# ANALYSIS OF EMPLOYEE WORKLOADS USING THE WORKLOAD ANALYSIS (WLA) METHOD ON MULTI-LINE NON-FOLDING PACKAGING WORKSTATION PT MARIMAS PUTERA KENCANA

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## Abstract

*PT Marimas Putera Kencana is a company specializing in the production of food and beverages, with its primary product being powdered drinks. The company operates a multi-line non-folding packaging work station, which is deemed less efficient compared to a multi-line folding machine. This workstation faces challenges related to labor efficiency, particularly during break hours, as the machine continues to operate without pausing production. Consequently, an assessment of the operators' workload was conducted to determine the optimal number of operators required. This study focuses on the workload measurement of the morning shift at the multi-line non-folding packaging work station, operating for an effective duration of 7 hours. The Workload Analysis (WLA) method was employed for this purpose. The data processing in this research included tests for data uniformity and adequacy, total production output, working hours, performance ratings, and operator allowances. The results of the calculations revealed that the operators' workload was 149,964%, indicating a significant excess over the maximum acceptable limit of 100%. Based on this workload value, it was determined that the optimal number of operators required is two.*

***Keywords***: *employee optimization, workload, Workload Analysis (WLA)*

## 1. Introduction

Human resources are a fundamental driver of a company and play a crucial role in its business journey. They are intrinsically linked to the management that governs them. Management is responsible for overseeing all workforce-related activities within the company. It is imperative for management to continually evaluate the performance of human resources to enhance the company's productivity. This evaluation can take various forms, such as performance assessments, condition evaluations, promotions, or workforce training to improve skills. Such evaluations should be conducted multiple times a year as part of ongoing improvement efforts.

PT. Marimas Putera Kencana operates in the field of food and beverage production, with its primary product being powdered beverages. The company began as a home industry in 1995, managed initially through a family-based management system. Since then, it has evolved into a national-scale enterprise with product distribution spanning across Indonesia and abroad. The company has consistently innovated its flavors to meet consumer demands and, as of today, offers 33 flavor variants.

The high demand from both domestic and international markets has driven PT Marimas Putera Kencana to grow rapidly. To date, PT Marimas Putera Kencana employs more than 2,000 individuals. Within its production unit 2, there are approximately 100 employees per shift. In each shift, four to five operators manage eight multi-line non-folding machines. During break times, the responsibilities of the operators increase if their colleagues are resting. The operators' tasks are entirely performed on the production floor, involving monotonous work with high targets and significant time pressures, in addition to working in uncomfortable conditions and positions. These factors greatly influence the operators' perceived workload. As a result, operators frequently experience a lack of focus and concentration, leading to product defects or delays in folding work due to accumulation on the conveyor. The failure of operators to detect defects disrupts subsequent packaging processes, such as plastic packaging and boxing in the final stages. Undetected defects necessitate halting and re-checking products that have already reached the warehouse.

In response, the HRD of PT Marimas Putera Kencana recognized the need to evaluate the operators' workload. Additionally, at the beginning of 2023, management implemented workforce efficiency measures, transitioning from a system where each operator handled one machine to a system where each operator handles two machines. Furthermore, a comprehensive analysis of the operators' workload had

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not been conducted for a considerable time due to the resignation of the employees previously responsible for this task.

Workload analysis is a form of human resources evaluation within the Production Department at PT Marimas Putera Kencana. Through workload analysis, the company can assess employee productivity, providing a basis for optimizing existing human resources and achieving the company's targets. The analysis will be conducted using the Workload Analysis (WLA) method, which can objectively determine employee productivity and identify the optimum number of employees required to perform tasks. The objectives of this research are to determine the percentage of productive and non-productive activities of the operators, to understand the workload that the operators bear, and to identify the optimal number of employees needed.

## 2. Literature Review

### Ergonomics

Ergonomics derives from the Greek words "ergo," meaning work, and "nomos," meaning law. Therefore, ergonomics is defined as the scientific discipline that studies humans in relation to their work (Wignjosoebroto, 2003). The field of ergonomics examines how people, workplaces, and their environments interact with one another, with the primary goal of adapting the working conditions to align with human nature. The discipline of ergonomics recognizes that humans have both short-term and long-term limits in their capabilities when dealing with the environmental conditions of their working systems, including hardware (machines, work equipment, etc.) and software (work methods, systems, and procedures, etc.). Consequently, ergonomics is inherently a multidisciplinary science, encompassing knowledge from the life sciences (medicine, biology), psychology, and sociology (Wignjosoebroto, 2003).

### Employee Performance

Human resources play a pivotal role in the management, organization, and utilization of employees within a company, ensuring their productive contribution towards achieving organizational goals. Within this context, labor, representing the workforce, stands as the primary driver of the production process. Labor is intricately linked with the capacity to work and productivity, often synonymous with performance. According to Mangkunegara (2017), performance is influenced by two key factors: ability and motivation. Additionally, other sources posit that employee performance is shaped by three distinct factors: individual attributes, organizational factors, and supportive management practices (Simanjuntak, 2005).

### Productivity

Quoting from Mail (1978) as cited in Wahyuni (2017), productivity is closely intertwined with efficiency, defined as the ratio between actual output and the expected standard output. In various definitions, productivity is frequently linked with an enterprise's efficiency in utilizing its resources (inputs) to generate goods, products, or services. Changes in productivity, whether increases or decreases, result from alterations in output or input utilization. An upward trend in productivity signifies organizational development, whereas a decline indicates underlying challenges requiring immediate evaluation and resolution.

Corporate productivity is influenced by a multitude of factors, encompassing both technical and human elements (Wignjosoebroto, 2003). Technical factors pertain to the utilization of work methodologies, applications, and efficient production facilities. Furthermore, productivity is shaped by the physical environment and labor conditions. Labor constitutes a pivotal determinant in achieving productivity enhancements. Even with optimal capital and a sound management system, without an effective workforce, productivity gains remain elusive. The workforce's capability to drive organizational success is closely tied to motivation, discipline, work ethic, and the fostering of harmonious workplace relationships. Understanding employee performance through productivity measurement is essential for companies. This practice facilitates comprehension of work conditions, assessment of efficiency, and alignment with organizational objectives

### Workload

A workload refers to the quantity of tasks or activities that an individual or organization must complete within a specific timeframe while maintaining normal working capacity (Pranoto & Retnowati, 2015). As defined by the Ministry of Health of the Republic of Indonesia, workload represents the number of tasks that a professional must fulfill within a year of service. Workload is categorized into two types: physical and mental. Physical workload typically pertains to roles requiring significant energy and physical exertion from operators to accomplish tasks. There are three options for calculating workload, as outlined by Marwansyah (2015):

- Workload = 100%: This scenario indicates that the labor quantity and utilization at the time of measurement are sufficient and adequately cover the work requirements.
- Workload > 100%: This signifies that the labor quantity and workload at the time of measurement exceed normal levels, necessitating an increase in the workforce due to excessive workload on existing staff.
- Workload < 100%: In this case, the number of workers and workload at the time of measurement exceeds requirements, prompting the need for efficiency measures to balance workload and workforce.

### Workload Analysis

Workload analysis pertains to the preparation of workforce needs, encompassing basic tasks and functions, analysis, and departmental information such as the department name and task descriptions.

Workload Analysis (WLA) is a method for assessing the workload of each employee based on their job description. This method involves determining the number of work hours a person utilizes or requires to complete a job within a specified timeframe (Mukti, 2021). The primary objective of workload analysis is to ascertain the appropriate number of staff and the corresponding responsibilities or workloads assigned to each officer. This analysis ensures that the assigned workload does not exceed 100%, thereby preventing overload, and enabling employees to perform their tasks within their capacity.

Other sources indicate that the Workload Analysis (WLA) method is employed to determine the level of work efficiency based on the total percentage of the workload assigned to complete the job. This method can analyze major causes of workload and identify corrective solutions to reduce it. Additionally, the workload experienced by workers can be used to determine the optimal number of employees required by the company. The following outlines the Workload Analysis (WLA) observation procedure:

- Determine the Objective of Observation
  Before the observation begins, it is essential to understand the background of the problem, the research purpose, and the object being observed
- Design Observation Sheet
  Observation sheets are designed as checklists of activities, including the time of observation, the elements of work observed, and the number and percentage of productive and non-productive activities performed by operators.
- Schedule the Observation Visit.
  Since the research did not utilize the Work Sampling method, the observation was conducted over a full day according to the operator's work shift.
- Observation of Objects
  After scheduling the visit, the next step is conducting the observation. This involves marking each element performed by the operator with a "v" sign within the observation time interval.
- Calculate the Percentage of Productive (P) and Non-Productive Activity (NP)
  The determination of productive and non-productive activities is made after collecting all the data. The formula used to calculate the percentage of productive and non-productive activities is as follows:

$$\%P = \frac{\text{Number of P}}{\text{Number of Activities}} x100\% \quad (1)$$

$$\%NP = \frac{\text{Number of NP}}{\text{Number of Activities}} x100 \quad (2)$$

- Measuring Test Data Uniformity
  A test of uniformity is performed on measurement data to determine whether the data is consistent and originates from the same system. Data is considered uniform if it falls within two control boundaries. If any data is found to be non-uniform or out of control, it will be excluded from the analysis.

$$UCL = p + 3\sqrt{\frac{p\,(1-p)}{n}} \quad (3)$$

$$LCL = p - 3\sqrt{\frac{p\,(1-p)}{n}} \quad (4)$$

  Description:
  p = Percentage of productivity
  n = Number of observations
- Measuring Test Data Adequacy
  A data adequacy test determines if the collected data is sufficient for real-time calculations. The observation data is deemed sufficient if the value is less than or equal to the theoretical data (N' ≤ N). If N' > N, the data is insufficient, necessitating additional observations. The data adequacy test formula is as follows:

$$N' = \frac{\frac{k^2}{s^2}(1-p)}{p} \quad (5)$$

  Description:
  k = Level of confidence
  s = Degree of density
  N = Total of observation data
  N' = Number of theoretical data
  p = Percentage of productivity

**Determining the Optimal Number of Workers**

The calculation of the number of laborers needed is conducted to ascertain the optimal workforce required, ensuring that the workload for each individual is manageable. This determination helps the company reduce expenditures if an excess of workers is identified. The result of determining the number of employees is a proposal to the company, recognizing that each company has distinct objectives. For companies aiming to minimize their workforce, proposals for additional workers may not be accepted, and alternative solutions to address workload issues will be explored. The following stages are used to determine the optimum number of workers:

➢ Determining Performance Rating
  Performance rating is a technique used to determine the time required by an operator to perform a task under normal conditions. The purpose of the performance rating is to assess the operator's ability to work during the performance of tasks to determine the standard time for a given operation. A rating factor is a measure obtained by comparing the working speed of an operator with the normal working speed as defined by the researcher or observer. This factor can be determined as follows (Wignjosoebroto, 2003):
  - If the operator is deemed to be working too quickly, i.e., above the normal pace, the rating factor will be greater than 1 (Rf > 1).
  - If the operator works too slowly, i.e., below the normal pace, the rating factor will be less than 1 (Rf < 1).

- When the operator works at a normal or reasonable pace, the rating factor is taken to be equal to 1 (Rf = 1). For tasks fully performed by machines (machine operating time), the measured time is considered the normal time.

Several methods are used to determine performance ratings, including the Westinghouse System's Rating, Skill and Effort Rating, Shumard Rating, and Synthetic Rating. This subjective method is based on four factors: skill, effort, working conditions, and the consistency of the operator in performing the job.

➢ Determining Allowance

Allowance refers to the time allocated for relaxation during production activities. It is provided to operators to enable them to complete their work effectively. According to the classification table of allowance values, eight factors are analyzed: energy expended, work posture, work movements, eye fatigue, temperature conditions at the workplace, atmospheric conditions, environmental conditions, and personal relaxation needs. The types of allowances are as follows (Sutalaksana et al., 2006):

- Allowance for personal needs is an allowance given to workers to fulfill their personal needs.
- Allowance for unavoidable obstacles is an allowance given to workers to deal with obstacles that cannot be avoided because they are beyond the worker's control.
- Allowance for fatigue is granted to alleviate fatigue and maintain the ability to work effectively

➢ Determining Standard Time

Standard time refers to the duration required by an average worker to complete a task under normal conditions, inclusive of allowances for relaxation (Sutalaksana et al., 2006). To calculate the standard time, it is essential to first determine the cycle time and normal time. Cycle time is the duration needed to complete one work process or the time taken for each element of a task. Normal time is the duration required by an average worker to complete a task under an adjusted work system design. The formulas for calculating cycle time, normal time, and standard time are as follows:

$$CT = \frac{\sum \overline{X_t}}{N} = \frac{\text{Number of Productive Minutes}}{\text{Number of Items Produced during Observation}} \quad (6)$$

$$NT = CT \times PR \quad (7)$$

$$ST = NT \times (1+\text{Allowance}) \quad (8)$$

Description:
CT = Cycle time
NT = Normal time
PR = Performance rating
ST = Standard time

➢ Calculating Workloads

Workload calculation is used to determine the amount of workload assigned to the workforce to complete a specific task within a given timeframe. The formula for calculating the workload is:

$$\text{Workload} = \text{Percentage of productivity} \times \text{Performance Rating} \times (1+\text{Allowance}) \quad (9)$$

➢ Optimal Number of Workers

The calculation for determining the optimal number of workers aims to identify the amount of labor needed to complete a particular task within a given time without overloading the workforce. The formula used to determine the optimal number of workers is:

$$\text{Number of Workers} = \frac{\text{Standard Time x Quantity of Production}}{\text{Working Hours}} \quad (10)$$

## 3. Method

In this study, several stages of research were conducted at PT Marimas Putera Kencana over the course of a month (January 5, 2023 – February 5, 2023). The first step involved conducting a field study and visiting the factory. The HRD department of PT Marimas Putera Kencana specifically requested an analysis of the workload of multi-line non-folding work station operators. The subsequent step entailed identifying and formulating the problems to be addressed and determining the research objectives for the relevant stakeholders. The third stage involved a literature review to identify appropriate methods for solving the identified problems and to review previous related research. The fourth stage comprised data collection, carried out through observations at the multi-line non-folding workstations. Observation sheets were utilized to record and calculate the percentages of productive and non-productive activities. Non-productive activities were classified based on work elements related to target work and their value generation. Additionally, data collection included measuring the output of two observed machines, considering both finished goods and defects. The next phase was data processing. The collected data were processed to verify their integrity, which would subsequently be used to analyze the workload. This phase included calculating the percentages of productive and non-productive activities, conducting a data consistency test, and performing data adequacy tests. Upon passing these tests, performance ratings and allowance values for the multi-line non-folding machine operators were determined. These values were essential for calculating cycle time, normal time, and raw time, incorporating the quantity of products produced by both machines during the observation period. Following these calculations, the workload borne by the operators was computed, and the optimal number of operators required was determined. The results of data processing were then analyzed. The analysis and subsequent improvement proposals were structured to align with the research objectives. The final stage of this research involved drawing conclusions based on the research objectives and providing recommendations for PT Marimas Putera Kencana

## 4. Result

Productive and non-productive percentages were derived from observation results spanning two consecutive days during a single work shift, from 08:30 to 12:00 AM on the first day and from 13:00 to 15:00 PM on the second day. The observation sheet utilized was structured as a checklist, encompassing data such as the number of observations, observation timing, codes denoting productive and non-productive work elements, along with a summary of the observation data tally. From the observations conducted, 25 instances of productive activities and 4 instances of non-productive activities were documented. The following presents a list of productive and non-productive activities, as depicted in Table 1.

**Table 1.** List of Procustive and Non-Productive Activities

| No | Type of Activity | Code | Activities |
|---|---|---|---|
| 1 | Non-Productive | A | Idle |
| 2 | | B | Personal needs |
| 3 | | C | Chatting |
| 4 | | D | Take a seat |
| 1 | Productive | F | Turning on the Machine |
| 2 | | G | Stopping the Machine |
| 3 | | H | Sachets Inspection |
| 4 | | I | Machine Inspection |
| 5 | | J | Report to Experts |
| 6 | | K | Repairing Machine |
| 7 | | L | Folding Sachets |
| 8 | | M | Putting Sachets on Conveyor |
| 9 | | N | Stacking Sachets |
| 10 | | O | Separating Defects |
| 11 | | P | Changing e-Ticket |
| 12 | | Q | e-Ticket Insspection |
| 13 | | R | Discard e-Ticket |
| 14 | | S | Checking Defects in the Previous Shift |
| 15 | | T | Calculating Machine Efficiency |

**Table 1.** List of Procustive and Non-Productive Activities

| No | Type of Activity | Code | Activities |
|---|---|---|---|
| 16 | | U | Giving Samples to QC |
| 17 | | V | Report to QC if there is a defect |
| 18 | | W | Helping Colleagues |
| 19 | | X | Replacing Ink Cartridges |
| 20 | | Y | Changing the Expiration Date |
| 21 | | Z | Check for Sachets Leaks |
| 22 | | AA | Cleaning Sealer |
| 23 | | AB | Folding Sachets in the Previous Shift |
| 24 | | AC | Cutting (Trimming) the Sachets |
| 25 | | AD | Roll Up e-Ticket |

Data collection also encompassed the outputs of the observed multi-line non-folding machines, namely MLT-08 and MLT-05. Output data were gathered by inspecting the counters on each machine. The total finished goods were derived by subtracting the number of rejected products from the total output. Products were classified as rejected if they exhibited packaging leaks, incorrect expiration dates, cracks in the e-ticket, or were found to be empty. The output calculation for MLT-08 and MLT-05 is detailed in Table 2.

**Table 2.** Output of MLT-08 and MLT-05

| Machine | Day | Output (Sachet) | Reject | Quantity of Production |
|---|---|---|---|---|
| MLT-08 | 1 | 114756 | 330 | 114426 |
| | 2 | 73620 | 140 | 73480 |
| MLT-05 | 1 | 104031 | 300 | 103731 |
| | 2 | 28581 | 266 | 28315 |
| **Total** | | | | **319952** |

According to Table 2, which presents the output of MLT-08 and MLT-05, the total production during the observation period amounted to 319,952 sets. PT Marimas Putera Kencana utilizes the unit of production per box. Therefore, the calculation of the output is as follows:

$$\text{Production Output (box)} = \frac{\text{Number of Sachets Produced}}{\text{Number of Sachets in the Box}} = \frac{319952}{720} = 444{,}3778 \approx 444 \text{ box}$$

Here is Table 3. Percentage Calculation of Productive and Non-Productive Activities

**Table 3.** Recapitulation of Productive and Non-Productive Activities

| Day | Productive | Non-Productive | Sum of Activities |
|---|---|---|---|
| 1 | 262 | 13 | 275 |
| 2 | 138 | 7 | 145 |
| **Total** | **400** | **20** | **420** |

Here's a calculation of the percentages of productive and non-productive activities for the first and second days of research.

- Productive Activities
  Percentage of Productive
  $= \frac{\text{Sum of Productive}}{\text{Sum of Activities}}$ x 100%
  $= \frac{400}{420}$ x 100%
  = 95,238%

- Non-Productive Activities
  Percentage of Non-Productive
  $= \frac{\text{Sum of Non-Productive}}{\text{Sum of Activities}}$ x 100%
  $= \frac{20}{420}\ x$ 100%
  = 4,672%

Based on the calculations, the percentage of productive activities was 95,238%, while the percentage of non-productive activities was 4,672%. Following these calculations, a data consistency test was conducted to ensure the uniformity of the obtained data. This test checks if the data falls within the established upper and lower control limits and is not out of control. Below is Table 4, which presents the data uniformity test.

**Table 4.** Data Uniformity Test

| Day | Number of Observation | Productivity % |
|---|---|---|
| 1 | 275 | 0,953 |
| 2 | 145 | 0,952 |
| Total | 420 | 1,904 |
| **Average** | **210** | **0,952** |

$\bar{n} = \frac{\sum n_i}{2} = \frac{275+145}{2} = 210$

UCL $= p + 3\sqrt{\frac{p\,(1-p)}{n}}$

$= 0{,}952 + 3\sqrt{\frac{0{,}952\,(1-0{,}952)}{210}} = 0{,}996$

LCL $= p - 3\sqrt{\frac{p\,(1-p)}{n}}$

$= 0{,}952 - 3\sqrt{\frac{0{,}952\,(1-0{,}952)}{210}} = 0{,}908$

The following is Figure 1. Which shows a graph of the data uniformity test

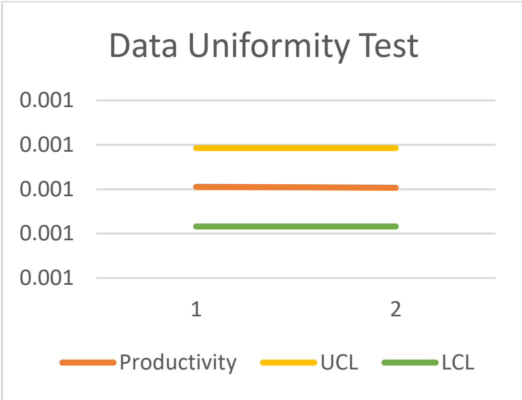


**Figure 1.** Data Uniformity Test

Based on the chart above, it can be seen that no data points are beyond the upper control limit (UCL) or the lower control limit (LCL), indicating that the data is uniform. Additionally, a data adequacy test was conducted to verify whether the data used was sufficient. This test involves comparing the calculated N' with the observed N. If N > N', the data is deemed sufficient. For this study, a 95% confidence level (k = 2) and a 5% rigidity value (s = 0.05) were used, and 420 activities were observed. Below is the calculation for the data adequacy test.

$$N' = \frac{\frac{k^2}{s^2}(1-p)}{p} = \frac{\frac{2^2}{0{,}05^2}(1-0{,}952)}{0{,}952} = 72{,}787 \approx 73 \text{ data}$$

Based on the above calculations, it can be observed that N > N', specifically, 420 > 73. Therefore, the data meets the adequacy test, indicating that the data collected is sufficient for further calculations. The next step involves determining the performance ratings using the Westinghouse System's rating and allowances. These values are based on the conditions of male operators who have been working at the workstation for over a year. The determination of performance ratings and allowances is presented in Tables 5 and 6. The tables show that the performance rating values differ between the first and second days, resulting in an average performance rating of 1,275 and an allowance of 23,5%. The subsequent step is to calculate the standard time by considering productive time, cycle time, and normal time. Below is the calculation of the standard time for the non-folding multi-line packaging process.

**Table 5.** Calculation of Performance Rating

| Day | S | E | Cond | Cons | Total | PR Score |
|---|---|---|---|---|---|---|
| 1 | 0,11 | 0,12 | 0,06 | 0,03 | 0,32 | 1,32 |
| 2 | 0,08 | 0,08 | 0,06 | 0,01 | 0,23 | 1,23 |
| | | | **Total** | | | **1,275** |

**Table 6.** Determining of Allowance

| No | Factors | Characteristics | % |
|---|---|---|---|
| A | Energy expended | Light | 7,5 |
| B | Work attitude | Standing on two feet | 2 |
| C | Work movement | Normal | 0 |
| D | Eye fatigue | Almost continuous sight | 7 |
| E | Temperature | Normal | 2 |
| F | Atmospheric | Normal | 2 |
| G | Environmental conditions | Repeated work cycles between 5-10 seconds | 1 |
| H | Personal needs | | 2 |
| | | **Total** | **23,5** |

The calculation of the standard time is performed by evaluating the observation time to determine the necessary amount of labor for the packaging workstation shows in Table. 7.

**Table 7.** Calculation of Observation Time

| Day | Start | Finish | Break | Duration | Minutes |
|---|---|---|---|---|---|
| 1 | 8.25 | 15.00 | 45 | 6.30 | 390 |
| 2 | 8.25 | 12.00 | - | 3.35 | 215 |
| | | **Total** | | | **605** |

- Number of productive minutes
  = %Productive x Duration of Observation Time
  = 95,238% x (390 minutes + 215 minutes)
  = 576,190 minutes

- Cycle Time
  $= \frac{\text{Number of Productive Minutes}}{\text{Number of Items Produced during Observation}}$
  $= \frac{\text{576,190 minutes}}{\text{444 box}}$
  = 1,298 minutes/box

- Normal Time
  = CT x Performance Rating
  = 1,298 minutes/box x 1,275
  = 1,655 minutes

- Standard Time
  = NT x (1+Allowance)
  = 1,655 minutes x (1+23,5%)
  = 2,043 minutes

A workload arises from the interaction between the demands placed on an employee, the working environment, and the employee's skills, behavior, and perception (Hart & Staveland, 2000). The purpose of workload calculation is to determine the percentage of the load received by the operator in fulfilling a responsibility within a given time. Here is the workload calculation for the non-folding multi-line machine operator:

Workload = Percentage of productivity x Performance Rating x (1+Allowance)
= 95,238% x 1,275 x (1+23,5%)
= 149,964%

After determining the workload received by the operator, the next step is to calculate the optimal number of workers required. Here is the calculation of the optimum workforce:

Number of Workers $= \frac{\text{ST x Quantity of Production}}{\text{Working Hours}}$
$= \frac{2{,}043\ x\ 444}{605}$
= 1,499 ≈ 2 operators

## 5. Discussion

The data processing involves the classification of elements into productive and non-productive work categories. Productivity elements are categorized based on activities that add value and contribute to achieving production targets. Examples of such elements include weighing attachments, replacing ink cartridges, and cleaning sealers. Based on the conducted data processing, the percentage of total productive activities performed by the labor force at the non-folding multi-line packaging workstations was determined to be 95,238%, while non-productive activities accounted for 4,762%. These percentages are assumed under normal operating conditions of the machinery without significant downtime due to malfunctions. Notably, the productivity percentage is notably higher compared to Indonesia's labor productivity rate of 74,4% (Biro Humas Kemnaker, 2020) and exceeds the average ASEAN labor productivity rate of 78,2%.

From the data processing, it is determined that the operator's performance rating is 1,275, with an allowance of 23,5%. Notably, the performance rating varies between the first and second days, primarily influenced by the operator's effort. On the first day, a rating of 0,12 was assigned, reflecting the operator's high productivity and undisturbed focus on tasks. Conversely, on the second day, a rating of 0,08 was assigned, as the operator worked in a more relaxed manner, often in a seated position. A performance rating greater than 1 indicates that the operator is working at an accelerated pace, exceeding the normal rate. A significant allowance is allocated for factors such as energy expenditure and eye fatigue, given the repetitive and visually demanding nature of the tasks performed by the operators. This is particularly evident as their movements are repetitive and short-lived throughout the work shift, leading to eye strain and occasional disengagement with the machinery. The calculations yielded a cycle time of 1,298 minutes per box, a normal time of 1,655 minutes, and a raw time of 2,043 minutes. Furthermore, the data processing revealed that the operator's claimed workload percentage is 149.964%, surpassing the maximum limit of 100%, indicative of overload (Wibawa et al., 2020). Additionally, the analysis determined the optimal workforce required for a multi-line, non-folding packaging workstation to be two operators. However, as a result of workforce efficiency measures, the company has implemented a policy for one person to handle two machines.

Based on the data processing results, it is evident that to achieve optimal production while ensuring the well-being of the workforce, at least two operators are required per shift. Increasing the workforce can be managed by appropriately distributing the workload among all workers at the workstation. Following the research findings, several recommendations were made to the company to help reduce the operators' workload below the maximum threshold. The suggested improvements include:

1. Evaluating Job Descriptions: Revising the operators' job descriptions to ensure that their tasks are more focused and functional.
2. Routine Training: Providing regular training to enhance the operators' skills, enabling them to work more efficiently.
3. Avoiding Job Increases: Preventing an increase in the number of tasks assigned to operators, as this would contribute to an excessive workload.
4. Upgrading Machinery: Considering the transition to a multi-line folding machine, which is deemed more efficient.
5. Regular Condition Checks and Incentives: Regularly assessing the operators' conditions and offering incentives to those handling excessive workloads

The research data was previously presented to the company as a report on practical work activities. The company agreed to consider the research results and the allowance tolerance for operators. The proposed improvements were also submitted. As part of the improvement process, the company intends to take further steps regarding the evaluation of job descriptions and the replacement of machines. Given the current goal of maximizing output with a minimal workforce, PT Marimas Putera Kencana plans to replace the non-folding multi-line machines with more efficient multi-line folding packaging machines.

## 6. Conclusion

Based on the objectives and results of the research conducted at the multi-line non-folding packaging workstations, the percentage of productive activity was 95,238%, while the percentage of non-productive activity was 4.672%. The percentage of total productive activities is significantly high, far exceeding the average productive percentages of the Indonesian and ASEAN labor forces, which are 74,4% and 78,2%, respectively. Workload arises from the interaction between task demands, the working environment, and the skills, behavior, and perception of the worker. According to the calculations, the percentage of the workload received by the operator at the non-folding multi-line workstation is 149,964%. A workload value exceeding 100% is considered to surpass the maximum allowable limit. Determining the optimal number of workers requires understanding the workforce needed to complete a targeted job within a given timeframe while maintaining a workload below the maximum limit. Based on the data processing results, the optimal number of operators required for the multi-line non-folding packaging workstations at PT Marimas Putera Kencana is two.

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