

Implementation of 5S Principles in Genset’s House Palm Plantation

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PAPER INFO	ABSTRACT
<p>Chronicle: Received: 15 March 2018 Accepted: 21 August 2018</p>	<p>Genset or generator set is one of the sources of electricity used in oil palm plantations; genset are placed in a special building that is a Genset’s house. Some of the problems encountered in the Genset’s house are oil spills, fuel oil spills, and dirty floors; scattered items in Genset’s house, packaging of hazardous and untreated substances, no safety sign board, and no work instruction. The study has conducted in an oil palm plantation company located in Central Kalimantan Province. The used method in this study is 5S (Seiri, Seiso, Seiton, Sheiketsu, and Shitsuke) by observing, interviewing, and literature review related to the discussed aspects. The results of the study show that the implementation of 5S makes the Genset’s house cleaner, the more orderly place of the goods, the no oil spill, the wider genset room, and the fundamental advantage is to reduce the environmental pollution due to the hazardous and toxic substances. So that the applied 5S principle to other parts of the company has proved to be effective in the maintenance of Genset’s houses and has reduced the possibility of fires and accidents.</p>
<p>Keywords: Genset. 5S. Genset’s House.</p>	

1. Introduction

Every company is important to pay attention to the working environment aspect to achieve its goals effectively and efficiently. A good working area is expected to create optimization and ensure the safety of workers and the environment. A good working environment is important to have any kind of work, including the activities of a generator home. Safety of workers and the environment is the responsibility of the organization [1]. This irregular work environment is suspected of having an impact on job optimization and fearing that it also has the potential to pose a threat to the health, safety, and soil and water pollution. Some things happen in the generator home environment because of this irregular work environment create some waste which are part of 7 waste elements (overproduction, inventory, time/ waiting, transport, processing, movement, and defect) [2]. One of them is the rest of the motion which is to find unnecessary additional movements when workers work to reach their work tools. In addition to motion, the rest of the time also happens because employees must transfer work devices from one place to another that can reduce the effective time to work. Deviations in working environment settings also affect the safety and security of workers; for example, deviation in restructuring of goods.

The Genset’s house which is the place to operate the generator, has several activities, namely turning on and off the generator according to its schedule, diesel fuel, oil change, diesel filter, and air filter replacement. A good Genset’s house system is a system that can protect the generator itself and the

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worker when doing activity in it [3]. Safe and good Genset's house has enough light, smooth air circulation, non-slip floor, no oil nor oil spill that can save work equipment effectively and to reduce the risk of fire or accident. If the condition of the Genset's house is in good condition, the lighting and energy distribution systems will run smoothly [4]. The function of a Genset's house in an oil palm plantation company is the same as another Genset's house which is the place to handle electrical energy resources in housing complexes. Genset's houses must be equipped with fire prevention equipment, fuel storage facilities, work equipment, personal protective equipment, and safety signs. The carried out activities must be in accordance with the applicable procedures in the Genset's house and a workers must carry out maintenance to avoid risk of harassment, equipment damage, and fire.

Controlling an ineffective generator will cause damage to the fire resulting in loss of the company; therefore, the supervision of the Genset's house must be fully controlled and inspected so as to avoid damage or fire hazard. Based on direct observations at the Genset's house, there are problems with less optimum arrangement and treatment. There are some things that the layout condition is still inadequate or messy, hazardous and toxic waste of oil, oil, fuel, slippery floors, waterways not smooth, and wall boring. In order to get better results and to make the condition of the Genset's house more than the maximum, the regulation and inspection will be done to prevent the occurrence of non-inflicting the operation of the generator and reducing the risk of fire and accident at the Genset's house; maintenance of the Genset's house should always be done by implementing 5S principle for problems that occur in generator house [5]. 5S is a five-step arrangement and optimized workplace arrangements developed through intensive efforts in manufacturing [6]. Through the 5S principle, homeowners will produce quality services and products for consumers. The implementation of the 5S principle itself is often done and proves to improve work productivity such as on the production floor.

In terms of the above, the concept is needed to solve the problem of deviation and working environment in the Genset's house; one of which is the 5S concept. The 5S (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke) method first appeared in [7]. This 5S method is a method that can be used for the purpose of creating and maintaining the quality of work environment in the company. Furthermore, according to Gapp et al. [8] it is important to pay attention to technical (visible) and philosophical (invisible) aspects. Another important thing to be aware of the implementation of 5S is communication because poor communication can be a barrier in the application of this method. So in the context of the implementation of 5S within the company, it is important to socialize the 5S concept to be applied in oil palm plantation companies. Furthermore, Ghodrati and Zulkifli [9] state that other factors that could prevent the application of 5S is a gap between management, implementers, and lack of training and a weak awareness related to 5S. In addition, budget availability is also one of the factors to consider in implementing 5S.

2. Methodology

The above conditions can be summarized as a way of maintaining a Genset's house by using the 5S principle to prevent the occurrence of damage, accident hazards, accidental workers and environmental pollution, and fire hazards. The purpose of this paper is to maintain generator houses using the 5S principle to prevent damage to generators, fire hazards, work accidents, environmental pollution and hygiene at home generator. This study has conducted at an oil palm plantation company located in Central Kalimantan, Indonesia. The study has conducted for 6 months. The formulation of this problem is done through observations made in the Genset's house. An analysis of the effects caused by existing circumstances is the result of observation and interviews with the concerned parties. Next, the paper will be a draft 5S program implementation and evaluation of its implementation results [10].

3. Results and Discussion

Genset is an essential facility provided to meet the needs of electricity in employer emplacement. Bad genset placement will cause the risk of damage to its equipment which may result in the absence of electricity in the housing. Generator house is basically a building that physically has certain criteria as the generator of the place and its supporting equipment that there will be some activities in it. Observation results show that the Genset's house is dirty and the arrangement of the goods is still not optimal. Some circumstances of the Genset's house environment and the order of goods can be seen in Fig. 1.



Fig. 1. Genset's house condition.

As shown in Fig. 1, there are some conditions of the Genset's house required by the house notice changes. Here is the explanation of the sample image: Existence of collecting items that are unclear which causes the waste of space; the packaging of hazardous toxic and hazardous chemicals, no empty B3 container management; there is no separation of empty jerry tin with jerry cans containing fuel; no work procedures, safety marks; there is no self-protection equipment available to clerks; the Genset's house wall is dirty because oil spills from engine generators.

3.1. Impact

Based on observations and interviews with the parties related to the generator house, it can be seen that some of the problems that have occurred in the Genset's house are as follows:

- Genset officers go to the Genset's house to turn on and turn off the generator only.
- There is a risk of falling due to the slippery floor caused by oil spills.
- The Genset's house is dummy and smelly.
- Rooms are narrow due to many useless things.
- There is a waste of time during working hours.
- Gensets are often damaged.
- Delay in the repair process when there is damage to the engine generator set.

3.2. The 5S Implementation Plan

The implementation of the 5S principle is intended to control and change the condition of Genset's house to better, so that it can have a positive impact on a particular peak Genset's house or a housing worker and a housing company. The 5S program will include a series of activities as shown in Table 1.

Table 1. 5S programs.

5S		
Seiri	Concise	Sorting
Seiton	Neat	Setup
Seiso	Clean	Settling
seiketsu	Treat	Consolidation
Shitsuke	Diligent	Habituation

The implementation stage is as follows: Making the first observation on the Genset's house in the company environment; 5S socialization to explain the 5S program to the parts related to the Genset's house; conducting training at a Genset's house location that is the primary purpose and household responsibility of the Genset's house to understand about 5S; explaining the 5S program to Genset's house workers and housing complex workers to help work together for the smooth implementation of the 5S program at Genset's house; collection of tools which is a form of tool that is already available in a Genset's house. The used tool in the 5S application in the Genset's house can be seen in Table 2.

Table 2. 5S Program support tools.

Tools	Function
Rag	As a cleaning cloth
Broom	For dust cleaners, garbage
Mask	Respirator from odor and dust
Gloves	Hand protection at work
Tools	For rack making
safety sign board	Safety signs
Procedure	As a procedure for work

Determine how to store goods; a good and precise storage technique will make it easier for home generator workers to look for items for using them in the field. This storage technique can be seen in Tables 3 and 4.

Table 3. Method of storage of goods.

Value	Frequency	Placement	Tools
Low	Not used	Sent to TPS LB3	- Woven fabrics - Chemical bottles - Used oil filter - Used solar filters
Average	Used 1-3 months, Used in a week	Stored in a special storage shelf outside the generator room, Saved near the generator set	Empty diesel fuel Spare parts Equipment repair
High	Used for emergency	Closed near the generator set	Genset fuel Fire extinguisher Sand fire fighters Daily Check list

Table 4. Goods storage technique.

Classification	Storage technique
Goods are often used	place it in a location that is easy to reach and easy to find
Goods are always used	Placed in a place that is easy to grab, easy to see and easy to restore
Goods are sometimes used	return the goods that have been used to the original place

3.3. Implementation Results 5S

Here is the result of the implementation of the 5S principle at the Genset's house.

Concise/Sorting (Seiri)

Concise/Sorting (Seiri) means the activity of the Genset's house to distinguish between what is necessary and unnecessary, to make strong decisions, and applying stratification management to dispose of unnecessary items. Steps in performing activities to remove unnecessary items, namely:

- Determine the scope and target. This step will help to define either require and not require things by setting targets, such as waste to be disposed, the parts to be cleaned, and the items to be sent to the TPS LB3.
- Be prepared; this is the process of applying six types of questions which is "who will do?", "What?", "Where?", "When?", "How?", and "why?" throw away garbage and everything related to safety.
- Train Genset's house personnel to identify what is not needed, give instructions to the Genset's house personnel to be able to identify the items needed with unnecessary items.

Conditions before execution of Seiri at home generator turned out to be a collection unimportant things, such as the collection of jerry cans, empty bottles, and jerry cans produced by generators due to hygiene and moisture that are not heard at the Genset's house. This cannot be distinguished among things that can still be used and cannot be used anymore; after Seiri application is shown in Fig. 2. It can be seen that the conductor of the house becomes more solid and clean, especially the spacious room.

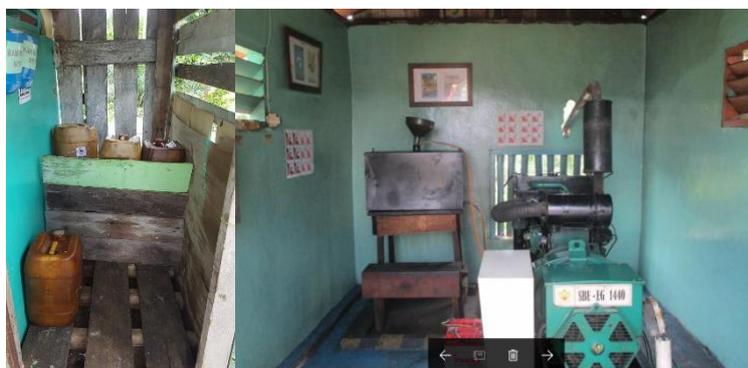


Fig. 2. Condition of genset house after implementation Seiri.

Neat/Setup (Seiton)

Neat/Setup (Seiton) is an activity that is done on a home generator with the level of storing the item in the right place or in the correct layout, so it can be used in a sudden state and can eliminate the search process and can be used for restructuring basically; that is:

- Understand and analyze the state of the Genset's house. Understand the exact nature of how to pick up and store items, and how much time it takes to perform the activity.
- Specify where items will be saved. This stage consists of 3 steps which is to remove unnecessary items, determines the analytical method for the stipulation and storage layout of the item.
- Determine how to store items to facilitate finding them. There are three points to note, namely storage learning and the name of the goods that makes it easy to pick up and store items and comply with the rules.
- Helping; the point is to unify the goods in accordance with the type of goods (work tools, personal protective equipment, fire prevention equipment, fuel, etc.).
- Setup that determines the area in the Genset's house to do the arrangement of the goods so that there is no excess waste due to an improper structure. The explanation is as follows:
 - Floors; Genset's house floor must be painted and no fuel or oil spill and should not be placed around the engine generator.
 - Walls; for routing the used work equipment that can be placed on the wall, such as helmet, ear cup,
 - Palette; the arrangement of fuel jerry in the generator, house should be covered with a pallet. Its function is to prevent this fuel from heating on the floor and can cause environmental pollution on the ground.
- Establish the identity of each location of goods placed in the Genset's house.

Conditions before the implementation of Seiton at the Genset's house cans are scattered and sacks are used to cut the floor affected by oil spills. This will be a waste of time when working to turn on the engine generator or at that time will fill the oil. The visible state of the gravely dirty home page is dirty and toxic and other waste is mixed together. The situation after Seiton's execution at Genset's house is shown in Fig. 3, where the pre-fueling of the fuel is not used by pallets and has now been used by pallets to prevent evaporation of fuel and explosive risks, to facilitate warehouse personnel to perform physical inspection of goods, and the production of goods will no longer be difficult.



Fig. 3. Condition of Genset's house after Seiton application.

Some of the items in the warehouse can be seen in Table 5, indicating that there are several names of items in the home generator that are completed with the condition of the goods and the percentage of use of the goods for using in the field. These chemicals have different ways of use. This table also shows frequently used chemicals and is rarely used in the field, so that they can be identified accordingly and not in accordance with the condition of the goods.

Clean/clean (Seiso)

Cleaning activities are done in generator houses, such as removing rubbish, dirt and foreign objects, and cleaning everything. This cleaning is also one of the forms of checking, so cleaning is not just cleaning it but also as a commitment to be responsible for all aspects of the used goods and ensuring the goods in the Genset's house are kept safe. Hygiene requirements should also be known what needs to be cleaned in the Genset's house area. Anything that is useless in the floor, shelf and work area should be removed or moved if the object still has an economic value. The classified objects as bulky should be discarded such as paper, chemical bottles, plastic and useless items. The situation after the implementation of Seiso at the Genset's house is seen in Fig. 4, where the previous floor was filled with dirty dust, scattered plastic waste such as chemical bottle cap, empty jumbo cartridge waste so that the stains of the insect were attached to the floor that looks tidy and the floor is clean too; the room was previously narrow as it was stuffed with rubbish, dust; now looks wider. Warehouse officials can carry out activities at Genset's house comfortably.



Fig. 4. Condition of generator house after implementation of Seiso.

Treat/Consolidation (Seiketsu)

It is a repetition of the activities and awareness of generator house in keeping and maintaining Seiri, Seiton and Seiso activities in the genetically engineered house, so as obtaining a steady state and a stable environment and keeping the economic value of the goods inside the generator house specify a cleaning schedule in the home generator. The Genset's house cleaning table can be seen in Table 5.

Table 5. Seiketsu activities.

Day	Tools	Activities
Monday	Duster	Cleaning the floor, taking out the garbage, cleaning the windows, moving the
Tuesday	Shoes	position of the goods, placing the items often in use near the door and removing the
Wednesday	Mask	goods that are rarely used, create a palette for fuel in the Genset's house house.
Thursday	Broom	
Friday	Gloves	provides a dumpster
Saturday	Earmuffs	
	Helmets	Make the identity of each location of the goods placement at the generator house
		Planting protective plants / plants useful, so that the area of the generator home is beautiful and comfortable

Diligent/Habituation (Shitsuke)

The practice of a worker or a Genset's house has been done well to remind the activities that need to be carried out and implemented; the employee's discipline in doing a job or performing the 5S (Seiri, Seiton, Seiso, and Seiketsu) are routinely so as creates the habits and awareness of each person by giving counseling about the importance of hygiene to the environment. One way to keep reminders of workers and Genset's house keeper is to install hygienic plots so that the Genset's house keeper can comply with the rules set out in the work environment.

After implementation of the 5S principle (Seiri, Seiso, Saiton, Seiketsu, and Shitsuke) in the Genset's house, where previously the warehouse was far from the attention and did not meet the home generator standards, it could get some results as follows:

- Get a better and more comfortable working environment by minimizing unnecessary things in the work area, such as removing garbage scattered in the warehouse.
- Avoid the occurrence of a fatal accident caused by a slippery floor.
- Provide a positive added value for the company, because with the implementation of this 5S, the warehouse situation becomes cleaner and tidy; the work process of the generator house becomes more optimum than ever before, so household electricity service goes better than before.
- Resuming workplace more frequently, waste of time can be avoided, so the optimized times can be used to do more useful stuff.
- Providing directives to warehouse personnel or officers that with S passage; the Program must be maintained on an ongoing basis to obtain better value for the particular employee and for the company in general.
- Cultivate discipline and give directions that encourage employees to keep work areas organized, safe, and productive.

4. Conclusion

Based on the results of the above investigation, it can be concluded that the application of the 5S principle (seiri, seiton, seiso, seiketsu, and shitsuke) made the Genset's house more generally to meet the standards in simplicity and convenience.

References

- [1] Hukumonline Pro. (1970). *Republik Indonesia, Undang undang*. Retrieved from www.hukumonline.com/pusatdata/downloadfile/.../parent/715
- [2] Modi, D. B., & Thakkar, H. (2014). Lean thinking: reduction of waste, lead time, cost through lean manufacturing tools and technique. *International journal of emerging technology and advanced engineering*, 4(3), 339-334.
- [3] Mahon, L. L. J. (1992). *Diesel generator handbook*. Newnes.
- [4] Hutahaeen, H. H. (2006). Manajemen logistik. *Jakarta: Universitas Katolik Indonesi Atma Jaya*.
- [5] Rachmawati, S., Rinawati, S., Suryadi, I., & Paskanita, M. (2018). Implementation of cultural 5R (Ringkas, Rapi, Resik, Rawat & Rajin) with sni iso 22000: 2009 approach and assessment in pt. y surakarta. *Journal of industrial hygiene and occupational health*, 2(2), 132-140.
- [6] Suwondo, C. (2012). Penerapan budaya kerja unggulan 5S (seiri, seiton, seiso, seiketsu, dan shitsuke) di Indonesia. *Jurnal magister manajemen*, 1(1), 29-48.
- [7] Nugraha, A. S., Desrianty, A., & Irianti, L. (2015). Usulan perbaikan berdasarkan metode 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke) untuk area kerja rantai produksi di PT. X. *Reka integra*, 3(4).
- [8] Gapp, R., Fisher, R., & Kobayashi, K. (2008). Implementing 5S within a Japanese context: an integrated management system. *Management Decision*, 46(4), 565-579.
- [9] Ghodrati, A., & Zulkifli, N. (2012). A review on 5S implementation in industrial and business organizations. *IOSR journal of business and management*, 5(3), 11-13.
- [10] Wahyudi, W. (2017). Penerapan budaya kerja 5s dan pengaruhnya terhadap kinerja karyawan. *Teknoterap*, 1(1), 49-80.