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# Standard Time Measurement of Sugar Brown MSMEs in Payakumbu

**Winny Alna Marlina[1*], Armijal[2], Syaiful Anwar[3]**
[1]Universitas Andalas, Sumatera Barat, Indonesia, winnyalnamarlina@eb.unand.ac.id
[2]Universitas Andalas, Sumatera Barat, Indonesia
[3]Universitas Andalas, Sumatera Barat, Indonesia

*Corresponding Author: winnyalnamarlina@eb.unand.ac.id[1]

**Abstract:** Sugar Brown MSMEs was established in 2000 in West Sumatera, Indonesia. This MSMEs produces brown sugar. This MSMEs doesn't have time standard in the production of brown sugar, the corporation is unable to precisely estimate the number of workers required based on the workload at each work station. Many hours are lost because employees have a lengthy amount of free time to work. In order for the business to identify effective working hours and boost productivity, as well as determine daily production, the research aims to investigate standard time by accounting for the average observation time and the typical amount of time needed for employees to finish the brown sugar production process. Time study is used in the qualitative research methodology. Primary data is the source of the data. A stopwatch is used to record working time data, and Westinghouse is the type of adjustment employed. After gathering data on employee working hours, the data is tested for consistency. Operator work is examined, operator working time is computed, the number of requests to be received is estimated, the workload of each work station is determined, and the number of workers is determined based on the workload. Result of the research found that the sap water collection activity yielded research data indicating that the time taken was 108.42 minutes on average, 89.98 minutes on normal, and 113.89 minutes on standard. The sap water boiling operation took an average of 7.92 hours, 6.57 hours on average, and 8.31 hours on standard. The standard time for the Brown sugar printing operation was 92.24 minutes, the normal time was 72.87 minutes, and the average time was 87.8 minutes. The packing operation took an average of 23 minutes, 19.09 minutes on average, and 24.16 minutes on average.

**Keywords:** Time measurement, Standard time, Normal time, Average time.

## INTRODUCTION

MSMEs or Micro, Small and Medium Enterprises are business entities that are able to create various jobs and financial services for the community. West Sumatera, especially Payakumbuh, offers abundant resources for the production brown sugar. Brown sugar besides being used as a cooking ingredient, brown sugar can also be used as a medicine that is useful for treating anemia, warding off free radicals, increasing body resistance and so on.

Halaban brown sugar has one of the MSMEs that makes brown sugar whose main ingredient is sap water which is located in Tanjuang Gadang, Lareh Sago Halaban, Lima Puluh Kota, West Sumatera. The business founded by Rudi is a hereditary business from the family which is then used as a source of income. The raw materials used are palm trees that are owned by owner. The employees of this business are exclusively family members, which has only two employees. The owner does Brown sugar with the two of them. Starting with the raw components and progressing to the packaging step. There are four steps involved in processing brown sugar. The first thing that must be prepared during the brown sugar making process is to take the sap water. Where the sap water is collected by the owner, starting at 09.00 am and 15.30 pm. After that, time to cook water. The process of cooking water starts at 09.00 am – 15.00 pm. Then for the afternoon cooking session, the water is cooked from 16.30 am - 18.30 pm where the cooking is only until the sap water boils and continues tomorrow morning. Then, it is brown sugar printing time. Before the brown sugar is printed, it is cooled first so that the brown sugar thickens and can give the right results. Then the thickened brown sugar is put into a mold made of bamboo. Brown sugar printing for 45 minutes. The last thing to do is packaging time. Brown sugar packaging is the process of weighing the size and weight of the brown sugar that has been printed into the wrapper.

Due to the high volume of orders received, this business occasionally faces delays from the scheduled timetable in order to meet the needs of its customers. Because there are only two employees and the process of creating brown sugar takes a long time, this is the result of wasteful and ineffective working hours. In addition, there are other elements that might impact productivity and create uncertainty during the production process, such as a safe and comfortable working environment and a shortage of equipment. The worker fails to satisfy the client's request, as depicted in figure 1.

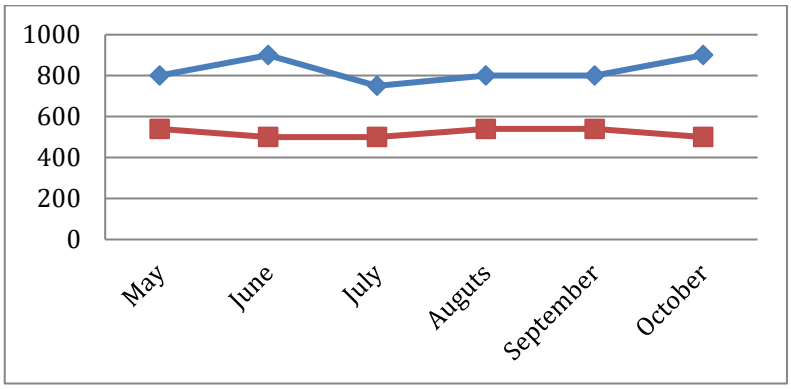



**Figure 1. Sugar Brown MSMEs Production Data**
Source: Research Results

This problem also happen similar to research of (Al Faridzi et al., 2022). When an employee is waiting for a tool, supply, part, to perform its task, or simply does not have any work due to equipment breakdowns, capacity restrictions, processing delays, or a lack of inventory, a bottleneck occurs (Cury & Saraiva, 2018).

Analysts in the logistics field have widely used Time studies to determine the right time, and it is necessary for workers and server systems to get normal quality cold points from management to minimize costs, time, and transportation between work points at normal speeds to carry out assigned tasks (Caliskan et al., 2007).

Previous research explains that time studies reveal whether a person is eligible for employment and is fully taught so that he may fulfill the needed capacity to level up (Cao et al., 2017). According to the findings of the new time study, the design of the new work system is superior to that of the old work system (Sayekti et al., 2019). Measurement Time Study is a

method for studying measurements in the workplace. When working on this approach, the considerations that must be addressed in creating technical standards are to enable it to carry out duties based on its capacity and ability to do so. If a task can be completed in the smallest amount of time, it is deemed productively completed. A task's effectiveness and speed of completion are typically used to gauge its success, and within this framework, physical output—more specifically, the rate at which services are rendered—is always a factor (Cahyani & Indriani, 2022).

Time study a work measurement technique consisting of careful time measurement of the task with a time measuring instrument, adjusted for any observed variance from normal effort or pace and to allow adequate time for such items as foreign elements, unavoidable or machine delays, rest to overcome fatigue, and personal needs" . Time study is employed in situations when there are short or lengthy cycles of repetitive labor, a wide diversity of task kinds, or process control aspects make up a portion of the cycle. Time study is achieved through job analysis, method standardization, and time study creation, in that order. As mentioned in the definition of the time study, getting an accurate time study requires knowing the workers' pace (Cevikcan et al., 2012).

Work study can be divided into work study and measurement methods. The purpose of using this method is to systematically study and improve human work methods by considering all the factors that affect efficiency and working conditions. Once the job of interest is selected, the time study can be checked by 1) recording all the information about the job, 2) breaking the job down into elements, 3) examining the elements and determining sample size, 4) recording the time to perform each job. elements using a stop-watch, 5) assessing the speed of work, 6) converting the observed time to the base time, 7) determining allowances:

## METHODS

The quantitative method of time study methodology was adopted in this investigation. The time research approach uses a number of tools, including time measurement, standard time, normal time, and average time. the lack of availability of tools, the inspection work carried out by time and the large number of aircraft loads, so that suggestions for improvements in the form of tool procurement training to reduce the existence of overloaded workload conditions (Yasmin, et al, 2018). This approach is carried out by measuring time through observation and recording working times for each cycle using prepared tools, and then this time data is estimated as standard time (Masniar & Maga, 2019). The information gathered as primary data is derived directly from field operations or activities (Hidayat & Cahyo, 2023).

The number of samples is calculated using the following formula:

$$n \geq \frac{N}{1 + Ne^2}$$

Where N is the total population and e is the percentage error (0.05).

In this case, the number of populations observed at predetermined time intervals is calculated. For time intervals = 4 minutes at 10.00 - 18.00 (6 working hours).

Population:

Time lapse (10.00-16.00)

$$N = \frac{6 \; x \; 60}{4}$$

$$N = 90$$

So the population in the observations made during one working day is 90 population.

$$n \geq \frac{90}{1 + 90(0{,}05)^2}$$

$$n \geq 73\ sample$$

ampel

The results of the uniform test demonstrate that the sample is sufficient (Sari et al., 2022). This research is using westinghouse and based on tabulation as below:

**Table 1. Calculation of productive work home**

| SKILLS | | | EFFORT | | |
|---|---|---|---|---|---|
| +0.15 | A1 | Super skill | +0.13 | A1 | Super skill |
| +0.13 | A2 | | +0.12 | A2 | |
| +0.11 | B1 | Very good | +0.10 | B1 | Very good |
| +0.08 | B2 | | +0.08 | B2 | |
| +0.06 | C1 | Good | +0.05 | C1 | Good |
| +0.03 | C2 | | +0.02 | C2 | |
| 0 | D | Average | 0 | D | Average |
| -0.05 | E1 | Fair | -0.04 | E1 | Fair |
| -0.10 | E2 | | -0.08 | E2 | |
| -0.16 | F1 | Poor | -0.12 | F1 | Poor |
| -0.22 | F2 | | -0.17 | F2 | |
| CONDITION | | | CONSISTENCY | | |
| +0.06 | A | Ideal | +0.04 | A | Ideal |
| +0.04 | B | Very good | +0.03 | B | Very good |
| +0.02 | C | Good | +0.01 | C | Good |
| 0000 | D | Average | 0 | D | Average |

Resource: (Kiraz, 2021)

The allowance is using table below

**Table 2. Allowences rating**

| NO | Type | | Sign % |
|---|---|---|---|
| 1 | Fixed leeway | | |
| | A | Personal Benefits | 5 |
| | B | Basic Fatigue Reliever | 4 |
| 2 | Variable Allowance | | |
| | A | Stand leeway | 2 |
| | B | abnormal position | |
| | I | Weird (bow) | 2 |
| | ii | Very Weird (Lie down, stretch) | 7 |
| | C | Using power or muscle power in lifting, pulling, pushing, the load being lifted (pounds) | |
| | I | 20 | 3 |

| | | |
|---|---|---|
| ii | 40 | 9 |
| I | 60 | 17 |
| D | Bad lighting | |
| I | Below the minimum requirements | 2 |
| ii | Very insufficient | 5 |
| e | variable air conditions (temperature and humidity). | 0-10 |
| F | Attention | |
| I | Accurate or Precise | 2 |
| ii | Very thorough or very precise | 5 |
| G | Noise level | |
| I | sometimes noisy | 2 |
| ii | Sometimes very loud or high pitched | 5 |
| H | Mental strain | |
| I | Complicated or too much attention | 4 |
| ii | Very complicated | 8 |
| I | Boredom | |
| I | Boring | 2 |
| ii | Very boring | 5 |

*Source: (Irwin/Mc Graw-Hill, 2023)*

## RESULTS AND DISCUSSION

### Determination of the proportion of observations

Determination of the proportion of observation time is done by comparing the total population of observations for each time interval with the number of observations that can be made when the operator is busy. This is proven by the following calculations: For a 360 minute time interval between 10.00 and 16.00 (6 hours): The observation is 73 times.

### Data Uniformity Test

Calculating the control limit first calculates the P value with the following formula:

$$P = \frac{T - C}{T}$$

Where :
T = Number of Observations,
C = Non-Work Activities

The following is a summary of the results of observations of brown sugar operator activities.

**Table 3. Recapitulation of Observation Results**

| Day | Operator Activation 1 | | Operator Activation 2 | |
|---|---|---|---|---|
| | A | B | A | B |
| 1 | 251 | 5 | 252 | 4 |
| Amount | 256 | | 256 | |

*Source: Sugar Brown MSMEs in Payakumbuh*

A. Operators 1

$$\bar{P} = \frac{T - C}{T}$$

$\bar{P}$ = 256 – 5
256
$\bar{P}$ = 0.980

Operators 2
$\bar{P} = \frac{T - C}{T}$
$\bar{P}$ = 256 – 4
256
$\bar{P}$ = 0.984

So $\bar{P}$ average is: $\frac{\bar{p}\,1 + \bar{p}\,2}{2}$
$: \frac{0.980 + 0.984}{2}$
: 0.982

UCL $= \bar{P} + 2\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.982 + 2\sqrt{\frac{0.982(1-0.982)}{256}} = 0.133$

LCL $= \bar{P} - 2\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.982 - 2\sqrt{\frac{0.982(1-0.982)}{256}} = 0.134$

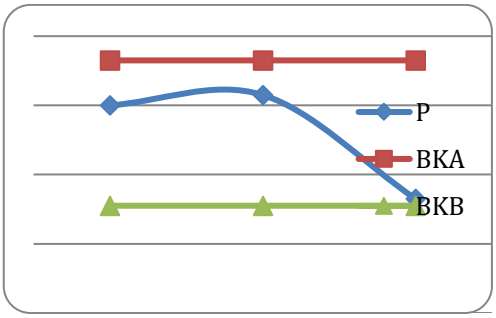



**Figure 2. Control Chart**
Source: Research Results

From the calculations of LCL and UCL it can be seen that the p-value is at the control limit, which means that the data is uniform.

**Data Adequacy Test**

Calculating the adequacy of observed data with a 95% confidence level and 5% accuracy level using the formula:
For N' < N, the number of observations is sufficient. And if N' > N, the number of observations is not sufficient then it must be added as many as n observations.

$$N' = \frac{\left(\frac{z}{x}\right)^2 (1-\bar{p})}{\bar{p}} = \frac{\left(\frac{2}{0.05}\right)^2 (1-0.982)}{0.982} = 29.328$$

It can be concluded that the value of N ≥ N' (256 ≥ 29.328), then the data collected is sufficient.

**Recapitulation of Observation Results and Number of Objects Served in the Observation Period**

**Table 4 Recapitulation of Operator Activity Observation Results**

| Day | Operator Activity 1 | | Amount | %P |
|---|---|---|---|---|
| | A | B | | |
| 1 | 251 | 5 | 256 | 98.05% |
| Amount | 251 | 5 | 256 | 98.05% |
| Day | Operator Activity 2 | | Amount | %P |
| | A | B | | |
| 1 | 252 | 4 | 256 | 98.43% |
| Amount | 252 | 4 | 256 | 98.43% |

*Source: Sugar Brown MSMEs in Payakumbuh*

**Table 5. Observed Operator Work Volume**

| Observation Day | Job volume |
|---|---|
| Tuesday (08.30-15.00) | 700 |

*Source: Sugar Brown MSMEs in Payakumbuh*

The number of brown sugar produced during 1 day of observation was 700 brown sugar on Tuesday (08.30-15.00).

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**Calculation of Productive Working Hours**

The observation session lasted 5.5 hours (from 08.30 to 15.00, with intervals from 12.00 to 13.00). From Form SP-03, the productive working hours of Brown sugar Industry operators and work stations can be calculated by the formula:

The Total Expected Work = ( $\frac{}{P}$ ).(total working time observation period)

= 0.972 x 330 minutes x 1

= 320.87 minutes

Based on the results of a observations that conducted with Sugar Brown MSMEs, the following is the Rating Factor value based on the results of:

1. Skill: +0.11 B1 (very good)
2. Effort: +0.05 C1 (good).
3. -0.03 E (fair) condition
4. Optimal consistency is +0.04 A.

Skill + Effort + Condition + Consistency = Rating Factor Value.

Rating Factor = 0.11 + 0.05 -0.03 -0.04 = 0.17

P = (rank factor value 1) = 0.83

P = (1-0.17) = 0.83

The MSMES Rating Factor value brown sugar after being seen from several factors obtained a value of 0.83. The following is a table of concessions:

**Table 6. Allowence**

| NO. | Loosen Type | Time | Sign (%) |
|---|---|---|---|
| 1. | Fatigue time | 15 minutes during production | 5% |
| 2. | Rest, Prayer, Eat | 2 hours starting from (12.00-14.00) | 6% |
| 3. | Feed livestock | 15 minutes from the clock (14.00-14.15) | 4% |
| 4. | Clean the cage | 13 minutes from the clock (14.17-14.30) | 3% |
| **Total** | | | **21%** |
| **Allowances** | | | **0.21** |

*Source: Sugar Brown MSMEs in Payakumbuh*

Time view measurement is the basis for companies to determine the standard time for employees to perform and complete work. The function of measuring time is to measure the performance of the company's employees. With the measurement of time can be obtained standard time that must be met by employees in completing a job.

Standard time is an activity that takes into account profit or profit due to working conditions. At standard time is divided into two, namely direct measurement and indirect measurement. Direct measurement is measurement that is directly carried out by employees who carry out activities, while indirect measurement is data collection based on historical data or tabular standard data. The formula used is as follows:

$$\frac{\text{Total Normal Time}}{\text{1- Allowance Factor}}$$

Normal time is the time required by an employee to have certain abilities at work with the time normally used by an employee under supervision to complete an activity or work in a predetermined manner without any objections from various parties. The formula used is as follows:

**Average Observation Time x Performance Level Factor**

Average time is a time calculation method which is the amount of time contained in each element of the production process activity carried out. The formula used is as follows:

$$\frac{\text{The amount of time recorded for each element}}{\text{Number of observations}}$$

**Average Time**

Average time is a time calculation method where the amount of time is recorded for each element in the production process activities. According to (Wignjosoebroto, 2003)

$Ws = \Sigma Xi\ N$

Where :

Ws = Average Cycle Time

$\Sigma Xi$= Total Cycle Time
$N$= Number of Observations 2
With the following formula:

$$\frac{The\ amount\ of\ time\ recorded\ for\ each\ element}{number\ of\ observations}$$

**Average Time of Palm Sap Water Collection**

The following below is a table of data collection for each activity carried out by MSMES Brown sugar Sugar Brown MSMEs as follows:

**Table 7.Time Collection for Each Activity**

| Activities performed | Time Required ( 7 days ) | Total Time |
|---|---|---|
| Palm Sap Water Collection | Morning = 490 minutes Afternoon = 269 minutes | 490+269 = 759 |
| Nira water cooking | Morning = 43.5 hours Afternoon = 12 hours | 43.5 + 12 = 55.5 |
| Brown Sugar Printing | Operator I = 315 minutes Operator II = 300 minutes | 315+300 = 615 |
| Sugar brown packaging | 161 minutes | 161 minutes |

*Source: Sugar Brown MSMEs in Payakumbuh*

Based on the total time obtained from sap collection in the morning with a total time of 400 minutes and sap collection in the afternoon with a total time of 269 minutes combined into 669 minutes divided by the total observation time for 7 days. With the following :

$$\frac{759\ \text{minutes}}{7\ \text{days}} = 108{,}42\ \text{minutes/days}$$

Based on the average total time obtained by taking the sap water is 108.42 minutes/day.

**Average Cooking Time of Palm Sap Water**

Based on the total time obtained for cooking sap water in the morning with a total time of 43.5 hours and sap water cooking in the afternoon with a total time of 24.5 hours combined into 68 hours divided by the number of observations for 7 days.

$$\frac{55{,}5\ \text{hours}}{7\ \text{days}}, 92\ \text{hours/days}$$

Based on the average total time obtained for cooking sap water is 7.92 hours/day.

**Average Brown Sugar Printing Time**

Based on the total time obtained for printing saka by operator I with a time of 315 minutes and for printing Brown Sugar by operator II with a time of 300 minutes, it is combined into 615 minutes divided by the number of observations for 7 days. .

$$\frac{615 \text{ minutes}}{7 \text{ days}} = 87{,}8 \text{ minutes/days}$$

So, based on the average time obtained for printing Brown Sugar, the result is 87.8 minutes/day.

**Average Brown Sugar Packaging Time**

Based on the total time obtained in the Brown Sugar packaging carried out by operator II with a time of 161 minutes divided by the number of observations for 7 days

$$\frac{161 \text{ minutes}}{7 \text{ days}} = 23 \frac{\text{minutes}}{\text{days}}$$

Based on the average time obtained in the Sugar Brown packaging process, the result is 23 minutes/day.

**Normal Time**

Normal time is a method in which the average time of observations is adjusted according to observations. According to (Wignjosoebroto, 2003)

$WN=Ws(1+Rating\ Factor$

Where :

WN : Normal Time

Ws : The following Silus Time:

**Average Observation Time x Performance Level Factor**

**Normal Time of Palm Sap Water Collection**

The following is a table for collecting the total average time of each activity carried out by Sugar Brown MSMEs as follows:

**Table 8. Collection of Total Average Time for Each Activity**

| Activities performed | Total Time | Total Time Average | Performance Level Factor |
|---|---|---|---|
| Palm Sap Water Collection | 490+269 = 759 | 759 : 7 = 108.42 | 83% |
| Palm Sap water cooking | 43.5 + 12 = 55.5 | 55.5 : 7 = 7.92 | 83% |
| Brown Sugar Printing | 315+300 = 615 | 615 : 7 = 87.8 | 83% |
| Brown Sugar packaging | 161 | 161 : 7 = 23 | 83% |

*Source: Sugar Brown MSMEs in Payakumbuh*

Based on the average total time obtained in taking sap water with a time of 108.42 minutes multiplied by a performance level factor of 83%.

108.42 minutes x 83% = 89.98 minutes

Based on the normal total time obtained in the process of extracting the sap for 89.98 minutes.

**Normal Time of Palm Sap Water Cooking**

Based on the average total time obtained for cooking sap water with a time of 7.92 hours multiplied by a performance level factor of 80%.

7.92 hours x 83% = 6.57 hours

So based on the normal total time obtained in the sap water cooking process with a time of 6.57 hours.

**Brown sugar Printing Normal Time**

Based on the average total time obtained to score Brown sugar with a time of 87.8 minutes multiplied by a performance level factor of 80%.

87.8 minutes x 83% = 72.87 minutes

So, based on the normal total time obtained in the Brown sugar printing process, the result is 72.87 minutes.

**Normal Brown sugar Packaging Time**

Based on the average total time obtained in packing brown sugar with 23 minutes multiplied by a performance level factor of 80%.

23 minutes x 83% = 19.09 minutes

So based on the normal total time obtained in the brown sugar packaging process, the result is 19.09 minutes

**Standard Time**

Standard time is a complete modification of normal time that takes into account personal demands, inevitable delays and fatigue. . According to (Wignjosoebroto, 2003) Using the following equation:

$WB=WN(1+Allowance)$

Where :

WB : Standard Time

WN : Normal Time

Allowance : Looseness

$$\frac{\text{Total normal time}}{1-\text{The leeway factor}}$$

**Standard Time for Palm Sap Water Collection**

The following is a table summing up the total normal time for each activity carried out by Sugar Brown MSMEs as follows:

**Table 9. Set of Total Normal Time for Each Activity**

| Activities performed | Total Time | Total Normal Time | leniency |
|---|---|---|---|
| Palm Sap Water Collection | 490+269 = 759 | 108.42 x 83% = 89.98 | 21% |
| Palm Sap water cooking | 43.5 + 12 = 55.5 | 7.92 x 83% = 6.57 | 21% |
| Brown sugar Printing | 315+300 = 615 | 87.8 x 83% = 72.87 | 21% |
| Brown sugar packaging | 161 | 23x83% = 19.09 | 21% |

*Source: Sugar Brown MSMEs in Payakumbuh*

Based on the normal total time obtained from taking the sap water, it is 89.98 minutes divided by 1 minus the leeway factor determined by the MSME of 21%.

$$\frac{89{,}98 \text{ minutes}}{1 - 21\%} = 113{,}89 \text{ minutes}$$

So, based on the total standard time obtained, the standard time for taking sap is 113.89 minutes.

**Standard Cooking Time for Palm Sap Water**

Based on the normal total time obtained from cooking sap water with a time of 6.57 hours divided by 1 minus the leniency factor determined by MSMES of 21%.

$$\frac{6{,}57 \text{ hours}}{1 - 21\%} = 8{,}31 \text{ hours}$$

So, based on the total standard time, the standard time for cooking sap water is 8.31 hours

**Brown sugar Printing Standard Time**

Based on the normal total time obtained from printing brown sugar with a time of 72.87 minutes divided by 1 minus the leeway factor determined by MSMES of 21%.

$$\frac{72{,}87 \text{minutes}}{1 - 21\%} = 92{,}24 \text{ minutes}$$

So, based on the total standard time, the standard time for Brown sugar printing is 92.24 minutes.

**Brown sugar Packaging Standard Time**

Based on the normal total time obtained from the packaging of brown sugar with a time of 19.09 minutes divided by 1 minus the leeway factor determined by MSMES of 21%.

$$\frac{19{,}09 \text{ minutes}}{1 - 21\%} = 24{,}16 \text{ minutes}$$

So, based on the total standard time, the standard time for packing brown sugar is 24.16 minutes.

The following is a table of the results of calculating the average time, normal time and standard time for each activity carried out:

**Table 10. Calculation Results of All Time Measurement Methods**

| No | Activities performed | Time Average | Normal Time | Standard time |
|---|---|---|---|---|
| 1 | Palm Sap Water Collection | 108,42 | 89.98 | 113.89 |
| 2 | Palm Sap water cooking | 7,92 | 6,57 | 8,31 |

| | | | | |
|---|---|---|---|---|
| 3 | Brown sugar Printing | 87.8 | 72,87 | 92,24 |
| 4 | Brown sugar packaging | 23 | 19.09 | 24,16 |
| **Amount** | | **227,14** | **188.51** | **238.6** |

*Source: Sugar Brown MSMEs in Payakumbuh*

Based on the data in the table above, the calculation results for the sap water collection activity obtained an average time of 108.42 minutes, 89.98 minutes of normal time, and 113.89 minutes of standard time. In the sap cooking activity, the average time is 7.92 hours, normal time is 6.57 hours, and standard time is 8.31 hours. In the Brown sugar printing activity, the average time is 87.8 minutes, normal time is 72.87 minutes, and standard time is 92.24 minutes. In the brown sugar packing activity, the average time is 23 minutes, normal time is 19.09 minutes, and standard time is 24.16 minutes.

**Calculation of Total Employee Needs**

To calculate the number of standard labor requirements, first calculate the total time with the formula:

$$Wt_i = \sum_{i-1}^{j} \left( Wb_{ij} \times Y_i \right)$$

Where Yes = volume of work in the i-th observation period
Wt = total time (minutes)
Wb = Standard workstation time (minutes)
So that the total time obtained is:
In the first observation period Yi = 700 brown sugar
Wt1 = 36.64 x 700 = 25648 seconds = 427.47 minutes
The total time is 427.47 minutes
Total requirement for Standard Labor (TKS) = Wt/JKA
= 427.47 / 330
= 1,295
≈ 2 persons

**Standard Calculations and Actual Productivity**

1. Standard Productivity
   First Day: Ps1 = Y1 / TKs = 700/ 1,295 = 540.54 Brown sugar per 3 day
2. Actual Productivity
   First Day: Pa1 = Y1 / TKa = 700/1 = 700 Brown sugar per 3 day

Graph of comparison of standard labor productivity and actual labor can be seen in Figure 4.2. below this:

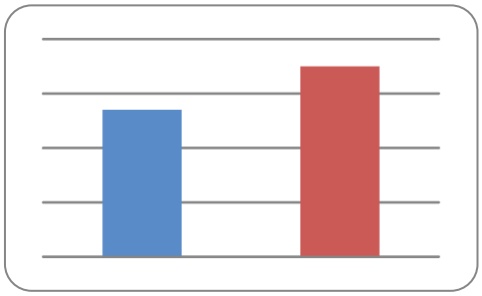


**Figure 3. Labor Productivity Comparison Chart Standard and Actual**
Source: Research Results

The Production portion is the one that must be implemented because it takes a long time and involves a large number of items (Kusuma & Firdaus, 2019).

The results of the data uniformity test show that the cycle time data is within the upper control limit and lower control limit, so that a data adequacy test is then carried out (Purbasari, 2020).

The Westinghouse technique is made up of four variables that assess justice and unfairness in the workplace, including skill, effort, working environment, and consistency. According to the research, the most leeway is due to employee rest, eating, and prayer time (Rachman, 2013).

Allowances and adjustments are calculated based on the weight of the work load carried out by the operator. According to the study, female operators have a large adjustment and leeway factor. This allowance factor is granted for personal needs, fatigue elimination, and avoidable impediments. The wife of the business owner provided the longest cycle time, regular time, and standard time (Yudisha, 2021).

The most effort is required in water collection activities for brown sugar, hence the workforce must be increased (Nurpratama et al., 2019). Two more personnel are required to match the demand for brown sugar.

## CONCLUSION

MSMES or Micro, Small and Medium Enterprises is a type of business that can expand employment and provide various economic benefits for the community. MSMEs play an important role in the legal system, increase people's income, encourage economic growth, and ensure national stability. Brown sugar Sugar Brown MSMEs MSMES, one of the MSMES in Fifty Cities Regency, was formed by Mr. Rudi Hartono who is engaged in food ingredients, especially brown sugar or palm sugar which comes from the sap of palm trees. After conducting the research, it may produce a total of the average time, normal time, and standard time that is sufficient to meet the stated standard.

Based on the analysis carried out using a time study with the standard time method at Sugar Brown MSMEs, the following results are obtained in the activity of collecting sap, the average time is 108.42 minutes, normal time is 89.98 minutes, and standard time is 113.89 minutes. In the sap cooking activity, the average time is 7.92 hours, normal time is 6.57 hours, and standard time is 8.31 hours. In Brown sugar printing activities, the average time is 87.8 minutes, normal time is 72.87 minutes, and standard time is 92.24 minutes. In the brown sugar packing activity, the average time is 23 minutes, normal time is 19.09 minutes, and standard time is 24.16 minutes. The water boiling process operation yields the longest cycle time, normal time, and standard time, whereas the packaging operation yields the shortest cycle time, normal time, and standard time.

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