5S implementation in Wan Cheng Industry Manufacturing Factory in Taiwan

by

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Abstract

Wan Cheng manufacturing company was established in 1981 and it produces hardware parts for many different kinds of products. Wan Cheng Company has been wanting to be a lean company, but with no knowledge to help the owner the goal has not been reached. This study has mainly focusing on 5S which is related to lean and would help Wan Cheng to reach their expectation.

The problem Wan Cheng manufacturing company deals with is messy tool setting, bad working environment and inefficient process flow. Wan Cheng cannot meet customer's demand and works inefficiently, because everyone in the company is not used to a clean working environment and all inventory interrupts the process flow; therefore the major objective of this study is to help Wan Cheng manufacturing company to rearrange and reset the working environment and enhance the process flow by using 5S tools.

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Chapter I: Introduction

One of the most important issues of traditional manufacturing factories in Taiwan is to try to have employees work in a better working environment in order to make them feel good and get more energy to do their projects. By doing so, the company can maximize the profits at the same time.

In Taiwan, there is a large number of employees in small traditional industrial companies' with employees working in uncomfortable, dirty, messy environments which are usually full of unused materials. Because of this situation, it is hard to find the appropriate tools which are needed. Difficulties are met when the company is doing the project which has a scheduled due date. Wan Cheng manufacturing factory is the same as many other small or medium firms who are looking for a solution to solve the problems which are caused by the messy environment in order to enhance the efficiency and to save more money.

About three decades ago, industrial manufacturing had just developed in Taiwan and made the products by hand controlled machines. In addition, because of the handle controlled machines, the working processes were slow and the value control was not good. Besides, technical knowledge at that time was not as efficient and convenient as today. People who established industrial enterprises had poor knowledge on how to arrange the layout and did not let all employees work efficiently. The common impressions of doing work in a Taiwanese traditional organization are being neat, clean, and comfortable. However, the working environments in Taiwanese traditional industrial firms are quite poor.

As all of the reasons above, there were many employees unwilling to work long term as was the relationship with the employees working in Wan Cheng manufacturing factory. To change this bad situation, it was decided to implement a 5S system within the factory. What is

5S? 5S may be the first step for the company to embrace Lean; this study will focus on 5S. 5S stands for five different characters which are sort, set in order, shine, standardize, and sustain. The 5S system is a tool, or system that supports a philosophy of operating in an organized fashion. The philosophy that this system supports is one of discipline, efficiency, and attention to detail (Graban, 2009). The idea behind 5S is that if a workplace is clean and well laid out, the identification of waste is much easier (Sarkar, 2005). Most of the manufacturing companies in Taiwan do not run 5S, or they do not even know what 5S is. 5S is a way to help the company to reduce the waste and enhance possible profits.

Statement of the Problem

Wan Cheng manufacturing company has difficulty in meeting customers' demands because of time consuming, and non-efficient process flow. The problem Wan Cheng manufacturing company has is tools and components are set without being categorized. The result is personnel have poor workplace surroundings and this makes the company experience lower efficiency and makes it hard to reach their customers' demand.

Purpose of the Study

The purpose of this study is to implement some of the lean and 5S principles to assist Wan Cheng manufacturing company to become more efficient and more productive by streamlining the process.

Assumptions of the Study

This study researched the application of 5S in Wan Cheng manufacturing company and how 5S helped the company to enhance the profits. The result was that the company improved their situation. This type of result from a similar implementation may not yield similar results.

Definition of Terms

5S. 5S is used by five different Japanese words which are seiri, seiton, seiso, seiketsu and shitsuke and these focus on effective workplace and work procedure (Graban, 2009).

Seiri. Seiri, which is sort in English, helps the company or any organization to distinguish the items into two different categories: used and non-used (Breyfogle,2010).

Seiton. Seiton means set in order and it is focusing on making efficiency in the workplace by rearranging all items in the company which will promote work flow. All the tools should be set in the place where can improve work flow and it is easy to find for job (BusinessKnowledgeSource.com, para. 4, 2010).

Seiso. Seiso means to clean and clear. This step focuses on to clean and clear any item and working environment (The 5S plan Lean manufacturing solution, 2008).

Seiketsu. Seiketsu means standardize. To keep the first three Ss as the standard all the time and extend to personnel's daily working (Paulsen, 2010).

Shitsuke. This final S typically stands for self-discipline or sustain (Paulsen, 2010).

Limitations of the Study

This study was done for organizations who are willing to solve the problems which are similar to Wan Cheng manufacturing company and intends to help these companies to enhance the profits by using 5S.

Methodology

The researcher will first figure out the issues which exist and guild the personnel of the company to understand what 5S tools are, then apply 5S concepts to rearrange the items utilizing all of employees in Wan Cheng manufacturing company.

Chapter II: Literature Review

The overview of 5S

In North America and Europe, 5S has been using as a central lean manufacturing tool. Also, 5S has become a very widely used tool in healthcare, government, and financial services (Graban, 2009).

Although no one study shows that 5S is the basic tool of running lean, yet 5S is a very good way to help the company to reduce the wastes and enhance the profits. The 5S concept comes from Japan. The original purpose of the 5s is to make the workplace orderly to improve safety and efficiency, reducing the product defects rate. Since the implementation of Japanese manufacturing, these techniques have proven to work well. Japanese goods have become synonymous with the top rank products of the world (Bureau of Employment and Vocational Training [BEVT], 2005). During the mid 1950s, Japanese manufacturing companies were forced due to lack of resources, to develop a method which to make every scrap used while wasting nothing (Dennis, Pascal, & Shook, 2007).

Breyfogle (2008) describes that there were four activities in the Japanese system. These activities, each beginning with the letter S, were:

1. Seiri (sort)
2. Seiton (set in order)
3. Seiso (shine)
4. Seiketsu (standardize)

After that, a fifth activity was added which called Shitsuke (sustain), they are now known as 5S.

Based on five Japanese words that begin with 'S', the 5S focuses on effective work place organization and standardized work procedures. 5S classifies the work environment, reduces

waste and non-value activity while improving quality, efficiency, and safety. These processes can increase morale, create positive impressions on customers, and increase efficiency and organization. 5S makes employees feel better about their work environment. This improvement leads to less waste, better quality and reduced lead times. Any of these benefits will make a company more profitable and competitive in the market place (Skaggs, 2010).

Before a company implements the 5S, they should know what 5S are and why 5S. A lot of companies feel that they should do 5S first in order to go lean. Some proven reasons for this: 5S is clear, easy and gets people's attention. Yet, there is no rule to ask where to start. Begin 5S implementation when there is a reasonable point within a company. Let employees understand what the purpose is and how to follow it (Figure 1). Do not use 5S just because everyone else is doing it; 5S is not a trend towards fashion (Flinchbaugh, 2006). When a company wants to implement 5S, just like anything new for the company, a leader should describe what 5S is and how it will be utilized.

Table 1. 5S Definitions

Japanese term	*English Equivalent*	*Meaning in Japanese Context*
Seiri	Tidiness	Throw away all rubbish and unrelated materials in the workplace
Seiton	Orderliness	Set everything in proper place for quick retrieval and storage
Seiso	Cleanliness	Clean the workplace; everyone should be a janitor
Seiketsu	Standardization	Standardize the way of maintaining cleanliness
Shitsuke	Discipline	Practice 'Five S' daily - make it a way of life; this also means 'commitment'

Source: "The 5 'S' Process: Seiri, Seiton, Seiso, Seiketsu, Shitsuke," Page 1 of 2, SiliconFarEast.com, Copyright © 2003-2004. Retrieved from: http://www.siliconfareast.com/5S2.htm

Personnel can understand what the company is talking about but not deep enough to know what it is going to be like (Barker, 2008). They should know all steps before taking the first step of 5S. Figure 1 refers to all steps of 5S. You should carry out all steps in 5S and look deeply at the details in one area before you consider the next step (Barker, 2008).

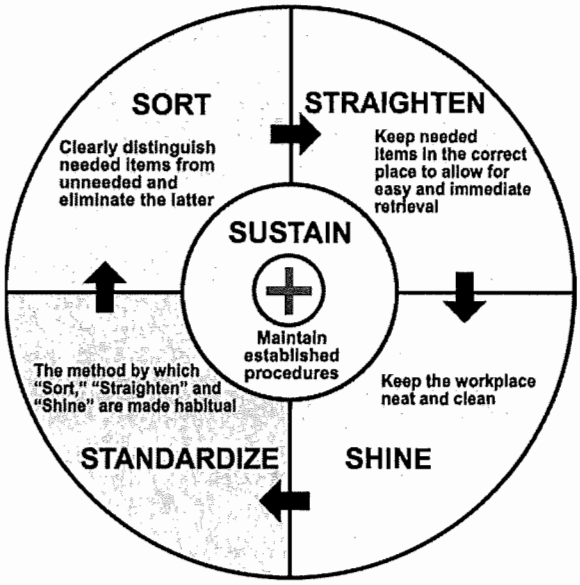

Figure 1. 5S
Source: "5S in the office," by Beyond Lean (BL), retrieved from: http://beyondlean.wordpress.com/?s=5s

People do not need to have a high education to run 5S. Any position of the employees in the organization can certainly do it. Anyone in the company should understand and practice 5S (Skaggs, 2010). So why 5S? A lot of studies show many benefits once the company runs 5S such as creating organized workplaces (Skaggs, 2010), promoting the clean work environments (Barker, 2008), improving safety (Prabwo, N.D.), and increased product quality and productivity (Business Excellence, 2010). 5S should be considered an everyday continuous improvement activity for individuals and small groups (Breyfogle, 2008).

However, some companies think that they are too busy to rearrange the workplace because it will take too much time cleaning and to keep the workplace neat. On the other hand, it means they do not want to keep the work environment clean and neat (Hirano,1995). Running 5S can be divided into three sections which are create a structured process for the project, make a clean environment, and create a clear method of management for the project (Rowlinson, 2004). If companies do 5S in the right way, it will help the company to have a smooth operation, hence, all the employees will be happy to remain with the new process in order to have a better environment (Olofsson, 2010).

The following are summaries of some important benefits from implementing a 5S process:

- Orderliness (seiri and seiton) – by using the simple way to maximize the company's efficiency and reduce defects.
- Cleanliness (seiso and seiketsu) – once they have better environment, they can improve the healthier life, safety and transparency, and
- Discipline (shitsuke) – enhance the quality control of work/ life and work criteria due to training and education improve the level of morale (Gapp, Fisher and Kaoru Kobayashi, 2008).

The first step of 5S implementation is sort (Seiri). The purpose of sort is to classify the items which you need from those that are not needed. The aim for sort is: keep everything required and eliminate everything else (Business Excellence, 2010).

Gather all of the people who work in the area where you are going to do the first step. Ask them to remove everything from the area that is not necessary (Flinchbaugh, 2006). Skaggs (2010) describes that in the first step, all items in a workplace are sorted based on needs and not wants. For sorting, first, divide all tools or materials into specific areas: cannot be used, unlikely

to be used, and tools or materials that can be used (Hirano, 1995). Hirano (1995) also divides the tools or materials into categories: rarely used items, occasionally used items, and frequently used items. In sort, criteria results should be obviously seen:

1. What items needed and not needed.
2. Red- tag targets, frequency, and responsibilities and
3. Disposal procedure (Dennis, et al, 2007).

Once you throw things away that you don't need, the place becomes larger, and you can save money and space rather than pay for more construction (Graban, 2009). What if there is some issue about items that will possibly be needed in the future? Graban (2009) also describes that there is a buffer zone, which is called a 5S sort area, that can be set up anywhere in the department. Not everyone in the organization can notice what items should be exactly kept and what else should throw away, so keep all unsure items for a week in order to make sure it is waste. This prevents people thinking the items might be used someday. The supervisor can interrupt if arguments occur. Unsure items can be kept in the special area in the center of the inventory location.

The differences between the things that you need and do not need is a key part of sort. Step one, sort, is to help the organization to be just-in-time (JIT) as the purpose of, "what is needed, only in the amounts needed, and only when it is needed," (Hirano, 1995). However, sort does not mean that you put everything you do not need away, neither does it mean that you ease all items that you need into orderly positions (Paulsen, 201). Skaggs (2009) also describes that sort creates the working place in which space, time, money, energy, and other resources can be controlled and used effectively.

Many studies show the first step of 5S should determine what things that are needed and what is not, as well as how to decide if the item is needed or not. Consider if the item is not for supporting the main process, then it should be kept outside the direct working place (Moulding, 2010).

The items can be set into three different categories: (1) low usage, (2) medium usage, and (3) high usage. The items that are defined as low usage can be kept at a far off work area. The medium usage items can be set it in a place nearby. For the high usage items, they should be kept closest to the main working place (Smith, 1977).

Set in order. In this step, all items had already passed the sort step and are ready to go further. The purpose of this step is to see where every item is located in the right place (Dolcemascolo, 2003). Paulsen (2010) describes that to run this step, first consider three questions:

- What do I need to do my job?
- Where should I located this item?
- How many of this item do I need?

In order to save more time, BEVT (2005) shows that set in order is to help everyone in the organization immediately know where the stuff is, so that they can grab it right away, and when they return everything needs to be in the same place as they were before they took them. The purpose of this step is to let anyone who needs the tool can get it right away. Set everything in order and keep everything in a condition which allows it to be used right away (CAA, 2001). "This step consists of putting everything in an assigned place so that it can be accessed or retrieved quickly, as well as returned in that same place quickly," (Siliconfareast.com, N.D.).

"All tools and equipment should be cleaned. Part of the purpose of the shine step is to expose problems. Trash and dirt may be obscuring worn or frayed wiring. Oil buildup on a machine may indicate a leak or crack in it that needs to be repaired or replaced," (Moulding, 2010). Paint the floor and all items to make them look like in new condition, and apply a fresh coat of paint. This step can make your organization look like a brand new business (Flinchbaugh, 2006). Skaggs (2010) explains that cleaning must be done not just after working, but on a regular schedule to remove dirt and dust from the workplace. Cleaning is not just about making everything look good. It is a way to notice problems early and to keep work areas and equipment in good operating condition even more to extend the duration for all (Dennis et. al, 2007).

Baker (2008) describes that in the standardized step, everything should be clearly identified and labeled. The purpose of this step is to keep the first three Ss, sort, set in order, and shine as the standard all the time and let all personnel keeps the same way whenever they perform their daily. Standardization is about keeping the first three steps up to speed and running 5S will come into effect (Baker, 2008). Breyfogle (2008) describes that, "working manners, tools and identification markings are standard and recognizable throughout the factory. 5S methods are applied consistently in a uniform and disciplined manner". This step is the way to keep the first three Ss, and make it as a standard method. Standardization also brings three Ss into regular work duties (U.S Environmental Protection Agency, N.D.).

This is the final step in the entire 5S system, but also is the hardest step for 5S. "The Sustain step is the most difficult because it requires continued diligence (Paulsen, 2010). The checklist helps everyone in the organization to maintain and continue all actions with first four Ss to improve work (Breyfogle, 2008). This final step does not mean just to keep the first four

Ss again and again but also means to keep up the increase of the improvements. The most important thing is to make a system which can distribute data for the company and this can help the company to make informed decisions (Bersbach, 2010). Dolcemascolo (2003) explains that if 5S implementation failed, it was because the company never completed 5S implementation. On the other hand, if the organization implements 5S completely, a 5S program will have longevity. Figure 2 is a sample of sustain step for helping the company to check each step by listing the details.

5S-Lean Audit Checklist--Manufacturing

Area Audited / Shift		Monthly Audit	Overall Score						
Area Supervisor		Quarterly Audit Team Self Audit							
Employee Interviewed:			XX						
Audit Team Members				Score					
Date Performed:				0	1	2	3	4	5
1	Sort: Are there any un-needed items in the area?								
	Comments on # 1:								
2	Straighten: Do the items that are needed have a conveniently located, visually designated homes? When not in use, are they returned to their home?								
	Comments on # 2:								
3	Shine: Are the machines, work stations, floors, walls and all items in the area clean, free from clutter and properly maintained? Are checklists posted and up to date?								
	Comments on # 3:								

Figure 2. 5S sustain checklist
Source: "5S-Lean Audit Checklist—Manufacturing", retrieved from http://www.lean.org/FuseTalk/Forum/Attachments/5S%20Audit%20Form(draft)-12-10-09-rev4-nL%20(2).xls

Summary

The purpose of the 5s is to make the workplace orderly to improve safety and efficiency, reduce the product defect rate and other possible wastes. This chapter covered by many different methods of each step of 5S and others' experiences who have used 5S before. From these details covered in this chapter, it became clear that how 5S helps an organization improve the working environment, and to promote efficient process flow.

Chapter III: Methodology

The purpose of this study was to assist Wang Chen manufacturing company to improve the process flow with 5S methods in order to reduce possible wastes and enhance the efficiency of operations so that Wang Chen can reduce costs. Since Wan Cheng manufacturing company has never done anything with 5S, and no one in the company knows what 5S and how it can help the company to improve the working environment, this study has provide the evidence that 5S is a great way to assist this organization. 5S provides a method to rearrange the layout and enhance the discipline. This study focused on how to use 5S in each step to help Wang Chen manufacturing company to rearrange the workplace and improve the efficiency. This chapter will describe each step and how 5S works entirely in the company.

Sort

Sort is the concept helps the company to keep everything they need and throw non-use items away. Sort is the first step in 5S to clean a place for better operation. Based on Sort concept, a company collects all items that it has now and determines whether or not it will be used, distinguishing the items into two different categories: used and non-used.

In Wan Cheng manufacturing company, they have several places that the owner uses for setting all drills and mills. Yet, Wan Cheng never has a place for setting specific size of drills and mills or even the broken drills and mills. By sort step, Wan Cheng looked at each inventory place and confirmed what the company needed, then what they did not need, and what was broken.

In addition, Wan Cheng manufacturing company had been working on so many different kinds of products, and as the result, Wan Cheng had many different kinds of samples. Wan

Cheng never set a specific place to put samples, and they were just put in a cabinet without ordering. Wan Cheng cleaned all samples out from the cabinet, and decided if samples should be kept or to sent back. Kept were the samples what Wan Cheng manufacturing company was still working on and rearranged the cabinet, everything else was sent back to an upstream company or the suppliers.

Set In Order

Set is the way to make the items look neat and reduce the time for searching the tools. If the company does not set all items in order, it will be very difficult to look for them. Set in order is the second step of 5S, which means the company should do sort first then set in order. Set in order is to keep everything you have after sort step then set it separately into the right place. For example, set the order in size, weight, and the rate of utility. The company will have more space since sort step cleans all items that the company does not need but occupied before so that it is not hard to set the items into the right place. Manufacturing companies usually have many different tools and items, so set in order is a very important step to help the personnel save time to gather the items they need. For example, put all the same size of drills, mills together and distinguish all different size separately. Hang the handle tools on the wall so that all users can see them clearly and get it right away. The most important step in set in order is to tag the name of the tools and items so that everyone will know where they should look for them without wasting time.

Wan Cheng manufacturing company, made a place to set the tools they have now, for example, they distinguished all sizes then put each size into separate containers and made a label to identify what size was inside of the container. In addition, they hung some tools that were used often on the wall, it reduced time to find and pick when anyone needed a tool.

However, set in order is just a way to distinguish the items into right position. In order to pick the tools and items right away all the time, the most important step is to make everyone in Wan Cheng company who used a tool to put the items back to the original place so that they can easily get it again next time when they need them.

In order to know how much time Wan Cheng Company has wasted by each time when anyone is looking for tools, recorded data was quite important. Whenever the personnel need tools, especially drills and mills, someone recorded the time while he was searching.

Shine

The general idea is to make everything in the workplace clean, shiny and neat. In order to make items have a longer life for using and have better working place, companies should ask the personnel to do cleaning after off duty but before they leave the company. Wipe the machines such as the panels, especially for the companies, which have CNC machines. Doing the shine step in 5S, wiping the machines is not enough, personnel also need to clean all tools and sweep the floor in order to have a better and cleaner working place. Put everything back in the place where it should be and every movable machine should be moved back to the correct place.

Wan Cheng manufacturing company uses a lot of coolant while the machines are working. Anytime the personnel are drying the products, they make the floor wet and dirty, since the product always carries a lot of scrap and coolant. To do the shine step in the company the manager lets all employees know they are in danger if they do not clean the floor because it is easy to slip and fall down. Beside, requiring employees to clean the machine and surrounding is also important after they are done for each process such as sweeping and wiping.

Standardized

As making a rule, after first three steps, the managers will ask all workers to keep everything the same as it was before. Standardization is the way to help the company to set the normal and it is possible to change these rules if it can be done better when they truly run first three Ss. When the company has the criteria, it is easy for the new workers to get involved when they first come and try to be familiar with the new structure in the company and also it is easy for the old workers to lead the new employees.

Wan Cheng manufacturing company doesn't have any rules to guide anyone who is new, and it is hard for senior employees to lead them if there is no standard. Wan Cheng should at least make a list for everything in the company such as operation rules, anything that can let the new employee clearly understand the right way, so that the new employees can feel the company is well organized. Making the standard can also help everyone in the company understand how the rules work in the company and how it can help people to get involved. The list should also have the sponsor for each rule so that the company can easily see whether everyone is in the right position.

Sustain

This is the final step for 5S implementation, and asks the executives to keep everything going every day. The company should make a checklist to help the manager to make sure whether everyone follows the rule to sustain. Once the company runs the first 4S, the staff in the company should know deeply what the first four Ss are, and keep everything they run daily in order without question. Making workers do sort, set in order, shine, and standardize when they are running the four Ss daily, means that they are completing sustain.

Data collection and processing record

Personnel who work in Wan Cheng manufacturing company, and the manager's operation collected the data. Processing records were from the daily operations by each of the employees in the company.

Summary

5S implementation was used at Wan Cheng Company to rearrange their processes. The 5S system provides the basic concept of organization to the Wan Cheng Company. In this chapter, the researcher provided some simple methods to help the Wan Cheng Company improve the process flow and reduce the time consuming acts of identifying and gathering tools and material required to process their work.

Chapter IV: Results

Wan Cheng is a manufacturing company that deals with a messy and dirty working place. The purpose of this study was to enhance the company's efficiency by using the 5S concept resulting in a better working place so that employees in the company can feel comfortable and be productive. Wan Cheng manufacturing company produces various different sizes of products and requires many different sizes of drills, mills and tools. The results of the data will be provided on how the company used 5S to enhance the efficiency and keep the working place neat and clean. The data was collected by recording the time required to get different sizes of drills, mills, and tools from different places before and after implementing 5S. The comparison between before and after 5S will be the metric used by Wan Cheng manufacturing company to judge the efficiency, flow, and how well they meet their customer's demands.

Time Consuming Analysis

Time utilization was taken each time the personnel or staff needed the tools or any item from the inventory places. In order to know how long it took looking for the different size of tools before running 5S, Table 2 was used to collect time in looking for different sizes of drills. Table 3 is the data collection chart used for looking for mills. This data was collected by the average number of 3 cycles. Figure 3 and 4 are for drills and samples. Figure 5 was used for looking for tools.

Table 2. Time consuming in looking for drills before 5S (seconds)

Size of drills	*D 1.6*	*D2.3*	*D6.7*	*D7.35*	*D3.65*	*D5.75*
Staff 1	45 sec	112	51	74	64	50
Staff 2	42 sec	122	64	75	68	38
Staff 3	39 sec	125	66	84	63	52

Staff 4	51 sec	136	58	66	59	50
Staff 5	33 sec	115	73	68	64	53
Staff 6	44 sec	111	71	74	78	31
Staff 7	43 sec	133	72	65	57	50
Staff 8	37 sec	130	70	73	60	39
Average	42	123	66	72	64	45

In Table 2, whenever the drills were needed, it took a lot of time for processing. Sometimes, they even found some broken items in the inventory place. The same manner for time reporting was used for mills (see Table 3).

Table 3. Time consuming in looking for mills before 5S (seconds)

Size of mills	M3	M3.5	M5	M8	M5.5	M6	M10
Staff 1	25	16	13	18	25	27	19
Staff 2	24	915	17	24	28	23	19
Staff 3	23	14	12	25	33	31	20
Staff 4	25	11	12	24	31	35	16
Staff 5	22	18	12	24	25	29	14
Average	24	15	13	23	28	29	18

Before Wan Cheng implemented 5S, all staff usually spent a lot of time for looking for the tools that the processing required and it can entirely impact the capacity. Table 2 and 3 are the results that show how much time was used when the drills and mills are needed in each time or project from different employees.

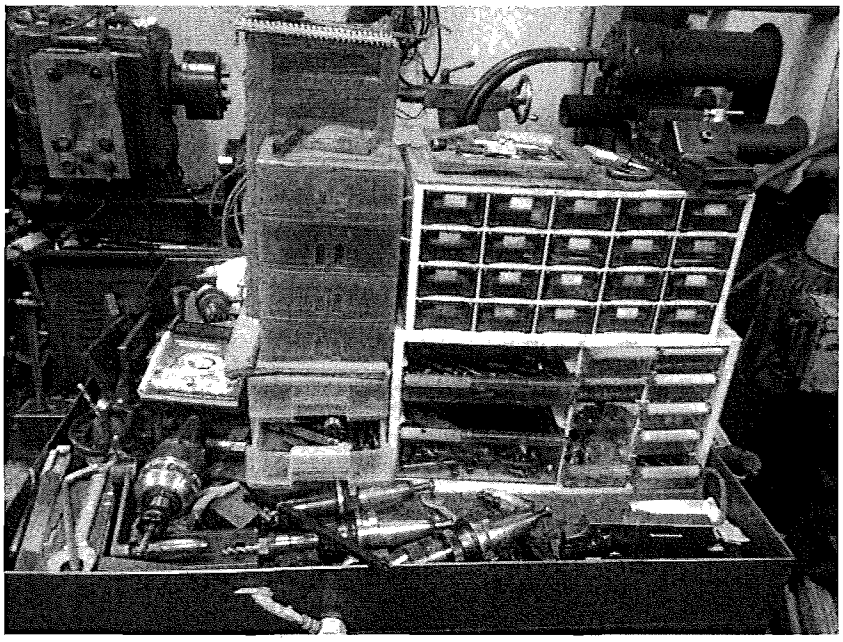

Figure 3. Drills setting place before 5S

There are many different spaces for the various sizes of drills, Wan Cheng manufacturing company did not write or note anything to distinguish the drills to reduce time spent searching.

Figure 4. Sample setting place before 5S

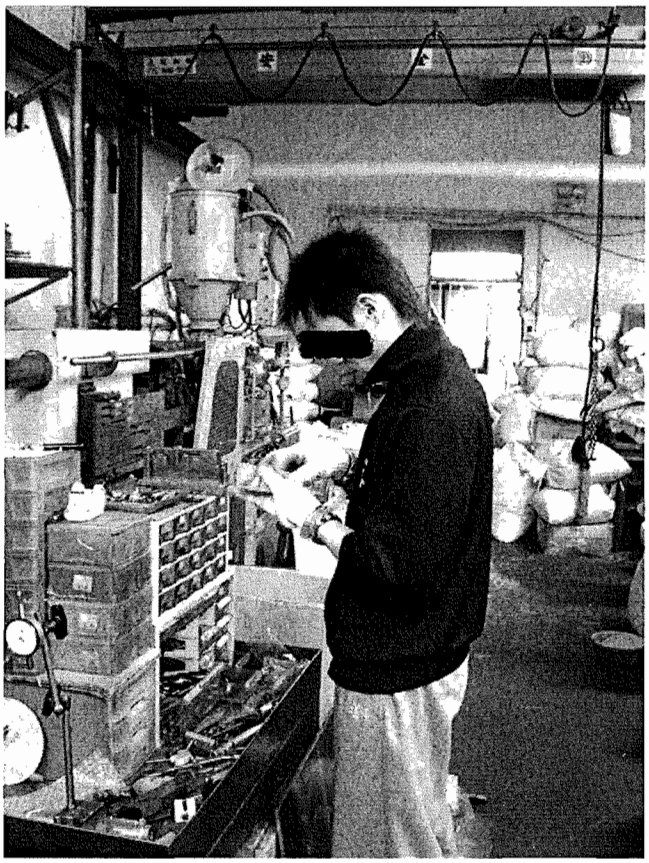

Figure 5. Staff is looking for drills

Sort

Sort is the way to help Wan Cheng to clean all items that had already broken, but were not thrown away so that the places for setting the items can look better and not as messy. Figure 6 and 7 are the results before and after sort. As we can see in the figure 6 , many of items set together without discard.

Figure 6. Before sort, drills and mills are setting together with some broken items.

Figure 7. After sort, all broken items have been taken out.

Set in order

Set in order helps Wan Cheng have the shortest time to look for the items when needed. Wan Cheng manufacturing company uses a lot of drills and mills without ordering so personnel usually waste too much time in searching when the processing requires these tools. Figure 8 and 9 show the before and after of the second step in 5S.

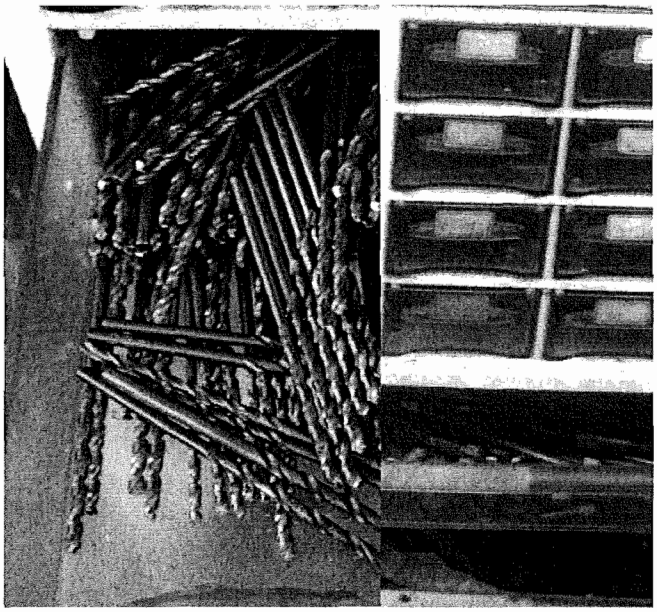

Figure 8. Before set in order, drills are setting without distinguishing.

Figure 9. After set in order, drills are set in right place.

Wan Cheng manufacturing company has been working on step 1 and 2, which are sort and set in order. Table 4 below shows the result after the drills were set in order.

Table 4. Time consuming after set in order step in Wan Cheng

Staff	D1.6	D2.3	D6.7	D7.35	D3.65	D5.75
Staff 1	11	25	15	33	25	21
Staff 2	13	26	18	37	23	18
Staff 3	13	23	28	34	28	29
Staff 4	18	28	28	27	33	24
Staff 5	12	29	29	35	33	29
Staff 6	15	31	24	35	35	29
Staff 7	18	41	27	28	25	17
Staff 8	15	25	36	41	39	22
Average	14	29	26	34	30	24

Table 5. Looking for Mills after 5S rearranging.

Staff	M3	M3.5	M5	M8	M5.5	M6	M10
Staff 1	10	9	7	10	15	13	7
Staff 2	11	10	8	10	15	12	9
Staff 3	13	8	6	13	14	10	9
Staff 4	10	8	10	10	7	14	11
Staff 5	8	9	10	13	9	9	8
average	11	9	8	12	12	12	9

Shine

Shine is a way to keep everything in the company clean and clear. Figure 10 is showing a situation of when the personnel were off duty before 5S conception.

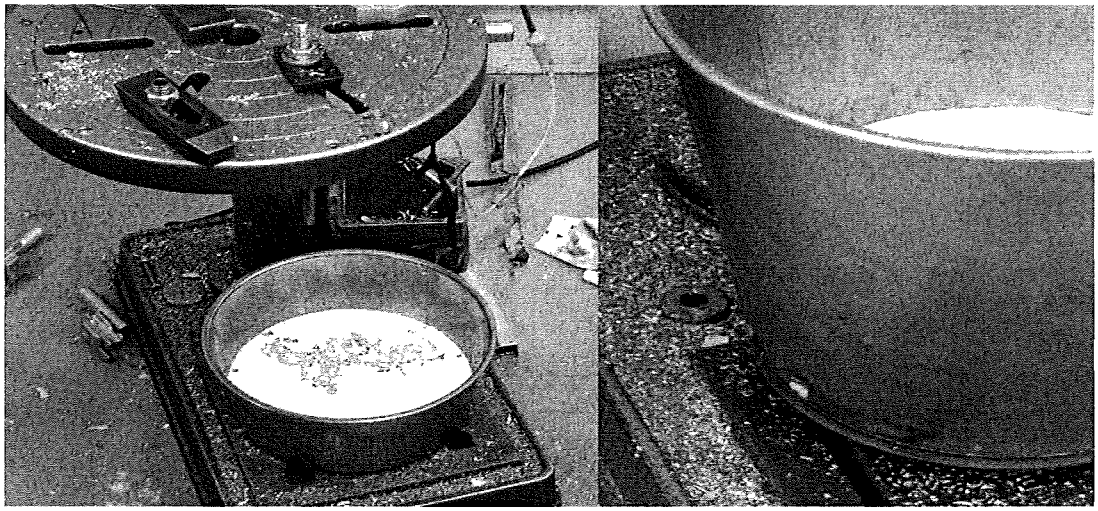

Figure 10. The machine and surrounding area without cleaning.

Figure 10 shows multiple scraps that remain without cleaning. Figure 11 shows the result of when workers implemented the shine step.

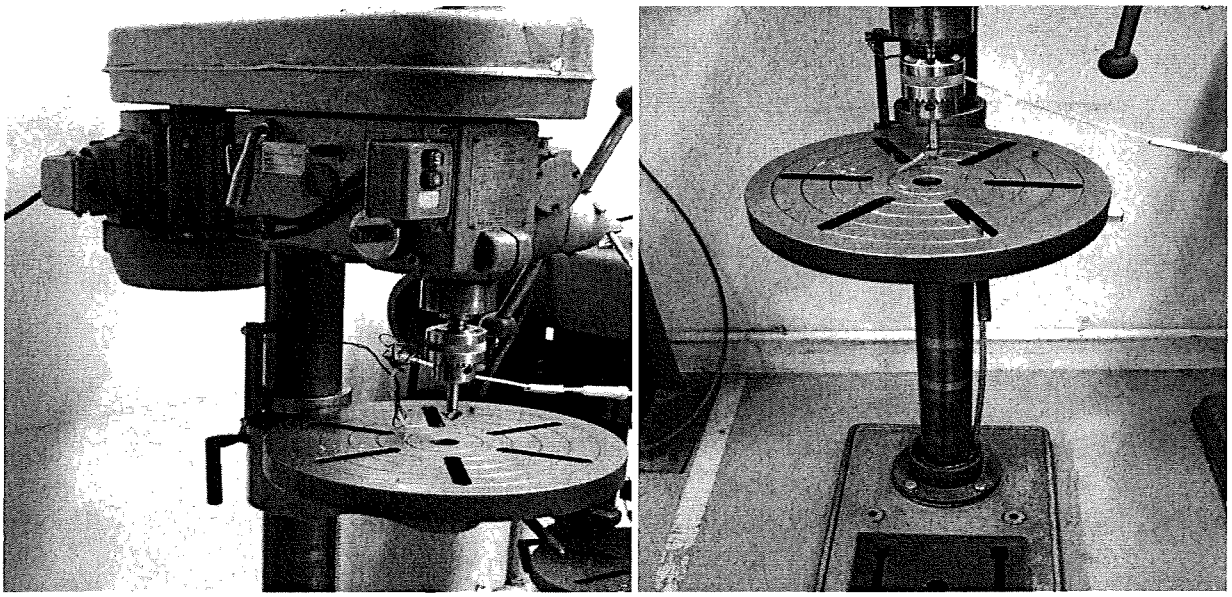

Figure 11. Machine is cleaned and so is the surrounding after personnel off duty.

Shine is not only to clean the machines but also set all products in the right place in the company. Figure 12 and 13 show the results before and after 5S.

Figure 12. Products setting without ordering.

Figure 13. After set in order and shine step.

Standardized

After 5S implementation, all staff in the company clearly understood what 5S accomplishes and how it works. Managers need to make a list to help all people in the company to know what and when they should do 5S activities. Figure 14 is a draft of checking each step of the 5S.

	A	B	C	D	E	F	G	H	I
1	5S	order						operator	
2	Sort	1. Make sure all broken stuff are in the place that should be							
3		2. Make sure the inventory room or place are for good tools to set						A Chin	
4		3. no good and bad stuff set together							
5									
6	set in order	1. check all tools in the right place, especially drills and mills						A Pone	
7									
8	shine	1. Clean the machines, surrounding						Mei Lynn	
9		2. sweep the floor and wipe it with a mop							
10									
11	standardize	1. make sure everyone is doing the right thing in right position.						Hung Ta	
12									
13	Sustain	1. Keep everyone doing things daily.						Hung Lin	

Figure 14. The draft of Checking list of 5S in Wan Cheng manufacturing company.

Sustain

Workers now know what 5S are, the owner and the manager in the company required all personnel to keep the concept in mind and do 5S every day to have improved operations. In order to have improved a more efficient process flow, Wan Cheng manufacturing company should use 5S as daily work and it will be the key to make employees in the company feels better and willing to contribute their energy to better promote company's image.

Summary

Wan Cheng Company is a traditional industry manufacturing company and using a lot of handle controlled machines. Wan Cheng Company also uses CNC machines and these use more coolant and produce scraps than hand controlled machine. Due to this, Wan Cheng Company's working environment is dirty and not well organized. Due to the poor working conditions, Wan Cheng decided to implement 5S to make workplace improvements.

Wan Cheng is now doing 5S. The results show that Wan Cheng Company is seeing the many improvements between before and after running 5S and is willing to keep doing 5S daily.

Chapter V: Discussion

Wan Cheng manufacturing company has been working on hardware processing for many years. Each product required many different tools such as drills and mills. It was a difficult time in Wan Cheng Company to do 5S at the beginning, because no one knew anything about 5S. Originating in Japan, 5S is the manner to help the company to have a better working environment and better efficiency. It stands for 5 different characters, seiri, seiton, seiso, seiketsu, and shitsuke, which in English means to sort, set in order, shine, standardize, and sustain. The purpose of this study was to enhance Wan Cheng manufacturing company's working environment and process flow in order to meet customer's demand.

Results

The average time consuming looking for and retrieving drills was reduced by 38%, and the time for mills was reduced by 49%. These reductions were a direct result of the 5S implementation. This time reduction will allow for additional productive time for employees to work meeting customer demand, being more efficient, and productive.

Limitations

This study is only for people who are willing to get involved in the company and help the company have better working environment and efficient process flow by using 5S.

Conclusions

After everyone was educated on 5S, Wan Cheng manufacturing company is walking on the road to lean. The information in literature reviews showed the method of running each step of 5S in order to help the organization to have a better working environment and improve the process flow. From very beginning of running 5S, Wan Cheng was dealing with difficulty since a lot of things needed to be changed and this required more time than expected. However, after

5S was implemented, the data was collected by using an excel spreadsheet and it showed the evidence that 5S did help the company improve. 5S provided the concept for how to rearrange the workplace, and distinguish the tools. Wan Cheng Company did get a good result from the 5S method.

Originally, Wan Cheng Company thought 5S could only improve the result in the working environment, but it proved also to helps the company to gain better efficiency. Sort helped Wan Cheng Company to decide between used and not used items, in addition, the company got more space from that. Set in order did improve the time that personnel in the company used to not need to search for tools. Shine made the working environment look better than the previous situation. Standardized and sustain are working for keeping all steps going forward.

Wan Cheng manufacturing company is now working on 5S, and hope they can go further on lean journey in the future.

Recommendations

The recommendations are that more can be done with implementation with 5S in Wan Cheng manufacturing company. Not only in making rearranging inside of the factory, but also any office department. Wan Cheng should use this first step of process improvement to being the lean transformation throughout the company.

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Appendix A: Data collection

collect by second

D 1.6	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	37	45	39	50	27	26	37	37	
time spend	51	41	35	56	33	58	45	48	
time spend	46	40	41	47	39	48	47	26	AVERAGE
average	44.6667	42	38.3333	51	33	44	43	37	41.625

D2.3	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	103	125	125	130	120	107	126	151	
time spend	120	117	131	137	118	129	135	123	
time spend	113	123	118	141	107	97	137	116	AVERAGE
average	112	121.667	124.667	136	115	111	132.667	130	122.875

D6.7	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	58	64	67	59	71	73	69	69	
time spend	51	67	61	63	77	71	72	77	
time spend	43	59	68	51	70	68	75	64	AVERAGE
average	50.6667	63.3333	65.3333	57.6667	72.6667	70.6667	72	70	65.2917

D7.35	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	78	83	84	77	69	73	71	81	
time spend	63	79	88	69	75	71	77	70	
time spend	80	62	79	51	58	76	47	67	AVERAGE
average	73.6667	74.6667	83.6667	65.6667	67.3333	73.3333	65	72.6667	72

D3.65	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	69	63	59	74	77	83	51	66	
time spend	48	75	69	57	61	72	63	51	
time spend	73	64	59	44	52	79	57	61	AVERAGE
average	63.3333	67.3333	62.3333	58.3333	63.3333	78	57	59.3333	63.625

D5.75	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	46	53	41	47	51	46	40	37	
time spend	67	36	52	43	62	31	58	37	
time spend	37	23	61	58	45	15	51	42	AVERAGE
average	50	37.3333	51.3333	49.3333	52.6667	30.6667	49.6667	38.6667	44.9583

drills	avrg. Time by mins.
D1.6	0.69375
D2.3	2.047916667
D6.7	1.088194444
D7.35	1.2
D3.65	1.060416667
D5.75	0.749305556

collection after 5S

D 1.6	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	12	14	16	21	13	17	21	15	
time spend	10	8	11	15	11	10	15	12	
time spend	11	15	10	17	11	16	17	16	AVERAGE
average	11	12.3333	12.3333	17.6667	11.6667	14.3333	17.6667	14.3333	13.9167

D2.3	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	22	35	23	27	37	38	37	15	
time spend	24	27	27	31	21	29	43	31	
time spend	27	15	19	24	29	25	41	27	AVERAGE
average	24.3333	25.6667	23	27.3333	29	30.6667	40.3333	24.3333	28.0833

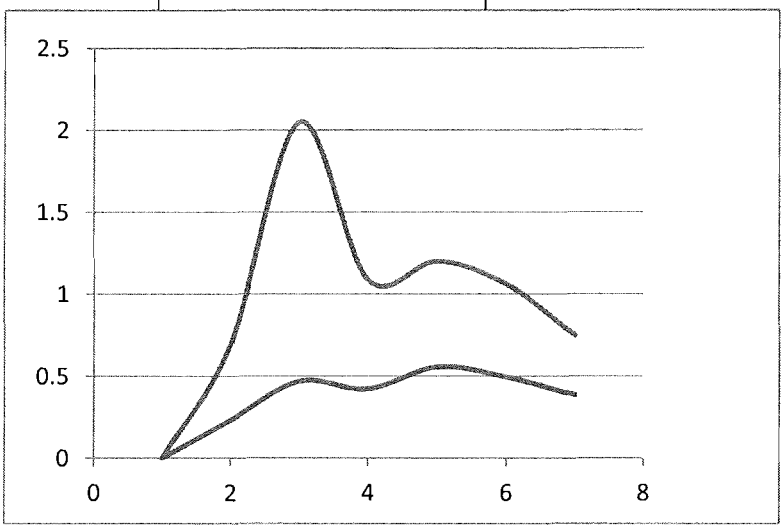
D6.7	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	13	24	27	33	31	25	31	43	
time spend	8	15	27	21	27	21	23	35	
time spend	21	14	30	28	29	26	27	29	AVERAGE
average	14	17.6667	28	27.3333	29	24	27	35.6667	25.3333

D7.35	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	39	43	29	33	36	36	27	37	
time spend	31	35	37	20	32	37	24	41	
time spend	29	31	36	27	37	31	31	44	AVERAGE
average	33	36.3333	34	26.6667	35	34.6667	27.3333	40.6667	33.4583

D3.65	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	27	23	25	29	31	39	25	37	
time spend	21	22	27	32	37	29	29	43	
time spend	25	22	31	37	31	35	21	36	AVERAGE
average	24.3333	22.3333	27.6667	32.6667	33	34.3333	25	38.6667	29.75

D5.75	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	Staff 6	Staff 7	Staff 8	
time spend	17	17	27	21	31	26	15	21	
time spend	21	15	31	26	29	34	19	27	
time spend	23	22	27	24	27	25	15	16	AVERAGE
average	20.3333	18	28.3333	23.6667	29	28.3333	16.3333	21.3333	23.1667

	before 5S	after 5S
drills	avrg. Time by mins.	avrg. Time by mins.
D1.6	0.69375	0.231944444
D2.3	2.047916667	0.468055556
D6.7	1.088194444	0.422222222
D7.35	1.2	0.557638889
D3.65	1.060416667	0.495833333
D5.75	0.749305556	0.386111111

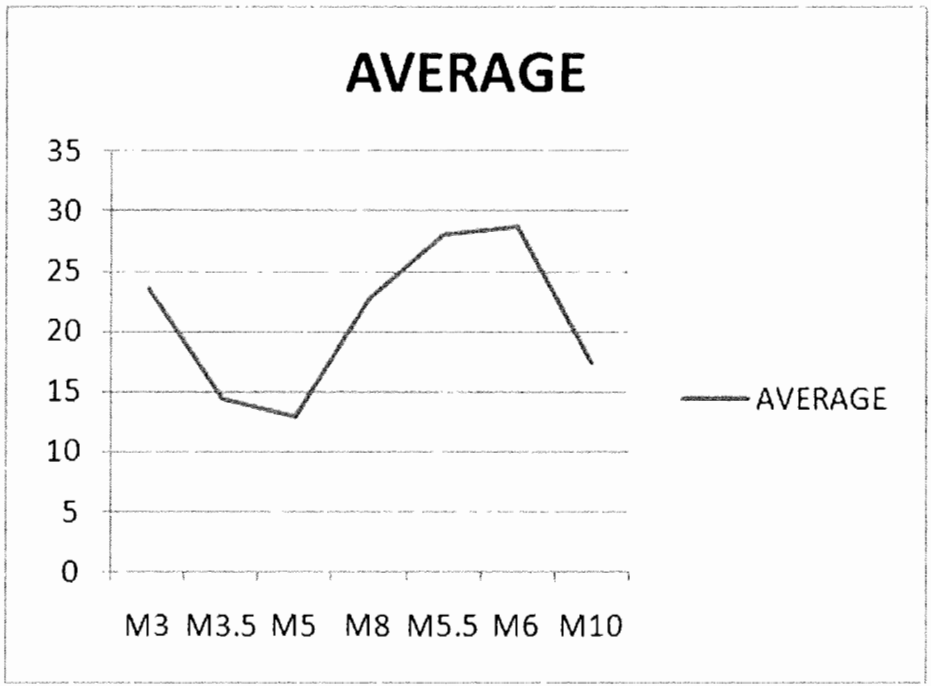


	Looking for Mills before 5S					
M3	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	25	19	21	27	15	
time spend	19	22	26	25	23	
time spend	31	31	21	21	27	AVERAGE
average	25	24	22.6667	24.3333	21.6667	23.5333
M3.5	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	12	9	14	7	20	
time spend	15	14	11	15	15	
time spend	21	20	15	11	17	AVERAGE
average	16	14.3333	13.3333	11	17.3333	14.4
M5	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	10	13	10	15	7	
time spend	11	15	11	7	17	
time spend	17	21	15	13	11	AVERAGE
average	12.6667	16.3333	12	11.6667	11.6667	12.8667
M8	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	22	27	26	21	25	
time spend	15	21	21	25	27	
time spend	17	24	27	24	18	AVERAGE
average	18	24	24.6667	23.3333	23.3333	22.6667

M5.5	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	37	31	40	35	38	
time spend	25	27	31	25	19	
time spend	13	24	27	31	17	AVERAGE
average	25	27.3333	32.6667	30.3333	24.6667	28

M6	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	31	27	33	41	34	
time spend	21	26	29	31	27	
time spend	28	14	30	33	25	AVERAGE
average	26.6667	22.3333	30.6667	35	28.6667	28.6667

M10	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	15	10	11	14	12	
time spend	20	23	28	17	15	
time spend	21	24	19	16	15	AVERAGE
average	18.6667	19	19.3333	15.6667	14	17.3333



	Looking for Mills afer 5S					
M3	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	10	15	12	13	7	
time spend	8	9	17	9	7	
time spend	12	7	10	7	9	AVERAGE
average	10	10.3333	13	9.66667	7.66667	10.1333333
M3.5	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	7	12	9	7	8	
time spend	8	5	5	7	10	
time spend	10	11	10	8	8	AVERAGE
average	8.33333	9.33333	8	7.33333	8.66667	8.33333333
M5	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	5	6	5	9	7	
time spend	8	7	6	10	12	
time spend	7	10	5	11	11	AVERAGE
average	6.66667	7.66667	5.33333	10	10	7.93333333
M8	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	11	10	13	6	15	
time spend	9	8	11	10	11	
time spend	10	12	15	12	13	AVERAGE
average	10	10	13	9.33333	13	11.0666667

M5.5	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	17	11	21	7	11	
time spend	13	16	11	8	9	
time spend	13	17	9	5	6	AVERAGE
average	14.3333	14.6667	13.6667	6.66667	8.66667	11.6

M6	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	11	14	12	15	7	
time spend	15	9	9	17	7	
time spend	13	11	9	10	11	AVERAGE
average	13	11.3333	10	14	8.33333	11.3333333

M10	Staff 1	Staff 2	Staff 3	Staff 4	Staff 5	
time spend	5	9	6	11	7	
time spend	8	8	11	12	9	
time spend	7	10	8	9	6	AVERAGE
average	6.66667	9	8.33333	10.6667	7.33333	8.4