

Implementation of 5S in Improving of Palm Oil Mill Working Environment

Khalida Syahputri¹, Rahmi Meilina Sari², Indah Rizkya³, and Albert⁴

^{1,2,3,4}Department of Industrial Engineering, Faculty of Engineering, Universitas Sumatera Utara, Jl. Almamater, 20155, Medan, Indonesia

Abstract. A work environment describes a place for employees affect them to do their tasks. A good work environment will certainly make employees do and spend all their energy and mind to work optimally. A comfortable feeling of the work environment can reduce boredom at work. This comfort feelings have an impact on increasing motivation and producing employee job satisfaction. The condition of the working environment in palm oil industry is currently classified as messy where there are still some tools scattered on the factory floor, there is mud and slippery puddles in various places such as floors or stairs. Conditions like this certainly need to be repaired immediately to avoid the risk of work accidents and increase employees' comfortable. Improvement of working environment conditions can be done by various methods, one of the methods is 5S method. 5S spelling as (*Seiri, Seiton, Seiso, Seiketsu, Shitsuke*) is one of the effective tool in management to improve the work culture of workers and the conditions of the work environment in a factory. Based on the evaluation results, the evaluation categories of 5S implementations are *Seiri* of 16 score, *Seiton* of 16 score, *Seiso* of 9 score, *Seiketsu* of 8 score, *Shitsuke* of 7 score. The results of this total score show the 5S value of palm oil mill is in the average score of 56 total score.

Keyword: Palm Oil, Fishbone, *Seiri, Seiton, Seiso, Seiketsu, Shitsuke*

Abstrak. Lingkungan kerja menggambarkan tempat bagi karyawan yang mempengaruhi mereka untuk melakukan tugas-tugas mereka. Lingkungan kerja yang baik berdampak pada pekerjaan karyawan yang menyebabkan seluruh tenaga dan pikirannya dapat bekerja secara maksimal. Perasaan nyaman terhadap lingkungan kerja dapat mengurangi kebosanan dalam bekerja. Perasaan nyaman tersebut juga berdampak pada meningkatnya motivasi diri yang menghasilkan kepuasan kerja karyawan. Kondisi lingkungan kerja pada industri kelapa sawit saat ini tergolong berantakan dimana masih terdapat beberapa alat yang berserakan di lantai pabrik, terdapat lumpur dan genangan air yang licin diberbagai tempat seperti lantai atau tangga. Kondisi seperti ini tentu perlu segera dilakukan perbaikan segera untuk menghindari resiko terjadinya kecelakaan kerja serta meningkatkan kenyamanan karyawan saat bekerja. Usulan perbaikan kondisi lingkungan kerja dapat dilakukan dengan berbagai metode, salah satunya 5S. 5S yang biasa disingkat sebagai (*Seiri, Seiton, Seiso, Seiketsu dan Shitsuke*) merupakan salah satu metode yang dikenal efektif dalam bidang manajemen untuk memperbaiki budaya kerja karyawan dan juga kondisi lingkungan kerja pada suatu perusahaan. Berdasarkan hasil evaluasi diperoleh katogeri implementasi 5S untuk *Seiri* dengan skor 16, *Seiton* dengan skor 16, *Seiso* dengan skor 9, *Seiketsu* dengan skor 8, *Shitsuke* dengan skor 7. Hasil dari total skor ini menunjukkan nilai 5S dari Industri kelapa sawit yaitu rata-rata dengan total skor sebesar 56.

Kata Kunci: Kelapa Sawit, Fishbone, *Seiri, Seiton, Seiso, Seiketsu, Shitsuke*

Received 29 March 2022 | Revised 16 December 2022 | Accepted 01 January 2023

*Corresponding author at: [Universitas Sumatera Utara, Jl. Almamater, 20155, Medan, Indonesia]

E-mail address: [khalida@usu.ac.id]

Copyright © Jurnal Sistem Teknik Industri (JSTI) [2023] Published by Talenta Publisher

p-ISSN: 1411-5247 | e-ISSN: 2527-9408 | DOI 10.32734/jsti.v25i1.8641

Journal Homepage: <https://talenta.usu.ac.id/jsti>

1. Introduction

Indonesia is an agricultural country where agriculture become an important pillar of people's livelihoods and economy. The role of agriculture is not only to provide food to large numbers of people, but also to control the country's export activities. One of the largest plantation productions in Indonesia today is oil palm [1]. Palm oil become a raw material of plantations has many advantages in the industrial sector. Crude Palm Oil (CPO) production is mainly obtained by the food industry. The advantage of palm oil is it can be a food raw material and non-food industries (cosmetics and pharmaceuticals) and for biodiesel production [2]. Palm oil is the largest source of vegetable oil needed by industries in the world. The palm oil market is spread by Indonesia and Malaysia. Indonesia is the world's largest of palm oil, with 43% of world's CPO (crude palm oil) production from Indonesia. Indonesia's palm oil production has grown significantly, reaching 7.8% annually, surpassing Malaysia's growth of 4.2% only. Oil palm plantations produce Fresh Fruits Bunches (FFB). FFB is processed by Palm Oil Mills to produce Crude Palm Oil (CPO) and the other products. One of the FFB characteristics is could easily be damaged. After harvesting, the FFB should be treated by 48 hours to reduce damage of oil loss. FFB produced on oil palm plantations processed by Palm Oil Mills to CPO [3].

The work environment is anything around an employee affects the tasks performance they perform. A good working environment certainly encourage employees to supply all their energy and ideas to do their best work. Good working conditions allow employees to perform their tasks perfectly, optimally, healthily, safely and comfortably and to build harmonious relationships each other. [4] A comfortable feelings of the work environment can reduce boredom at work. These comfortable feelings affect employee's motivation and job satisfaction [5]. Employee performance is the level of success the employee to meet requirements and responsibilities. Employee performance is influenced by job satisfaction, organizational commitment, leadership, safety, and organizational culture [6].

The problem exist in this palm oil mill is the work environment where mud and puddle slippery can be found in various places such as floors and stairs, which is cause occupational accident for workers. Tools are used or old should be stored in the right place so that it can be easily found, tidy and efficient. Table 1 shows some actual condition of working environment in the palm oil mill.

Conditions like this certainly need to be repaired immediately to avoid the risk of work accidents and increase employee comfort while working. Improvement of working environment conditions can be done by various methods, one of which is 5S. 5S is a tool to reduce waste, productivity optimization, and quality by maintaining and organizing workplace. The 5S concept tools consist of Sort (*seiri*), Set in Order (*seiton*), Shine (*seiso*), Standardise (*seiketsu*) and Sustain (*shitsuke*) [7]. A good work culture in an organization is one of the impacts of 5S implementation [8]. 5S concept implementation is not only to create a systematic working environment but also to provide a safe and comfortable working environment [9].

Table 1 Actual Condition of Working Environment

Figure	Description
	<p>There is a liquid spill on the floor area of clarification station</p>
	<p>There are so many empty FFB left in the threshing station area</p>
	<p>There are iron pipes left in the loading ramp sterilizer station</p>
	<p>Puddle of water in the production area between the sterilizer threshing station</p>
	<p>There are dirt deposits in the sterilizer station</p>

Several studies related to 5S have been done in many previous studies. Indah et al have implemented 5S in a warehouse in Medan City [10]. Another study has also been conducted by Cristina Veres, et al to see the impact of implementing the 5S method in automotive companies. Based on previous studies, this study aims to improve the working environment conditions of the palm oil industry by using a cause-and-effect diagram (fishbone diagram) and the 5S method.

2. Methodology

This research uses primary data collected by 18 days observations in the terrestrial working environment of palm oil mill. Problem identification based on cause-and-effect diagram (fishbone diagram) method. A fishbone diagram method consists of identifying and organizing the possible causes of a particular effect and isolating the root cause. After identifying these problems cause, apply the 5S method (*Seiri, Seiton, Seiso, Seiketsu, Shitsuke*).

There are five steps to build and maintain a workplace developed by focus on manufacturing. Translated into English, five steps of workplace maintenance are called 5S (Sort (*seiri*), Set in

Order (*seiton*), Shine (*seiso*), Standardise (*seiketsu*) and Sustain (*shitsuke*)) [9]. The steps to solve the problem in this research are; (1) Identify how to solve the problem; (2) Identification of manufacturing process; (3) Draft check sheet and evaluation checklist; (4) Determination the check sheet of examiner's checklist; (5) Evaluation; (6) Summary of results; (7) Evaluation of the existing condition; and (8) Proposed improvements [11].

3. Result and Discussion

3.1. Problem Identification by Using Cause and Effect Diagram (Fishbone Diagram)

The following is fishbone diagram of the identification results carried out on the environmental conditions of production floor area in palm oil mill.

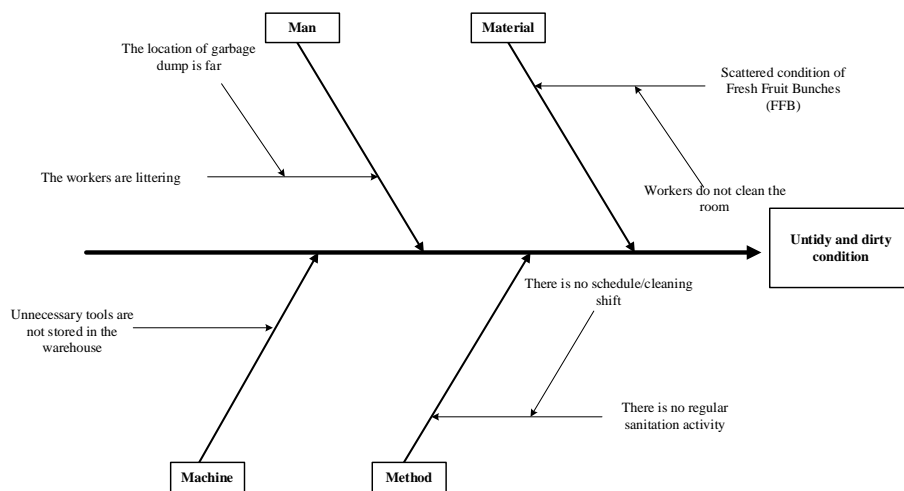


Figure 1 Fishbone Diagram of the Production Floor

3.2. Assessment on 5S Concept

On the checklist sheet, several questions are made arranged based on palm oil mill consideration with 5S concept and Palm oil industry conditions. The assessment based on direct observation in Palm oil industry. A questionnaire used to solve this problem using a Likert scale which is 0 (Poor), 1 (Fair), 2 (Good), 3 (Very Good), and 4 (Excellent). The following is the calculation result obtained by the assessment of production floor area in the palm oil mill.

Table 2 5S Score

No	Category	Criteria	Score				
			0	1	2	3	4
1	<i>Seiri</i>	There are many items do not need				√	
2		There are many damaged items and placed carelessly				√	
3		There is trash on the production floor				√	
4		There is a written procedure for the disposal of unnecessary items					√
5		Unnecessary items are easy to identify				√	
Sub Total Seiri Score						16	
1	<i>Seiton</i>	There are explicit indicators of minimum and maximum inventory quality					√
2		Items are stored according to their place				√	
3		Many objects that do not have a storage place			√		

4		There is an area for material-handling activities	√	
5		There is a label/mark indicates the storage area		√
Sub Total Seiton Score			16	
1		Workplace sanitation has been carried out regularly	√	
2	<i>Seiso</i>	There is a rotational shift for sanitation staff of work area	√	
3		The level of cleanliness of production area floor		√
4		Unnecessary items must be clean	√	
5		Sanitation tools are available		√
Sub Total Seiso			9	
1	<i>Seiketsu</i>	There are explicit indicators of minimum and maximum inventory quality	√	
2		Items are stored according to their place		√
3		Many objects that do not have a storage place		√
4		There is an area for material-handling activities	√	
5		There is a label/mark indicates the storage area	√	
Sub Total Seiketsu Score			8	
1	<i>Shitsuke</i>	Everyone is involved in improvement activities		√
2		Sanitation standard and work procedures are followed	√	
3		Written procedures are implemented and communicated by each employee		√
4		Motivation from the company for 5S implementation	√	
5		5S audits are carried out regularly	√	
Sub Total Shitsuke Score			7	
Total Score 5S			56	

The results of the 5S assessment in the Palm oil industry department can be seen on the radar map in Figure 2.



Figure 2 Map Radar

The classification of the total score shows that 0-30 means not satisfying, step 1 on checklist filling; 31-50 is below average, should review the lowest score; 51-70 means average, it is necessary to strengthen poor parts; 71-90 is above average, set a high goal; 91-100 is outstanding, must be maintained. From the total score, it shows a score of 56, which means that it is average, it is necessary to strengthen poor parts, namely *seiso*, *seiketsu*, and *shitsuke*. The unorganized working environment of palm oil mill causes a waste of time, energy, and materials.

3.3. Solution

Based on the calculation of the total score results obtained, which is 56, means that reinforcement is needed in several parts. Therefore, some suggestions or solutions can be given as follows:

1. *Seiton* (Set in Order)

The implementation of a *seiso* in the palm oil mill has yet to be implemented well, it is can be seen from the average score of 9. The recommendations are; (a) unnecessary tools are stored in the warehouse or remove it; (b) Make a routine sanitation schedule by shifts; (c) empty fruit bunches are removed or trimmed.

2. *Seiketsu* (Standardize)

The implementation of a *seiketsu* in palm oil mill has yet to be implemented well, it is can be seen from the average score of 8. The suggestions are; (a) provide more instructions to workers regarding the 5S implementation to improve implementation in the worker area. Reference can be given routine before workers start their work; (b) make the rules where workers must maintain clean and tidy working conditions, such as: do not litter, no smoking while working and sanitation work areas.

3. *Seiso* (Shine)

The implementation of a *seiso* in the palm oil mill has yet to be implemented well, it is can be seen from the average score of 9. The recommendations are; (a) unnecessary tools are stored in the warehouse or remove it; (b) make a routine sanitation schedule by shifts; and (c) empty fruit bunches are removed or trimmed.

4. *Seiketsu* (Standardize)

The implementation of a *seiketsu* in a palm oil mill has yet to be implemented well, it can be seen from the average score of 8. The suggestions are; (a) provide more instructions to workers regarding the 5S implementation to improve implementation in the worker area. Reference can be given routine before workers start their work; and (b) make the rules where workers must maintain clean and tidy working conditions, such as: do not litter, no smoking while working and sanitation work areas.

5. *Shitsuke* (Sustain)

The implementation of a *shitsuke* method in the palm oil mill has yet to be implemented well, this is can be seen from the average score of 7. Proposed recommendations are; (a) periodic audits are carried out, and audits do twice during a one-year period. The audit is carried out with several assessments based on standards determined by the company; (b) reward employees if they reach the standards set by the company as a motivation for workers to implement 5S well.

4. Conclusion

Based on 5S implementation in the palm oil industry, it found that the scores in each category were *Seiri*, *Seiton*, *Seiso*, *Seiketsu*, and *Shitsuke*, namely 16, 16, 9, 8, and 7 with a total score of 56, meaning that on average, it is necessary to strengthen the the bad ones, namely *seiso*, *seiketsu*,

and *shitsuke*. The unorganized working environment of palm oil mills causes a waste of time, energy, and materials.

REFERENCES

- [1] I. Rizkya, R. M. Sari, K. Syahputri, and N. Fadhilah, "Implementation of 5S methodology in warehouse: A case study," *IOP Conf Ser Mater Sci Eng*, vol. 1122, no. 1, p. 012063, Mar. 2021, doi: 10.1088/1757-899x/1122/1/012063.
- [2] R. Tea, S. Jamhari, P. Studi Manajemen Keselamatan Transportasi Jalan, P. Studi Manajemen Keselamatan Transportasi Jalan Politeknik Keselamatan Transportasi Jalan Jl Semeru No, and K. Tegal, "Evaluasi Penerapan Seiri, Seiton, Seiso, Seiketsu, dan Shitsuke (5S) pada Departemen Transportasi PT. Prasadha Pamunah Limbah Industri Bogor," Tegal, 2019.
- [3] I. Rizkya, N. Hidayati, R. M. Sari, and U. Tarigan, "Evaluation of the Leading Work Culture 5S in Industry," in *IOP Conference Series: Materials Science and Engineering*, Oct. 2019, vol. 648, no. 1. doi: 10.1088/1757-899X/648/1/012003.
- [4] H. Murnawan, "Perencanaan Produktivitas Kerja dari Hasil Evaluasi Produktivitas dengan Metode Fishbone di Perusahaan Percetakan Kemasan PT.X," *Jurnal Teknik Industri HEURISTIC*, vol. 11, no. 1, 2014.
- [5] Q. S. Aruan and M. Fakhri, "Pengaruh Lingkungan Kerja Terhadap Kepuasan Kerja Karyawan Lapangan Departemen Grasberg Power Distribution PT.Freeport Indonesia," *MODUS*, vol. 27, no. 2, pp. 141–162, 2015.
- [6] I. Rizkya, K. Syahputri, R. M. Sari, and I. Siregar, "5S Implementation in Welding Workshop-A Lean Tool in Waste Minimization," in *IOP Conference Series: Materials Science and Engineering*, Jul. 2019, vol. 505, no. 1. doi: 10.1088/1757-899X/505/1/012018.
- [7] F. Hamidy, "Pendekatan Analisis Fishbone untuk Mengukur Kinerja Proses Bisnis Informasi E-Koperasi," Bandar Lampung, 2016. [Online]. Available: https://servicelink.pinnacol.com/pinnacol_docs/lp/
- [8] D. Rachmat and A. Y. Darma, "Tingkat Korelasi Budaya Organisasi Dan Kinerja Karyawan (Studi Pabrik Kelapa Sawit PT. Smart.Tbk)," *Jurnal Vokasi Teknologi Industri*, vol. 2, no. 1, pp. 1–11, 2020.
- [9] R. Siahaan and B. H. Tambunan, "Pengaruh Lingkungan Kerja dan Budaya Organisasi Terhadap Kinerja (Studi pada Koperasi CU Mandiri Tebing Tinggi)," *Jurnal Stindo Profesional*, vol. VII, no. 1, 2021.
- [10] H. Stephanie, N. Tinaprilla, and D. A. Rifin, "Efisiensi Pabrik Kelapa Sawit di Indonesia," *Jurnal Agribisnis Indonesia*, vol. 6, no. 1, pp. 27–36, 2018, [Online]. Available: <http://journal.ipb.ac.id/index.php/jagbi>
- [11] A. Syahuri Zein, "Analisis Produksi Sawit Di Sumatera Barat," *Jurnal Ilmu Ekonomi dan Keislaman*, vol. 7, pp. 320–336, 2019.
- [12] P. Nurfathiyah and Rendra, "Penyuluhan Tentang Peremajaan Kelapa Sawit Dan Kelembagaan Petani Di Kecamatan Sungai Bahar Kabupaten Muaro Jambi," *Jurnal Karya Abdi Masyarakat*, vol. 3, no. 1, pp. 1–9, 2019.
- [13] A. Desrianty, "Usulan Perbaikan Berdasarkan Metode 5S (Seri, Seiton, Seiso, Seiketsu, dan Shitsuke) Untuk Area Kerja Lantai Produksi Di PT.X." *Jurnal Online Institut Teknologi Nasional*, vol. 3, no 4, pp. 219-229, 2015.