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## DESIGN OF INCENTIVE WAGES WITH STANDARD TIME TO IMPROVE PACKAGE OPERATOR PERFORMANCE (A Case Study at PT. XYZ)

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**ABSTRACT**

*XYZ is a company engaged in the paper industry, which is located in West Java. Since established in 1976, this company has produced photocopy paper in the form of reams. This company has advantages in terms of paper quality so that its products dominate the international market and the domestic market. With a very tight level of market competition, companies must continue to work optimally to continuously improve employee performance and company productivity. The purpose of this study is to plan an incentive-based employee wage system, which is suitable and in accordance with company conditions. Incentive wages are important as one of the main components to increase and maintain motivation, performance and work integrity. This research was conducted in the Finishing Department of the copy manual wrapping work unit. The method used are the Piecework method, the Halsey method, and the Rowan method. The result of this research is a comparison of the amount of wages between the wage system used by the company and the three methods of incentive pay as a company alternative. From the comparison of the three incentive wage design methods, the authors recommend the Halsey method as the best method that is able to provide benefits for both the company and for workers which we call dual mutualism. The Halsey method still guarantees a basic wage and a decent incentive wage for workers as a motivation to work faster and better.*

## INTRODUCTION

Generally, companies operating in the manufacturing industry will be faced with 9 (nine) main challenges, namely: prediction of product demand, control of inventory, managing sales prospects, increasing Return on Investment (ROI), adding quality workforce, developing efficiency in factories, product development and innovation, development and use of the payroll system, and the skill gap, as conveyed by Novia Widya Utami at Insight Talenta (Utami, 2020).

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Several ways and efforts are needed to overcome these challenges so that they do not become blunders in their operations. On this occasion, the author will try to conduct a theoretical study and case study on a manufacturing company, especially on the challenges in "developing efficiency in factories". The problem that is often faced by the manufacturing industry is the development of efficiency in the factory. This is because the budget that must be spent to increase the efficiency of performance in the factory is classified as high.

Efficiency is a measure of input is being used properly for the desired task or function (output). This often consists specifically of the ability to apply certain efforts to produce a certain result with a minimum amount or quantity of unnecessary waste, cost, or effort. Efficiency is the ability to carry out tasks properly and appropriately without wasting time, effort and cost. Increasing efficiency is another word for increasing productivity. Productivity is often identified with efficiency in terms of a ratio between output and input. In measuring productivity, there are of course many factors or elements that influence, including work motivation which is often referred to as invisible input (Wignjosoebroto, 2003).

Most companies apply incentive wages to their employees, which are believed to be able to maintain and or increase employee motivation (Mangkunegara& Prabu, 2004). Incentives are rewards / compensation given to motivate workers so that their performance or work productivity is high, they are not fixed or at any time. Incentives can be given to both direct workers and indirect workers on certain grounds. The determination of the amount of incentive for direct workers is based on the efficiency of the operator's work, namely the comparison between the output produced and the standard output, attendance, work discipline, and creativity. As for indirect workers, the amount of incentives is based on the efficient use of work facilities, the use of materials used and the emphasis on wasting materials, saving energy consumption, and increasing work output.

Some of the research had been conducted to find out the relationship between intensive wages and employee productivity, such as: the research title: *"Desain Penentuan Insentif bagi Karyawan untuk Meningkatkan Dual Mutualisme antara Perusahaan dan Karyawan di PT. Arista Assembling and Packing Surabaya"* (Prabowo, 2018); *"Perencanaan Upah Insentif untuk Meningkatkan Kinerja Karyawan di PT. Praoe Lajar Semarang* (Cahyantari & Purwaningsih, 2017)*",* dan "*Perencanaan Upah Insentif untuk Meningkatkan Kinerja Karyawan dan Meningkatkan Hasil Produksi yang Optimal di PD. Panduan Ilahi* (Hauten & Gunadhi, 2013)*; Compensation has a positive and significant effect on employee performance, in the article "Effect of Compensation on Employee Performance towards Motivation as Mediation Variable"* (Candradewi & Dewi, 2019)*; Non pay incentives significantly correlates with employee's productivity in the article "Effects of Incentives on Employees Productivity"* (Daniel, 2019). Djula (2010), Olla et.al (2015), and Alan (2011) also concluded that in order to improve employee work performance, companies should increase their attention to improving employee welfare so that employees feel secure at work.

Standard time is the time that takes a normal worker to complete a job that is carried out in the best work system (Sutalaksana et al., 2006). When the time or standard output has been determined successfully, management will have the convenience of making an evaluation of the operator's work performance. Time or standard output will be benchmarks and targets to be achieved by a worker. For those who succeed in exceeding the predetermined standards, of course, they must be rewarded with appropriate rewards (incentives or bonuses) in accordance with the achievements that have been shown. The main purpose of providing incentives is none other than to increase the efficiency and productivity of their work. It should also be noted here that the increase in operator work efficiency will be able to have a direct impact on increasing production output and consequently will reduce the overhead cost per unit of the product produced (Rahdiana et al., 2020).

Therefore, the authors are interested in conducting a similar study with the title "Design of Incentive Wages with Standard Time to Improve Package Operator Performance (A Case Study PT. XYZ)". Before applying incentive pay, it must be designed or designed a fair work system, where this work system will not harm one party, either the company or the employee.

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Furthermore, keep the incentive design as simple as possible. Because the simpler the plan we are going to make, the easier it will be for both parties to understand, so it is more likely that the plan will be approved. The design of individual incentives will be easier to understand, besides that, by providing incentives, employees will work as well as possible provided that the individual output of each employee can be calculated (Rahdiana et al., 2020).

The work unit chosen as the research site is the finishing department, manual copy wrapping unit, whose activities can be seen in the picture below.

Figure 1. Photocopy manual wrapping workstation

In this study, the authors try to design incentive wages with several calculation methods which can be compared and selected as an alternative for companies in determining incentive wages for employees.

## RESEARCH METHOD

### A. Flow Chart of The Research

Flow *chart* of the research is shown in Figure 2.

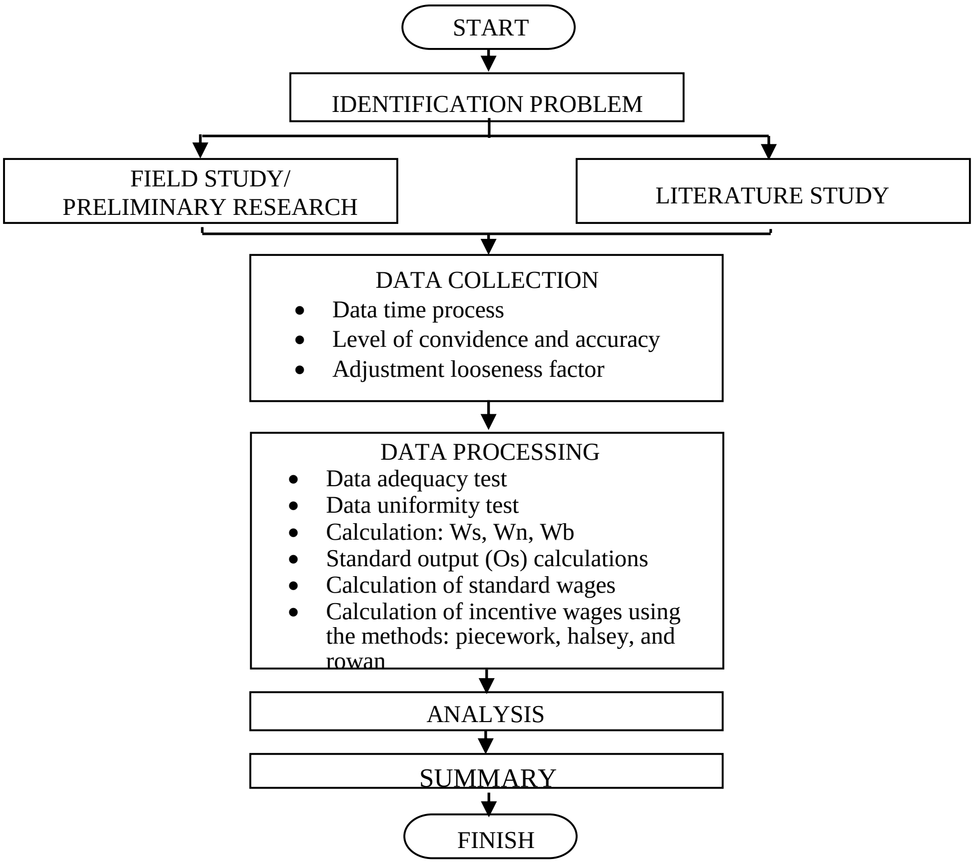


Figure 2. Research flowchart

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**B. Research Methodology**

Research methodology that used in this research is descriptive method which can be described as follows:

1. Identification Problem
   Problem identification as part of the research process can be understood as an effort to define the problem and make the definition measurable as the first step in research.
2. Field of Study (Preliminary Research).
   Preliminary research was carried out by direct survey to the company (field study) to determine the actual working conditions and to find out the activities carried out in the production process, in the finishing department, photocopy manual wrapping work unit.
3. Literature of Study
   This literature study is carried out by researchers after determining the research topic and determining the formulation of the problem, before going to the field to collect the necessary data. The literature study is carried out by searching various written sources, in the form of books, archives, magazines, articles, and journals that are relevant to the research theme.
4. Data Collection
   At this step, the authors measure working time data, analysis of movement studies and movement economics to assist in determining the adjustment factor and allowance factor of the operator during observation/measurement, determining the level of confidence and accuracy during measurement, recording production data, the number of workers, and calculations. Labor wages used by the company.
   The Finishing Department of the photocopy manual wrapping work unit has two lines production, each of which consists of ten operators. Data were collected in two lines production and compared them.
5. Data Processing
   At this stage, the cycle time, normal time and standard time will be calculated. Determination of the level of confidence and the level of accuracy will determine the validity of the measurement data. The standard output calculation is determined based on the normal ability of the workers which is calculated based on the standard time.
6. Alternative Problem Solving (Selection of Incentive Wage Plans)
   The researcher makes an incentive wage design based on the concept of standard time to improve employee performance, with several methods, namely: wages and incentives based on piecework, wages and incentives based on time saved (Halsey plan), and wages and incentives based on working time (Rowan plan). Henceforth, the researcher will compare with the wage system used by the company (straight piecework), that is, wages are paid based on all products produced multiplied by the wage rate per piece or per unit.
7. Summary and Suggestion
   At this stage the researcher makes a comparison of the total amount of operator or employee wage receipt, as an alternative for companies in determining wages and incentives for employees in the finishing department, manual wrapping work unit. And the suggestion is that the company can carry out an analysis to select the most appropriate method to be applied that is able to provide dual mutualism between the company and its employees.

**RESULT AND DISCUSSION**

The results and discussion describes data collection, data processing, and data analysis to design incentive wages using the piecework, Halsey, and Rowan methods which are then compared to the wage system used by the company, so that it can be selected as an alternative company in determining the wage system for employees.

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## A. Data Collection

1. Data Production

The following is the wrapper operator production report data for the period February 2020.

Table 1. Recap of line A daily production report for the period of February 2020 (ream)

| | Operator | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **A1** | **A2** | **A3** | **A4** | **A5** | **A5** | **A7** | **A8** | **A9** | **A10** |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | 708 | 686 | 676 | 735 | 727 | 765 | 667 | 775 | 663 | 802 |
| 4 | 747 | 750 | 729 | 760 | 703 | 768 | 672 | 770 | 774 | 798 |
| 5 | 805 | 737 | 779 | 716 | 681 | 743 | 719 | 727 | 704 | 792 |
| 6 | 760 | 659 | 681 | 698 | 732 | 718 | 651 | 674 | 686 | 790 |
| 7 | 712 | 690 | 681 | 704 | 650 | 670 | 706 | 663 | 766 | 791 |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | 781 | 721 | 659 | 733 | 703 | 786 | 714 | 771 | 681 | 784 |
| 11 | 801 | 685 | 654 | 748 | 742 | 791 | 732 | 714 | 732 | 792 |
| 12 | 793 | 775 | 725 | 780 | 745 | 783 | 739 | 680 | 679 | 795 |
| 13 | 795 | 687 | 736 | 781 | 779 | 793 | 673 | 698 | 693 | 801 |
| 14 | 790 | 738 | 728 | 772 | 737 | 678 | 721 | 732 | 700 | 783 |
| 15 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 17 | 686 | 719 | 668 | 657 | 771 | 785 | 653 | 720 | 703 | 802 |
| 18 | 800 | 710 | 750 | 664 | 684 | 804 | 674 | 728 | 723 | 807 |
| 19 | 757 | 734 | 665 | 664 | 766 | 808 | 739 | 662 | 717 | 797 |
| 20 | 696 | 658 | 669 | 683 | 734 | 781 | 653 | 688 | 704 | 805 |
| 21 | 755 | 692 | 671 | 715 | 716 | 783 | 710 | 764 | 672 | 780 |
| 22 | | | | | | | | | | |
| 23 | | | | | | | | | | |
| 24 | 717 | 721 | 667 | 765 | 746 | 725 | 746 | 742 | 810 | 735 |
| 25 | 713 | 676 | 700 | 727 | 659 | 761 | 679 | 652 | 808 | 748 |
| 26 | 702 | 709 | 737 | 779 | 673 | 665 | 691 | 679 | 808 | 776 |
| 27 | 709 | 733 | 690 | 761 | 708 | 676 | 669 | 701 | 794 | 805 |
| 28 | 711 | 744 | 680 | 705 | 703 | 721 | 722 | 669 | 791 | 686 |
| 29 | | | | | | | | | | |
| Total | 14.938 | 14.224 | 13.945 | 14.547 | 14.359 | 15.094 | 13.930 | 14.209 | 14.608 | 15.669 |
| Average | 746,90 | 711,20 | 697,25 | 727,35 | 717,95 | 754,70 | 696,50 | 710,45 | 730,40 | 783,45 |

Average production counted for line A

Daily average production = $\frac{(14.938 + 14.224 + \cdots + 15.669)}{10}$ = 14.552,30 ream

Rate of production/day/person = $\frac{(746{,}90 + 711{,}20 + \cdots + 783{,}45)}{10}$ = 727,62 ream

Line A "rough" average wrap processing time for the period February 2020

Total "second" work line A = (16 days x 7 hour x 60 minutes x 60 second) + (4 days x 6,5 hour x 60 minutes x 60 second)
= 496.800 second

Wrapping time average = $\frac{496.800}{14.552{,}30}$ = 34,14 second/ream

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Table 2. Recap of line B daily production report for the period of February 2020 (ream)

| Date | Operator | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B5 | B7 | B8 | B9 | B10 |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | 731 | 746 | 804 | 681 | 738 | 805 | 668 | 745 | 810 | 773 |
| 4 | 685 | 800 | 786 | 688 | 748 | 782 | 697 | 768 | 798 | 790 |
| 5 | 741 | 780 | 786 | 715 | 728 | 796 | 688 | 727 | 789 | 715 |
| 6 | 757 | 797 | 808 | 688 | 758 | 808 | 710 | 686 | 802 | 802 |
| 7 | 769 | 766 | 781 | 695 | 678 | 765 | 690 | 677 | 743 | 692 |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | 791 | 724 | 787 | 728 | 679 | 794 | 662 | 692 | 710 | 747 |
| 11 | 800 | 675 | 810 | 781 | 685 | 799 | 695 | 737 | 684 | 731 |
| 12 | 787 | 710 | 781 | 782 | 683 | 798 | 696 | 692 | 702 | 741 |
| 13 | 805 | 675 | 807 | 799 | 676 | 792 | 741 | 661 | 734 | 750 |
| 14 | 788 | 688 | 783 | 774 | 668 | 715 | 668 | 713 | 673 | 718 |
| 15 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 17 | 666 | 702 | 794 | 663 | 673 | 734 | 791 | 779 | 712 | 802 |
| 18 | 743 | 805 | 799 | 693 | 726 | 740 | 785 | 693 | 779 | 694 |
| 19 | 685 | 784 | 793 | 656 | 744 | 716 | 780 | 709 | 735 | 691 |
| 20 | 688 | 712 | 799 | 691 | 687 | 659 | 784 | 750 | 698 | 702 |
| 21 | 688 | 736 | 752 | 726 | 738 | 705 | 742 | 701 | 738 | 691 |
| 22 | | | | | | | | | | |
| 23 | | | | | | | | | | |
| 24 | 713 | 748 | 809 | 721 | 659 | 704 | 805 | 802 | 749 | 808 |
| 25 | 675 | 710 | 791 | 745 | 697 | 676 | 787 | 784 | 705 | 787 |
| 26 | 688 | 750 | 788 | 775 | 721 | 709 | 794 | 780 | 691 | 792 |
| 27 | 668 | 732 | 798 | 789 | 745 | 650 | 808 | 809 | 735 | 782 |
| 28 | 704 | 690 | 729 | 763 | 683 | 717 | 778 | 748 | 674 | 793 |
| 29 | | | | | | | | | | |
| Total | 14.572 | 14.730 | 15.785 | 14.553 | 14.114 | 14.864 | 14.769 | 14.653 | 14.661 | 15.001 |
| Average | 728,60 | 736,50 | 789,25 | 727,65 | 705,70 | 743,20 | 738,45 | 732,65 | 733,05 | 750,05 |

Average of production counted for line B

Daily average production = $\frac{(14.572 + 14.730 + \cdots + 15.001)}{10}$ = 14.770,20 ream

Rate of production/day/person = $\frac{(728,60 + 736,50 + \cdots + 750,05)}{10}$ = 738,51 ream

Line B "rough" average wrap processing time for the period February 2020

Total "second" work line B = (16 days x 7 hour x 60 minutes x 60 second) + (4 days x 6,5 hour x 60 minutes x 60 second)
= 496.800 second *(same with line A)*

Wrapping time average = $\frac{496.800}{14.770,20}$ = 33,64 second/ream

2. Operation Time Data Retrieval

Meanwhile, primary data collection was conducted by measuring the working time in a direct way, using the stopwatch method. Previously, the gauges had discussed and coordinated with the supervisor of the manual copy-wrapping work unit, in selecting the

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wrap operator to be the subject of data collection. To make it easier to collect data on work processing time, the meter replaces the stopwatch function with a camera, so the result is a video. The recording of working time per product (per ream) is taken by observing the video and time in the video, then recording it in the observation sheet.

Measurement of working time is taken for 20 days with a sample of one operator. The recapitulation of the measurement results data can be seen in Table 3.

Table 3. recapitulation on measurement results for wrap processing time in March 2020

| No | Date | n- observation | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 1 | 02-Mar | 30 | 36 | 28 | 34 | 32 | 30 | 30 | 29 | 26 | 31 | 26 | 34 | 31 | 26 | 27 | 25 | 26 | 34 | 35 | 33 |
| 2 | 03-Mar | 29 | 37 | 25 | 34 | 34 | 33 | 25 | 36 | 36 | 27 | 30 | 28 | 33 | 32 | 36 | 34 | 26 | 36 | 35 | 30 |
| 3 | 04-Mar | 36 | 34 | 32 | 32 | 25 | 33 | 37 | 33 | 30 | 32 | 33 | 30 | 27 | 36 | 29 | 32 | 26 | 28 | 36 | 30 |
| 4 | 05-Mar | 31 | 36 | 27 | 29 | 26 | 34 | 29 | 25 | 33 | 35 | 27 | 30 | 31 | 28 | 32 | 30 | 28 | 37 | 33 | 25 |
| 5 | 06-Mar | 35 | 26 | 34 | 26 | 31 | 35 | 29 | 31 | 25 | 27 | 33 | 26 | 29 | 37 | 37 | 34 | 36 | 31 | 36 | 30 |
| 6 | 09-Mar | 35 | 34 | 32 | 33 | 30 | 28 | 29 | 30 | 31 | 34 | 30 | 28 | 34 | 29 | 27 | 35 | 33 | 35 | 29 | 35 |
| 7 | 10-Mar | 31 | 32 | 35 | 28 | 30 | 34 | 28 | 27 | 33 | 34 | 27 | 28 | 34 | 33 | 33 | 28 | 27 | 34 | 28 | 27 |
| 8 | 11-Mar | 34 | 33 | 32 | 30 | 27 | 29 | 29 | 29 | 33 | 34 | 33 | 27 | 27 | 30 | 33 | 28 | 30 | 28 | 30 | 34 |
| 9 | 12-Mar | 34 | 34 | 30 | 35 | 27 | 33 | 29 | 27 | 31 | 32 | 27 | 28 | 30 | 32 | 33 | 31 | 34 | 27 | 34 | 34 |
| 10 | 13-Mar | 32 | 28 | 28 | 29 | 35 | 30 | 28 | 28 | 32 | 35 | 27 | 29 | 32 | 30 | 35 | 35 | 28 | 34 | 30 | 34 |
| 11 | 16-Mar | 32 | 30 | 29 | 29 | 34 | 29 | 29 | 35 | 32 | 32 | 33 | 34 | 28 | 29 | 32 | 31 | 33 | 34 | 34 | 28 |
| 12 | 17-Mar | 35 | 29 | 31 | 27 | 34 | 27 | 32 | 27 | 33 | 30 | 33 | 35 | 30 | 33 | 35 | 28 | 27 | 35 | 29 | 33 |
| 13 | 18-Mar | 32 | 29 | 35 | 34 | 33 | 29 | 29 | 30 | 28 | 31 | 35 | 27 | 33 | 29 | 27 | 34 | 35 | 27 | 32 | 32 |
| 14 | 19-Mar | 29 | 31 | 34 | 35 | 31 | 34 | 30 | 31 | 33 | 27 | 33 | 27 | 31 | 27 | 30 | 34 | 29 | 33 | 34 | 34 |
| 15 | 20-Mar | 35 | 30 | 33 | 30 | 31 | 35 | 35 | 34 | 33 | 35 | 34 | 28 | 33 | 29 | 28 | 34 | 33 | 34 | 29 | 31 |
| 16 | 23-Mar | 33 | 28 | 35 | 25 | 26 | 27 | 26 | 33 | 26 | 29 | 26 | 33 | 28 | 31 | 29 | 29 | 37 | 34 | 35 | 31 |
| 17 | 24-Mar | 34 | 32 | 25 | 33 | 28 | 34 | 31 | 26 | 29 | 36 | 36 | 29 | 27 | 31 | 29 | 35 | 31 | 31 | 32 | 27 |
| 18 | 25-Mar | 29 | 36 | 30 | 30 | 35 | 35 | 37 | 37 | 32 | 31 | 33 | 31 | 37 | 31 | 27 | 27 | 34 | 37 | 31 | 31 |
| 19 | 26-Mar | 36 | 30 | 25 | 28 | 32 | 30 | 34 | 34 | 26 | 36 | 30 | 36 | 30 | 27 | 37 | 25 | 35 | 37 | 37 | 33 |
| 20 | 27-Mar | 37 | 30 | 28 | 32 | 31 | 35 | 34 | 36 | 30 | 27 | 32 | 32 | 36 | 34 | 37 | 29 | 25 | 35 | 29 | 25 |

## B. Data Processing

1. Data Adequacy Test

The data adequacy test can be done using the following formula (Barnes, 1980):

$$N' = \left[ \frac{\frac{z}{s}\sqrt{N.\sum X_i^2 - (\sum X_i)^2}}{\sum X_i} \right]^2 \quad (1)$$

According to the observations during the measurement process, the gauge determines an accuracy level of 5%, and a confidence level of 95%, meaning that the meter is 95% sure that the measurement data only deviates a maximum of 5% from the actual average. With the level of confidence (k) = 95%, then the z value (obtained from table Z) = 1,96 ≈ 2. So that the calculation results can be seen as follows:

$$N' = \left[ \frac{\frac{2}{0{,}05}\sqrt{400\ (30^2 + 36^2 + \cdots + 25^2) - (30 + 36 + \cdots + 25)^2}}{(30 + 36 + \cdots + 25)} \right]^2$$

$$N' = \left[ \frac{\frac{2}{0{,}05}\sqrt{400\ (393.465) - (12.479)^2}}{(12.479)} \right]^2$$

$$N' = \left[ \frac{40\sqrt{157.386.000 - 155.725.441}}{12.479} \right]^2$$

$$N' = \left[ \frac{40\sqrt{1.660.559}}{12.479} \right]^2$$

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$$N' = \left[\frac{51.545,07}{12.479}\right]^2$$
$$N' = [4,13]^2 \quad = 17,06$$

From the calculation above N' < N (17,06 < 400). Thus the amount of data is sufficient.

2. Data Uniformity Test

In the uniformity test, the data were divided into 20 subgroups, namely adjusting the measurement data where the data of 1 group was the measurement data in 1 (one) day, so that the data in 1 group were not mixed with data from different days. The results of grouping the measurement data into subgroups can be seen in Table 4, below:

Table 4. The downtime time measurement subgroup table

| Sub Group | n- observation | | | | | | | | | | | | | | | | | | | | average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 1 | 30 | 36 | 28 | 34 | 32 | 30 | 30 | 29 | 26 | 31 | 26 | 34 | 31 | 26 | 27 | 25 | 26 | 34 | 35 | 33 | 30,15 |
| 2 | 29 | 37 | 25 | 34 | 34 | 33 | 25 | 36 | 36 | 27 | 30 | 28 | 33 | 32 | 36 | 34 | 26 | 36 | 35 | 30 | 31,80 |
| 3 | 36 | 34 | 32 | 32 | 25 | 33 | 37 | 33 | 30 | 32 | 33 | 30 | 27 | 36 | 29 | 32 | 26 | 28 | 36 | 30 | 31,55 |
| 4 | 31 | 36 | 27 | 29 | 26 | 34 | 29 | 25 | 33 | 35 | 27 | 30 | 31 | 28 | 32 | 30 | 28 | 37 | 33 | 25 | 30,30 |
| 5 | 35 | 26 | 34 | 26 | 31 | 35 | 29 | 31 | 25 | 27 | 33 | 26 | 29 | 37 | 37 | 34 | 36 | 31 | 36 | 30 | 31,40 |
| 6 | 35 | 34 | 32 | 33 | 30 | 28 | 29 | 30 | 31 | 34 | 30 | 28 | 34 | 29 | 27 | 35 | 33 | 35 | 29 | 35 | 31,55 |
| 7 | 31 | 32 | 35 | 28 | 30 | 34 | 28 | 27 | 33 | 34 | 27 | 28 | 34 | 33 | 33 | 28 | 27 | 34 | 28 | 27 | 30,55 |
| 8 | 34 | 33 | 32 | 30 | 27 | 29 | 29 | 29 | 33 | 34 | 33 | 27 | 27 | 30 | 33 | 28 | 30 | 28 | 30 | 34 | 30,50 |
| 9 | 34 | 34 | 30 | 35 | 27 | 33 | 29 | 27 | 31 | 32 | 27 | 28 | 30 | 32 | 33 | 31 | 34 | 27 | 34 | 34 | 31,10 |
| 10 | 32 | 28 | 28 | 29 | 35 | 30 | 28 | 28 | 32 | 35 | 27 | 29 | 32 | 30 | 35 | 35 | 28 | 34 | 30 | 34 | 30,95 |
| 11 | 32 | 30 | 29 | 29 | 34 | 29 | 29 | 35 | 32 | 32 | 33 | 34 | 28 | 29 | 32 | 31 | 33 | 34 | 34 | 28 | 31,35 |
| 12 | 35 | 29 | 31 | 27 | 34 | 27 | 32 | 27 | 33 | 30 | 33 | 35 | 30 | 33 | 35 | 28 | 27 | 35 | 29 | 33 | 31,15 |
| 13 | 32 | 29 | 35 | 34 | 33 | 29 | 29 | 30 | 28 | 31 | 35 | 27 | 33 | 29 | 27 | 34 | 35 | 27 | 32 | 32 | 31,05 |
| 14 | 29 | 31 | 34 | 35 | 31 | 34 | 30 | 31 | 33 | 27 | 33 | 27 | 31 | 27 | 30 | 34 | 29 | 33 | 34 | 34 | 31,35 |
| 15 | 35 | 30 | 33 | 30 | 31 | 35 | 35 | 34 | 33 | 35 | 34 | 28 | 33 | 29 | 28 | 34 | 33 | 34 | 29 | 31 | 32,20 |
| 16 | 33 | 28 | 35 | 25 | 26 | 27 | 26 | 33 | 26 | 29 | 26 | 33 | 28 | 31 | 29 | 29 | 37 | 34 | 35 | 31 | 30,05 |
| 17 | 34 | 32 | 25 | 33 | 28 | 34 | 31 | 26 | 29 | 36 | 36 | 29 | 27 | 31 | 29 | 35 | 31 | 31 | 32 | 27 | 30,80 |
| 18 | 29 | 36 | 30 | 30 | 35 | 35 | 37 | 37 | 32 | 31 | 33 | 31 | 37 | 31 | 27 | 27 | 34 | 37 | 31 | 31 | 32,55 |
| 19 | 36 | 30 | 25 | 28 | 32 | 30 | 34 | 34 | 26 | 36 | 30 | 36 | 30 | 27 | 37 | 25 | 35 | 37 | 37 | 33 | 31,90 |
| 20 | 37 | 30 | 28 | 32 | 31 | 35 | 34 | 36 | 30 | 27 | 32 | 32 | 36 | 34 | 37 | 29 | 25 | 35 | 29 | 25 | 31,70 |
| | | | | | | | | | | Total | | | | | | | | | | | 623,95 |

The following is the calculation of the data variety test at an accuracy level of 5% and a confidence level of 95%.

a. Subgroup average ($\overline{\overline{X}}$) = $\frac{623,95}{20} = 31,20$

b. Actual Standard deviation from finishing time ($\sigma$)

$$\sigma = \sqrt{\frac{(30-31,20)^2 + (36-31,20)^2 + \cdots + (25-31,20)^2}{400-1}} = 3,23$$

c. Standard deviation from average distribution sub group ($\sigma_{\overline{\overline{X}}}$)

$$\sigma_{\overline{\overline{X}}} = \frac{3,23}{\sqrt{20}} = 0,72$$

d. Upper Control Limit and Lower Control Limit, at confidence level 95% (z=2)

$(BKA) = \overline{\overline{X}} + z\sigma_{\overline{\overline{X}}}$ = 31,20 + 2 (0,72) = 32,64

$(BKB) = \overline{\overline{X}} - z\sigma_{\overline{\overline{X}}}$ = 31,20 – 2 (0,72) = 29,76

e. Map Control

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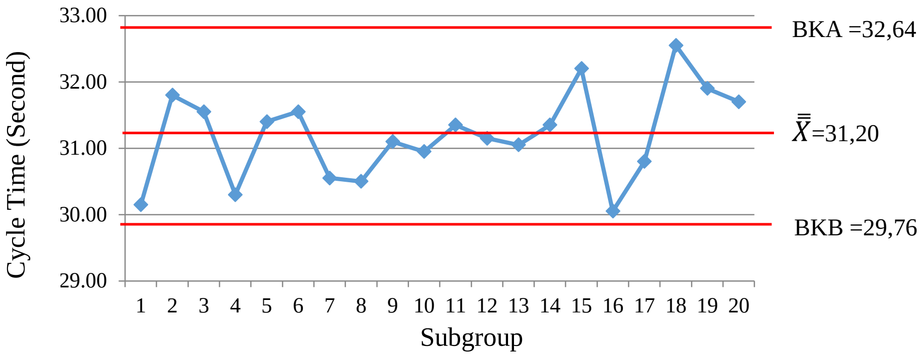


Figure 3. Time measurement control map stopwatch method

The results of the variety test showed that all the subgroup average data were within the control limits, so it could be concluded that the data were uniform.

3. Cycle Time Calculation (Ws)

A simple cycle time calculation can be obtained from the subgroup table data, namely the following calculation (Barnes, 1980):

$$Ws = \bar{\bar{X}} = \frac{623{,}95}{20} = 31{,}20 \text{ second}$$

4. Normal Time Calculation (Wn)

The normal time calculation formula is as follow (Barnes, 1980):

Wn = Ws x p

The following is how to determine the adjustment factor (performance rating) with the Westinghouse method which divides the assessment criteria into 4 (four) parts, namely skills, effort, working conditions, and consistency (Sutalaksana et al., 2006).

The calculation using wastinghouse:

| | | |
|---|---|---|
| Ability | : Good *(C1)* | = +0,06 |
| Effort | : *Good (C2)* | = +0,02 |
| Work Condition | : *Average (D)* | = 0,00 |
| Consistency | : *Fair (E)* | = -0,02 |
| Total | | = +0,06 |

p score is:

p = 1 + 0,06 = 1,06 or 106%

With a p value = 106%, it means that the meter gives its assessment to the wrapper operator as “working too fast”. The gauges assess that the operator feels observed and judged. Thus, he tries to show his best work, so it seems a little rushed. Based on cycle time data and adjustment values that have been determined by the Westinghouse method, the normal time can be calculated as follows:

Wn = 31,20 x 1,06 = 33,07 second

5. Standard Calculation Time (Wb)

The formula for calculating normal time is as follows (Barnes, 1980):

Wb = Wn x (1 + allowance)

For the calculation of standard time, it is necessary to determine how much leeway will be given to the operator in completing the work? Allowance is given for 3 (three) things, namely: leeway for personal needs, eliminating fatigue (fatigue), and obstacles that cannot be avoided (Sutalaksana et al., 2006).

From the results of observations in the measuring field try to determine the amount of allowance, with the following calculations:

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a. Looseness to removed fatigue.
   - Ignored the power ouput = 2,5%
   - Work attitude while sitting = 0,3%
   - Normal work movement = 0%
   - Intermitten sight view = 1,5%
   - Normal room temperature and humidity = 0,5%
   - Good atmosfer situation = 0%
   - Good physical environment (not noisy) = 0%

   Total = 4,8%
b. Loosenes for private needs (female) = 2%
c. Looseness for obstacles inevitable = 1%

**Total Looseness = 7,8%**

Accordingly:

Wb = 33,07 x (1 + 0,078)
= 33,07 x (1,078) = 35,65 second ≈ 0,0099 hour

Thus, based on the calculation, the standard time (standard time) for this job is 0,0099 hours

6. Standard Output Calculation

In order to be able to find out how much work output a worker can produce in per minute, it can be searched for the standard output calculation formula as follows (Rahdiana et al., 2020):

$$O_s = \frac{1}{\text{Wb}} = \frac{1}{0{,}0099} = 100{,}9818 \text{ reams/hour} \approx 100 \text{ reams/hour}$$

If in 1 working day there are 7 effective working hours, then the daily output = 7 hours x 100 reams/hour = 700 reams/day.

7. First Standard Production (Output Actual)

This standard data production is obtained from existing data in the company which is the actual output that can be produced. We can see this data from Table 1 and Table 2, which is a recap of actual production data. If we calculate the average production from line A and line B, the result is:

$$\text{Average Production} = \frac{727{,}62+738{,}51}{2} = 733{,}065 \text{ reams/day}$$

Currently, the company provides a production target for packaging operators of 800 reams/day. While the calculation of wages per unit (per ream), the company calculates the 20 effective working days with the following formula:

$$\text{Wage per ream} = \frac{Rp.\ 4.200.000}{800\frac{ream}{day} \times 20\ Effective\ day\ work}$$

$$= \frac{Rp.\ 4.200.000}{16.000}$$

= Rp. 262,5/ ream

Meanwhile, the actual wage per day, assuming an average production of 733 reams per day, the wage is = 733 x Rp. 262,5 = Rp. 192.413 per day. To make it easier to calculate, we will round up the amount of wages to Rp. 193.000, - per day.

8. Calculation of Incentive Wage

The total wages received by workers are equal to the basic wage plus incentives. The basis for determining the payment of incentives paid is the efficiency of the operator's work as measured by the output produced compared to the standard output set (Wignjosoebroto, 2003).

When the standard time (standard time) and standard output have been successfully determined, the company (management) has the convenience of evaluating the employee's

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work performance. Time and standard output become benchmarks in determining target workers. For those who succeed in exceeding the targets that have been set, of course they must be rewarded by providing rewards, incentives or bonuses.

The main purpose of giving incentives to employees is basically to motivate them to work better and be able to show good performance (Faozi, et.al., 2017). This method is a very effective way to increase the company's production results. The application of the incentive wage system is intended so that companies are able to encourage increased work productivity of employees, and retain employees who excel to remain in the company.

In this study, a worker will get an incentive or wages per day greater than Rp. 193,000.- if you can produce a product (ream of paper) with an amount more than the standard output (Os) = 700 reams/day.

These are some methods of the draft wages intensive (bonus) that discussed in this research:

a. Piecework Method

The piecework is the most basic incentive plan. This piecework system is highly individualistic and provides workers according to the portion of their contribution to increasing productivity. The basis of this method is that all wage payments for workers are directly proportional to the units of work output produced. To calculate how much incentive a worker can receive, it is necessary to know the unit wage, which is Rp. 262,5 per ream (according to the calculation above).

Thus, the calculation of wages that can be received by workers (pack operators) according to the piecework method for output per day of 650 reams, 700 reams, 750 reams, 800 reams, 850 reams, 900 reams, 850 reams, and 1.000 reams is as follows:

The incentive wage calculation for daily output of 800 reams is:

- Incentive wage = (Actual Output– Target Output) x Wage of work per unit
  = (800 – 700) ream x Rp. 262,5 per ream
  = 100 x Rp. 262,5 = Rp. 26.250,-

Table 5. Daily wages piecework method

| Unit Output per Day (Ream) | Basic Wage (Rp) | Incentive Wage (Rp) | Total wage Received per Day (Rp) |
|---|---|---|---|
| 650 | Rp. 193.000,- | - | Rp. 193.000,- |
| 700 | Rp. 193.000,- | - | Rp. 193.000,- |
| 750 | Rp. 193.000,- | Rp. 13.125,- | Rp. 206.125,- |
| 800 | Rp. 193.000,- | Rp. 26.250,- | Rp. 219.250,- |
| 850 | Rp. 193.000,- | Rp. 39.375,- | Rp. 232.375,- |
| 900 | Rp. 193.000,- | Rp. 52.500,- | Rp. 245.500,- |
| 950 | Rp. 193.000,- | Rp. 65.625,- | Rp. 258.625,- |
| 1.000 | Rp. 193.000,- | Rp. 78.750,- | Rp. 271.750,- |

b. Halsey Method

The calculation of incentive wages using the Hasley method, workers will receive an incentive of 50% of time saved. Then the calculation of the wages received by the operator per day of daily output of 800 reams is:

- Incentive wage = $\left(\frac{Output\ Aktual - Output\ Standar}{Output\ Standar}\right)$ x 50% x Wage per day
  = $\left(\frac{800-700}{700}\right)$ x 50% x Rp. 193.000,-
  = Rp. 13.786,- per day
- So the package operator wages per day is Rp. 193.000,- + Rp. 13.786,- = Rp. 206,786,- per day

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Finally, the wages received by pack operators according to the Halsey method for output per day of 650 rim, 700 rim, 750 rim, 800 rim, 850 rim, 900 rim, 850 rim, and 1.000 rim are as follows:

Table 6. Daily wage halsey method

| Unit Output per Day (Rim) | Basic Wage (Rp) | Incentive Wage (Rp) | Total Wage daily Received (Rp) |
|---|---|---|---|
| 650 | Rp. 193.000,- | - | Rp. 193.000,- |
| 700 | Rp. 193.000,- | - | Rp. 193.000,- |
| 750 | Rp. 193.000,- | Rp. 6.893,- | Rp. 199.893,- |
| 800 | Rp. 193.000,- | Rp. 13.786,- | Rp. 206.786,- |
| 850 | Rp. 193.000,- | Rp. 20.679,- | Rp. 213.679,- |
| 900 | Rp. 193.000,- | Rp. 27.571,- | Rp. 220.571,- |
| 950 | Rp. 193.000,- | Rp. 34.464,- | Rp. 227.464,- |
| 1.000 | Rp. 193.000,- | Rp. 41.357,- | Rp. 23.357,- |

c. Rowan Method

In the Rowan method, the calculation of incentive wages is based on time worked. In this method, workers also have to work on the output above the saved standard time, but the basic wage is still guaranteed. An example of calculating incentive wages using the Rowan method can be seen as follows:

Thus, the calculation of the wages received by the operator per day of daily output of 800 reams is:

- Incentive Wage $= \left(\frac{Actual\ Output - StandarOutput}{Actual\ Output}\right)$ x wage per day

  $= \left(\frac{800 - 700}{800}\right)$ x Rp. 193.000,-

  = Rp. 24.125,- per day
- So the package operator wages per day is Rp. 193.000,- + Rp. 24.125,- = Rp. 217.125,- per day

Thus, the wages received by pack operators according to the Rowan method for output per day of 650 reams, 700 reams, 750 reams, 800 rims, 850 rims, 900 rims, 850 rims, and 1.000 rims are as follows:

Table 7. Daily wage rowan method

| Unit Output per Day (Rim) | Basic Wage (Rp) | Incentive Wage (Rp) | Total Wage Received per Hari (Rp) |
|---|---|---|---|
| 650 | Rp. 193.000,- | - | Rp. 193.000,- |
| 700 | Rp. 193.000,- | - | Rp. 193.000,- |
| 750 | Rp. 193.000,- | Rp. 12.867,- | Rp. 205.867,- |
| 800 | Rp. 193.000,- | Rp. 24.125,- | Rp. 217.125,- |
| 850 | Rp. 193.000,- | Rp. 34.059,- | Rp. 227.059,- |
| 900 | Rp. 193.000,- | Rp. 42.889,- | Rp. 235.889,- |
| 950 | Rp. 193.000,- | Rp. 50.789,- | Rp. 243.789,- |
| 1.000 | Rp. 193.000,- | Rp. 57.900,- | Rp. 250.900,- |

## C. Data Analysis

From the calculation of several methods above, it is possible to plan a proposal for an incentive system based on the excess products achieved by the workers and the guaranteed unit rate plan. Because with the proposal, the company or the workers (employees) are not both disadvantaged or in other words, are mutually benefited (dual mutualism).

Several methods of calculating incentives for workers which calculated in this study include: the piecework method, the Halsey method, and the Rowan method. The comparison

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between the three methods and the wage method used by the company, namely the straight piecework method, can be seen in Table 8 and Figure 4.

Table 8. Worker daily comparison wage

| Output per Day(Rim) | Company System | *Piecework* Method | *Halsey* Method | *Rowan* Method |
|---|---|---|---|---|
| 650 | Rp. 170.625,- | Rp. 193.000,- | Rp. 193.000,- | Rp. 193.000,- |
| 700 | Rp. 183.750,- | Rp. 193.000,- | Rp. 193.000,- | Rp. 193.000,- |
| 750 | Rp. 196.875,- | Rp. 206.125,- | Rp. 199.893,- | Rp. 205.867,- |
| 800 | Rp. 210.000,- | Rp. 219.250,- | Rp. 206.786,- | Rp. 217.125,- |
| 850 | Rp. 223.125,- | Rp. 232.375,- | Rp. 213.679,- | Rp. 227.059,- |
| 900 | Rp. 236.250,- | Rp. 245.500,- | Rp. 220.571,- | Rp. 235.889,- |
| 950 | Rp. 249.375,- | Rp. 258.625,- | Rp. 227.464,- | Rp. 243.789,- |
| 1.000 | Rp. 262.500,- | Rp. 271.750,- | Rp. 234.357,- | Rp. 250.900,- |

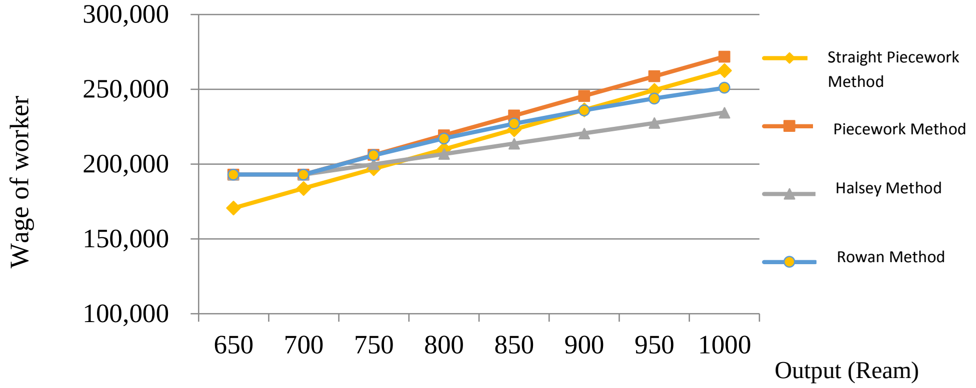


Figure 4. Comparison of wage method

From the 4 (four) methods of calculating the incentive wage above, the comparison can be seen clearly, especially the comparison of the wage system used by the company (straight piecework) with the other three incentive wage system designs (piecework, Halsey, and Rowan). The system used by the company is lower than the other three methods, especially at an output of 650-750 reams per day. The wage system that has been used so far has not had a beneficial impact on workers, because there is no motivation for workers to produce a greater work output, this is evidenced by an average output of 733 reams per day.

The wage system used by the company is considered less profitable for pack operator workers. The wages received by workers are paid based on all products produced multiplied by the piece rate or per unit wage, there is no minimum wage or basic wage guaranteed by the company. When workers are in a bad condition (for example, sick), they cannot produce a large amount of output, thus impacting the income or wages received. Meanwhile, for the piecework, halsey, and rowan methods, namely an incentive-based wage system, workers are guaranteed a basic wage.

From the comparison of the three incentive wage design methods, the authors recommend the Halsey method as the best method that is able to provide benefits for both the company and for workers which we call dual mutualism. The Halsey method provides lower wages than the piecework and rowan method, especially at output levels above the standard output (700 rim). However, the Halsey method still guarantees a basic wage and a decent incentive wage for workers as a motivation to work faster and better.

The second reason the authors chose the Halsey method is related to the output value that the company targets is 800 reams per day, this is a very realistic figure for workers to achieve, of course with a little improvement in working methods and increasing work discipline. For an

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output value above 800 reams per day (7 hours of work per day), this is a number that is very risky of being exposed to occupational diseases or accidents.

## CONCLUSIONS

The conclusions that can be drawn from this study based on the results of data processing and discussion analysis are The standard time (Wb) measured using the stopwatch time study method for 400 sample observations is 35,65 seconds per ream or 0,0099 hours per ream. The standard output (Os) that can be produced by a worker (pack operator) based on the predetermined standard time is 100 reams/hour or 700 reams/day with an effective working time of 7 hours per day. This value is smaller than the average production recapitulated during the study, which is 733 reams / day. Thus, workers who are able to produce an output of more than 700 reams / day have the opportunity to get production incentives or bonuses. Based on a comparison of the wage system used by the company (the straight piecework method) with the three incentive wage methods (the piecework method, the Halsey method, and the Rowan method), it shows that the wage system used by the company has not implemented an incentive wage system, because the wages received by workers are paid. based on the entire product or output produced multiplied by the piece rate wage. From the comparison of the three incentive wage methods, the authors conclude that the Halsey method is the best method that companies can apply to increase mobility, performance, and productivity, because this method is able to provide benefits for both companies and workers.

To ensure that the method chosen is truly tested and measurable, the author's advice is that the company can carry out a simulation first, and of course the company still has the opportunity to improve the work method of the wrapper operator (with its motion study), improve the work system (including layout or work station layout), and the physical work environment optimally as an effort to make corrections to the currently obtained standard time values.

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