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Use of Work Sampling to Determine Standard Time in Sales Outlet Performance: A Case Study

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Abstract−Working time measurement is an attempt to identify the typical time required to finish a job in order to achieve a balance between output produced and labour performed. During the investigation, the problem was that employee working hours varied, thus it was required to enhance the working hours of sales outlet personnel. The findings of observations in non-productive areas were 0.27, indicating that there was still allowance time occurring at that site, indicating that research must be conducted continually. Trying to achieve standard time throughout sales outlet working hours and looking for strategies to boost outlet worker efficiency during the job process. The work sample approach was employed in the company's research, and the results showed that the standard time for a sales outlet to serve each customer required a minimum of p.1= 6.162 minutes, p.2= 8.453 minutes, for a total of 18.17 minutes. The standard productivity that two outlet employees must achieve during one shift (6 working hours) can be calculated using the standard time computation, which is a minimum of 19.81 ≈ 20 pcs of products sold.

Keywords: Work Sampling; Performance Measurement

1. INTRODUCTION

Performance is closely related to productivity difficulties since it is an indicator of how much effort is put forth to reach a company's level of productivity (Sedarmayanti & Pd, 2001). Productive tasks are those that are carried out in accordance with the predefined job description in order to maximize employee productivity. Meanwhile, non-productive activities are those that have nothing to do with employee productivity but occur during the course of work (Ishak et al., 2016). Productive actions are those that are carried out in accordance with the job description in order to maximize employee productivity. Meanwhile, non-productive activities are those that have nothing to do with employee productivity but occur while at work(Sulistyowati, 2020).

During the investigation, the problem was that employee working hours varied, thus it was required to enhance the working hours of sales outlet personnel.

Table 1. Frequency of employee observations

Activity	Frequency observed on day-to-day		Amount
	1	2	
Productive	32	30	62
Non-Productive	4	6	10
Amount	36	36	72
% Productive	0.88	0.83	1.72
% Non-Productive	0.11	0.16	0.27

It is vital to do ongoing research based on the outcomes of non-productive observations of 0.27, when there is still sufficient time occurring at that site. Previous research regarding Determining the Number of Packing Operators Using the Work Sampling Method resulted in a packing process by increasing the number of operators from 3 to 6 and increasing the production target by 22%(Iriani, 2021). In previous research with the theme Direct Working Time Measurement Using the Work Sampling Method in Soerabi Bandung MSMEs, this research resulted in 72 observations consisting of 36 non-productive activities and 36 productive activities with a total activity percentage of 50%. The adjustment factor is found to be 1.00 and the allowance factor is 0.23. Furthermore, a standard time of 4.53 minutes was obtained for producing one portion of soerabi for male workers(Anggraini et al., 2023). previous research, namely Optimizing the Number of Labor Needs at Hoisting Crane Work Stations Using the Work Sampling Method (Case Study: PT, it was found that the average productive percent for each operator was 92.37%. The standard time required to pour one lorry into the Hooper Theresser machine is 5.27 minutes/lorry, and the number of workers actually needed at the Hoisting Crane station is 4 people with details of 2 people as crane machine operators, 1 person as director The lorry from the boil station goes to the Crane track and 1 person directs the empty lorry back to the return lane(Umam et al., 2020). Based on these three prior studies, it can be stated that the work sample approach may optimize work, and there are changes in this study, notably the research location, the data used, and the research object for which data processing will be carried out.

Trying to achieve standard time throughout sales outlet working hours and looking for strategies to boost outlet worker efficiency during the job process. Benefits as a consideration for companies in increasing the effectiveness and efficiency of sales outlet work in order to achieve optimal productivity in the service process to consumers, as well as providing additional information and insight as reference material used as a basis for further research related to calculating standard time and productivity(Oddone et al., 1995). This work measurement is widely used and applied to

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establish standard time and percentage of delay time, as well as the length of work required for an operator to perform a certain project at a regular work speed level in the optimum work environment available at the time (Pérez et al., 2022).

2. RESEARCH METHODS

Work measurement, also known as time study, is an attempt to estimate the usual time required to perform a job in order to achieve a balance between product produced and work done(Andriani et al., 2017). Working time measurement techniques are broadly classified into two types: direct working time measurement and indirect working time measurement. It is called direct measurement because the measurement is done where the job is done, namely with a stopwatch (time study) and work sampling(Hadad & Hanani, 2023). In contrast, indirect work measurement is a computation of working time in which the researcher does not need to be present at the workplace being measured, but instead calculates his working time by reading the accessible time tables. Work measurements were taken directly in this study, utilizing the work sampling method, also known as work sampling, ratio delay study, or random observation method(Blay et al., 2014).

Work sampling is a technique for measuring direct work that was created by L.H.C. Tippet to examine the operations of machines, operators, or processes by randomly sampling observations in accordance with the law of probability (Andriani et al., 2017). Work sampling can be used on a variety of tasks that are non-repetitive and have a long cycle(Hajikazemi et al., 2017).

Prior to conducting work sampling, the measurement objectives were determined, the existing work system was researched, a good operator was chosen, productive and non-productive activities were identified, and equipment, such as observation boards and observation sheets, was prepared. Processing work sampling data requires multiple steps, which are as follows:

1. Preliminary sampling (pre-work sampling) should be carried out.
   This stage involves making a number of observations on the work activities of the operators being monitored in order to determine the optimal work system and the time interval of those working during one work cycle. Which are chosen at random and often repeated no fewer than thirty times, because the data can be regarded to be normal from the start. The observed population is next subjected to data validation procedures, such as uniformity and data adequacy checks(Robinson, 2010).

$$\bar{p} = \frac{\sum_{i=1}^{n} Pi}{k} \quad (1)$$

$$\bar{n} = \frac{\sum_{i=1}^{n} ni}{k} \quad (2)$$

   Where: Pi = percent productive in period i
   K = number of days of observation
   Ni = number of observations in period i
2. Perform data uniformity testing.
   This phase determines if the time measurement findings are uniform. When data falls inside a given control limit range, it is considered to be uniform. The control limit ranges are the Upper Control Limit (UCL) and Lower Control Limit (LCL), and the values are obtained using equations (1) and (3)(Mariawati, 2019).

$$\text{Upper Control Limit (UCL)} = \bar{P} + 3\sqrt{\frac{\bar{P}(1-\bar{P})}{\bar{n}}} \quad (3)$$

$$\text{Lower Control Limit (LCL), } = \bar{P} - 3\sqrt{\frac{\bar{P}(1-\bar{P})}{\bar{n}}} \quad (4)$$

3. Test data sufficiency
   This is done to establish whether there is enough observational data to perform research. The number of observations required in work sampling will be governed by two factors: level of confidence and level of accuracy(Diniaty, 2015)

$$N' = \frac{1600(1-\bar{P})}{\bar{P}} \quad (5)$$

   Where: P = Productive percentage
   N' = Amount of data required
   If the lowest number of measures necessary is smaller or equal to the number of preliminary measurements (N′ N), the number of time measurements is considered to be sufficient. If the number of measurements remains insufficient (N′ > N), another measurement must be performed until the number of measurements is adequate.
4. Determine standard time
   This stage is completed if all of the data received is consistent and the numbers are sufficient. The data is then processed to get the standard time(Yudisha, 2021), by :

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a. Calculate the cycle time, which is nothing but the average completion time during the measurement.

$$Ws = \frac{\sum X_i}{N} \quad (6)$$

Where: Xi = the number of observed completion times
N = number of observations made

b. Calculate normal time.

$$Wn = Ws \times p \quad (7)$$

Where: Ws = cycle time
P = adjustment factor, if
P = 1 (reasonable work)
P < 1 (works too slow)
P > working too fast

Where p is the correction factor. If an operator is honest, the value of p is 1. If, on the other hand, the operator works too slowly or too quickly, it must first be normalized by assigning a value of p 1 and vice versa.

c. Calculate standard time

$$Wb = Wn + A \quad (8)$$

Where: Wb = standard time
A = slack

Where a is the compensation paid to the operator to execute the work. This provision is offered for personal needs, avoiding weariness and potential disturbances that the operator cannot avoid.

5. Calculate the amount of standard output *(OB).*
This step is performed to determine the output produced in a single cycle that has been estimated in standard time.

The procedure through which time measurement analysis compares the operator's performance (speed or tempo) under observation with the measurer's own concept of operating normally is known as performance adjustment or rating. The time acquired from conditions and work techniques executed fairly and accurately by the operator is the standard time that we have been seeking for(Landy & Farr, 1980). If an irregularity occurs, the measurer must examine it and make adjustments based on this assessment.

Allowance Factor (Allowances): Before converting normal time to standard time, the allowance value must be determined. Allowances are concessions that are nevertheless acceptable or reasonable to operators(Lee et al., 2022). Allowances can be made for three reasons: personal needs, fatigue elimination, and unavoidable impediments.

3. RESULTS AND DISCUSSION

Setting measuring objectives, assessing the existing work system, and selecting the standard time for employee working hours are the first steps conducted before performing work sampling. The standard time for employee working hours was pretty good at the time of the research, but employee working hours tended to vary, making it necessary to enhance the working hours of sales outlet personnel(Cavallari et al., 2022).

The following stage is to distinguish between productive and non-productive activities. Productive tasks are those that are carried out in accordance with the predefined job description in order to maximize employee productivity. Meanwhile, non-productive activities are those that have nothing to do with employee productivity but occur during the course of work.

Working period 15:00 - 22:00, dinner break 17:30 - 18:30, working time 7 hours - 1 hour = 6 hours, W = Effective working time: 6 hours, t = units time in minutes: 60 minutes, s = Length of each visit: 5 minutes, then:

$$\text{Visit} = \frac{W\ x\ t}{s} = \frac{6\ x\ 60}{5} = 72$$

Direct observation and measurement were used to determine the date. As indicated in table 2, data from observations that assess the productive and non-productive time of employee job activities are employed in data processing:

Table 2. Number of observation points

Number	Time	Number	Time	Number	Time	Number	Time
1	08:05	21	09:45	41	11:25	61	13:05
2	08:10	22	09:50	42	11:30	62	13:10
3	08:15	23	09:55	43	11:35	63	13:15
4	08:20	24	10:00	44	11:40	64	13:20
5	08:25	25	10:05	45	11:45	65	13:25
6	08:30	26	10:10	46	11:50	66	13:30

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Number	Time	Number	Time	Number	Time	Number	Time
7	08:35	27	10:15	47	11:55	67	13:35
8	08:40	28	10:20	48	12:00	68	13:40
9	08:45	29	10:25	49	12:05	69	13:45
10	08:50	30	10:30	50	12:10	70	13:50
11	08:55	31	10:35	51	12:15	71	13:55
12	09:00	32	10:40	52	12:20	72	14:00
13	09:05	33	10:45	53	12:25		
14	09:10	34	10:50	54	12:30		
15	09:15	35	10:55	55	12:35		
16	09:20	36	11:00	56	12:40		
17	09:25	37	11:05	57	12:45		
18	09:30	38	11:10	58	12:50		
19	09:35	39	11:15	59	12:55		
20	09:40	40	11:20	60	13:00		

Random sample times were then calculated from the observation sites in table 2 above using the existing random number table.

Table 3. Random Number

Random number						
0,614954	0,802738	0,215061	0,217121	0,127908	0,291066	0,216528
0,424541	0,780522	0,803555	0,401405	0,837596	0,980676	0,677158
0,693886	0,26962	0,934781	0,012273	0,923298	0,616707	0,513369
0,558294	0,34533	0,59834	0,462186	0,298327	0,635648	0,615428
0,792259	0,960956	0,290016	0,75383	0,604901	0,327158	0,42813
0,46257	0,970678	0,521782	0,834204	0,793054	0,102679	0,634336

From these random numbers, selected observation points are obtained for sampling.

Table 4. Selected observation points

Selected Lookout Points						
0	1	2	3	4	5	6
7	8	9	10	12	14	16
17	21	22	25	26	27	28
29	30	32	33	34	35	36
38	40	41	42	43	45	46
47						

Observations were then conducted from the identified observation spots to get a recapitulation of the frequency and percentage of productive and non-productive activities at the sales outlet. The following findings were derived from 72 observations:

Table 5. Shows the frequency and proportion of employee A

Activity	Frequency observed on day-to-day		Amount
	1	2	
Productive	30	25	55
Non-Productive	6	11	17
Amount	36	36	72
% Productive	0.83	0.69	1.52
% Non-Productive	0.16	0.30	0.47

Table 5 illustrates the percentage of productive and non-productive activities (employee A) on the first and second days of observation, with the percentage of productive activities being 0.83 and 0.69, respectively, and the percentage of non-productive activities being 0.16. and 0.30. Employee B is at table 6.

Table 6. shows the frequency and proportion of employee B

Activity	Frequency observed on day-to-day		Amount
	1	2	
Productive	32	30	62
Non-Productive	4	6	10
Amount	36	36	72
% Productive	0.88	0.83	1.72

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Activity	Frequency observed on day-to-day		Amount
	1	2	
% Non-Productive	0.11	0.16	0.27

Table 6 depicts the percentage of productive and non-productive activities (employee B) on the first and second days of observation, with the percentage of productive activities being 0.88 and 0.83, respectively, and the percentage of non-productive activities being 0.11. and 0.16.

Data uniformity test, the obtained measurement data is next checked for uniformity to determine if the data is uniform or not. Before defining the upper and lower control limits, the average productive percentage for two days of observation and the number of initial observations must be calculated.

Employee A : $\bar{p} = \frac{0.83+0.69}{2} = 0.76$

$$\bar{n} = \frac{36+36}{2} = 36$$

Calculating the average productive percentage and the number of initial observations, then establishing the upper and lower control limits, yields the findings.

$$UCL = 0.76 + 3\sqrt{\frac{0.76(1-0.76)}{36}} = 0.97$$

$$\text{LCL} = 0.76 - 3\sqrt{\frac{0.76(1-0.76)}{36}} = 0.55$$

From these calculations, the control chart diagram is obtained as follows:

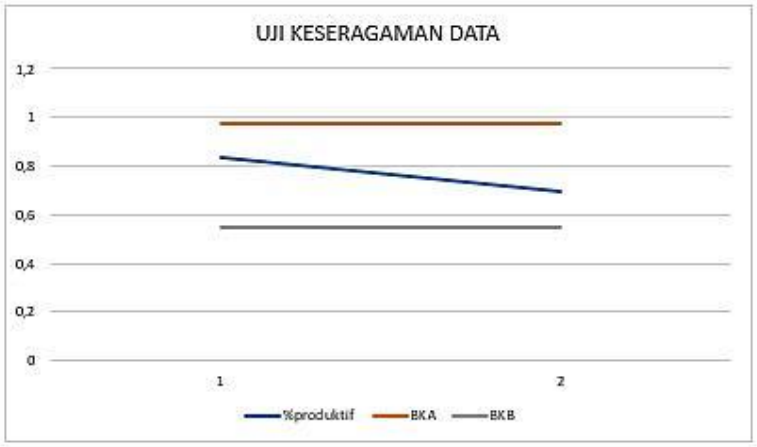

Figure 1. Data uniformity test for employee A

Figure 1 shows that all observation data is still within control limits, so the observation data can be said to be uniform data.

Employee B : $\bar{p} = \frac{0.88+0.83}{2} = 0.86$

$$\bar{n} = \frac{36+36}{2} = 36$$

After knowing the results of calculating the average productive percentage and the number of initial observations, then determine the upper control limit and lower control limit.

$$\text{UCL} = 0.86 + 3\sqrt{\frac{0.86(1-0.86)}{36}} = 1.03$$

$$\text{LCL} = 0.86 - 3\sqrt{\frac{0.86(1-0.86)}{36}} = 0.69$$

With these calculations, the control chart diagram is obtained as follows:

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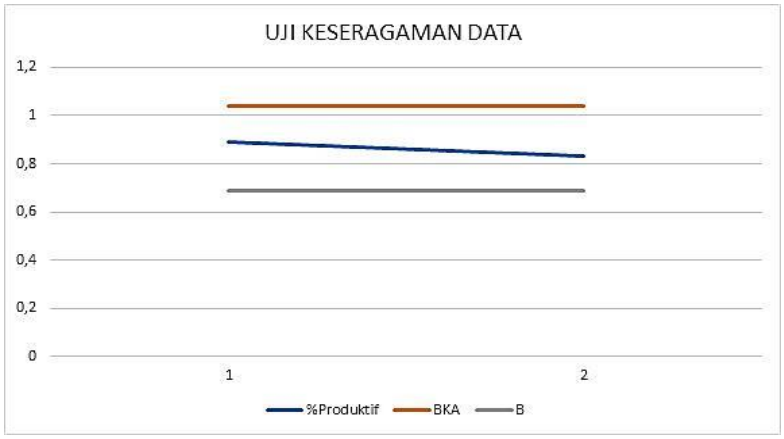

Figure 2. Employee B's data uniformity test

Figure 2 demonstrates that all observation data is still within control boundaries, indicating that the data is uniform. A data adequacy test is also required to verify the uniformity of observational data. This test determines whether the data collected for study is adequate or not.

$$N' = \frac{400\ (1-0{,}86)}{0{,}86} = 65.11\ \approx 65$$

The confidence level is 90% and the accuracy level is 10% so that the result is 65. This shows that the amount of research data is said to be sufficient for the amount of data needed, because N ≥ or 72 ≥ 65.

a. Determining Standard Time

1. Number of Observation

Productive number for employee A	: 55
Number of non-productive	: 17
Number of activities	: 72
Productive percentage	: 76%
Number of productive employees B	: 62
Number of non-productive	: 10
Number of activities	: 72
Productive percentage	: 86%

2. Number of Minutes of Observation

Number of minutes of observation	= 6 hours x 60 minutes x 2 day
	= 720 minutes
Number of productive minutes for employee A	= 76% x 720
	= 547,2 minutes
Total productive minutes of employee B	= 86% x 720
	= 619,2 minutes

3. Maximum number of products sold

Number of products sold by employee A	= 50 produk
Time required/sales	= 547,2 / 50
	= 10,9 minutes
Number of products sold by employee B	= 65 product
Time required/sales	= 619,2 / 65
	= 9,52 minutes

4. Normal Time (Wn)

Wn = Ws x P

Where when viewed from the adjustments according to westing house

Adjusments:

Skills	:	Good (C1)	: 0,06
Effort	:	Good (C2)	: 0,02
Condition	:	Excellent (B)	: 0,04
Consistency	:	Good (C)	: 0,01
Total			: 0,13

So P = (1+0,13) = 1,13 then the normal time is :

Employee A:

Wn	= 10,9 x 1,13
	= 12,3 minutes

Employee B:

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Wn = 9,52 x 1,13
= 10,7 minutes

5. Standard Time
In determining the standard time, the thing that needs to be done first is to determine the allowance value.

Table 7. Data allowance

No	Factor	Work	Load Equivalent	Allowance (%)
1	Energy expended	Serving consumers, promoting offline/online products, arranging new products arriving on each shelf.	-	7%
2	Sitting work posture	Fold/roll the veil	-	2%
3	Normal work movement	Free movement	-	0%
4	Eyestrain, almost continuous gaze	Viewing cellphones for promotions and serving consumers online.	-	5%
5	The working temperature is normal	22-28 C	-	5%
6	The atmosphere is good	Good ventilation	-	0%
7	The environment is clean, healthy, bright with low noise	-	-	0%
Jumlah				19%

The total amount required by each employee is shown in Table 7. An operator also need allowance for personal needs, so 2% will be added to each allowance assessment result in the table above. As a result, the conventional time values are as follows:

$$Employee\ A : 12{,}3\ x \frac{100}{(100-21)} = 9{,}71\ minutes$$

$$Employee\ B : 10{,}7x \frac{100}{(100-21)} = 8{,}45\ minutes$$

The following recapitulation findings were derived from the data calculations:

Table 8. Research Results Recapitulation

No	Name	Cycle time (minutes/unit)	*Performance rating*	Normal time	*Allowance*	Standard time (minutes/unit)
1	Employee A	10,9	1,13	12,3	21%	9,717
2	Employee B	9,52	1,13	10,7	21%	8,453
Amount						18,17

This indicates that both employees can sell a minimum of 19.81 ≈ 20 goods in a single shift (6 working hours). Based on the findings of this study, it is suggested that companies use this standard time measurement as a reference for determining standard productivity or sales targets for sales outlets, where the minimum time required for each salesperson to serve customers is: employee A. = 9.71 employees B = 8.45. A minimum of 20 goods must be sold per shift.

4. CONCLUSION

According to the findings of research conducted at the company using the work sample approach, the standard time for a sales outlet to service each customer required a minimum of p.1= 6.162 minutes, p.2= 8.453 minutes, for a total of 18.17 minutes. The standard productivity that two outlet employees must achieve during one shift (6 working hours) can be calculated using the standard time computation, which is a minimum of 19.81 ≈ 20 pcs of products sold.

REFERENCES

Andriani, D. P., Anugrah, B., & Islami, A. D. (2017). *Aplikasi Metode Work Sampling untuk Menghitung Waktu Baku dan Kapasitas Produksi pada Industri Keramik*.

Anggraini, R., Laorenza, S., & Adelino, M. I. (2023). Analisis Pengukuran Waktu Kerja Secara Langsung Dengan Metode Work Sampling Pada UMKM Soerabi Bandung. *Jurnal Sains Dan Teknologi (JSIT)*, *3*(1), 151–157.

Blay, N., Duffield, C. M., Gallagher, R., & Roche, M. (2014). Methodological integrative review of the work sampling technique used in nursing workload research. *Journal of Advanced Nursing*, *70*(11), 2434–2449.

Cavallari, J. M., Laguerre, R., Ferguson, J. M., Garza, J. L., Suleiman, A. O., Lombardi, C. M. P., Barnes-Farrell, J. L., & Dugan, A. G. (2022). The development and initial validation of a new working time scale for full-time workers with non-standard schedules. *BMC Public Health*, *22*(1), 1–14.


TIN: Terapan Informatika Nusantara
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ISSN 2722-7987 (Media Online)
Website https://ejurnal.seminar-id.com/index.php/tin
DOI 10.47065/tin.v4i10.4336

Diniaty, D. (2015). Analisis Beban Kerja dengan Menggunakan Metode Work Sampling. *Jurnal Teknik Industri: Jurnal Hasil Penelitian Dan Karya Ilmiah Dalam Bidang Teknik Industri*, *1*(2), 60–69.

Hadad, Y., & Hanani, M. Z. (2023). Determining workers efficiency using work sampling and time standards. *International Journal of Logistics Systems and Management*, *46*(1), 76–94.

Hajikazemi, S., Andersen, B., & Langlo, J. A. (2017). Analyzing electrical installation labor productivity through work sampling. *International Journal of Productivity and Performance Management*, *66*(4), 539–553.

Iriani, Y. (2021). Determination the Number of Packing Operators Using Work Sampling Method. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(8), 1189–1197.

Ishak, A. P., Soegoto, A. S., & Trang, I. (2016). Lingkungan Kerja, Pelatihan, Dan Pemberdayaan Pengaruhnya Terhadap Kinerja Karyawan Pada Pt. Asuransi Jiwasraya Manado. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *4*(2).

Landy, F. J., & Farr, J. L. (1980). Performance rating. *Psychological Bulletin*, *87*(1), 72.

Lee, J. S., Nickman, N. A., & Pace, M. (2022). Evaluating hematology/oncology clinical pharmacist activities via self-reported work sampling. *American Journal of Health-System Pharmacy*, *79*(12), 960–968.

Mariawati, A. S. (2019). Pengukuran waktu baku pelayanan obat bebas pada pekerjaan kefarmasian di Apotek CT. *Journal Industrial Servicess*, *5*(1), 1–3.

Oddone, E., Weinberger, M., Hurder, A., Henderson, W., & Simel, D. (1995). Measuring activities in clinical trials using random work sampling: implications for cost-effectiveness analysis and measurement of the intervention. *Journal of Clinical Epidemiology*, *48*(8), 1011–1018.

Pérez, C. T., Salling, S., & Wandahl, S. (2022). Location-Based Work Sampling. *Proceedings of the 30th Annual Conference of the International Group for Lean Construction, Edmonton, AB, Canada*, 27–29.

Robinson, M. A. (2010). Work sampling: Methodological advances and new applications. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *20*(1), 42–60.

Sedarmayanti, M., & Pd, M. (2001). Sumber daya manusia dan produktivitas kerja. *Bandung: CV. Mandar Maju*.

Sulistyowati, R. (2020). Analisa Perbandingan Waktu Pengukuran Menggunakan Kursi Atropometri di Laboratorium Perancangan Sistem Kerja dan Ergonomi UNS. *Indonesian Journal of Laboratory*, *1*(4), 1–7.

Umam, M. I. H., Nofirza, N., Rizki, M., & Lubis, F. S. (2020). Optimalisasi Jumlah Kebutuhan Tenaga Kerja pada Stasiun Kerja Hoisting Crane Menggunakan Metode Work Sampling (Studi Kasus: PT. X). *Jurnal Teknik Industri: Jurnal Hasil Penelitian Dan Karya Ilmiah Dalam Bidang Teknik Industri*, *5*(2), 125–129.

Yudisha, N. (2021). Perhitungan waktu baku menggunakan metode Jam Henti pada proses Bottling. *Jurnal Vorteks*, *2*(2), 85–90.