INCREASING PRODUCTIVITY OF PT. XYZ THROUGH THE UTILIZATION OF STANDARD TIME AND THE TWO HANDED PROCESS FOR PANEL BOX PRODUCTION

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ABSTRACT
PT. XYZ is a manufacturing company renowned for its product, the Panel Box. Previously, the company's productivity level was relatively low hence it was difficult for PT. XYZ to achieve their production target. Productivity level was previously measured using the objective matrix method (OMAX); as such, the productivity index result which started at 0 in January and later followed with a 0.56% increase in February, a 1.06% increase in March, a decrease of 1.19% in April, a 1.60% decrease in May as well as a drop of 1.97% in June. One of the factors causing the downward trajectory is related to the workers in which the operator has not maximized their working hours – this is due to the workers not being able to calculate or determine the standard time required to produce 1 product therefore causing the operator to remain unwary when conducting his duties. The suggestion for PT. XYZ was to determine a standard time for the production of 1 product through the use of the two handed process. In doing so, the company was able to experience an 11.40% growth in productivity levels in July.

Keywords: Productivity, Objective Matrix (OMAX), Work Sampling, Two Handed Process

1. INTRODUCTION

1.1. Background
The main product that is produced as well as used for research purposes from PT. XYZ is the Panel Box. Based on research results, the company's productivity level was relatively low hence creating challenges in achieving the production target. A significant portion of this is because the operator were not yet been able to maximize their working hours. With no standard time determined, operators can often be found working at a leisurely pace. In an effort to fulfill the company’s production target, PT. XYZ turned to necessitating overtime from its workers therefore causing excessive financial spending. Results from the Objective Matrix (OMAX) indicates that wasted time during working hours are directly linked to the operator's ability to carry out the production process.

1.2 Scope of Issue
PT. XYZ's challenge is in its inability to meet the production target given its operators' inability to fully take advantage of their working hours. To fulfill said demands, the company had to provide incentives for overtime hours thus resulting in extra spending. One of the measures to boost productivity levels is to decrease input and increase output because efficiency in utilizing the company's resources is vital to bolster profit. Resources hereby include manpower, number of total working hours, and the available hours.

1.3 Research Purposes
The purpose of this research is to provide suggestions regarding increasing productivity which among them includes:

1. Creating a strategy to increase productivity by deciding on a standard time required to manufacture 1 product by using a operating system overhaul such as Two Hand Process.
2. Conduct a review of productivity levels in Panel Box product manufacturing before utilizing the Objective Matrix (OMAX) method.
1.4 Research Limitations
The following are limitations to the research:
1. The research is carried out at PT. XYZ which is situated at Jalan Ledug No. 100 Tangerang – Banten.
2. The research is carried out only at the panel box product manufacturing level which had previously been measured.
3. Productivity measurement is valid for partial productivity in order to have an overview of the results from improving upon the operating method.
4. Data output includes product output, acceptable product data, imperfect product data, overtime hours, regular hours, and undetermined hours.
5. Inputted data consists of normal working hours, the number of workforce, and the amount of energy used.

2. THEORETICAL BACKGROUND

2.1 Productivity
Sunyoto (2012) stated that work productivity is a measurement that showcases the balance between output and input of a company within a pre-determined time period. Thus workers productivity is the output from employees that is measured by the amount of time that is utilized in maximizing the available resources. Sumanth, 1985 introduced the formal concept of productivity cycle as a means to be used for sustainable productivity. Mauli (1978) stated that productivity is not the same as production; instead production, quality performance, and results make-up the components of productivity attempts. Therefore productivity is a combination of effectiveness and efficiency which is measured as:

\[
\text{Productivity} = \frac{\text{output results}}{\text{used input}} = \frac{\text{mission}}{\text{utilized resources}}
\]

\[
\text{Productivity} = \frac{\text{efficiency in carrying out tasks}}{\text{effectiveness in utilizing resources}}
\]

2.2 Measuring Productivity Using The Objective Matrix Model (OMAX)
The Objective Matrix Model (OMAX) is a system used to measure partial productivity that was later developed to also monitor productivity in every division within a company under the condition that the productivity criteria is in accordance to its objective. This model was first developed by Dr James L Riggs (Department of Industrial Engineering at Oregon State University). OMAX was first introduced in the United States during the 1980s. This measurement model has a unique characteristic in that the performance criteria of a working group is included within the matrix. Every performance criteria has a goal which is a special pathway to improvement as well as containing the necessary requirements with the importance of increasing productivity kept in mind. The purpose of the OMAX are as follows:
1. As a tool to measure productivity levels
2. As a tool to solve issues related to productivity
3. As a tool to monitor productivity growth

2.3 Improving Productivity according to Deming
Deming (1986) stated that implementing quality within an organization requires a change in philosophy namely for the management. According to Deming, the concept of quality within an organization or a company requires repeated change or improvement. From 14 points related to the improvement of productivity according to Deming, the following are related to workers:
   a. Training workers in order to sharpen the skills needed to carry out the task
   b. Improve the quality of line supervisors
   c. Workers are required to conduct quality work
   d. Train staff members to understand statistical methods
   e. Train staff members to hone in on new skills as a requirement

2.4 Two Handed Process (PTKTK)
The Two Handed Process is a tool from the study of movement to determine efficient
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measures that are necessary to complete a task. This process provides an overview of movements of the left and right hand during use as well as during idle time – this also shows the comparison of tasks carried out by the left and right hand.

Use of Two Handed Process
a. Equalize the movement of both hands and reduce fatigue
b. Remove or reduce movements that are inefficient and unproductive therefore shortening the production hours
c. As a tool to analyze the mapping of working stations
d. As a tool to be utilized for carrying out training related to new tasks

3. RESEARCH METHOD

4. RESULT AND DISCUSSION

According to previous research, it was determined that the productivity of a company often decreases. The following is the result of the previous research.

Image 4 Graph of 6-month Performance Indicator

The performance indicator illustrates the level of success in meeting targets of a company. Image 4 shows that the performance indicator of the company decreased for 4 continuous months.
The productivity index is used to determine if there is an increase or decrease in productivity in comparison to the base period. Image 5 illustrates that a company’s productivity decreased for 4 continuous months as evident in the negative score index.

Good productivity is always above 100%. Image 6 illustrates the current productivity rate of the company in which productivity from the previous month was below 100%. The increase and decrease in productivity is caused by input and output that are interrelated.

4.1 Increasing Productivity Planning
Increasing productivity planning is highly important for a company in order to remain competitive and stay ahead.

**Flowchart (Panel Box Production Process)**

Previously, the amount of time required to produce 1 product unit was 2,070 seconds or 34.7 minutes. The following is a flowchart of the production process:

**Object Name, Created by, Date, Status**
The flowchart of the production process indicates that the necessary time to setup a pond system and conduct welding takes the longest duration compared to other procedures. As such, the plan is to create a two handed process for the pond system and welding process.

**Table 2 Table of Operating Time before Reparation**
Two Handed Process Diagram before Reparation
Pond System Process (Holes)

Image 9 Two Handed Process for Pond System (Holes)

Welding Process

Image 10 Mapping of Welding Process

Two Handed Process after Reparation
Pond System Process (Holes) Recommendations

Image 11 Suggestions for Two Handed Process on Pond System (Holes)

Recommendations for Welding Process

Image 12 Suggestions of Two Handed Process for Welding Procedure

4.2 Results Of Productivity Increase Planning

After implementing the suggested two handed process, the time results was 1,324 seconds or 31.7 minutes. Hence the company should be able to produce 30 products/day without overtime. Below is the operational time table before and after reparation:
Table 3 Table of Operational Time after Reparation

<table>
<thead>
<tr>
<th>Process</th>
<th>Time (sec)</th>
<th>Frequency</th>
<th>F+T</th>
<th>Time (minutes)</th>
</tr>
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<tbody>
<tr>
<td>Large Cut</td>
<td>13</td>
<td>6</td>
<td>78</td>
<td>1.2</td>
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<tr>
<td>Small Cut</td>
<td>13</td>
<td>4</td>
<td>52</td>
<td>0.87</td>
</tr>
<tr>
<td>Drilled</td>
<td>34</td>
<td>4</td>
<td>136</td>
<td>2.27</td>
</tr>
<tr>
<td>Bent</td>
<td>12</td>
<td>4</td>
<td>48</td>
<td>0.8</td>
</tr>
<tr>
<td>Punched</td>
<td>12</td>
<td>4</td>
<td>48</td>
<td>0.8</td>
</tr>
<tr>
<td>Welding</td>
<td>42</td>
<td>4</td>
<td>188</td>
<td>2.8</td>
</tr>
<tr>
<td>Sizing</td>
<td>26</td>
<td>4</td>
<td>104</td>
<td>1.73</td>
</tr>
<tr>
<td>Stone Grinding</td>
<td>32</td>
<td>4</td>
<td>128</td>
<td>2.13</td>
</tr>
<tr>
<td>Washing</td>
<td>120</td>
<td>1</td>
<td>120</td>
<td>2</td>
</tr>
<tr>
<td>Coating</td>
<td>120</td>
<td>1</td>
<td>120</td>
<td>2</td>
</tr>
<tr>
<td>Drying</td>
<td>900</td>
<td>1</td>
<td>900</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>1324</td>
<td>39</td>
<td>1902</td>
<td>31.7</td>
</tr>
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</table>

Table 4 Production Data on July 2015 after Reparation

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<th></th>
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<td>130</td>
<td>120</td>
<td>130</td>
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</tbody>
</table>

Table 5 Value of Ratio on July 2015

<table>
<thead>
<tr>
<th>Date</th>
<th>Raw Material</th>
<th>Ratio 1 (%)</th>
<th>Ratio 2 (%)</th>
<th>Ratio 3 (%)</th>
<th>Ratio 4 (%)</th>
<th>Ratio 5 (%)</th>
<th>Ratio 6 (%)</th>
<th>Ratio 7 (%)</th>
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<tr>
<td>06-01-2015</td>
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<td>8.5</td>
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<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
</tr>
<tr>
<td>07-01-2015</td>
<td>130</td>
<td>8.8</td>
<td>8.5</td>
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<td>8.5</td>
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<tr>
<td>08-01-2015</td>
<td>130</td>
<td>8.8</td>
<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Table 6 Result of Upwards Interval and Downwards Interval

Table 7 Result of Productivity Measurement using the Objective Matrix Method (OMAX) on July 2015

5. CONCLUSION

In the beginning of the research it was explained that productivity for PT. XYZ was relatively low caused by use of working hours that were not maximized by the operator. As such the company found it difficult to meet their target. To minimize the aforementioned problem, a standard time had to be determined by the operator to make one product. Setting up the standard time required improving the work system using the two handed process. It was previously mentioned that to make one product required 34.5 minutes and the diagram for the production process illustrated that the pond system and welding were the most time-consuming procedures. Prior to adopting a standard time, the construction for a pond system time required 2.67 minutes and welding required 4 minutes. After setting up a standard time, the pond process took to 2.27 minutes and welding at 2.8 minutes. Therefore after conducting reviews on productivity levels...
using the objective Matrix method (OMAX) the company's productivity increased by 11.40%.

6. REFERENCES


(g) Muchdarsyah Sinungan 1995. *Produktivitas Apa dan Bagaimana : Bumi Aksara, Jakarta*


AUTHOR BIOGRAPHIES

Use “BIOGRAPHY” style when putting in the author biographies. Use the “Hyperlink” character style when specifying the author's e-mail and web addresses. See the following examples.

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