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Determination Of The Need For The Number Of Workers At The Cutting Station Of The Cut Up Department With The Standard Time Calculation Approach At Pt. Xyz.

Dimas Akmarul Putera[1,4*], Hadi Sutanto[2], Isdaryanto Iskandar[3], Aulia Agung Dermawan[4]

[1,2,3] Program Profesi Insinyur, Atma Jaya Catholic University of Indonesia, Indonesia

[1,4] Engineering Management Department, Faculty of Industrial Technology, Institut Teknologi Batam, Indonesia

[1]DIMAS.202204070048@STUDENT.ATMAJAYA.AC.ID

[1]Dimas.A.P@iteba.ac.id

[2]hadi.sutanto@atmajaya.ac.id

[3]isdaryantoiskandar@gmail.com

[4]agung@iteba.ac.id

Abstract – One of the problems that occurred at PT. XYZ. is the difference between the actual time and the company's standard time regarding the production process. This can result in sub-optimal production targets because it also depends on the production capacity of the company. The purpose of this research is to determine the new standard time for PT. XYZ using the time study method. The results show that some products have differences in actual standard time with the company's standard time. Based on the new standard time, there are additions and reductions in the number of workers needed in each production process. Factors that cause differences in standard time are influenced by man, machine, method, and measurement. Recommendations that can be given are improving the master data and monitoring the actual time on a regular basis.

Keywords – Motion and Time Study, Standard Time, Rating Factor, Meat Factory

I. INTRODUCTION

The current era makes the business world experience very rapid development in the field of manufacturing and services. Competitive pressures and high customer needs force companies to make various improvements to win the competition[1]. Companies are required to improve their competitiveness continuously. Companies in a short time must be able to change themselves to become stronger and able to respond to market needs. If related to the marketing aspect, companies that have strong marketing will be able to compete in intense business competition [2]. Along with the development of information technology that is growing, the competition among companies is also increasing. So the company is trying to continue to improve its ability to survive in an increasingly competitive competition. Companies that are able to survive in the competition are companies that can adapt to the changes that occur in the business world. Technological development is something that we cannot avoid. The development of technology must be addressed by companies by utilizing existing technology in running their business. Companies can use technology for promotional and communication purposes with consumers.[3].

The production system is said to be effective if it can complete an order on time, in the right quantity and at a reasonable price. The ability to fulfill orders consistently to maintain customer loyalty and this is one of the keys to success in business in a highly competitive global market. The production process in manufacturing companies is currently faced with a dilemma, which

must increase effectiveness and efficiency which will have an impact on increasing productivity, increasing customer satisfaction, and increasing company competitiveness [4]. The production aspect is the core of all resources that work together to produce a product. A company is capable of optimizing the resources used if the company has good production productivity [5]. Productivity is a very important factor in supporting the survival of every company, namely by analyzing and evaluating the products produced based on the level of performance in a certain period of time. Productivity is the comparison or ratio between the total output and the total input used by the company [6].

The company certainly wants the production process to be carried out with a short working time to meet production targets so that the profits will be maximized. The standard working time determined by the company has an important role in the production process. Lack of supervision of working time will affect the level of productivity of workers who have not met the target time in the production process [7]. Various kinds of technologies used have a role to accelerate the rate of production. In addition to accelerating the rate of production, the desired role is to have technology that can be used optimally and maximum available power, so as to create an effective and efficient production process. Regarding efficiency and effectiveness in a production, the company will pay attention to the problem of time and available resources to carry out production. In this case, standard time is needed in order to achieve a good production system. Standard time is the actual time required by each operator to produce an item or tool.[8].

Increasing the growth of Indonesia's population per year until 2021 is the main step of PT. XYZ is increasingly racing in the processed food business. This is due to the increasing number of consumer demands for food needs in the market share, and this is what drives PT. XYZ is getting ahead and becoming a world-class producer in the field of processed food made from chicken meat. PT. XYZ developed a business in the chicken-based food processing industry by opening its first factory in the Cikande area which is one of the most modern chicken processing factories in Indonesia which is also the center of PT. XYZ in Indonesia then opened branches in Salatiga, Surabaya and Medan.

Standard time calculations and determining the number of workers required are carried out within the company so that the products produced can be completed on time, so as to achieve high productivity for smooth production at PT. XYZ. The objectives of this research to be achieved in this study are to calculate the standard time and determine the optimal number of labor requirements at the Cut up Department Slaughtering Station at PT. XYZ. Observations were only made at the Cutting Station of the Cut up Department and time observations were carried out directly by applying the stopwatch time study method. Assumption used in this research is procurement and provision of raw materials and auxiliary materials are considered capable of meeting production needs so as not to disrupt the speed of the production line. Each worker at the same work station has the same ability and expertise in carrying out the production process that passes through the work station. The Cut Up Department does not there was rework. There was no change in the number of production machines and equipment during the study.

II. METHOD

Literature study was conducted to obtain supporting theories used in research to solve the problems encountered. The supporting theories include: technical understanding of work procedures, motion research, time research, stopwatch time studies, steps for measuring time and determining the number of workers. This literature study is also useful as a basis for logical thinking in solving problems scientifically. Here's few of method to use in this research:

A. Time Study

Measuring labor and time is very important for every company. In general, in every company all activities must be carried out by measuring the workforce. The results of measuring labor and time are in the form of benchmarks that provide information about the achievements of the implementation of a work plan that can be used as a benchmark in making production adjustments as well as in the production planning and control activities of a company [8] [9].

B. Location of Research

Research conducted at PT. XYZ which is located on Jalan Pulau Solor. Medan Industrial Area. This research was conducted in July 2021 – August 2022.

C. Variable of Research

Variable used in this research can be seen below:

- Time data
- Rating Factor
- Allowance
- Production amounts of meat
- Number of workers and working hours

D. Data Collecting

First, collect all the variables above. For time data, researching collecting in following order:

- Conducted interviews with the Cutting Station Department of Cut Up at PT. XYZ
- Observe workplace layout and work methods.
- Measure the time directly on the cutting process using a stopwatch.
- Observing the skills, effort, and consistency possessed by workers, as well as observing their working conditions.
- Observing the factors that influence the work allowance given to employees.
- Collect company documents related to research.

The research was conducted on the process of cutting chicken meat by separating the parts of the chicken meat. The description of the chicken meat cutting process can be seen in Table 1:

TABLE 1. DESCRIPTION OF THE PROCESS OF CUTTING CHICKEN MEAT

Initial Cutting Process	**BIL Separation**	**BIB Separation**
1. BIL Cutting	1. Pattern Cutting	1. FW & BB Cutting
2. BIB Cutting	2. TB Cutting	2. SBB & Skin Cutting
3. Fillet Cutting	3. DB & Tendon Cutting	
	4. SB & Skin Cutting	

Initial Cutting Process

Initial cutting consists of 3 activity elements, namely BIL cutting, BIB cutting, and fillet cutting.

BIL, BIB, and Fillet Cutting

BIL Cutting means operator cuts by separating the chicken thigh from the body of the chicken meat. BIB Cutting means operator cuts by separating the chicken breast (including wings) from the body of the chicken meat. Lastly Fillet Cutting means operator cuts by separating the remaining parts of the meat from the body of the chicken meat. For BIL Cutting, BIB Cutting, and Fillet Cutting time measurement data can be seen in Table 2:

TABLE 2. BIL CUTTING, BIB CUTTING, AND FILLET CUTTING MEASUREMENT TIME DATA

Bil Cutting Measurement Time Data		**Bib Cutting Measurement Time Data**		**Fillet Cutting Measurement Time Data**	
Observation	**Time (Seconds)**	**Observation**	**Time (Seconds)**	**Observation**	**Time (Seconds)**
1	11	1	5	1	4
2	9,5	2	5,5	2	5
3	8,7	3	4,5	3	5,2

4	8,3	4	6	4	4,4
5	9	5	5,5	5	4,5
6	8,4	6	4,5	6	6
7	10,6	7	5,6	7	4,8
8	9,8	8	5,4	8	5,2
9	8	9	4,2	9	4,8
10	9,2	10	4,8	10	5,6

BIL Separation

Separation of BIL consists of 4 elements of activity, namely making cut patterns, cutting TB, cutting DB & Tendon, and cutting SB & Skin.

Pattern Cutting, TB Cutting, DB & Tendon Cutting, Cutting SB & Skin

Pattern Cutting means the operator makes a cut pattern on the chicken thigh. TB Cutting means operator cuts the chicken thigh to remove the upper chicken thigh bone. DB & Tendon Cutting means operator cuts the chicken leg to remove the tendon and chicken leg bone (drum bone). Lastly, Cutting SB & Skin means operator cuts the chicken leg to remove the remaining chicken leg bones and exfoliates the skin of the chicken leg. For Pattern Cutting, TB Cutting, DB & Tendon Cutting, Cutting SB & Skin time measurement data can be seen in Table 3:

TABLE 3. PATTERN CUTTING, TB CUTTING, DB & TENDON CUTTING, CUTTING SB & SKIN TIME MEASUREMENT DATA

Pattern Cutting Measurement Time Data		**TB Cutting Measurement Time Data**		**DB & Tendon Measurement Time Data**		**Cutting SB & Skin Measurement Time Data**	
Observation	**Time (Seconds)**	**Observation**	**Time (Seconds)**	**Observation**	**Time (Seconds)**	**Observation**	**Time (Seconds)**
1	1	1	3,5	1	4	1	6
2	1,2	2	5	2	4,5	2	5,5
3	1,4	3	5,5	3	5	3	4
4	1	4	3,5	4	4,5	4	4
5	1,5	5	4	5	4,3	5	5
6	1,2	6	4,2	6	4,8	6	4,8
7	0,8	7	4,8	7	5	7	4,5
8	1	8	5,2	8	4	8	5
9	1,5	9	4,5	9	4,9	9	4,8
10	1,1	10	5,1	10	4,5	10	4,5

BIB Separation

BIB separation consists of 2 activity elements, namely cutting FW & BB and cutting SBB & Skin

Cutting FW & BB and Cutting SBB & Skin

Cutting FW & BB means operator cuts the breast pieces to separate the breast and chicken wings. Lastly, Cutting SBB & Skin means operator separates the skin from the breast meat. For Cutting FW & BB and Cutting SBB & Skin time measurement data can be seen in Table 4:

TABLE 4. CUTTING FW & BB AND CUTTING SBB & SKIN MEASUREMENT TIME DATA

Cutting FW & BB Measurement Time Data		**Cutting SBB & Skin Measurement Time Data**	
Observation	**Time (Seconds)**	**Observation**	**Time (Seconds)**
1	1	1	1,5
2	1,5	2	1
3	2	3	2
4	1	4	1,8
5	1,5	5	1,5
6	1,6	6	1,4
7	1,2	7	1
8	0,8	8	1
9	1,8	9	1,2
10	1,5	10	1,7

Rating Factor and Allowance

Based on the assumption used, that every worker at the same "work station" has the same capabilities and expertise as well as the same working environmental conditions in carrying out the production process, the data for determining the factor rating and allowances for the "cutting work station" are considered the same. Determination of the rating factor using the Westinghouse factor determination method [10] which can be seen as follows:

1. Skills : *Excellent* (B2) = 0,08
2. Efforts : Good (C1) = 0,06
3. Working Condition : Good (C) = 0,02
4. Consistency : Excellent (B) = 0,03 +

   0,19

Then the value of the rating factor given = 0.19

For allowance, determination of the allowance value can be seen as follows:

1. Energy expended: Working at a desk, standing up = 6%
2. Working attitude: body straight, standing on two feet = 1%
3. Movement work: Normal = 0%
4. Eyestrain : Intermittent vision = 1.5 %
5. Temperature conditions: Low (12^{O} C) = 0.5 %
6. Atmospheric state : Good = 0 %
7. Environmental conditions: Repeated duty cycle (0-5 seconds) = 1.5 %
8. Personal needs: Women = 2 % +

   12,5%

So the allowance value given is 12.5%.

Amount of Productions

The amount of production is obtained based on the amount of material used. The amount of material used in the period July-August 2022 was 2800 kg per day. Based on material data, one griller sack weighs 20 kg and contains 8 grillers inside. So it

is found that for every day in that period requires a griller of:

$$\text{Amount of griller} = \frac{5800\text{kg}}{(20\text{kg}/8\,\text{griller})} = 11200\ \text{griller}$$

So that the amount of material needed is 11,200 grillers per day for that period.

Number of Workers and Working Hours

Data on the number of workers available at the cutting stations of each process can be seen in Table 5:

TABLE 5. DATA ON NUMBER OF SLAUGHTERING STATION WORKERS

Process Description	**Number of People**
Initial Cutting Process	
BIL Cutting	2
BIB Cutting	4
Fillet Cutting	4
BIL Separation	
Pattern Cutting	2
TB Cutting	2
DB & Tendon Cutting	2
SB & Skin Cutting	2
BIB Separation	
FW & BB Cutting	2
SBB & skin Cutting	2
Total	**22**

Working hours at the Cut up Department are 07.00 – 15.00 WIB with breaks at 12.00 – 13.00 WIB, so that the effective working hours at the Cut up Department are 7 hours per day.

E. Data Processing

Data Uniformity Testing

Data uniformity testing is carried out to see how much deviation the data has measured [11], then selecting data that is included in the limits so that testing can be carried out to the next stage. Data uniformity testing was carried out with a confidence level of 95% (value k = 2). If the data is not uniform, it is necessary to retest by removing non-uniform data. The results of the recapitulation of data uniformity testing for all elements of activities at the Cut Up Department Slaughtering Station can be seen in Table 6.

TABLE 6. RECAPITULATION OF THE UNIFORMITY TEST OF ALL ELEMENTS OF ACTIVITIES

Elements Of Activities	**Top Class Limits**	**Low Class Limits**	**Information**
Initial Cutting Process			
BIL Cutting	11,23	7,27	In Control
BIB Cutting	6,27	3,93	In Control
Fillet Cutting	6,12	3,78	In Control
BIL Separation			
Pattern Cutting	1,64	0,70	In Control
TB Cutting	5,95	3,11	In Control

DB & Tendon Cutting	5,30	3,80	In Control
SB & Skin Cutting	6,05	3,57	In Control
BIB Separation			
FW & BB Cutting	2,15	0,63	In Control
SBB & skin Cutting	2,12	0,70	In Control

Data Adequacy Testing

Data adequacy testing was carried out to see whether the data that had been collected met the data requirements under observation. To calculate the required number of observations using the N formula with a 95% confidence level (value of k = 2) and 10% accuracy level. The data adequacy calculation for the next element can be seen in the recapitulation of the data adequacy calculation results in Table 7

TABLE 7. RECAPITULATION OF DATA SUFFICIENCY CALCULATION RESULTS FOR ALL ELEMENTS OF ACTIVITIES

Elements Of Activities	N'	N	Information
Initial Cutting Process			
BIL Cutting	5	10	Data Sufficient
BIB Cutting	5	10	Data Sufficient
Fillet Cutting	6	10	Data Sufficient
BIL Separation			
Pattern Cutting	8	10	Data Sufficient
TB Cutting	9	10	Data Sufficient
DB & Tendon Cutting	3	10	Data Sufficient
SB & Skin Cutting	6	10	Data Sufficient
BIB Separation			
FW & BB Cutting	9	10	Data Sufficient
SBB & skin Cutting	9	10	Data Sufficient

Standard Time (ST) Calculation

Before calculating the standard time, it is necessary to know the rating factor and allowance for each work element. Thestandard time calculation for other work elements can be seen in the summary of the calculation results in Table 8.

TABLE 8. RECAPITULATION OF STANDARD TIME CALCULATION RESULTS FOR ALL WORK ELEMENTS

Elements Of Activities	Time Chosen	Normal Time	Standard Time
Initial Cutting Process			
BIL Cutting	9,25	11,01	12,58
BIB Cutting	5,10	6,07	6,94
Fillet Cutting	4,95	5,89	6,73
BIL Separation			
Pattern Cutting	1,17	1,39	1,59
TB Cutting	4,53	5,39	6,16
DB & Tendon Cutting	4,55	5,41	6,19
SB & Skin Cutting	4,81	5,72	6,54
BIB Separation			
FW & BB Cutting	1,39	1,65	1,89
SBB & skin Cutting	1,41	1,68	1,92

Determination of the Number of Workers

The calculation of the required number of workers in the initial cutting process is as follows:

1. BIL Cutting

Workload = Number of production per day x ST
= 11200 Process x 12,58 Second/Process
= 140896 seconds

Available time = 7 x 3600 Second
= 25200 Second

$$\text{Total manpower} = \frac{\text{Workload}}{\text{Available Time}}$$

$$= \frac{140896\,\text{Second}}{25200\,\text{Second}} = 5{,}59 \approx 6 \text{ Man power}$$

2. BIB Cutting

Workload = Number of production per day x ST
= 11200 Process x 6,94 Second/Process
= 77684 seconds

Available time = 7 x 3600 Second
= 25200 Second

$$\text{Total manpower} = \frac{\text{Workload}}{\text{Available Time}}$$

$$= \frac{77684\ \text{Second}}{25200\,\text{Second}} = 3{,}08 \approx 4 \text{ Man Power}$$

3. Fillet Cutting

Workload = Number of production per day x ST
= 11200 Process x 6,73 Second/Process
= 75399 seconds

Available time = 7 x 3600 Second
= 25200 Second

$$\text{Total manpower} = \frac{\text{Workload}}{\text{Available Time}}$$

$$= \frac{75399\ \text{Second}}{25200\,\text{Second}} = 2{,}99 \approx 3 \text{ Man Power}$$

The calculation of the required number of workers in BIL Separation is as follows:

1. Pattern Cutting

   Workload = Number of production per day x ST

   = 22400 Process x 1,59 Second/Process

   = 35643 seconds

   Available time = 7 x 3600 Second

   = 25200 Second

   Total manpower $= \frac{\text{Workload}}{\text{Available Time}}$

   $= \frac{35643\,\text{Second}}{25200\,\text{Second}} = 1{,}41 \approx 2$ Man Power

2. TB Cutting

   Workload = Number of production per day x ST

   = 22400 Process x 6,16 Second/Process

   = 138002 seconds

   Available time = 7 x 3600 Second

   = 25200 Second

   Total manpower $= \frac{\text{Workload}}{\text{Available Time}}$

   $= \frac{138002\,\text{Second}}{25200\,\text{Second}} = 5{,}47 \approx 6$ Man Power

3. DB & Tendon Cutting

   Workload = Number of production per day x ST

   = 22400 Process x 6,19 Second/Process

   = 138612 seconds

   Available time = 7 x 3600 Second

   = 25200 Second

   Total manpower $= \frac{\text{Workload}}{\text{Available Time}}$

   $= \frac{138612\,\text{Second}}{25200\,\text{Second}} = 5{,}50 \approx 6$ Man Power

4. TB Cutting

   Workload = Number of production per day x ST

   = 22400 Process x 6,54 Second/Process

   = 146531 seconds

Available time = 7 x 3600 Second

= 25200 Second

$$\text{Total manpower} = \frac{\text{Workload}}{\text{Available Time}}$$

$$= \frac{146531\,\text{Second}}{25200\,\text{Second}} = 5{,}81 \approx 6 \text{ Man Power}$$

The calculation of the required number of workers in BIB Separation is as follows:

1. FW & BB Cutting

Workload = Number of production per day x ST

= 22400 Process x 1,89 Second/Process

= 42345 seconds

Available time = 7 x 3600 Second

= 25200 Second

$$\text{Total manpower} = \frac{\text{Workload}}{\text{Available Time}}$$

$$= \frac{42345\,\text{Second}}{25200\,\text{Second}} = 1{,}68 \approx 2 \text{ Man Power}$$

2. SBB & Skin Cutting

Workload = Number of production per day x ST

= 22400 Process x 1,92 Second/Process

= 42955 seconds

Available time = 7 x 3600 Second

= 25200 Second

$$\text{Total manpower} = \frac{\text{Workload}}{\text{Available Time}}$$

$$= \frac{42955\ \text{Second}}{25200\,\text{Second}} = 1{,}70 \approx 2 \text{ Man Power}$$

III. Result And Discussion

Grill cutting process at PT. XYZ Cut up Cutting Station consists of 3 processes, namely initial cutting, BIL separation, and BIB separation. After the standard time calculation process is carried out, the required amount of labor is obtained. Comparison of the need for the number of workers with the actual workforce can be seen in Table 9:

TABLE 9. RECAPITULATION OF STANDARD TIME CALCULATION RESULTS FOR ALL WORK ELEMENTS

Elements Of Activities	**Actual Manpower**	**Manpower Needed**	**Information**
Initial Cutting Process			
BIL Cutting	2 persons	6 persons	Lack
BIB Cutting	4 persons	4 persons	Sufficient
Fillet Cutting	4 persons	3 persons	Excessive
BIL Separation			
Pattern Cutting	2 persons	2 persons	Sufficient
TB Cutting	2 persons	6 persons	Lack
DB & Tendon Cutting	2 persons	6 persons	Lack
SB & Skin Cutting	2 persons	6 persons	Lack
BIB Separation			
FW & BB Cutting	2 persons	2 persons	Sufficient
SBB & skin Cutting	2 persons	2 persons	Sufficient
Total	**22 persons**	**37 persons**	**Lack**

It is found that only in the process of cutting BIB, making cut patterns, cutting FW & BB, and cutting SBB & skin which has actual labor that is in accordance with the calculations. In the fillet cutting process, the actual number of workers is greater than the labor required and in the rest of the other processes, the actual number of workers is smaller than the labor required.

The evaluation that can be given is as follows.

1. Providing integrated training so that higher work quality (Rating Factor) is obtained from operators.
2. Adjusting some of the working conditions for the operator so as to reduce the concession value given to the operator.
3. Sort the cutting processes that have a larger number of workers than needed to other cutting processes and add the number of operators as needed to the various processes that have a shortage of workers.

IV. CONCLUSION

From the results of the calculation of the number of labor requirements from several processes at the cutting station, there are as many as 37 workers. There is a difference of 15 workers when compared to the actual number of workers, so that for improvement what needs to be done is to adjust the number of required workers according to needs. The company need to adjusting several working conditions for the operator so as to reduce the value of the allowance given to the operator, for example providing a seat for the operator that can be adjusted to the height of the work table.

REFERENCES

[1] D. A. Putera, "Pengendalian Persediaan Beras Menggunakan Pendekatan Sistem Dinamis Di Perum Bulog Divre Sumut," *Post Graduate Tesis*. Universitas Sumatera Utara, Medan, pp. 1–80, 2021, [Online]. Available: https://repositori.usu.ac.id/handle/123456789/47744.

[2] J. Setiyono and S. Sutrimah, "Analisis Teks dan Konteks Pada Iklan Operator Seluler (XL dengan Kartu AS)," *Pedagog. J. Pendidik.*, vol. 5, no. 2, pp. 297–310, 2016, doi: 10.21070/pedagogia.v5i2.263.

[3] V. Pitoy, A. Tumbel, and M. Tielung, "Analisis Strategi Bersaing Dalam Persaingan Usaha Bisnis Document Solution (Studi Kasus Pada Pt. Astragraphia, Tbk Manado)," *J. Berk. Ilm. Efisiensi*, vol. 16, no. 3, pp. 302–312, 2016.

[4] M. Nawir, "Analisis dan Perancangan Sistem Sistem Informasi Produksi yang Terintegrasi untuk Meningkatkan Efektifitas dan Efisiensi di PT.KKM Malang," *J. Ilm. Mhs. Univ. Surabaya*, vol. 4, no. 1, pp. 1–18, 2015.

[5] S. Syamsudin, E. H. Sucipto, and H. Sartika, "Analisa Produktivitas Pada Divisi Produksi PT. XYZ Menggunakan Metode Objective Matrix (OMAX)," *J. Penelit. Tek. Ind.*, vol. 1, no. 1, pp. 1–12, 2022, doi: 10.51999/jpti.v1i1.1.

[6] E. Z. Afianti, I. K. Satriawan, and I. W. G. Sedana Yoga, "Analisis Produktivitas Produksi PT. Bapak Bakery Badung Bali," *J. Rekayasa Dan Manaj. Agroindustri*, vol. 8, no. 1, p. 127, 2020, doi: 10.24843/jrma.2020.v08.i01.p13.

[7] M. N. Alfareza and T. A. Praditya, "Analisis Perhitungan Waktu Standar Dengan Metode Time Study Pada Bidang Produksi PT . Indofarma (Persero) Tbk," *J. Tek. Ind.*, no. November, pp. 1–8, 2020.

[8] W. G. Utomo, "Analisis Perhitungan Waktu Baku Dengan Menggunakan Metode Jam Henti Pada Produk Pulley," *J. PASTI*, vol. XII, no. 2, pp. 169–183, 2016.

[9] A. Y. Pradana and F. Pulansari, "Analisis Pengukuran Waktu Kerja Dengan Stopwatch Time Study Untuk Meningkatkan Target Produksi Di Pt. Xyz," *Juminten*, vol. 2, no. 1, pp. 13–24, 2021, doi: 10.33005/juminten.v2i1.217.

[10] H. Damayanthi and S. Hidayat, "Pengukuran Waktu Baku Stasiun Kerja Pada Pipa Jenis Sio Menggunakan Metode Jam Henti di PT. XYZ," *Semin. dan Konf. Nas. IDEC*, no. November, pp. 1–9, 2020.

[11] S. Siswanto, E. M. Widodo, and R. Rusdjijati, "Perancangan Alat Pengupas Salak dengan Pendekatan Ergonomi Engineering," *Borobudur Eng. Rev.*, vol. 1, no. 1, pp. 25–38, 2021, doi: 10.31603/benr.3164.