



## Analysis of Working Time Measurement and Incentives Work to Increase Shoe Upper Production at CV. Esa Kalen Jaya

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### Abstract

As time goes by, competition in the industrial world is increasing, every company is required to be able to compete with other companies. CV.Esa Kalen Jaya is a company that produces semi-finished goods, namely shoe uppers. Where there are obstacles in the form of not being able to fulfill the production targets that have been determined by the company which results in the company's productivity not being optimal. This research was conducted to calculate standard production time through direct observation using a stopwatch time study as well as improving the regulation of the number of working hours and providing work incentives using the piecework plan method. as an effort to increase company productivity.. Results obtained. The standard output obtained is 4588.48 units/month. And after increasing the number of production working hours to 8 working hours, the results were 5,234 units/month, which means the production target has been achieved. And based on the calculation of incentives that the company will provide in standard hourly wages, namely IDR 7,051.41/hour. It can be concluded that by determining the standard production time and determining the number of working hours, the production results have achieved the set production targets.

## Introduction

Increasing productivity is closely related to production planning and scheduling through standard time calculations (Afiani & Pujotomo, 2017). CV.Esa Kalen Jaya is a subsidiary of the manufacturing holding company PT.Esa Kalen Jaya which is located at Jl.Jombang Temuwulan, Perak District, Jombang Regency, East Java 61461. Where output production upper The resulting shoes will then be distributed to the parent company to be assembled parts others become finished shoe products that are ready to be marketed. Manufacturing production process flow upper. This shoe consists of two line production in a sequence of stages including Warehouse, gluing and cutting materials, sticking or gluing, sewing, foam turning, tongue trapping upper, rope installation upper, cutting and fireplace,Quality control,and last finishing and packing.

The daily production target for shoe uppers at CV.Esa Kalen Jaya is no less than 200 pcs of uppers which are divided into two production lines where each production line has a production target set by the company every day. However, the problem that occurs in the company is that the production target cannot be met. Often companies experience a shortage of savings at the parent company, causing the company's productivity to not reach optimal conditions. It is necessary to measure working time to obtain production time standards. To obtain production output standards through direct observation with a time study stopwatch.

Achieving production targets cannot be separated from high employee performance (Farida & Setiawan, 2022). There is a work incentive program as an effort to increase productivity with production results reaching predetermined production targets. Providing work incentives can be done using the contract method so that the expected output results will reach the production target without exceeding the specified time standards. If the unit of output produced is less than or equal to the standard, then the wage the worker receives is the basic (standard) wage. However, if workers can produce units that exceed the standard, they will receive incentives with a percentage according to the number of units produced (Rachmawati, 2021). The work incentive program is given if the production output produced by the worker exceeds the daily production target set and is calculated at IDR 7,000 multiplied by the number of production units produced by the worker. This program is planned as an effort to increase company productivity to achieve production optimization. Based on the problems above, the basis of this research is to analyze the determination of standard time through measuring working time using the Stopwatch Time Study method and providing work incentives to workers as an effort to increase productivity to achieve production targets by increasing the number of workers. upper shoe production at CV.Esa Kalen Jaya.

### **Productivity**

One very important element in the sustainability of a company is productivity. Productivity can also be interpreted as the effective and efficient use of resources (input) to produce or increase the output of goods and services. Every company must pay attention to the factors that influence work productivity if it wants to increase the work productivity of its employees in order to achieve the optimal production targets that have been set (Douw et al., 2021). A production target is something that is set to be achieved in the future by industrial companies, especially industries that are centered on companies that process raw materials into a product (Alwi, 2022; Kristoffersen et al., 2020).

### **Working Time Measurement (Stopwatch Time Study)**

Measuring working time (Time Study) is an activity to determine the time needed by an operator or employee to complete work activities under normal conditions and tempo (Fardiansyah et al., 2022). To increase productivity values, one way that can be done is to calculate standard time. Standard time is defined as the amount of time required by workers with a normal working time tempo to complete a certain task with a predetermined work system. Standard time is important data needed to plan the division of labor and determine the optimal number of workers in production (Fragapane et al., 2022). Measuring working time has an important role in efforts to determine standard time in work processes. There are two methods of measuring working time, namely direct method measurement and indirect method measurement (Asarela & Sari, 2023).

### **Standard Time**

Standard time is the amount of time required by a worker of average ability to complete a task. The results of standard time work measurements can be used to create a work scheduling plan that shows how long an event should take, how much output is produced, and how much labor is needed to complete the work. Next, the data must be processed to obtain standard time. Cycle time and normal time can be searched to find this standard time (Sitorus & Alfath, 2017).

### **Cycle Time**

Cycle time is the amount of time required to complete one unit of production, starting from standard materials processed at the workplace and finishing (Palange & Dhattrak, 2021) Cycle time can be considered as a result of direct observations shown in stopwatch..

$$W_{cycle} = \frac{\sum X t}{N} \dots\dots\dots (2.1) \text{ cycle time}$$

### **Normal Time**

Normal time is defined as the amount of time required for a worker to work under normal conditions while being supervised to complete a task in a prescribed manner and without interruption.

$$W_{normal} = W_{cycle} \times P \dots\dots\dots (2.2) \text{ Normal time}$$

### **Standard Time**

Standard time is the result of calculations between actual time, performance assessments, and allowances. Standard time is defined as the time that is reasonably required by normal workers to complete their tasks with the best work system they have.

$$W_{standard} = W_{normal} \times \frac{100\%}{100\% - \%allowance} \dots\dots\dots (2.3) \text{ standard time}$$

Next, worker productivity is calculated using standard time data obtained from previous calculations as follows:

$$Output\ Standard = \frac{1}{standard\ time} \dots\dots\dots (2.4) \text{ Output Standard}$$

(Juwardi et al., 2023)

### **Performance Rating**

Next is to determinerating factorsnamely by looking at the situation that occurs at the location of the research object and then determining adjustments according to the tablerating factors which exists. According to (Sitorus & Alfath, 2017), the tool developed by westinghouse Electric Corporationis one of the oldest methods for determining ratings performance.

### **Work Incentives**

According to (Syafitri et al., 2022) incentives are defined as a system of providing remuneration that is related to employee performance. Incentives can be material or non-material which can encourage employee motivation to work more actively and enthusiastically so as to achieve increased production targets and ultimately achieve company goals. So it can be concluded that the definition of incentives is additional compensation that the company gives to employees if they do things above the standards set based on work results or working time (Qomariah et al., 2022). Meanwhile, incentive programs are programs designed by companies to provide more rewards to employees who achieve performance above standards in proportion to the profits obtained from these achievements (Putra & Gupron, 2020).

### **Work Incentive Method**

Incentive wages, given to workers if they achieve or exceed the established work standards. Increasing and maintaining employee motivation to increase work productivity is the main goal of incentives (Kayatun et al., 2022). The Piecework method is the most basic technique that can be used to encourage employee performance based on production output expressed in the number of production units. If the output of the units produced is less than or equal to the standard, then the wages that will be received by the worker are basic wages (standard). However, if workers can produce units exceeding the standard, they will receive incentives with a percentage according to the number of units produced (Rachmawati, 2021).

### **Methods**

Research with the title "Analysis of Working Time Measurements and Work Incentives to Increase Production of Upper Shoes at CV.Esa Kalen Jaya" was carried out at CV.Esa Kalen

Jaya Jl.Jombang Temuwulan, Perak District, East Jombang Regency, Java 61461 in February 2024 until completion or observation data fulfilled. There are steps that must be taken to get the desired results namely problem identification, data collection, data processing, results analysis and conclusion. The data collection stage is a way to obtain data required in data processing. Data was obtained by direct observation at field and also interviews with parties related to the company. Some of the data needed to support this research are as follows: (1) Total Data and Production Targets; (2) Observation time data; (3) Performance rating; (4) Allowance; (5) Salary data for CV. Esa Kalen Jaya workers.

## Results and Discussion

The data required in the research is primary data obtained from observation data on shoe upper production at CV. Esa Kalen Jaya to calculate standard production time on 13 - 15 February 2024. The following is a collection of production observation time data at CV Esa Kalen Jaya:

Table 1. Collection of Shoe Upper Production Data at CV.Esa Kalen Jaya

Time Observation to-	Work Elements (Second)							
	Making a pattern and Cutting Material	Pasting Material	Sewing variations	Sewing the foam back layer	Sewing Tongue Trap	Attaching rope	Scissors and finishing	Quality Control
1	23.2	10.8	47.8	8.8	10.2	4	4.8	2.4
2	21.9	9.4	45.4	7.3	9.2	3.9	4.7	2.6
3	22.8	9	49.1	8	10.8	4.2	4.7	2.5
4	20.6	8.7	48.9	8.2	8.8	4	4.8	2.4
5	21.6	10.3	49.2	8	10.3	3.9	4.9	2.3
6	23.4	10.2	49.1	8.1	10.2	4.1	5	2.3
7	20.6	10.5	46.6	7.8	9.9	4	4.7	2.5
8	22.9	10.2	44.8	7.9	10.2	4.2	4.9	2.3
9	23	9.8	49.4	8	10.8	4.1	5.1	2.5
10	23.3	9.6	48.8	8.2	9.2	3.9	4.8	2.6
11	22.8	10	49	8	10	4	4.9	2.4
12	20.6	9.7	46.8	8.1	10.2	3.9	5	2.4
13	23.4	9.6	45.2	8.3	10.3	4.1	4.9	2.3
14	22.8	10.2	47	8	11.1	4	4.8	2.5
15	23.5	8.9	49.1	7.8	10.1	3.8	5.1	2.6
16	20.5	10.5	48.5	6.9	10	4.1	4.7	2.5
17	22	9.5	44.8	7.9	10.3	4	4.7	2.4
18	21.9	9.6	49	8.1	10.2	3	5.1	2.3
19	20.6	10.1	49.1	7.9	9.9	4.1	4	2.6
20	22.9	10.3	44.6	8	10.2	4	4.8	2.5
21	21	10	44.1	8.2	11.1	4.2	4.9	2.7
22	22.5	9.7	49.3	8	10.4	4.1	5	2.3
23	20.6	9.1	47	8.1	10.2	3.4	5.2	2.4
24	23.4	10.4	48.9	7.8	10	4	4.8	2.3
25	21.2	10	49.1	7.9	10.2	3.9	4.7	2.6
26	20.6	10.3	44.4	8	10.3	4.1	4.9	2.5
27	22.1	10.8	49.3	8.2	11	4	4	2.4
28	20.5	10.1	44.2	8	10.1	3.9	4.9	2.3
29	22.8	9.8	49.3	8.4	10	4.1	5	2.5
30	23.5	9.2	45.9	7.4	9.9	4.2	4.7	2.3

Source : CV.Esa Kalen Jaya

From table 1 it can be seen that the results of observations on shoe upper production at CV.Esa Kalen Jaya were 30 observations on each work element. And the results obtained are as in the table above.

## Data Sufficiency Test

The data adequacy test is carried out to determine whether the amount of data obtained from observations is sufficient to complete the research. Data adequacy testing is a data testing process that aims to find out whether the amount of measurement data carried out has been completed sufficient for standard time calculations. The amount of data is sufficient if  $N' = N$ , and data is defined as insufficient if  $N' > N$ .

The following is the formula used in the data adequacy test, namely:

$$N' = \left[ \frac{\frac{k}{s} \sqrt{N(\sum x^2) - (\sum x)^2}}{\sum x} \right] \dots\dots\dots \text{Data Sufficiency Test}$$

In the process of Making a pattern and Cutting Material, the  $n'$  value is obtained as follows:

$$n' = \left( \frac{\frac{2}{0,05} \sqrt{30(14667.03) - (662.5)^2}}{662.5} \right)$$

$$n' = 4,02$$

$$n' = 4$$

Information :

$N'$  = number of theoretical observations that should be made

$N$  = number of observations that have been made

$s$  = level of accuracy

$x$  = observations time data

$k$  = level of confidence

Table 2. Data Sufficiency Test

Work elements	N	N'	Sufficiency Data
Making a pattern and Cutting Material	30	4	Enough Data
Pasting Material	30	5	Enough Data
Sewing variations	30	3	Enough Data
Sewing the foam back layer	30	3	Enough Data
Sewing Tongue Trap	30	4	Enough Data
Attaching the rope	30	6	Enough Data
Scissors and finishing	30	5	Enough Data
<i>Quality Control</i>	30	4	Enough Data

From the table it can be seen that all work elements have met the assumption of data adequacy. At the Making a pattern and Cutting Material work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 4$ . At the pasting material work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 5$ . At the sewing variation work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 3$ . At the sewing the foam back layer work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 3$ . At the sewing tongue trap work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 4$ . At the attaching the rope work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 6$ . At the scissors and finishing work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 5$ .

5. At the quality control work station, the data taken  $N' = 30$  is more than enough to represent the variation in the research sample that should be  $N' = 5$ . Data taken is the working time of each work station using assistive devices in the form of a stopwatch. The results show that the data obtained by the author is sufficient represents the entire population to be used as research material. Proven by the amount of data that should be collected is smaller than the number of observations or if denoted by the symbol is  $N' < N$ .

### Data Uniformity Test

After testing the adequacy of the data and all the data is sufficient, then a data uniformity test can be carried out. Data uniformity testing can be done by calculating UCL (upper control limit) and LCL (lower control limit). If there is data that is outside the control limits, then the data is not used in the calculation. Based on the values in table 4.2 to calculate the UCL and LCL values, the following calculations are obtained:

#### Average

$$\bar{X} = \frac{\sum x}{N} = \frac{662.5}{30} = 22,08$$

#### Standar Deviasi

$$\sigma = \sqrt{\frac{\sum (X - \bar{X})^2}{N-1}} = \sqrt{\frac{(23,2 - 22,08)^2 + (21,9 - 22,08)^2 + \dots + (23,5 - 22,08)^2}{30-1}} = 1,1078$$

#### Upper Control Limit (UCL) and Lower Control Limit (LCL)

$$\begin{aligned} \text{UCL} &= \bar{X} + k. \sigma \\ &= 22.08 + (2 \times 1,1078) \\ &= 24,29 \text{ second} \\ \text{CL} &= \bar{X} = 22,08 \text{ second} \\ \text{LCL} &= \bar{X} - k. \sigma \\ &= 22.08 - (2 \times 1,1078) \\ &= 19,86 \text{ second} \end{aligned}$$

After obtaining the results of calculations and data diversity tests, a control chart can be created for the packing and cutting process of materials as follows:

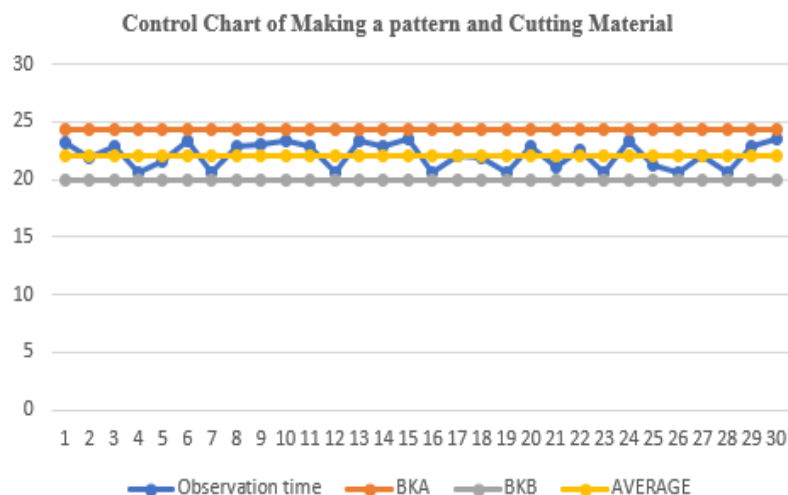


Figure 1. Control Chart of the Making a pattern and Cutting Material

The following is the calculation for the data uniformity test for shoe upper production elements at CV.Esa Kalen Jaya.

Table 3. Data Uniformity Test For Shoe Upper Production Elements At CV.Esa Kalen Jaya

No	Work Elements	UCL	CL	LCL	Description
1	Making a pattern and Cutting Material	24,29	22,08	19,86	Uniform Data
2	Pasting Material	10,94	9,87	8,8	Uniform Data
3	Sewing variations	51,27	47,45	43,63	Uniform Data
4	Sewing the foam back layer	8,63	7,97	7,31	Uniform Data
5	Sewing Tongue Trap	11,16	10,17	9,17	Uniform Data
6	Attaching the rope	4,44	3,97	3,5	Uniform Data
7	Scissors and finishing	5,33	4,81	4,3	Uniform Data
8	<i>Quality Control</i>	2,67	2,44	2,2	Uniform Data

The calculation results above show that the average of each subgroup is between the upper class limit and the lower class limit, so The overall production element time data obtained is uniform. If the data is uniform or within the control limit range, the data can be processed to the next stage, namely finding the production cycle time.

#### **Allowance**

Work Time = 7 hours x 60 minutes = 420 minutes

$$\text{Allowance} = \frac{60 \text{ minutes}}{420 \text{ minutes}} \times 100\% = 14,3\%$$

Based on the allowance that have been carried out, it is known that the slack time required by employees in the shoe upper production process at CV.Esa Kalen Jaya is 14.3%.

#### **Standard Time**

Once the adjustment factor is known, then we continue calculating normal time. The following is the normal time calculation for the work elements for Making a pattern and Cutting Material as follows:

$$\text{Cycle Time} = \frac{\sum x}{N} = \frac{662.5}{30} = 22,08 \text{ second}$$

$$\text{Normal Time} = \text{WS} \times \text{P}$$

$$= 22,08 \times (1 + \text{Performance Rating})$$

$$= 22,08 \times (1+0,12) = 24,72 \text{ detik/unit}$$

$$\begin{aligned} \text{Standard Time} &= \text{Normal Time} \times \frac{100\%}{100\% - \text{allowance \%}} \\ &= 24,72 \times \frac{100\%}{100\% - 14,3\%} = 28,68 \text{ second} \end{aligned}$$

Table 4. Normal Time

No	Work Elements	Cycle Time (Second)	Performance Rating	Normal Time (Second)	Allowance	Standard Time (Second)
1	Making a pattern and Cutting Material	22.08	+0.12	24.72	0,143	28.68
2	Pasting Material	9.87	+0.05	10.36	0,143	12.02
3	Sewing variations	47.45	+0.14	54.09	0,143	62.74

4	Sewing the foam back layer	7.97	+0.17	9.32	0,143	10.81
5	Sewing Tongue Trap	10.17	+0.18	12	0,143	13.92
6	Attaching the rope	3.97	+0.16	4.6	0,143	5.34
7	Scissors and finishing	4.81	+0.13	5.43	0,143	6.3
8	Quality Control	2.44	+0.1	2.68	0,143	3.11
<b>Total Production Time/Unit</b>						<b>142,95 second</b>
						<b>0,0397 hours</b>

### ***Output Standard***

After knowing the total standard time for making shoe uppers, you can then calculate the standard output produced by CV.Esa Kalen Jaya. The following is the calculation of the work element processing and cutting of materials as follows:

$$\begin{aligned}
 \text{Output Standar/second} &= \frac{1}{\text{Standard Time}} \\
 &= \frac{1}{142,95} \\
 &= 0,0069 \text{ unit/second} \\
 &= 4588,48 \text{ unit/month}
 \end{aligned}$$

### **Setting Of Working Hours**

Table 5. *Output and Target Production of Upper Shoe*

Month	Production of Upper Shoe CV. Esa Kalen Jaya	
	Output	Target
Apr-23	4650	5000
Mei-23	4680	5000
Jun-23	4640	5000
Aug-23	4470	5000
Sept-23	4670	5000
Okt-23	4620	5000
Nov-23	4520	5000
Des-23	4500	5000
Jan-24	4600	5000
Feb-24	4650	5000
Mar-24	4650	5000
Apr-24	4670	5000

Source : CV.Esa Kalen Jaya

Based on the results of the output standard, it turns out that it has not reached the production target set by the company. Therefore, the number of working hours is increased by 1 hour to 8 working hours per day as follows:

$$\begin{aligned}
 \text{Output Standard} &= (\text{output unit} / \text{hours} \times \text{working time}) \\
 &= 25,164 \text{ unit/hours} \times 8 \text{ working time} \\
 &= 201,312 \text{ unit/day} \\
 &= 201,312 \text{ unit/day} \times 26 \text{ day (in a month)}
 \end{aligned}$$



$$= 5.234 \text{ unit/month}$$

Based on the results of standard output calculations after increasing the number of working hours, it is 201,312 units/day 5,234 units/month, which means that the production target has been achieved.

### Work Incentives

To calculate how much bonus a worker will receive, it is necessary to first know the work wage per unit. The standard incentive system given to CV.Esa Kalen Jaya workers based on company standards/working hours is as follows:

$$R = \frac{1 \text{ hour}}{\text{Standard time/hour} \times \text{output / hour}} \times \text{incentives /hour}$$

$$= \frac{3600}{142,95 \times 25} \times \text{Rp.7000} = \text{Rp. 7.051,41/hour}$$

Based on the calculation results above, the incentive results given in the hourly period are IDR 7,051.41/hour.

### Discussion

From this research, the results were obtained from direct observation of the shoe upper production process at CV.Esa Kalen Jaya. The number of observations for each work element in the production process (n) is 30, with the level of accuracy (s) used being 5% and the confidence level being 95% so that k=2. And the standard production time for each element, namely for handling and cutting materials, was 28.68 seconds; in sewing attachment it was 12.02 seconds, in variation sewing it was 62.74 seconds, in foam backstitching it was 10.81 seconds, in tongue trap sewing it was 13.92 seconds in attaching the upper strap it was 5.34 seconds, in cutting and Upper hearth is 6.3 seconds, quality control is 3.11 seconds. So the total standard production time per upper unit is 142.95 seconds/unit. Meanwhile, for calculating the standard output value from the CV.Esa Kalen Jaya company, it is known that the results obtained were 0.0069 units/second or 25,164 units/hour or 176, 148 units/day 4588.48 units/month. And after increasing the number of working hours to increase production volume and in order to achieve the production target, the results obtained were 201,312 units/day 5,234 units/month, which means that the production target has been achieved. And based on the calculation of incentives that the company will provide in standard hourly wages, namely IDR 7,051.41/hour.

### Conclusion

Based on the analysis and discussion that has been carried out, it is concluded that the total standard production time for shoe uppers at CV.Esa Kalen Jaya is 142.95 seconds/unit. And the standard output obtained is equal. Meanwhile, for calculating the standard output value from the CV.Esa Kalen Jaya company, it is known that the results and standard output obtained are 4588.48 units/month. And after increasing the number of production working hours to 8 working hours, the results obtained were 5,234 units/month, which means that the production target has been achieved. And based on the calculation of incentives that the company will provide in standard hourly wages, namely IDR 7,051.41/hour. It can be concluded that by determining the standard production time for setting the number of working hours, production output has reached the predetermined production target. With this work incentive program, it is hoped that it can motivate employees to increase workforce productivity to the maximum

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