effort to analyze the productivity of peanut bread at PT. ABD-Medan, some conclusions can be drawn:

1. Based on the results of the productivity measurement, during the measurement period from January 2019 to December 2020, the value of the partial productivity index of labor, materials, capital and other costs fluctuated. The acquisition value obtained from the measurement results are:
  - a. The highest partial labor productivity index was achieved in February 2019 with a value of 2.66 and the lowest in March 2020 of 1.70, April 2020 of 1.42 and May 2020 of 1.74.
  - b. The highest partial material productivity index was achieved in June 2019 with a value of 4.89 and the lowest in March 2020 with a value of 1.26, April with a value of 1.30 and May with a value of 1.33.
  - c. The highest partial productivity index of capital was achieved in January 2019 with a value of 2.07 and the lowest in March 2020 of 0.21, April 2020 of 0.10 and May 2020 of 0.24. The highest other cost partial productivity index was achieved in January 2020 with a value of 171.64 and the lowest in March 2020 with a value of 12.07, April 2020 with a value of 15.16 and May 2020 with a value of 23.78.
  - d. The highest other cost partial productivity index was achieved in January 2020 with a value of 171.64 and the lowest in March 2020 of 12.07, April 2020 of 15.16 and May 2020 of 23.78.
2. Evaluate and provide the required proposals with efforts to increase the company's productivity in order to achieve the desired value, among others as follows:
  - a. Replacing new machines and doing routine monthly maintenance.
  - b. Replacement (replacement) of machines and equipment whose age is above their economic life, this replacement is carried out based on a replacement study by considering the service life of the machine, the intensity of use and the actual condition of the machine and equipment.
  - c. Continue to produce despite the pandemic by carrying out health protocols.

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