Workload of Workforce in Fertilizing Industry: An Analysis

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Abstract. Analysis of the number of workers in a company is very important. This is very necessary to determine the optimal number of workers. This research has been done in a company engaged in processing single and compound fertilizers. The company trades fertilizer as its first business which is a subsidiary one of the largest agribusiness company in Indonesia. In this study an analysis of the needs of the number of workers was carried out based on the job description of each worker at packaging station. Thus, the workload is calculated for each worker at the packaging station using the Work Load Analysis (WLA) method to calculate the percentage of productivity using the Work Sampling method. Next, the determination of the Rating Factor value using the Westinghouse method and determining the value of Allowance using the Industrial Labour Organization (ILO) table. The workload calculation results obtained that the workload received by 5 operators is high because the value is above 100%. The proposed improvement recommendations given related to the high workload condition is by adding 2 more workers so that the number of workers recommended at packaging station is 7 workers.

1. Introduction
Humans are the main assets in the organization, so that human resources (HR) must be managed and utilized in a balanced and humane manner. HR does not mean just referring to people but the ability of the employee. Talent, competence, ideas, energy from employees, productivity, and performance of the organization are collectively identified as HR of a company [1]. Human resource management is the science and art that regulates the relationship and role of the workforce, so that it can effectively and efficiently help realize the goal [2]. Every organization will always strive to improve the work productivity of its employees, with the hope that what will be achieved by the company will be achieved [3]. The role of human resources (HR) in a company is very important because HR conducts all activities in order to meet the objectives of the company. With the effectiveness, efficiency and productivity, company can find out how to optimize the resources used and can find out the achievement of targets that have been carried out by the company. With human resource planning the company can determine the number of employees needed to run the company's system efficiently [4]. Work productivity is a measure that shows the consideration between input and output issued by the company and the role of labor that has a union of time. The productivity measurement is carried out by the company with the aim of knowing whether it is successful or not in improving the quality of work productivity of employees. If there is an increase in productivity, it means that the company is able to improve the quality of the company's operational activities [6]. Employee productivity can also be influenced by workload [7]. The high and low workload depends on the level of complexity of work procedures, the
demands of work, the tempo of work, and job responsibilities that are not the same. This causes the speed of completing tasks and the productivity of each employee is not the same according to the workload of each [8]. The workload has a significant influence on employee work productivity. Training is a planned effort from the company to improve the knowledge, skills and abilities of employees [9]. Training or training is a systematic effort of the company to increase all knowledge, skills and attitudes of employees through the learning process so that they are optimal in carrying out their functions and job duties [10]. Training or training can affect employee work productivity. Training can prepare employees to have the knowledge, expertise and ability to be able to adapt and anticipate changes to the business environment [11]. There are several factors that influence employee performance [12] intrinsic factor and extrinsic factor.

Workload is a set or number of activities that must be completed by an organizational unit or office holder within a certain period of time. Workload variables use indicators namely work time, number of jobs, internal body factors, and external factors of the body [13]. Job analysis is always needed when the organization makes work plans for employees.

Workload analysis is a process to determine the total time spent completing a particular job. In other words, workload analysis aims to ensure the number of employees needed is in accordance with several workloads and specific responsibilities given to employees. This too, is an activity carried out to identify the number and qualifications of employees needed to realize organizational goals. In addition, workload measurements are also considered as management techniques to obtain information about certain positions or jobs. This is solved through a systematic research and evaluation process. Workload analysis calculates the time and ability of employees to complete tasks. Therefore, workload analysis will be important in studying the workload of each position and the lowest work unit. Finally, the exact amount of work volume imposed on a unit can be known, and this will later be useful in interpreting strategic policies in the future [14].

The method used in this study is the Workload Analysis (WLA) method, because this method is suitable for analysing the workload of workers. WLA is one way that can be used to calculate the amount of workload caused by activities carried out. This study will analyse several causes of the magnitude of the workload and determine remedial solutions to reduce the high workload. In addition, the workload that has been received by workers can also be used to determine the number of workers that the company needs to have [15].

2. Methodology
This study examines the workload conditions of workers using the workload analysis method to calculate workload and number of workers. The steps taken in carrying out this research are as follows. First, field studies are conducted to obtain information about the general description and actual conditions of the company. Second, identification of the problem based on existing problems. To identify the problem, cause-and-effect diagram has been used. This diagram shows the root cause of the workload problems. Third, specify the research objectives to determine the research goals. In this research, the objective is to measure the exact workload for each workforce in the company. Fourth, collecting the data from the organization including the number of workers, job description and so forth. After collecting the data, then do the data processing. In this step, using the WLA method to determine the number of workers. The analysis carried out in this study is related to the number of workers which will compare the number of workers currently with the number of workers based on their workload.

3. Result
Cause-and-effect diagram due to mismatch of workload on Bagging station as follows:
3.1 Workload Measurement With Work Load Analysis (WLA)

A good workload, preferably close to 100% or under normal conditions. The 100% workload means that for 8 hours of work the worker is able to work continuously in normal conditions. The following is the calculation of workload for each filling and recapitulation of workload for each workforce can be seen in Table 1.

**Filling Operator Workload**

**Workload Day 1**

\[ \text{Workload Day 1} = (\%P \times (1 + \text{Rating Factor})) \times (1 + \text{Allowance}) \]

\[ = (0.75 \times (1 + 0.22)) \times (1 + 0.20) \]

\[ = 1.0980 \approx 109.80\% \]

**Workload Day 2**

\[ = (\%P \times (1 + \text{Rating Factor})) \times (1 + \text{Allowance}) \]

\[ = (0.8804 \times (1 + 0.22)) \times (1 + 0.20) \]

\[ = 1.2310 \approx 123.10\% \]

**Workload Day 3**

\[ = (\%P \times (1 + \text{Rating Factor})) \times (1 + \text{Allowance}) \]

\[ = (0.7826 \times (1 + 0.22)) \times (1 + 0.20) \]

\[ = 1.1457 \approx 114.57\% \]

**Table 1. Workload Each Operator**

| No | Operator        | Day 1    | Day 2  | Day 3  |
|----|-----------------|---------|-------|-------|
| 1. | Filing Operator | 109.80  | 123.10| 114.57|
| 2. | Binding Operator| 102.59  | 123.10| 126.26|
| 3. | Sewing Operator | 107.77  | 187.81| 124.09|
| 4. | Transfer Operator| 178.86 | 187.81| 176.63|
The average workload calculation for filling operators is as follows:

\[
\text{Workload Average (\%WL)} = \frac{\text{Workload Day 1} + \text{Workload Day 2} + \text{Workload Day 3}}{3}
\]

\[
= \frac{109.80 + 123.10 + 114.57}{3} = 115.82\%
\]

Table 2 shows the average workload of operators in each activity.

| No | Operator           | Workload Average (%) |
|----|--------------------|-----------------------|
| 1. | Filing Operator    | 115.82                |
| 2. | Binding Operator   | 117.32                |
| 3. | Sewing Operator    | 139.89                |
| 4. | Transfer Operator  | 180.99                |
| 5. | Operator Assistant | 116.29                |

Based on the average workload of each worker above, the overall productivity of operator activities can be calculated as follows:

Total Workload

\[
= \%WL_1 + \%WL_2 + \%WL_3 + \%WL_4 + \%WL_5
\]

\[
= 115.82\% + 117.32\% + 139.89\% + 180.99\% + 116.29\%
\]

\[
= 670.31\%
\]

Average Workload of Each Worker (Actual)

\[
= \frac{\text{Amount of Workload}}{\text{Number of Workers}} = \frac{670.31}{5} = 134.06\%
\]

3.2 Data Analysis and Discussion

The number of workers is one of the problems in Bagging due to the excessive amount of workforce will make the productivity of each worker decrease while the number of workers who are less will make the productivity of each worker. After calculating the workload for each operator, the workload for filling operators is obtained. Binding operators, Sewing operators, Transfer operators, and auxiliary operators are 115.82%, 117.32%, 139.89, 180.99%, and 116.29% respectively. The average workload of each worker is 134.06%, where the average workload exceeds the workload limit of 100% so that the number of workers is needed so that the workload of each worker can be reduced. The calculation of the number of workers recommended can be seen as follows:

Average Workload for Each Worker (Recommended)

\[
= \frac{\text{Amount of Workload}}{\text{Number of Workers}} = \frac{670.31}{7} = 95.76\%
\]

Based on the results of the above calculations, it can be concluded that the number of workers recommended at Bagging station is 7 workers with an average workload of each worker is 95.76%.

4 Conclusion

Based on the calculation of workload on bagging stations for charging operators, binding operators, sewing operators, transfer operators, and auxiliary operators respectively 115.82%, 117.32%, 139.89%, 180.99%, and 116.29%. The average workload of each operator is 134.06% (Exceeding the workload limit) and improvements are made to the work system at bagging stations by increasing the number of
workers to 7 people so that the average workload of each operator can be minimized to 95.76% (Does not exceed the workload limit).

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