



Smoothing Production Supported by Equipment and Machinery at De Terrace Café & Resto Jember

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Abstract

The production process is managing raw goods (input) into processing (process) until they become finished goods (output) and Maintenance or maintenance is all activities that include efforts to keep the equipment system working as expected. To carry out machine maintenance, the probability method can be used as a method that is expected to determine effective and efficient maintenance so that it can support the smooth production process. This study aims to determine the effect of machine maintenance on the smooth production process at De Terrace Café & Resto Jember, the results show that machine maintenance is proxied by the variables: repairing and checking affect the smooth production process at De Terrace Café & Resto Jember. Through machine maintenance, manufacturers will be able to obtain a smooth production process through two repair and inspection approaches

Keywords: Machine Maintenance, Production Process, Repair and Inspection

INTRODUCTION

Along with the development of the times, from time to time the company is one of the efforts that must be considered in order to achieve the goals and objectives set, especially in modern times, one that must be considered is the problem of maintaining production machines and equipment. The competition that occurs between these food businesses encourages each company to create opportunities by implementing new ideas to attract consumer interest. The cafe business is a promising business for business people, not just as a dining area, many people use cafes as a gathering place.

Maintenance is a combination of various activities carried out to maintain production facilities including machines and other production equipment or to repair them to an expected condition. According to [1] there are two types of maintenance, namely firstly preventive maintenance includes carrying out routine inspections and repairs and maintaining the facility by carrying out appropriate repairs and secondly breakdown maintenance occurs when equipment is damaged. failure and must be repaired based on emergency or priority .

According to [2] Maintenance or maintenance is all activities that include efforts to maintain the equipment system so that it works as expected. And also the machine as one of the elements that is very important for the company because it has a very important influence and role in carrying out the production process. Machines are used to simplify and assist workers in producing goods that are marketable.

The production process is a method of using the input of labor, equipment, and capital resources. The production process usually includes how to produce a product efficiently and productively so that it can be sold to be able to reach customers quickly from the quality of the product. And according to [3] *the production process begins with the input of raw materials, to the moment when the process is completed, with the productions of the unit of the commodity under consideration obtained through the transformation of those materials* . means: the production process starts from entering raw materials, then processed which is more complicated,

with units of commodity production considered and thought through the transformation of raw materials.

Table 1 Production Achievement Data at De Terrace Café & Resto Jember in 2026

No	Month	production targets	Realized production
1.	January	3,500 pcs	3,250 pcs
2.	February	3,500 pcs	3,350 pcs
3.	March	3,500 pcs	3,220 pcs
4.	April	3,500 pcs	3,450 pcs
5.	May	3,500 pcs	3,490 pcs
6.	June	3,500 pcs	3,197 pcs
7.	July	3,500 pcs	3,425 pcs
8.	August	3,500 pcs	3,220 pcs
9.	September	3,500 pcs	3,112 pcs
10.	October	3,500 pcs	3,350 pcs
11.	November	3,500 pcs	3,300 pcs
12.	December	3,500 pcs	3,250 pcs

Data Source: De Terrace Café & Resto Jember 2026

Based on the data in table 1.1, it can be seen that the production target by achieving production every month is not in accordance with what was targeted by the De Terrace Café & Resto Jember company. This can be seen from the achievement of the implementation of machine maintenance that has been improved in accordance with the Company's Operating Standards (SOP) should be able to support production process activities, but in reality the production process is not comparable to the maintenance that has been carried out.

METHOD

The data collection method is carried out in several ways such as: following :

1. Direct observation, namely by making direct observations in the field with the aim of knowing directly the production activities of the company De Terrace Café & Resto Jember.
2. Interviews conducted with authorized parties or concerned with the owner of the De Terrace Café & Resto and the Production section.
3. Secondary data collection is done manually by asking secondary data or reports from companies and collect data with download internet online media in the form of data from print media or the company's official website, or data from the production department of the company De Terrace Café & Resto Jember.

Data analysis technique:

The method used by the author to analyze data and information has been obtained in maintenance, so with this the author uses the probability method to overcome existing problems. As for the steps used by the author in this study, namely:

1. Descriptive analysis which aims to describe and obtain an in-depth and objective description of the engine maintenance analysis in order to increase productivity at De Terrace Café & Resto Jember.
2. Calculate the probability of the amount of damage to the machine using formula:

$$P = \frac{x}{n}$$

x = the number of damaged machines

n = number of machine breakdowns

P = probability of failure during a certain month after maintenance

- a. Calculating the amount of damage to the machine using the formula for the amount of damage:

$$B_n = N \sum n_1 P_n + B(n-1)P_1 + B(n-2)P_2 + \dots + B_1 P(n-1)$$

Information:

B_n = amount of damage expected in the nth month

N = Number of Machines (units)

P_n = probability of machine failure in period n

- b. The formula for the smooth running of the production process is:

$$\frac{\text{pencapaian produksi}}{\text{target produksi}} \times 100\%$$

The following are the criteria for the smooth running of the production process, namely:

>100% = very smooth

=100% = very smooth

80-100% = fairly smooth

<80% = substandard

- c. Calculation of maintenance costs for several different 2026 periods can be made in tabular form as follows:

Table 2 calculation of maintenance costs for the period (2026)

Preventive maintenanc e for M months	Estimated amount of damage in M months (B)	Average amount of damage per month (b:a)	Cost of damage is estimated per month (cx c2x N)	Estimated preventive maintenance costs per month (1/M x C1 x N)	required monthly maintenan ce sub- policy costs (d +e)
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1.
etc.

Data Source: Journal of Analysis of Machine Maintenance in Supporting the Smooth Production Process at De Terrace Café & Resto Plant 1 Year 2026

After calculating with the probability method, with so that the costs that must be incurred by the company can be known then the company knows what to do. Maintenance costs are good prevention or repair can be determined by the company and can affect the improvement of the production process. After that the company can determine how many times the machine maintenance can be done to run smoothly. that way the results of the production process will increase from before by looking at the percentage increase in production from usually the result of maintenance with this method will be improve the production process at De Terrace Café & Resto Jember.

RESULTS AND DISCUSSION

1. Probability formula

$$p = \frac{x}{n}$$

Description: x = many broken machines
 n = number of machine breakdowns
 p = probability of failure during a given month after maintenance

Table 3. Calculation of the probability of a broken machine at De Terrace Café & Resto Jember in 2026

No	Month	Broken machine	The probability that the machine is broken
1.	January	1	$\frac{1}{6} = 0,16$
2.	February	1	$\frac{1}{6} = 0,16$
3.	March	2	$\frac{2}{6} = 0,33$
4.	April	2	$\frac{2}{6} = 0,33$
5.	May	2	$\frac{2}{6} = 0,33$
6.	June	2	$\frac{2}{6} = 0,33$
7.	July	1	$\frac{1}{6} = 0,16$
8.	August	2	$\frac{2}{6} = 0,33$
9.	September	4	$\frac{4}{6} = 0,66$
10.	October	2	$\frac{2}{6} = 0,33$
11.	November	2	$\frac{2}{6} = 0,33$
12.	December	3	$\frac{3}{6} = 0,5$

Data Source: Processed by the author at De Terrace Café & Resto 2026

Based on the probability calculation above, a table can be made probability of machine damage at De Terrace Café & Resto Jember. Damage probability table as follows:

Table 4 Probability of engine damage at De Terrace Café & Resto Jember in 2026

Months after maintenance (i)	Damage amount (Pi)	Damage probability (Pi)	Cumulative damage probability (i.pi)
1.	1 time	0.16	0.16
2.	1 time	0.16	0.32
3.	2 times	0.33	0.99
4.	2 times	0.33	1.32
5.	2 times	0.33	1.65
6.	2 times	0.33	1.98
7.	1 time	0.16	1,12
8.	2 times	0.33	2.64
9.	4 times	0.66	5.94
10.	2 times	0.33	3,3
11.	2 times	0.33	3.63
12.	3 times	0.5	6
Total	24 times	3.95	29.05

Data Source: Processed by the author in 2026



In accordance with the calculation of the probability of engine damage, the estimated age of the engine is 29.05 months before it is damaged. To find out the estimated amount of engine damage, you can use the probability formula as follows:

2. The formula for the amount of damage :

$$B_n = N \sum n1P_n + B(n-1)P_1 + B(n-2)P_2 + \dots + B1P(n-1)$$

Note:

B_n = estimated amount of damage in the nth month

N = Number of Machines (6 machines)

P_n = probability of machine failure in period n

Machine maintenance every month in 2021:

$$B1 = N.P1 = 6 (0.16) = 0.96$$

Table 5 Estimated Machine Damage

Maintenance Month	Estimated damage
1	0.96
2	2.07
3	4.38
4	7.22
5	10.7
6	15.13
7	19.55
8	26.47
9	31
10	41.27
11	54.22
12	71.34

Data Source: Processed by the author in 2026

Expected average monthly engine damage calculated using the following formula:

3. The formula for calculating the average engine damage

$\frac{\text{jumlah kerusakan yang diperkirakan}}{\text{pemeliharaan tiap bulan}}$

Table 6 Calculation of Average Machine Damage

Month	Calculation	Amount
1	0.96 : 1	0.96
2	2.07 : 2	1.03
3	4.38 : 3	1.46
4	7.22 : 4	1.80
5	10.7 : 5	2.14
6	15.13 : 6	2.52
7	19.55 : 7	2.79
8	26.47 : 8	3.30
9	31 : 9	3.44
10	41.27 : 10	4.12
11	54.22 : 11	4.92
12	71.34 : 12	5.94

Data Source: Processed by the author in 2026

Meanwhile, to calculate the estimated maintenance costs per month obtained by the following formula:

4. Repair cost formula

Average damage X estimated repair costs per month

This data is the result of calculations for the estimated cost of repairs for the next year, namely 2027.

Table 7 Calculation of estimated repair costs per month

Month	Calculation	Amount
1	0.96 x Rp. 3,346,000	Rp. 3,212,160
2	1.03 x Rp. 3,346,000	Rp. 3,446,380
3	1.46 x Rp. 3,346,000	Rp. 4,885,160
4	1.80 x Rp. 3,346,000	Rp. 6,022,800
5	2.14 x Rp. 3,346,000	Rp. 7,160,440
6	2.52 x Rp. 3,346,000	Rp. 8,431,920
7	2.79 x Rp. 3,346,000	Rp. 9,335,340
8	3.30 x Rp. 3,346,000	Rp. 11,041,800
9	3.44 x Rp. 3,346,000	Rp. 11,510,240
10	4.12 x Rp. 3,346,000	Rp. 13,785,520
11	4.92 x Rp. 3,346,000	Rp. 16,462,320
12	5.94 x Rp. 3,346,000	Rp. 19,875,240

Data Source: Processed by the author in 2026

5. Estimated prevention costs can be known by using formula s:

$$\text{Biaya pencegahan} = \frac{\text{Biaya pemeliharaan} \times \text{Jumlah mesin}}{\text{Pemeliharaan setiap bulan}}$$

Table 8 Calculation of estimated monthly prevention costs:

Month	Calculation	Amount
1	$\frac{1}{12} \times \text{Rp. 167.000} \times 6$	Rp. 1,002,000
2	$\frac{2}{12} \times \text{Rp. 167.000} \times 6$	Rp. 501,000
3	$\frac{3}{12} \times \text{Rp. 167.000} \times 6$	Rp. 334,000
4	$\frac{4}{12} \times \text{Rp. 167.000} \times 6$	Rp. 250,500
5	$\frac{5}{12} \times \text{Rp. 167.000} \times 6$	Rp. 200,400
6	$\frac{6}{12} \times \text{Rp. 167.000} \times 6$	Rp. 167,000
7	$\frac{7}{12} \times \text{Rp. 167.000} \times 6$	Rp. 143,142
8	$\frac{8}{12} \times \text{Rp. 167.000} \times 6$	Rp. 125,250
9	$\frac{9}{12} \times \text{Rp. 167.000} \times 6$	Rp. 111,000
10	$\frac{10}{12} \times \text{Rp. 167.000} \times 6$	Rp. 100,200
11	$\frac{11}{12} \times \text{Rp. 167.000} \times 6$	Rp. 91,090
12	$\frac{12}{12} \times \text{Rp. 167.000} \times 6$	Rp. 83,500

Data Source: Processed by the author in 2026

Thus, from the above data that has been processed by the author, we can find out the costs of the minimum maintenance policy so that the machine continues to run well and work optimally .

Table 9 Calculation of Machine Maintenance Costs at De Terrace Café & Resto in 2026

(a) Monthly preventive maintenance	(b) estimated amount of damage in a month	(c) Average amount of damage per month (b:a)	(d) damage costs per month (c x Rp. 3,346,000)	(e) maintenance costs per month (1/M.C1.N) Rp. 167,000	(f) costs (d+e)
1	0.96	0.96	Rp. 3,212,160	Rp. 1,002,000	Rp. 4,214,160
2	2.07	1.03	Rp. 3,446,380	Rp. 501,000	Rp. 3,947,380
3	4.38	1.46	Rp. 4,885,160	Rp. 334,000	Rp. 5,219,160
4	7,22	1.80	Rp. 6,022,800	Rp. 250,500	Rp. 6,273,300
5	10,7	2,14	Rp. 7,160,440	Rp. 200,400	Rp. 7,360,840
6	15,13	2.52	Rp. 8,431,920	Rp. 167,000	Rp. 8,598,920
7	19.55	2.79	Rp. 9,335,340	Rp. 143,142	Rp. 9,478,482
8	26,47	3.30	Rp. 11,041,800	Rp. 125,250	Rp. 11,167,050
9	31	3,44	Rp. 11,510,240	Rp. 111,333	Rp. 11,621,573
10	41,27	4,12	Rp. 13,785,520	Rp. 100,200	Rp. 13,885,720
11	54,22	4.92	Rp. 16,462,320	Rp. 91,090	Rp. 16,553,410
12	71.34	5.94	Rp. 19,875,250	Rp. 83,500	Rp. 19,958,750

Data Source: Processed by the author in 2026

From the results of the calculation of the data above, the policy good maintenance and have low cost will be issued company if the company uses preventive maintenance. In table 9, costs can be obtained total monthly for lowest (minimum) preventive maintenance costs is the cost in column (f) which is Rp. 3,947,380 . Therefore, with the maintenance of production machines at De Terrace Café & Resto Jember which is carried out every month and there is machine prevention, machine checking carried out every day so that the machine used for production can run well and the output targets set by the company can be achieved as well can increase profits for the company.

From the results of the above calculations , the authors can conclude that De Terrace Café & Resto Jember uses the probability method because after processing it can be known effective and efficient maintenance, namely maintenance that is carried out twice a month , because the costs incurred by the company are lower compared to maintenance in other months.

The next step is to calculate the smoothness of the production process experienced by De Terrace Café & Resto Jember . Companies often experience setbacks in achieving production time, so that the target production time has been set by the company rarely can be achieved. To calculate the smoothness of the production process :

$$\frac{\text{pencapaian produksi}}{\text{target produksi}} \times 100\%$$

The following are the criteria for the smooth running of the production process, namely:

>100% = very smooth

=100% = very smooth

80-100% = fairly smooth

<80% = substandard

The following is the formula for calculating the production process carried out by the author as follows:

$$\text{Production} = \frac{\text{Output x waktu standart}}{\text{Jumlah tenaga kerja x waktu kerja}} \times 100$$

$$= \frac{116 \text{ unit} \times 160 \text{ menit}}{10 \text{ orang} \times 720 \text{ menit}} \times 100$$

$$\begin{aligned}
 &= \frac{18.560}{7.200} \times 100 \\
 &= 257 \text{ units/day} - 116 \text{ units/day} \\
 &= 141 \text{ units/day} \times 30 \text{ days} \\
 &= 4,230 \text{ units/month}
 \end{aligned}$$

Information :

Output	= Target of 3,500 units/month: 30 days = 116 units/day
Standard Time	= 160 minutes of work
Total manpower	= 10 people
Working time	= 12 hours x 60 minutes = 720

Based on the results of the calculation of the data above, it can be seen that increasing the production process produced by De Terrace Café & Resto Jember increased production by 4,230 units every month, for example in January the target was 3,500 units and that was realized by the company is only 3,250 units, while researchers use productivity calculations can add 4,320 units to 7,480 production units improve the production process, so as to meet the target is said to have meet production targets.

So, with regular maintenance of production machines, the production process can run well and the output targets are determined by company can be achieved and increase profits for De Terrace Café & Resto Jember. Maintenance is done to prevent damage so that the machine can work properly optimal for the product produced and if the production machine is always properly conditioned, it can improve the production process at De Terrace Café & Resto Jember.

The following calculates the smoothness of the production process:

$$= \frac{3.250}{3.500} \times 100\% = 93\%$$

The following are the criteria for the smooth running of the production process, namely:

- >100% = Very Current
- =100% = Current
- 80-100% = Fairly Current
- <80% = Substandard

Based on the results of the calculation of the data above, that the smooth process production produced by Herda Cafe Puger Jember for 1 year (12 months) that is equal to 93% smooth production process so getting closer to 100% where the smooth production process is good approaching 100% or more than 100%

CONCLUSION

Based on the research results that have been presented in CHAPTER previously regarding the analysis of machine maintenance in order to improve smoothness the production process at De Terrace Café & Resto Jember can be interesting conclusion as follows:

1. On the maintenance that has been carried out by De Terrace Café & Resto Jember at the time It is both preventive and corrective. Where the company has done routine maintenance but still there is a machine that needs to be done repair, should be the company do the maintenance in a way Check after use the machine.
2. The smooth production process of De Terrace Café & Resto Jember can be seen from the results of the research that have decreased and increased uncertain every month from the desired production target figure achieved by De Terrace Café & Rsto Jember
3. After being analyzed using the probability method it can be It is known that effective machine maintenance is effective maintenance carried out with a period of 1 month 2 times because after being tested with using the probability method obtained the lowest maintenance costs in the 9th month with a damage fee of Rp. 3,947,380 and preventive



maintenance costs Rp . 113,300 and smooth production produced by De Terrace Café & Resto Jember 93 % is said to be sufficient production fluent.

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