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Analysis of the Effect of Down Time on Productivity at Pt. Eastern Pearl Flour Mills Makassar

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Abstract
Productivity is a comparison between the results achieved (output) with the overall required resources (input) or a comparison between the results achieved with the role of labor per unit time. The purpose of this study was to study Down Time analysis techniques for productivity in a wheat processing company (PT. Eastern Pearl Flour Mills Makassar), which produces wheat flour products of the Gatotkaca, Gunung, Kompas and Gerbang types. Down Time is the amount of time when a tool/machine cannot operate due to failure, but the factory can still operate because there are still other tools/machines that can replace functions so that the production process can still run.
Based on the data analysis of the calculation of down time for manpower, it shows that the existence of down time during the process will affect the level of productivity (actual and standard). The value of down time from the calculation of working hours minus work effectiveness results in down time for each production area each month. The manpower down time results from all areas, namely in the area of 0 minutes/month. While the amount of data from the analysis of down time calculations for machines in all areas has a higher number of machine down times, namely in the milling area of 28 hours. And for the lowest results, namely in the area of unloading, cleaning, and packing, it is 0 hours.

Keywords: down time, effectiveness, productivity, manpower, machines.

Introduction

Facing the current free market era, where there is a lot of very tight competition, companies are required to be able to create products with various creations and good quality. However, in wheat processing companies there is usually a decrease in productivity, one of which is down time in the production process caused by manpower, machine factors and the amount of production or the amount of raw materials.

One of the products contained in a wheat processing company is processing wheat into wheat flour, of course in producing wheat flour using tools or machines that can support the production process so that it runs smoothly and has good quality too. One of the productivity levels of down time will affect productivity and of course will cause the volume of production achieved to be reduced or below the standard value set by the company and can also make the company suffer losses.

PT. Eastern Pearl Flour Mills is one of the wheat flour industries whose production growth is very rapid so that to meet consumer demand a strategy is needed to prevent production down time. Therefore, to deal with problems like this, creative thinking is needed to prevent down time by means of which a company must be careful in paying attention to the time that will be

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lost during production, preparation of raw materials and preparation for maintenance of tools/machines before use. PT. Eastern Pearl Flour Mills produces wheat flour, namely:

a. Gatotkaca

This flour can be used for various kinds of fried foods, cakes, and various other market snacks.

b. Gunung

This flour is used to make noodles and various kinds of danish parties.

c. Kompas

This flour is a multi-purpose flour that can be used to make sweet bread, noodles, biscuits, and pastries Kompas brand flour has a high protein content.

d. Gerbang

Gerbang brand flour can be used to make biscuits and pastries as well as bread.

Literature Review

Down Time is the amount of time when a tool/machine cannot operate due to failure, but the factory can still operate because there are still other tools/machines that can replace functions so that the production process can still run.

The production process certainly has losses that affect its success, these losses are grouped by Nakajima (1988) into 6 major ones, namely: Downtime Losses. If production expenditure is zero and the system does not produce anything, the unused time segments are called downtime losses, which consist of:

1. Breakdown losses, occur because the equipment is damaged, so it requires repair or replacement. This loss is measured by how long it takes during the damage to be repaired.
2. Reduce speed losses, namely reducing the speed of production from the design speed of the equipment. The measurement is by comparing the ideal capacity with the actual workload.
3. Defect or quality losses. If the resulting production output does not meet quality specifications, it is called quality losses, which consist of Rework and quality defects. These losses occur due to product defects during production. Products that do not meet specifications need to be scrapped. Labor is required to carry out the scrap process and the material converted into scrap is also a loss for the company.
4. Yield losses, occur due to wasted raw materials. These losses are divided into two, namely raw material losses due to product design and manufacturing methods and adjustment losses due to product quality defects produced at the beginning of the production process.

Troubleshooting Down time in the production process at PT. Eastern Pearl Flour Mills Makassar, can be done by observing and analyzing the preparation of the production process carried out by each section including:

1. Unloading, namely the process of transferring wheat from the ship to the silo by a pneumatic process using a telescopic pipe.
2. Cleaning, namely the process of cleaning wheat from impurities.
3. Milling, namely the process of grinding, screening, and separating flour, bran, pollar, and

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industrial flour.

4. Packing, namely the process of packing the product

Preparation for this process needs to be done to support activities, to know the length of time for work, to supervise the work, to know the obstacles, damages that may arise and the possibility of changes (Reksohadiprodjo 1976). The things that need to be studied in the preparation process include; the length of time for carrying out activities which includes lead time, namely all the time needed to obtain materials including inventory time as well as movement and time standards (covering individual activities), increasing the effectiveness of work standards, job training, and machine maintenance.

Research that has been done previously by Renty Anugerah Mahaji Puteri (2014), is entitled Analysis of the Effect of Availability Value and Downtime on Machine Productivity in Automatic Ampoule Filling and Sealing Machines at PT Indofarma, Tbk.

In knowing the value of availability, downtime and machine productivity on Automatic ampoule filling and sealing machines at PT. Indofarma Tbk, especially in the sterile production section of the injection ampoule filling process. The analysis used in carrying out maintenance using the distribution of damage is the Weibull distribution, exponential, normal and lognormal and multiple regression methods to determine the effect of availability, downtime on machine productivity. The results obtained from this maintenance analysis for availability values in general are below 59 % and inherent availability (availability) of 68.1% with an average machine downtime of 36.809524 minutes per day and an average machine productivity of 59.282%.

Research Method

In this study, researchers used a Quantitative Descriptive method, namely:

a. Interview

Interviews were conducted in the form of question and answer directly with employees or employees at PT. Eastern Pearl Floor Mills Makassar.

b. Observation method

Namely by direct observation of the research object, the data obtained in this study are:

1. Primary Data

Data collection was carried out by direct observation and active participation in this research activity.

2. Secondary Data

Collection of data obtained from books and other libraries that support primary data

The research began with the existence of food agro-industry activities that have the potential to improve production quality by producing wheat flour. Initial identification is carried out at the stages of the production process, preparation of raw materials, checking of tools/machines, and analyzing the effect of loss of down time on the production process. The next step is to identify the source of the cause of down time in the wheat processing production process. Productivity results were then analyzed for their overall effect on the potential effect of loss of down time on the productivity of wheat processing companies.

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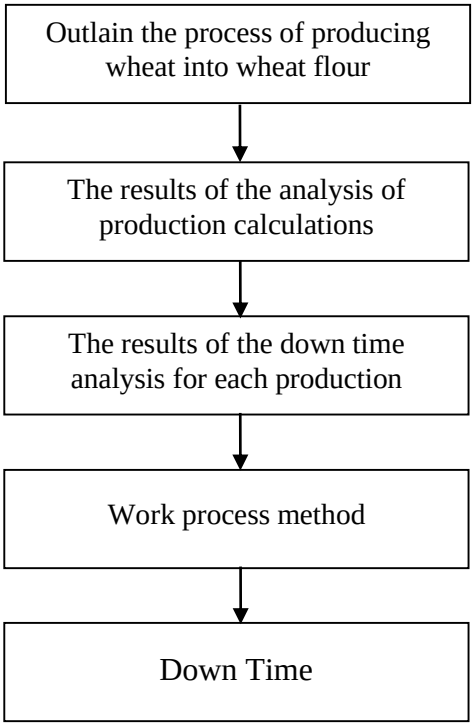


Figure 1. Research framework

Productivity Calculations

If the measure of production success so far is only seen from the output side, then productivity is seen from two sides at once, namely, the input and output sides. Thus, it can be said that productivity is related to the efficient use of inputs in producing output (goods or services).

$$\text{Productivity} = \text{Output} / \text{Input}$$

Information:

- Productivity = Percen (%)
- Output = Units (pcs)

Calculation of Down Time

Calculation Down time is the number of calculations that can affect the level of productivity (actual and standard). The existence of down time will certainly cause the production volume achieved to be reduced/below the standard value. The formula used to calculate Down time is as follows:

$$\textit{Down Time} = \text{Working Hours} - \text{Work Effectiveness}$$

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Work Procedures and Product Replacement Process

Work procedures and product turnover processes are a series of activities, processes that are carried out through a series of jobs that produce a desired goal for a product. A procedure usually results in a change.

Results and Discussion

Productivity Calculation Analysis Results

Productivity calculations are carried out to measure the level of production effectiveness and efficiency. Productivity calculations are used to calculate the company's down time. The calculation of productivity as in table 1.

Table 1. Calculation of Productivity in 2023

Month	Output	Input	Productivity
February	36.000 ton	480,70 ton	74,89 %
March	36.000 ton	480,70 ton	74,89 %
April	36.000 ton	480,70 ton	74,89 %

Based on the results of productivity calculations, namely the amount of input in February to April is 480,700 tons, the amount of output in February to April is 36,000 tons, and has a productivity value of 74.89%.

Results of Manpower Down time Calculation Analysis

The results of the analysis of manpower down time calculations are carried out to measure the level of effectiveness and efficiency of production. The results of the analysis of manpower down time calculations are used to find out the results of down time for manpower from the company.

The results of down time calculations for manpower are similar to those in several areas.

1. Unloading area

Standard manpower (units) = 21 x 28 days

Number of shifts = 2

Actual manpower = 21 x 28 days

Total manpower = 42 x 28 days

Loss of manpower time (minutes) = 588 – 588 units

Table 2. Calculation of Down time Unloading

Month	Manpower standard (menutes)	Number of shifts	Manpower actual (menutes)	Total manpower	Lost manpower time/amount of down time (minutes)
February	588	2	588	1,176	0
March	588	2	588	1,176	0
April	588	2	588	1,176	0

The number of manpower from February to April standard manpower is 588 minutes with a total change of working hours of 2 shifts also has an actual manpower of 588 minutes and has a total manpower of 1,176 while the down time or loss rate in the unloading area is 0 minutes per month.

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Down time in the unloading area has no loss of down time, which means that operators working in the unloading section are able to overcome problems in the productivity process which will not hinder the process in the unloading area, of course the productivity in the unloading area process can run according to standards.

2. Cleaning Areas

Standard manpower (units) = 27 x 28 days

Number of shifts = 2

Actual manpower = 27 x 28 days

Total manpower = 54 x 28 days

Loss of manpower time (minutes) = 765 – 765 units

Table 3. Calculation of Down time Area Cleaning

Month	Manpower standard (menutes)	Number of shifts	Manpower actual (menutes)	Total manpower	Lost manpower time/amount of down time (minutes)
February	765	2	765	1,530	0
March	765	2	765	1,530	0
April	765	2	765	1,530	0

The number of manpower from February to April, the standard manpower is 765 minutes, with the number of shifts of 2 shifts also has an actual manpower of 765 minutes and has a total manpower of 1,530. While the down time or loss rate in the cleaning area is 0 minutes per month, in the sense that there is no down time in the label area, which means that operators working in the cleaning section are able to overcome problems in the productivity process which will not hinder processes in the cleaning area. cleaning. Of course, in the area cleaning process, productivity can run well.

3. Milling Areas

Standard manpower (units) = 36 x 28 days

Number of shifts = 3

Actual manpower = 36 x 28 days

Total manpower = 108 x 28 days

Loss of manpower time (minutes) = 1.008 – 1.008 units

Table 4. Calculation of down time for milling areas

Month	Manpower standard (menutes)	Number of shifts	Manpower actual (menutes)	Total manpower	Lost manpower time/amount of down time (minutes)
February	1.008	3	1.008	2,016	0
March	1.008	3	1.008	2,016	0
April	1.008	3	1.008	2,016	0

The total production of the Milling Area from February to April was 19,000 tons, had a standard manpower of 1,008 minutes with a total of 2 shifts working hours, also had an actual

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manpower of 1,008 minutes and had a total manpower of 2,016. While the down time or loss rate in the Milling area is 0 minutes per month, in the sense that there is no down time in the Milling area, which means that operators working in the milling section are able to overcome problems in the productivity process which will not hamper processes in milling. Of course, in the process of milling area productivity can run as expected by the company.

4. Packing areas

Standard manpower (units) = 25 x 28 days

Number of shifts = 2

Actual manpower = 25 x 28 days

Total manpower = 50 x 28 days

Loss of manpower time (minutes) = 700 – 700 units

Table 5. Calculation of down time packing area

Month	Manpower standard (menutes)	Number of shifts	Manpower actual (menutes)	Total manpower	Lost manpower time/amount of down time (minutes)
February	700	2	700	1,400	0
March	700	2	700	1,400	0
April	700	2	700	1,400	0

The number of manpower from January to March has a standard manpower of 700 minutes with a total change of working hours of 2 shifts also has an actual manpower of 700 minutes and has a total manpower of 1,400. While the amount of down time or loss rate in the Packing area is 0 minutes per month, meaning that there is no down time in the Packing area, which means that operators working in the Packing section are able to overcome problems in the productivity process which will not hamper the process in the Packing area. Packing, of course, in the process of the packing area, productivity can run according to standards.

Analysis Results Calculation of Machine Down time.

The results of the analysis of machine down time calculations are carried out to measure the level of effectiveness and efficiency of production. The results of the analysis of machine down time calculations are used to determine the results of down time for the machine from the company.

The results of down time calculations for machines such as in several areas.

1. Unloading area

Standard machine working time = 24 x 28 days

Actual machine working time = 24 x 28 days

Down town machine = 672 x 672

Table 6. Calculation of Down Time for Unloading Area Machines

Month	Machine Working Time (Standard)	Machine Working Time (Actual)	Down Time Mechins
February	672 hours	672 hours	0

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March	672 hours	672 hours	0
April	672 hours	672 hours	0

The results of calculating the unloading area machine down time from February to April, the standard machine working time is 672 hours, the actual machine working time from February to April is 672 hours. While the amount of down time or loss rate on the unloading machine is 0 minutes per month, in the sense that there is no down time on the unloading machine, which means that the machine working in the unloading section is able to overcome problems in the productivity process which will not hamper the process in the unloading area. Unloading, Of course in the process of unloading the productivity area can run according to standards.

2. Cleaning Machine

Standard machine working time = 24 x 28 days

Actual machine working time = 24 x 28 days

Down town machine = 672 x 672

Table 7. Calculation of Down Time for Cleaning Machines

Month	Machine Working Time (Standard)	Machine Working Time (Actual)	Down Time Mechins
February	672 hours	672 hours	0
March	672 hours	672 hours	0
April	672 hours	672 hours	0

The results of the calculation of machine down time in the cleaning machine area from February to April, the standard machine working time is 672 hours, the actual machine working time from February to April is 672 hours. While the amount of down time or loss rate on the cleaning machine is 0 minutes per month, in the sense that there is no down time on the unloading machine, which means that the machine working in the cleaning machine section is able to overcome problems in the productivity process which will not hamper the process on unloading area, Of course, in the process of cleaning machine productivity can run according to the wishes of the company.

3. Milling Machines

Standard machine working time = 24 x 28 days

Actual machine working time = 23 x 28 days

Down town machine = 672 x 644

Table 8. Calculation of Milling Area Machine Down Time

Month	Machine Working Time (Standard)	Machine Working Time (Actual)	Down Time Mechins
February	672 hours	644 hours	28
March	672 hours	644 hours	28
April	672 hours	644 hours	28

The results of the calculation of milling machine down time from February to April, the standard machine working time is 672 hours, the actual machine working time from February to April is 672 hours. While the amount of down time or loss rate on the Milling machine is 28 hours, in the sense that the amount of down time on the Milling machine is due to damage to the

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sifter or sieve machine. So it takes quite a long time to fix it. If incidents like this often occur, it can result in losses to the Company.

Conclusion

Based on the data analysis that has been carried out on the value of the effect of loss of down time which is a critical measurement in a production process, it can be concluded that down time is a factor that greatly influences the company's progress in the productivity process so that it needs to be handled such as: it can be done by observing and analyze the preparation of the production process carried out by each part of production. The amount of data from the analysis of down time calculations for machines in all areas has a higher number of machine down times, namely in the milling area of 28 hours. While the lowest results are in the area of unloading, cleaning, and packing totaling 0 hours.

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