

# Productivity Improvement with Implementation of 5S: A Case Study in Mining Services Industry in the General Services Department

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**Abstract:** 5S is a smart step method for removing unnecessary items, reducing item search time, checking during cleaning, standardizing settings to avoid misplaced and keeping all of the above through self-discipline. In this Journal, the conditions before and after the implementation of the 5S program will be displayed. The purpose of this study is to make arrangements and standardize the work space, thus creating a comfortable workspace and pleasant work, and improving discipline in standard use. Results of this study increased the search of documents <3 minutes by 62%, stored documents in a 1-2 year wardrobe of 62%, change behavior in the co-workers' remembrance of 40.9% and reduced the animals / insects found 75% and lost 37%.

**Keywords:** 5S, standardization, Work Desks

## 1. Introduction

In the era of globalization and the free market, both industrial and manufacturing industry developments continue to grow, so industry players must be prepared to compete and are always ready to improve their performance and productivity. Productivity improvement problems cannot be separated from human factors and work environment that can be observed, scrutinized, analyzed and corrected. This is done to find ways to work better, effectively and efficiently, and are supported by a better working environment. One solution is to use the 5S method to standardize and standardize the work environment, create a comfortable workspace and improve employee discipline. The 5S can be thought of as a simple house cleaning method to organize desktop that emphasize visual order, organization, cleanliness and standardization. This helps to eliminate all types of waste related to uncertainty, waiting, and the search for relevant information and so on. By eliminating what is not necessary and to leave everything clear and predictable, clutter is reduced, the necessary items are always in the same places and the work is easier and faster [1]. 5S methodology in all countries is not the same as in Japan which emphasizes 5S as a strategy for business excellence, which requires participation in the workplace and at home. On the other hand, 5S in the UK and the United States are seen as systems or tools for work only. In some countries, the implementation of the 5S methodology is an easy way to comply with the minimum requirements for health and safety at

work [2]. Employee cooperation in 5S related programs is a key factor in successful execution. In other words, the responsibility of the staff and their commitment to the 5S is a secret behind the success of the system [3]. When 5S is implemented in the service industry, operations must have different approaches due to the behavioral changes required by 5S. After all members in the organization are able to fully understand and implement the 5S, the organization is prepared to practice the most realistic, so that it leads to successful and improved 5S practice results to moral and organizational abilities [4]. Although the 5S methodology is well-known in the manufacturing sector, there is little evidence of its use [5]. In this study, we used a case in one of the mining contractor companies in Indonesia, PT XYZ, where the General Services Department was in general responsible for supporting the company in carrying out its operations by managing all of the company's household affairs with the following details : 1) Plan, do and evaluate the operation and management of buildings. 2) Plan, coordinate, evaluate and propose problem solving in carrying out and fully responsible for the operational comfort of the building. 3) Supervise the activities and results of sub-contractor work (cleaning service, gondola, pest control, hygiene system, landscaping, garbage removal), security and parking according to the standards set. 4) Coordinate, inform the relevant department so that the service is going well so that customers feel satisfied and comfortable. 5) Maintain, record and maintain all company assets. 6) Management of documents for internal and external interests of the company, such as tender processes, contracts, management of building permits, telecommunications licenses, lightning distributor permits, plant permits, and others. 7) Meet all employee needs for such stationery. From the job description above, the General Service Department requires a working method to produce optimal productivity, especially focusing on the work desk area using 5S. In carrying out this program a team was formed to analyze the conditions of the workbench shown in Figure 1. From the data shown in Fig. 1, this became an evaluation for General Service Department by obtaining 5S average achievement before improvement of 1.2 on a scale of 5 so that improvement in 5S standards was needed in order to increase productivity, eliminate waste and build a comfortable work

environment. When explained in detail the average achievement is based on the inspection results of team 5s, 1) Seiri is still found, accessories and ornaments that are not necessary on the work desk, 2) Seiton, not all parts have not provided a classification of documents used at work every day and in the closet 3) Seiso, once a week is carried out clean activities and every day there is a cleaning service section that helps clean the desk. 4) Seiketsu, there is no standardization of work desks and systems to regulate the cleanliness and tidiness of work desks. 5) Shitsuke, discipline and employee consistency in implementing 5S have not been done regularly.



Fig. 1. Existing Condition Before project  
Sources: Inspection Activity by 5S team

## 2. Literature review

### A. 5S (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke)

The 5S methodology arose following the Second World War as part of the quality movement in Japan [18]. However, the term was formalized by Takashi Osada in 1980 [10], [11]. The 5S method is a stage for organizing work place conditions that have an impact on work efficiency, work productivity, quality of work, and work safety. One way to create a comfortable and safe work atmosphere is the company implemented the 5S work attitude. Environment work that was previously uncomfortable for workers can be fixed and arranged with the 5S program so that employees have a good work culture so the quality of the products produced is appropriate company and international standards [6], [7].

- *Seiri (Sort)* Distinguish between what is needed and not needed in the work area and get rid of what is not needed. Make a workplace classification based on the level of need. The selection and sorting of workplace elements into two main categories, important and unimportant, in an effort to eliminate unused or rarely used elements that accumulate and create disturbances. Hirano proposed sorting tools and materials into certain categories according to relevance or use because they removed things, which were not needed, making the workplace bigger [12]. The benefit is saving space rather than having to invest in a new workplace.
- *Seiton (Straighten)* everything must be placed in accordance with its position so it is ready for use when needed. Straighten refers to providing space for each

item that was previously classified as "level of need" so that it can be easily accessed. To carry orders to the workplace, items classified as "important" are labeled, sorted and placed according to the frequency of their use so that operators can quickly find them, use them and return them to their proper place [13], [14].

- *Seiso (Sweep)* Maintain environmental conditions in a clean and ready to use condition. Creating a clean place and work environment, not only cleansing but must be seen as a form of examination. Cleansing is a process that considers every machine or tool important because it has its own demands and abilities and tries to treat it properly. One aspect of "Seiso" is the design and application of effective methods that must be integrated into the user's daily maintenance task. However, it is important to clarify that the third "S" is also looking for mechanisms to prevent dirty and irregular workstations. Some authors explain that cleaning the hat should not only be done at the end of the day, but also have a regular schedule for removing dirt and dust [15].
- *Seiketsu (Standardize)* Expand the concept of cleanliness both work stations and users themselves and continue to practice the previous three "S" steps. Always try to maintain the condition of the work station through standardization. Seiketsu is intended so that each individual can continue to apply the three previous principles. This seiketsu phase implementation will maintain the environment. The aim of this step is to maintain the previous three S's as standards that allow operators to carry out their daily activities consistently. Thus, everything must be clearly identified and labeled [16].
- *Shitsuke (Discipline)*. Building discipline in each individual and accustomed to applying 5S through norms and standardization of work. The emphasis is on creating workplaces with good habits and behavior. Teach everyone what to do and order everyone to do it, bad habits will be wasted and good habits will be formed. One of the key factors to achieving and maintaining successful implementation methodology is the implementation of a regular audit to reveal the status of each 'S'. Audits must be focused on ensuring that the specified routines and schedules are met. This audit also provides a good opportunity to ask questions and provide feedback to stimulate further improvement [17]. The benefits will be obtained if applying this 5S method include [18]: 1. Providing a Work place Fun 2. Helps to streamline work 3. Minimizing Work Accidents 4. Guiding on Better Product Quality and Increased Productivity.

### B. Productivity

Productivity can be defined as the relationship between the





Fig. 2. Photo deviation in workbench  
 Sources: Inspection activity by 5S team

In Table 2, explained some conditions before the 5S program is carried out : (1) Employees only focus on their work tables, few employees take the initiative to remind other colleagues to carry out cleanliness and tidiness on the work table, (2) 21 Employees searching for documents for more than 3 minutes means a lot of time is wasted looking for documents, (3) 22 employees have seen mice, cockroaches and insects that have the potential to cause disease, (4) 18 employees at GS are interrupted by loss of stationery, (5) 27 employees save documents for more than 2 years in a closet and work desk so documents are not neat.

Table 2  
 Potential risk

No.	Item	Description
1	Do not have a sense of caring / reminding each other	Care only in the area of each workbench
2	Respondents looking for documents <3 minutes = 12.5%	21 respondents experienced lost time. because documents are not well organized / stored properly in file cabinets or bantex
3	Respondents 91.7% found mice / insects	6 respondents often saw and 16 people rarely saw rats / cockroaches / flies / ants due to cleanliness under the table and leftovers that could potentially pests.
4	75% of respondents often lose / exchange office stationery	18 respondents often experienced loss of ATK
5	33.7% of respondents kept documents in the closet 1-2 years	33.7% of respondents kept documents in cabinets 1-2 years

Sources : General Services Department

**A. No item description**

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- Respondents 91.7% found mice / insects 6 respondents often saw and 16 people rarely saw rats / cockroaches / flies / ants due to cleanliness under the table and leftovers that could potentially pests.
- 75% of respondents often lose / exchange office

stationery 18 respondents often experienced loss of ATK

- 33.7% of respondents kept documents in the closet 1-2 year
- 33.7% of respondents kept documents in cabinets 1-2 years

Sources: General Services Department

**B. Implementation of 5S Methodology**

- *Seiri*: The concept is to get rid of unused items from the work area. In principle, if the item is not needed then it must be disposed of. Items that are not needed are items that are not useful and not related to work. In addition, SEIRI activities also include sorting between items that are still needed and those that are not needed. If it is still needed, the goods remain stored in the work area. The smaller the number of items in an area, it will make the work area more spacious and help smooth work and productivity. Implementation of Seiri in General Services Department is to sort out useful items that are stored and useless.



Fig. 3. Photo Deviation in Work Desk  
 Sources: Inspection activity by 5S team

The items at the work desk are given a sign so that they are easily distinguished from items that are still useful. Based on the mapping of the items on the table are computers, telephones, socket, contract documents, photos, ballpoint and bantex. The leaner (lean) workbench of items that are not needed, the more efficient the work table will be, GSD also reduces unnecessary space so that it is not used as storage of items shown by Fig. 4.



Fig. 4. Relay out before and after workspace  
 Sources: GSD Layout after Seir

General Services Department eliminate storage so that it becomes wider and does not have the potential to be a storage place for large quantities of goods or other useless items. Warehouse is moved outside in a more appropriate position a part from the list being put in a closet or discarded.

- *Seiton* Seiton concept is to arrange the location and storage of goods so that it will support smooth work and productivity. After the Seiri activity, of course the items left in the work area are only what is needed in the work. The next task is to organize the storage and placement of these items so that they are easy to find, easily identified with an ergonomic position, so that employees do not have to bother looking before using them. The concept is zero time finding, meaning that the time to search for goods must be very fast, thus reducing stress when searching for goods and making the work area more productive. Implementation of Seiton which means arranging the items needed so that they are easy to use and labeled so that anyone can find and store them shown by the following Figure 5.



Fig. 5. Label on document  
 Sources: General Services Department

Seiton implementation in General Services Department organizes useful items so that they are easy to find, secure, and labeled can be seen as Fig. 4. One example of a label, regarding the explanation of group documents related to civil work can be shown in Fig. 6.



Fig. 6. Label on document  
 Sources: General Services Department

In Fig. 6, it is explained about the use of labeling, for example in the civil construction document there are: (a) company name as the project owner, (b) project name regarding the project that

is done such as building a mess, workshop, warehouse, main office and other buildings, (c) the contractor who works on the project, (d) lists the recapitulated and stored documents, (e) the year the document was made, and (f) details of the project location. This is all done to eliminate waste in finding documents and documents neatly.

- *Seiso* Seiso after all the items have their own place, then the next activity is cleaning and ensuring the cleanliness of all items and work areas at peak conditions. The concept is clean and shining like an exhibition hall. A clean work area makes the work environment healthy and comfortable. This is also good for preventing work motivation from falling because the work area is not clean. Seiso which is applied in GSD by cleaning work desks, under tables, mobile cabinets and chairs, this seiso activity is also assisted by the cleaning service company and the commitment of employees every Friday to do collective service so that the environment is clean and neat so that the work environment is healthy and comfortable so that it prevents work motivation from falling due to a dirty and messy workplace. The result of the seiso activity is shown by the Fig. 7.



Fig. 7. Seiso implemented in office area  
 Sources: General Services Department

- *Seiketsu* In this step, it must be ensured that the first three steps really run consistently by setting standards. For example, by making a procedure that regulates how often the activity must be carried out, who does it. How to clean it and with what. All work practices must be consistent and standardized so that quality deterioration does not occur. Seiketsu implemented GSD carries out the standardization of working tables that are neat and clean. The conditions that have been achieved in the process of seiri, seiton, and seiso must be standardized. These standards must be easily understood, implemented to all members of the organization, and checked regularly and periodically.

In Fig. 8, it is explained that the existence of seiketsu makes it easier for the team to carry out inspections that have a standard, one of which is a work desk and accelerate in determining the next solution so that it can match what is set.



Fig. 8. Before implementation of Seiketsu  
 Sources: General Services Department

- *Shitsuke* Activities in this step are maintaining and reviewing things that have been standardized periodically. When all four "S" have been done, a new work habit will be formed that applies in the work area. Maintain focus on the four S's and do not let old habits slowly re-do. If 5S activities are carried out regularly, a habit will be created to maintain cleanliness and order. If this habit is done with full awareness without always being commanded, a character will grow. This character will shape culture and have a big impact on the success of work in the company.



Fig. 9. Performance Review  
 Sources: General Services Department

Running 5S consistently and regularly also needs to be supported by regular socialization and evaluation by the team shown in Fig. 9, with expectations employees can consistently carry out 5S activities and become a culture of work. From the team will support through socialization and supported through management to do a reminder.

### 5. Conclusion

The final conclusion of the research and also the suggestions put forward to improve the condition of the work station process in the General Service Department Room are oriented to improve the quality of the work station. Conclusions

obtained from the results of research and data analysis on the conditions before and after the project run can be shown in the following Fig. 10.

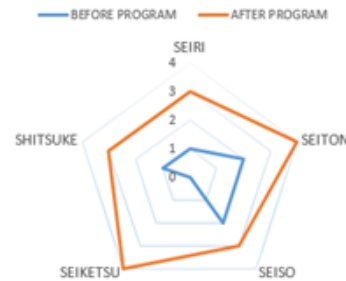


Figure 10. Performance Review  
 Sources: General Services Department

In Fig. 10, it is explained about the achievement of 5S that previously the average of 1.2 to 3.4 with the maximum value is 5 with the following details, (a) Seiri, the increase in points from 1 to 3 is because GSD employees have eliminated goods needed at the work desk and carry out warehouse re-layout as shown in Figure 4, the challenges faced still need to be made a better system due to contractual and other legal improvements that cause document buildup on several employee work desks. (b) Seiton, an increase in points from 2 to 4 because employees have made a clear classification of documents both in the work desk and storage area, the challenges faced due to the limitations of large storage sometimes some documents are still found mixed. (c) Seiso, increase point 2 to 3 because GSD employees have cleared the work desk, challenges faced are still often found food left behind and found dusty work tables (d) Seiketsu, increase points from 0 to 4 because 5S team has made standardized tables work and the targets that need to be achieved are explained in Table 3.

Table 3  
 After program

No.	Target	Before condition	After condition
1	100% search for documents <3 minutes	12.5% search for documents <3 minutes	75% search for documents <3 minutes
2	0% found mice / cockroaches / flies	91.7% found animals / insects	16.7% found animals / insects
3	0% lost ATK	100% often lose ATK	62.5% often lose ATK
4	100% of documents in the cabinets <2 years	33.7% store documents in cabinets 1-2 years	91.7% store documents in cabinets 1-2 years
5	100% daily reminder of co-workers	Care only in the area of each work desk	40.9% reminded every day, 54.5% not every day, 4.6% not every day

Seiketsu, increasing points from 1 to 3 not all GSD employees implement 5S in a consistent and disciplined manner so that they need reminder and management support in evaluating the program. From the experience that occurred in the project above, others companies have same conditions,

namely the lack of optimal implementation of the 5S, in general the root of the problem that occurs is the knowledge of employees regarding 5S, less optimal management support, the absence of clear standardization and systems and commitment from each employee. So the solution needed is clear socialization of 5S knowledge to facilitate implementation and raise awareness to implement 5S programs, coordinate with management consistently and share achievement results as a form of evaluation, making detailed standardization and systems that are easy to implement. For next improvement, there is also great scope for improving this methodology. Now, the 5S concept is evolving into a 7S Methodology. There has been a prolonged debate since past few years whether to add 'Safety' and 'Security' as the two new S's or not. Therefore, we can say that this methodology is still evolving and a lot of innovations to implement this methodology are also coming up

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