A Study of Application for Production Machine Operation Manufacturing Company in Indonesia

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Abstract

Effective use of machinery is an important element in maintenance performance in the company. There are several ways to measure effectiveness in machinery usage in the manufacturing industry. Among the parameters employed are times of production processes, capability in terms of production quantity and quality, and machinery’s capacity to operate, which is looked at from an economic perspective. Machine operation failures often occur at manufacturing companies in Indonesia. Some of the causal factors are the frequency of machine breakdown due to long usage, cost consumed in machine maintenance, and incorrect application of production machinery. For that reason, the purpose of this study were to examine as to how far these factors are true for the manufacturing company in Indonesia namely is PTP 1 Nusantara, as well as to identify the application of production machinery at this company. The study developed concept model that the factors of production machine application. Machine application factor is the model to examine machine maintenance, which included machine operation efficiency. This model is developed to help the company in developing a more effective production system and strategies, consequently, affecting the study companies’ performance. The research has been done by quantitative analysis. Based on gathered information, study results showed that oversights in machine application, it was found that there were also oversights in the machine maintenance system. This was because the machine applications at the companies haven’t yet to be effective. This is evident from the analysis of data that domain machine condition in this company (min= 1.27), cost of maintenance (min= 1.38), cost of usage (min= 1.26), down time cost (min 1.76), production quantity (min= 1.58) machine maintenance system (min= 1.25). In order to avoid such problems, it is proposed that the company to improve their machine maintenance systems.

Keywords: Machine maintenance, cost of operational machine, machine operational effectiveness

1. Introduction

A productive company should have the capability of technological use, which includes operational capability, optimal supervision and maintenance of all types of technological components. These capabilities are vital for constant improvement of all activities and technological components, to ensure optimal profit while minimizing maintenance cost [4].

Failure in machine operations often occurs in several manufacturing companies in Indonesia. One of the causing factors of the companies’ are incrased in mainitening the machine and error in the application of production machines. The purpose of this research is to determine the cause of operational failure, develop a model for production machine application, and also test the suitability of the planned models with its application.

2. Research Methodology

In order to find out the practices and strategic approaches used by the company being studied, a survey and interviews, as well as document collection was carried out. The company were chosen as research subjects that is PTP 1 Nusantara in Indonesia, a company manufacturing palm oil.

The study was conducted into those responsible for production machine operations/maintenance. In this study, the instrument utilized is a questionnaire consisting of 100 questions, which is categorized by six attributes. Data collected were then analyzed using descriptive and quantitative statistics.

The sequence of research methodology implemented, as proposed by [8], is as the following:
1. Analysis of machine
2. Analysis of employee
3. Analysis of operation cost
4. Analysis of materials
5. Analysis of production

From the study’s analyses and interviews, the suitable development model was developed to aid the industry in generating production strategies and systems that are more effective and give an impact on the company performance. The model is the production machine application model.
For the machine application model (Fig. 1) to analyze machine maintenance, the parameters involved are assessments made on the machines, employees, cost, materials and production. Next, implementation in terms of tracking, forecast and results of diagnosis on the condition of the machine, cost, machine maintenance and results are carried out. By this analysis, it can be determined whether the machine application of a company is effective or otherwise. If ineffective, further study is needed to identify the cause – are there errors on the part of machine, employees, cost, materials or even the production itself?

The instrument used to analyze this machine application model is an interview carried out at the company being studied. These models is described in the Fig. 1.

Table 1

<table>
<thead>
<tr>
<th>Average Scores</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 to 1.89</td>
<td>Very Low</td>
</tr>
<tr>
<td>1.90 to 2.69</td>
<td>Low</td>
</tr>
<tr>
<td>2.70 to 3.49</td>
<td>Moderate</td>
</tr>
<tr>
<td>3.50 to 4.29</td>
<td>High</td>
</tr>
<tr>
<td>4.30 to 5.00</td>
<td>Very High</td>
</tr>
</tbody>
</table>

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Table 2
The Production Machine Application

<table>
<thead>
<tr>
<th>Variables</th>
<th>PTP. Nusantara</th>
<th>MIN</th>
<th>SD</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1 Machine Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1.1 Spec of Production</td>
<td>3.98</td>
<td>.060</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>X1.2 Machine condition</td>
<td>1.27</td>
<td>.140</td>
<td>VL</td>
<td></td>
</tr>
<tr>
<td>X1.3 Machine maintenance</td>
<td>1.25</td>
<td>.175</td>
<td>VL</td>
<td></td>
</tr>
<tr>
<td>X2 Employe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X2.1 Working members</td>
<td>4.07</td>
<td>.089</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>X2.2 Employe training</td>
<td>4.05</td>
<td>.091</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>X3 Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X3.1 Maintenance cost</td>
<td>1.38</td>
<td>.171</td>
<td>VL</td>
<td></td>
</tr>
<tr>
<td>X3.2 Daily maintenance</td>
<td>3.95</td>
<td>.113</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>X3.3 Cost of accident</td>
<td>3.89</td>
<td>.208</td>
<td>H</td>
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<tr>
<td>X3.4 Cost of usage</td>
<td>1.26</td>
<td>.176</td>
<td>VL</td>
<td></td>
</tr>
<tr>
<td>X3.5 Down time cost</td>
<td>1.76</td>
<td>.494</td>
<td>VL</td>
<td></td>
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<tr>
<td>X4 Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X4.1 Material availability</td>
<td>4.12</td>
<td>.143</td>
<td>H</td>
<td></td>
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<tr>
<td>X4.2 Material usage</td>
<td>4.55</td>
<td>.220</td>
<td>VH</td>
<td></td>
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<tr>
<td>X5 Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>X5.1 Production quantity</td>
<td>1.58</td>
<td>.257</td>
<td>VL</td>
<td></td>
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<tr>
<td>X5.2 Production quality</td>
<td>4.95</td>
<td>.094</td>
<td>VH</td>
<td></td>
</tr>
</tbody>
</table>

VL = Very Low
L = Low
M = Moderate
H = High
VH = Very High

3. Result and Discussion

Results of data analysis showed that the machine application in the PT. P. 1 Nusantara company’s is: Analysis of data obtained from respondents through questionnaire. The data obtained so analyzed using Statistical Product for Service Solution (SPSS)”. Descriptive statistics were used as Results of data analysis showed that the machine application in the PT. P. 1 Nusantara company’s is:

Analysis of data obtained from respondents through questionnaire. The data obtained so analyzed using min and standard deviation to describe the results of the descriptive analysis stage.

The results of the inference analysis also get a decision research to address the issues relating to the background of the problem and research objectives. All information obtained by the result of research decisions has been processed and analyzed in the form of table and is used to report the decision according to the research background of problem, statistical inference used ANOVA analysis. The following shows the table of the interpretation average score into five stages Likert scale.

In Table 1 that indicate average scores and interpretation of value from 1.00 to 1.89. This means the interpretation has a very low. 1.90 to 2.69 is low. 2.70 to 3.49 is moderate, 3.50 to 4.29 is high, whereas a value 4.30 to 5.00 is very high. The following shows the results of descriptive applications in manufacturing production machinery PT P. 1 Nusantara of five aspects: production machinery, employee in the company, the cost of production, materials and production. Analysis and descriptions are described according to study issues. The result of the analysis are shown in Table 2:

Table 2 shows the descriptive applications include the production machine:

a) Domain production machines include specs of machine, machine condition and machine maintenance system. Specs of machine in PT P. 1 Nusantara (min= 3.98) . This shows the specifications of the machine in the company PT P. 1 Nusantara has a very good quality. Domain machine condition PT P. 1 N (min=1.27). PTP 1 N production machine often damage. Whereas, machine maintenance system PT P. 1 N (min= 1.25), It shows machine maintenance system in the company haven’t yet to be effective.

b) Domain employee in a company with a high two stages namely working members and employee training. For employee training domain, PT P. 1 Nusantara (min= 4.05) are at high stage.

c) Domain production cost include the cost of maintenance machine, daily maintenance operational cost, cost of accident, cost of usage and down time cost. Cost of maintenance in company PT P. 1 N (min=1.38) is at a very low stage. It shows that the total cost of maintenance are very much excluded because these companies often make improvements as a result of machine are often damaged. Within a few years ago at the company PTP 1 N, machine production occurs wear or other damage caused by metal fatigue so that the cost for machine maintenance program in a very large. Therefore, the total cost for machine maintenance program in PTP 1 N value is not in accordance with the company’s budget. For domains
daily operating cost, PTP 1 N (min= 3.95). This was due in
companies PTP 1 N many uses materials helper to operate
machines in their daily company. Domain accident costs in
the company.(min= 3.89). This means the company
doesn’t often happen accident. Domain cost of usage in the
PTP 1 N company (min= 1.26) are very low stage. It shows
that in the company PTP 1 N more using the cost of using
to run the machine at the company’s operation. Domain
cost to failure machine operations (down time cost) in PTP
1N ( min= 1.76) are at very low stage. This is due in the
common enterprise machine down time as a result of
damage to machine.

d) Domain material covers the supply of materials and the
use of materials. The supply of materials in the company
PTP 1 N (min=4.12) shows that the company have good
material and achieve effective phase. Domain materials
usage in the PTP 1 N company ( min= 4.55), is at a very
high stage . It shows the use of the material in the company
has reached the stage of effective anyway.

e) Domain production includes production quantity and
production quality. In the PTP 1 N company’s ( min= 1.58) is at a very low stage. Realization of production
quantity in the company PTP 1 N has not reached the
budget by the company. Realization of palm oil production
which doesn’t reach the budget caused by prolonged
machine down time due to frequent machine trouble.
While the quality of production in PTP 1 N ( min=4.95) .
This means that the company has carried out maintaining
the quality of production and the quality of the company’s
production has reached the level of effective.

4. Conclusion

Based on the data obtained, it was found that the
machine application that there were errors in the machine
maintenance system. The this case has been problem
because of machine application not yet effective. The
situation worsened when the machines need to be
improvements must be made to the machine maintenance
system.

The effectiveness application of machine will be
advantageous to the company because the machine’s
productivity is better. The application of machine need to
be improvement must be made because if not, they will
cause various be losses in terms of the increased work
needed on the machine, the drop in company’s productivity
due to delayed production time, product quality will be
suffer, increase in the costs for spare parts and employees
in the machine maintenance department, and machine
damage that will ultimately result in the company to fulfill
not the client’s order of products.

The developed and pleased models are hoped to
correlate to the company being studied, whereby it can be
applied for the production machine operations. The
developed models are intended to help the company to
develop production strategies and system that are more
effective. Which can give an impact on their performance.

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