A PROJECT REPORT ON

5S IMPLEMENTATION

UNDERTAKEN AT

NOBLEEXCHANGE ENVIRONMENT SOLUTIONS PUNE LLP

IN THE PARTIAL FULFILLMENT OF

POST GRADUATE DIPLOMA IN BUSINESS MANAGEMENT

SUBMITTED TO

MIT SCHOOL OF DISTANCE EDUCATION, PUNE.

UNDER THE GUIDANCE OF

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CERTIFICATE

This is to certify that Mr. Ritesh Bhimrao Gulhane has completed the project report with us for his project report work on **"5S IMPLEMENTAION"** in fulfilment for the completion of his course with MITSDE on "PGDM" as prescribed by MIT School of Distance Education, Pune.

This Project Report is record of authentic work carried out by him/her with guidance by our relevant department from Date 15th October 2022 to 15th December 2022.

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DECLARATION

I hereby declare that this project report entitled "5S IMPLEMENTAION IN NOBLEEXCHANGE ENVIRONMENT SOLUTIONS PUNE LLP" is a bonafide record of the project work carried out by me during the academic year 2020-21, in fulfilment of the requirements for the award of POST GRADUATE DIPLOMA IN MATERIAL MANAGEMENT (PGDM) of MIT School of Distance Education, Pune.

This work has not been undertaken or submitted elsewhere in connection with any other academic course.

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I would like to express my deep sense of gratitude and profound thanks to all staff members of
NobleExchange Environment Solutions Pune LLP, Gat No 443, Ambi-Nigde Road , Ap Ambi, Maval, Pune 410507   for their kind support and cooperation which helped me in gaining lots of knowledge and experience to do my project work successfully.

At last but not least, I am thankful to my Family and Friends
for their moral support, endurance and encouragement during the course of the project.

Gulhane Ritesh Bhimrao

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Executive summary

    I am MR. GULHANE RITESH BHIMRAO At MIT School of Distance Education a PG student. This report explains the importance of 5S Implementation in manufacturing industry for quality improvement in process in present era and this report will help the reader to get an idea about the 5S methodology and its implementation Industry as well as our daily routine life and work, Steps involved in 5S implementation. After reading the whole report the reader will be able understand the reason behind importance of 5S implementation.

Title of the Report is **"5S Implementation in NobleExchange Environment Solution Pune LLP"** and Objectives of the project is to understand 5S implementation in industrial operation excellence and process improvement.

Methodologies used for achieving the objective are research papers articles. I used four research papers for this project. For achieving the objective, I have done one research using an online questionnaire. The title for the research is **"5S implementation in NobleExchange Environment Solution Pune LLP".**

Main findings of the research are given here. In this report we explain the 5S implementation methodology. On the basis of our own research, it can be stated, that introducing the 5S rules bring great changes within company, for example: process enhancement by costs' reduction, increasing of effectiveness and efficiency in the processes, maintenance and improvement of the machines' efficiency, safety increasing and reduction of the industry pollution, proceedings according to decisions. The 5S method begins each programme of improvement in a company. This method can be used in all companies. Its result is the effective organization of the workplace.

    More details about findings are given this report.5S is a methodology for organizing a workplace that brings numerous benefits to any organization that utilizes it. In order to see the full benefit, a well-planned implementation is required. Our project's primary focus was to develop a way to improve the implementation of 5S at **NobleExchange Environment Solution Pune LLP** in Baner and Talegaon Dabhade, Pune. 5S, as an organizational philosophy helps reduce multiple kinds of waste that occur during the manufacturing process. **NobleExchange**

Environment Solution Pune LLP's facility in Baner and Talegaon Dabhade presented us with a number of unique cultural and organizational challenges that we had to understand. By the end of our project, our client hoped to establish a culture of continuous improvement at **NobleExchange Environment Solution Pune**, and to meet their implementation targets.We hoped to aid them in these goals by helping **NobleExchange Environment Solution Pune** save time and make the plant more efficient. To do this, we came up with two objectives for our project: Creating a Standard Operating Procedure (SOP) and creating an Education & Training Guide (E&TG).

In order to carry out our objectives and create the SOP, our team collected information by using several methodologies. First, we analyzed the problems and found out the root causes and the relations among them by using Analyzing tools such as Axiomatic Design (Suh, 1990) and 5WHYs (Chase & Jacobs, 2016). Then we went to **NobleExchange Environment Solution Pune** and stood at the frontline of manufacturing to get a first-hand look at the initiatives in different zones by making observations. At the same time, we interviewed some employees from different level including operators and Autonomous Team Leads (ATLs) and Value Stream Coaches (VSCs). We also reviewed the existing documents in **NobleExchange Environment Solution Pune**. The documents provided us ideas in our deliverables and enlightened us on creating new documents.

By using these methods, we were able to come up with relevant information to achieve our objectives. We created an SOP with detailed step by step instructions on how to conduct 5S in any zone of the factory. This document contains ideas and instructions relating to **Sort, Set In Order, Shine, Standardize and Sustain**. It explains in details on how a worker should go about implementing 5S at their workspace by using various tool and methods that we created for them. It also incorporates the correct usage of materials and documents that **NobleExchange Environment Solution Pune** has already created. For the E&TG, we focused on introducing basic concepts relevant to each S in accordance with the philosophy of the 5S methodology. This guide is a supplemental material employees can refer to whenever they are stuck on a certain S. It contains the importance, significance and examples of the various tools and methods we introduced in the SOP.

At the end of our project, we were able to learn a number of valuable lessons, such as the fact that working in a manufacturing environment is extremely challenging, and requires skills that cannot often be found in normal academics. We also found that it is imperative for project teams: to possess a clear goal and scope for their project, to plan their activities well in advance, to regularly perform self-assessments, to communicate in ways that are proactive, substantive, and honest- no matter how difficult it is to accomplish. We have learned a great deal from this project and will carry it forward to future efforts.

The successful completion of this project indicates that **"A place for everything and everything in its place"** is the mantra of the 5S methodology. 5S is a system to reduce waste and optimize productivity through maintaining an orderly workplace and using visual clues to achieve more consistent operational results. I conclude my research by quoting again that *"Quality is not Act, It is a Habit"*

Chapter 1: Introduction

In today's world, a company must continuously improve its operations and manufacturing system in order to stay competitive. There is an invaluable tool that can help achieve this: 5S. In order to successfully implement an organizational philosophy such as 5S, a great implementation and education program is needed. Proper implementation of 5S has been proven to improve efficiency and to reduce manufacturing cost and time by eliminating waste. Our organization seeking to implement 5S was NobleExchange Environment Solutions Pune LLP a Biogas Plant in Talegaon Dabhade,Pune.

NobleExchange Environment Solutions Pune LLP is a Limited Liability Partnership, established by Mr.Nuirel Perzarkar in 2015. For 6 years the company has endured and has evolved from producing CBG (Compressed Bio Gas) gas from MSW (Municipal Solid Waste i.e. Hotel Waste), to a global role model for BioGas Sector after Sweden to introduce CBG as a vehicle fuel and heating purpose in foundry forced Govt of India introduced new fuel policy under SATAT, also encourage Indian Oil company i.e. IOCL,HPCL,BPCL and Gas Companies like MNGL,IGPL,Torrent Gas to sale this CBG gas in their Retail Outlet (Petrol Pumps) and introduce new revolution in India to start many CBG production plants to reduced dependency on Natural Gas and saving our cash flow to the Middle east Countries . This company also set up a same design and capicty of Plant in Bangalore Municipal Corporation in Year 2017

NobleExchange Environment Solutions Pune LLP has begun to implement a new operating program: World Class Manufacturing (WCM) The program introduces new manufacturing techniques and philosophies, including 5S and Lean Manufacturing. Sustainability and efficiency practices are nothing new to NobleExchange Environment

Solutions Pune LLP, but this program poses unique challenges. In Talgaon Dabhade Plant, the goal has been set to reach a bronze level certification by the end of the year. To do this, plants need to push all 8 of their zones to obtain a 50% implementation score by year's end. The plant's model and pilot areas for 5S need to reach even higher: 80% by the end of the year.

Keeping this in mind, the main goal of our project was to help improve the implementation of 5S in Nobleexchange Environment Solutions Pune LLP, Talegaon Plant. To do this, we provided the employees adaptable education and implementation resources. The tools we provided, unlike the ones the company already had, are suitable for each of its unique 8 zones. During this project, we also learn more about manufacturing, operational management, and working with blue-collar employees. Along the way we would learn many lessons, and grow as students and future employees.

1.1 Objectives and Benefits

Objectives

- ✓ To increase Productivity of Organization
- ✓ Increases Safety issue of Organization
- ✓ Reduces Waste
- ✓ Better Worker Commitment

Benefits

- ✓ 5S helps to make everything in discipline form
- ✓ 5S Improves organizational efficiency
- ✓ 5S Improves safety
- ✓ 5S Reduces waste in all forms
- ✓ 5S Improves speed and quality of work performance
- ✓ 5S Cuts down employee frustration when "the system doesn't work"
- ✓ 5S creates a visually attractive work environment.

1.2 Scope of the Study

The scope of this work is limited to determine performance factors and dimensions of industrial organizations and also characteristics of those dimensions, which will be proposed as questions, and finally find out whether 5S is an effective method to improve whole performance of an industrial organization.

It realized that the scope is ambitious in that, but it examines a new outlook at organization and total quality approach, however it is limited enough to be a realistic base for research.

The output of this research will help us to locate 5S practices in the most suitable framework for total quality management and performance improvement in industrial organizations

Chapter 2: LITERATURE REVIEW

A fool-proof way to ensure the same is to first implement the 5S process as a part of lean methodology. 5S was popularized by Taiichi Ohno, Toyota engineer who is also known as the father of 5S

"A place for everything and everything in its place" is the mantra of the 5S methodology. 5S is a system to reduce waste and optimize productivity through maintaining an orderly workplace and using visual clues to achieve more consistent operational results. The term 5S refers to 5 pillars of visual workplace as mentioned. These are Seiri (Sort), Seiton (Set in order), Seiso (Shine), Seiketsu (Standardize) and Shitsuke (Sustain). It is firstly important to understand why it is necessary to implement each pillar of the 5S methodology.

1) **Seiri** is necessary because:

   ➢ The factory becomes extremely crowded and hard to work in.
   ➢ Lockers, shelves and cabinets for storage get in the way of communication
   ➢ Time is wasted in tools, parts searching
   ➢ Excess Stock hide production problems
   ➢ Unneeded items and equipment make it harder to improve process flow

2) **Seiton** is necessary because it helps eliminate many kinds of waste in the workplace:

   ➢ Motion Waste – Person sent to find cart searched full factory
   ➢ Searching Waste – No one can find the key to the tool cabinet

➢ Waste of Human Energy – Frustrated worker gives up searching for template after two hours

➢ Waste of Excess Inventory – Desk drawers are full of papers and stationary supplies

➢ Waste of defective products – Items not kept back in the same location so worker picks up wrong piece for assembly

➢ Waste of unsafe condition – Boxes of material kept in the walkway, causing someone to trip and get injured

3) Implementation of **Seiso** avoids certain problems like

➢ Puddles of oil or water led to slippages and injury

➢ Cutting shaving, dirt can get mixed up in the production resulting in defects

➢ Cutting shaving can get into people's eyes and create injury

➢ Windows are so dirty so no sunlight enters – Defects are less obvious in the dark

➢ Filthy work environment lowers morale

4) Implementation of **Seiketsu** avoids problems like

➢ Conditions go back to their old undesirable levels even after companywide implementation of 5S

➢ At the end of the day piles of unneeded items are left from the day's production and lie scattered.

➢ Tool storage sites become disorganized and need to be put in order at the end of the day.

➢ Cutting shavings constantly fall on the floor and need to be swept frequently

➢ Even after implementing 1S and 2S, soon the office is cluttered with more stationary supply than needed.

5) • Implementation of **Shitsuke** avoids problems like

➢ Unneeded items begin pulling up as soon as sorting is completed.

➢ No matter how well Set in Order is planned and implemented, tools and jigs do not get returned to their designated places after use.

➢ No matter how dirty equipment becomes, little or nothing is done to clean it.

➢ Items are left protruding into walkways, causing people to trip and get injured.

➢ Dirty machines start to malfunction and produce defective goods.

The strategy devised by Hirano depicts that the implementation should be carried in such an order that the simpler and basic methodologies should be installed first. Hirano describes the sequence of implementation in the following fig.1
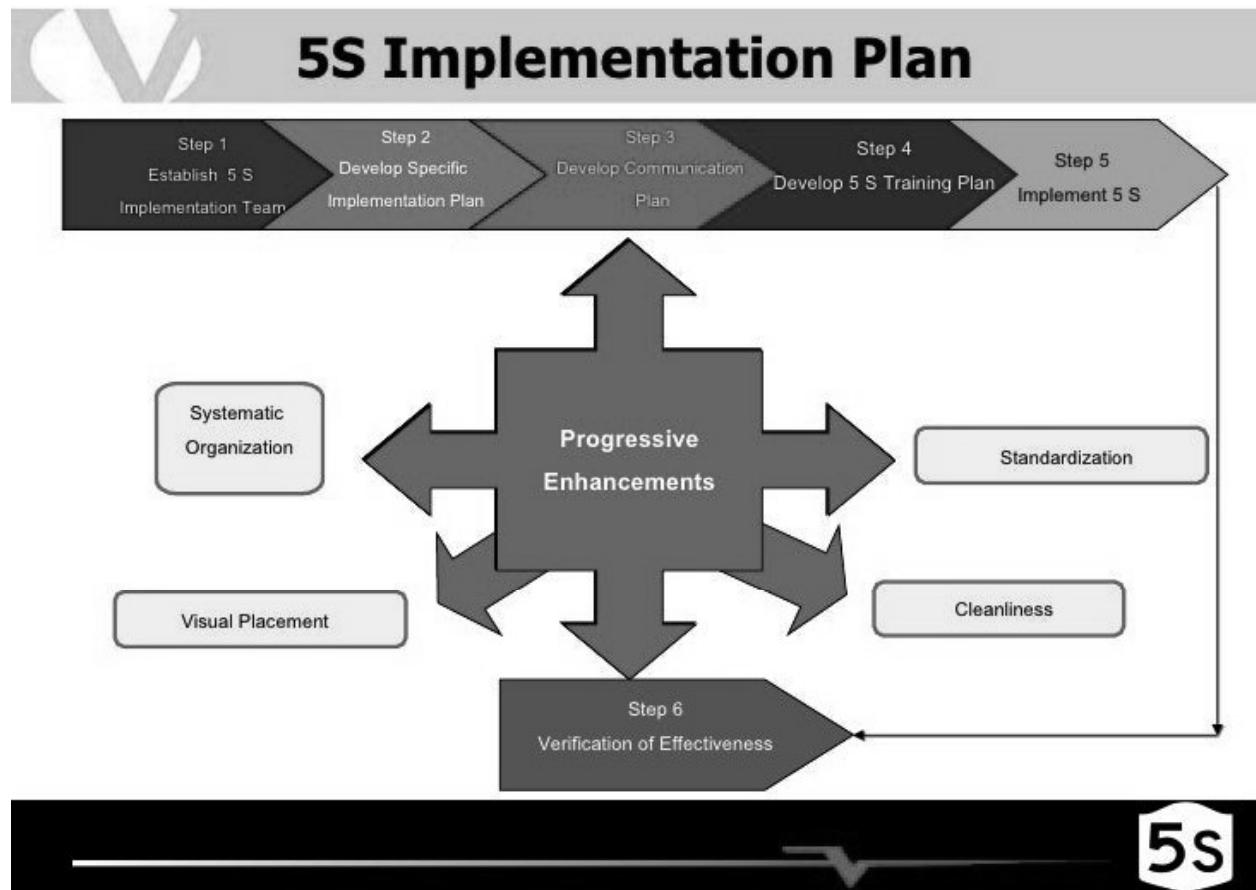

Fig.1 Hirano's 5S Implementation Strategy

Skaggs described some benefits of implementing 5S as a source of reduction of wastes and no value adding work activities while simultaneously increasing the productivity and efficiency of the workplace. The most interesting aspect of 5S is that it doesn't require specialized personnel for its implementation.

Chapter 3 Company Profile

NobleExchange leads the path to a better world. Striving each day to restore the innocence of a green and tranquil planet we inherited. Creating a world that enables a better quality of life for the next generation. Offering green solutions that ensure progress and profits need not be at the cost of the environment. By recycling waste and in its place, and transforming it to offering rejuvenated, eco-friendly solutions for a greener tomorrow. Create a symbiotic exchange that is truly noble. It is this transformational process which has inspired the name Noble-Exchange'

Accelerating climate change, environmental imbalance problems, and diminishing natural resources are having a negative impact on quality of health and life. accelerating climate change, environmental problems, and diminishing natural resources with associated health problems. At the same time, domestic reliance on foreign oil, geopolitical unrest, and the prospect of future fuel shortages has driven public dialogue and research towards alternative energies. Municipal Solid Waste (MSW) sent to landfills presents a crucial untapped resource in solving this problem - touching on every aspect of the issue: clean fuel; land-use; health; water, land and air pollution; and economic and strategic resilience.

Landfills are a hazard to human health through contamination of groundwater, breeding disease carriers and emission of poisonous greenhouse gases. Alternatives to landfills such as composting, or incineration are either economically unviable or environmentally unsustainable.

Organic refuse-processing facilities using Anaerobic Digestion (AD) - a process in which microorganisms break down biodegradable waste to produce biogas and organic manure - offer two important benefits: environmentally safe waste management and disposal, as well as

generation of clean, renewable energy. AD greatly reduces the environmental impact of MSW including the elimination of greenhouse gas emissions. AD technology is an environmentally sound and techno-economically viable way to treat biodegradable waste. Biogas when cleaned and purified to 95% purity can be used as alternate fuel for natural gas vehicles or replace other fossil fuels such as LPG, Diesel, Furnace Oils, etc. CBG is certified as a 100% carbon-neutral gas by the United Nations Federation for Climate Control (UNFCC).

Anaerobic Digester processing facilities have further led into the associated beneficial opportunities of organic agriculture and mass mobility solutions.

Company Journey

Company Established by Mr.NURIEL NEHEMIA PEZARKAR in Year 2015 and location of Plant in Talegaon Dabhade (Main Plant) and Baner (Raw Material-Crushing Plant)

- ❖ **March 2015-** Concession Agreement awarded by Pune Municipal Corporation (PMC).
- ❖ **July 2016 -** Plant commissioned with 300 TPD capacity and all statutory permissions including environmental clearance, PESO license, PCB clearance, power connection, etc. received.
- ❖ **July 2016 – July 2017-** Trials for use of CBG for transport conducted in association with TATA Motors, ARAI, VRDE, Bio Fuels Committee, NITI Aayog & others. Data shared with Govt. Authorities to influence policy for adoption of CBG as alternate fuel for the transport sector.
- ❖ **August 2017-**Plant shut down due to regulatory issues with sale of CBG for transport sector.
- ❖ **November 2017-** Hon. Minister – Ministry of Petroleum & Natural Gas (MoPNG) visits NobleExchange plant (interaction with PMC Commissioner, Pune Smart City CEO, Head Sustainability Infosys, and Head R&D – CNG busses – TATA Motors).
- ❖ **June 2018 -** BioFuels Policy adopted by Government of India – recognizing CBG as Modern Biofuel good for use as Transport Fuel in conventional CNG engine vehicles.
- ❖ **October 2018-** SATAT program launched by MoPNG making it mandatory for OMC's to sign CBG off-take arrangements with private CBG producing companies.
- ❖ **January 2019-** NobleExchange signs LOI with Indian Oil Corporation (IOCL) for CBG off-take that is first under the SATAT program.

❖ **January 2019-** NobleExchange commences repair and restart activity for the plant.

❖ **June 2019 -**Phase I with 100 TPD processing capacity plant successfully restarted and Mahindra CIE adopts CBG for replacement of High-Speed Diesel (HSD) used in manufacturing process for direct combustion purpose.

❖ **September 2019 -** Indian Oil commences operations of India's first CBG retail outlet at Talegaon with CBG supplied from NobleExchange Pune plant. First of its kind CBG retail outlet in the world - outside of Sweden.

❖ **September 2019 - October 2020-**

- Over 500 tons CBG dispensed into 70000+ vehicles from IOCL – CBG retail outlet at Talegaon replacing 500 tons fossil fuel

- Over 180 tons CBG supplied to Mahindra CIE replacing 225 KL furnace oil for direct combustion purpose

- Over 14000 tons food waste processed during this time

- Impact of over 16300 Tons CO_2 per Year created in this period

3.1 Mission and Goal Statement

MISSION

Our mission is to increase awareness of Biogas usage for Commercial uses and reduces MSW and carbon footprints, and to improve the business scenario of the Biogas industry by advocating for conducive policies and to set up 10 new commercial biogas plants by the end of the year 2024. To attain World Class Excellency by demonstrating Value added products to customers

GOAL

To become the country's largest Compressed Bio-Gas manufacturing company.

Chapter 4 Research Methodology

Type of Research: Descriptive Research:

Descriptive research aims to accurately and systematically describe a population, situation or phenomenon. It can answer what, when, where, when and how questions, but Not why questions. To determine cause and effect, experimental research is required.

A descriptive research design can use a wide variety of quantitative and qualitative Methods to investigate one or more variables. Unlike in experimental research, the researcher does not control or manipulate any of the variables, but only observes and measures them.

3.3 DATA COLLECTION METHOD

Primary Data: -

It is a firsthand data which is collected by the researcher. The different way of collecting prim data is personal interview, questionnaire, survey etc. For this particular research I have collected data with the help of questionnaires, personal interview and observations.

Secondary Data: Secondary data implies second-hand information which is already collected and recorded by any person other than the user for a purpose, not relating to the current research

problem. It is the readily available form of data collected from various sources like censuses, government publications, and internal records of the organization, reports, books, journal articles, and websites and so on.

Secondary data offer several advantages as it is easily available, saves time and cost of the researcher. But there are some disadvantages associated with this, as the data is gathered for the purposes other than the problem in mind, so the usefulness of the data may be limited in a number of ways like relevance and accuracy.

I have collected the Secondary data for my project. For this particular research I have referred company documents, company publications, journals, magazines, Company annual Reports

Sampling Techniques

Sampling helps a lot in research. It is one of the most important factors which determines the accuracy of your research/survey result. If anything goes wrong with your sample then it will be directly reflected in the final result.

Population- Total number of employees in my company is 80 nos', therefore for my particular research total population is 80.

Sample Size-Number of elements in the sample is the sample size. In my project Sample size is 40 no's (selected only 40 employees).

In my Project sampling Technique is used-Simple Random Sampling Techniques from Probability Sampling.

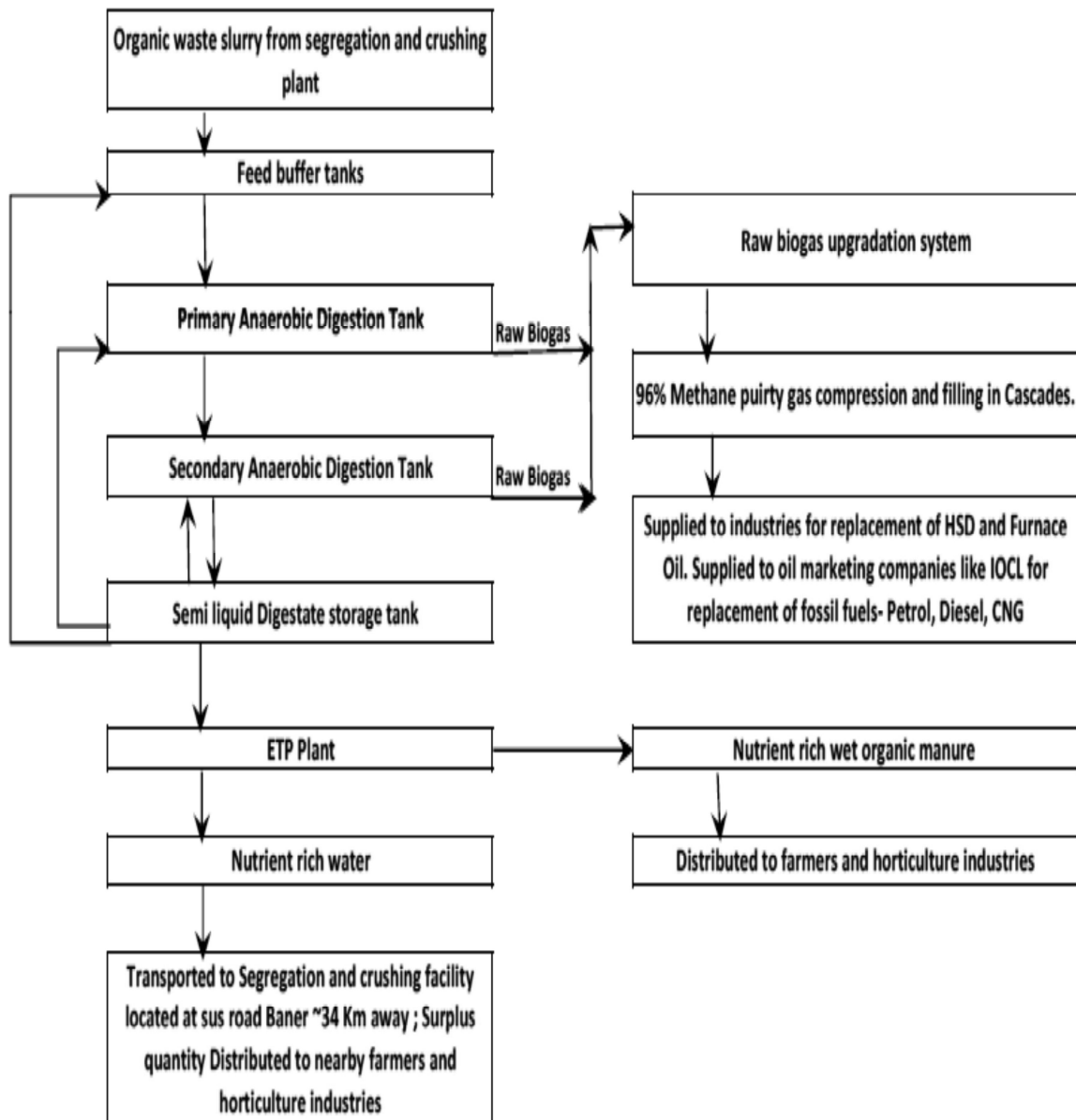**Probability Sampling-**This Sampling technique uses randomization to make sure that every element of the population gets an equal chance to be part of the selected sample. It's alternatively known as random sampling.

Simple Random Sampling: Every element has an equal chance of getting selected to be the part sample. It is used when we don't have any kind of prior information about the target population.

Chapter -5 Theoretical Background

5.1 Process Flow Chart

PROCESS FLOW CHART FOR BIOGAS PLANT TALEGAON

Organic waste slurry from segregation and crushing plant
↓
Feed buffer tanks
↓
Primary Anaerobic Digestion Tank → Raw Biogas
↓
Secondary Anaerobic Digestion Tank → Raw Biogas
↕
Semi liquid Digestate storage tank
↓
ETP Plant → Nutrient rich wet organic manure
↓
Nutrient rich water
↓
Transported to Segregation and crushing facility located at sus road Baner ~34 Km away ; Surplus quantity Distributed to nearby farmers and horticulture industries

Raw biogas upgradation system
↓
96% Methane puirty gas compression and filling in Cascades.
↓
Supplied to industries for replacement of HSD and Furnace Oil. Supplied to oil marketing companies like IOCL for replacement of fossil fuels- Petrol, Diesel, CNG

Nutrient rich wet organic manure
↓
Distributed to farmers and horticulture industries

5.2 What Is the 5S System?

The 5S system is a lean manufacturing tool that improves workplace efficiency and eliminates waste. There are five steps in the system, each starting with the letter S:

1. Sort   2. Set in Order   3. Shine   4. Standardize 5. Sustain

By providing a systematic framework for organization and cleanliness, 5S helps facilities avoid lost productivity from delayed work or unplanned downtime.

The Steps of 5S

5S was created in Japan, and the original "S" terms were in Japanese, so English translations for each of the five steps may vary. The basic ideas and the connections between them are easy to understand, though.

Table-1 Steps in 5S

Step Name	Japanese term	Explanation
1. Sort	Seiri (tidiness)	Remove unnecessary items from each area
2. Set in Order	Seiton (orderliness)	Organize and identify storage for efficient use
3. Shine	Seiso (cleanliness)	Clean and inspect each area regularly
4. Standardize	Seiketsu	Incorporate 5S into standard operating procedures
5. Sustain	Shitsuke (discipline)	Assign responsibility, track progress, and continue the cycle

The philosophy of 5S represents a way of focusing and thinking in order to better organize and manage workspace, specifically by eliminating the 8 wastes as defined by the Lean Manufacturing system. It is one of the most widely used and fundamental components of Lean Manufacturing. It's simple; common-sense application is highly effective and reliable as a stabilizing force in Lean strategies.

5S is a method of organizing a workspace to make it safe, efficient and effective. The goal of 5S is to create a clean, uncluttered environment that allows people to do their jobs without wasting time, while also lowering the risk of injury.

The five words in 5S represent the five steps to accomplish this goal. They are sort, set, shine, standardize and sustain. Lean bases the words on the original Japanese: **seiri, seiton, seiso, seiketsu and shitsuke.**

5S is a key component in eliminating the eight wastes of Lean when setting up a workstation. While it ranks among the most widely used and fundamental components of Lean Manufacturing, it's common-sense application also works in almost every setting.

Here's an overview of the five steps.

Sort

In this first step, workers sort everything in a workspace into what is and what is not needed. Some use a system called "red tagging" in which every item not necessary for a process gets red-tagged during the sort phase. These items are set aside and evaluated later. Workers store seldom used items nearby, but not at the workstation. They discard unsafe items and clutter.

The Sort phase is the first step to making more effective use of space by clearing out hazardous items and clutter that distracts from doing the job.

Set

Set, or Set in Order, follows the advice: "A place for everything and everything in its place." Workers position items based on use, with frequently needed items kept closer at hand. Every item that made it through the Sort stage is given storage space. In some cases, workers can use color-coded labels to easily identify storage spaces.

The Set in Order phase creates an ergonomic, organized and uncluttered workspace where employees have what they need close at hand and know where every item is stored. This creates a less stressful work environment.

Shine

With the clutter gone and storage space organized, it's time to clean. After a thorough initial cleaning, workers clean the station every day (sometimes twice a day). This maintains the gains made in the Sort and Set phases. Cleaning includes storage areas, machines, equipment, tools and work surfaces.

The Shine phase creates a more pleasant environment for employees, who no longer have to combat dust, dirt and clutter. Cleaning the area every day also leads to a higher level of employee buy-in for the 5S method.

Standardize

This step involves creating ways to sustain the first three steps. Employees participate in creation of a set of standards that will govern maintenance of the workspace going forward. Once this "new normal" becomes a habit; all old habits will fall away. This may require oversight and enforcement before becoming a habit, however.

The Standardize phase takes the progress and changes in behavior from the first three steps and makes them the standard procedure.

Sustain

In Sustain, the goal is to stick to the new rules. Workers keep the new standards in place and practice the first three steps every day until they become automatic and the accepted way of doing things. This final step often proves the most challenging. However, without sustaining the new system, all the cost and effort that went into creating it will prove pointless.

The Sustain phase of 5S often requires training and good communication, but it eventually will lead to employees becoming comfortable with 5S procedures.

While not complicated, the 5S system presents challenges in both implementing the steps and sustaining the practice. Putting 5S into place can not only help make people less stressed and more efficient, but will also improve workplace safety and reduce training time for new employees.

5.3 Implementation of 5S System in NEX Operation and Maintenance

5.3.1 <u>Seiri /Sort</u>

Seiri means to remove all items from the workplace that are not needed for current production / operations. This is done with the objective of saving and recovering space. The implementation of Seiri is done in the following manner:

1) The company has to be divided into several small zones such that every inch of space in the company is included when all zones are combined. Assign coordinators for each of these zones. The zone will include garden, security cabins, toilets, cafeteria, etc. also

2) Identify a red tag holding area. Red tagged items are those which are considered to be unnecessary in a particular area/zone. Read tag holding area is the area set aside for use in storing red tagged items that need further evaluation. There are two types of red tag areas:

   a) Local Red Tag area – Each Department / Zones / Area can have individual red tag area to avoid mix up of items with other areas

   b) Central Red Tag Area – One red tag area for the whole company

3) Define the red tag. Red tag is a paper tag with the following information:

   - What is the item?
   - How much Quantity?
   - Why is it removed out (damaged, excess, etc)?
   - What is approx. value?
   - Section from where the item is removed?

4) Establish the frequency of doing red tagging

5) Do the red tagging.

   It is done in the following manner:

   Every person asks himself/herself regarding all the items around his / her workplace

   - Is this item needed?
   - If it is needed, is it needed in this quantity?
   - If it is needed, is it required very frequently?

In case, the answer to any of the above questions is no, then remove the item from the workplace. The flow chart for the target items for red tagging is as shown in fig.2.
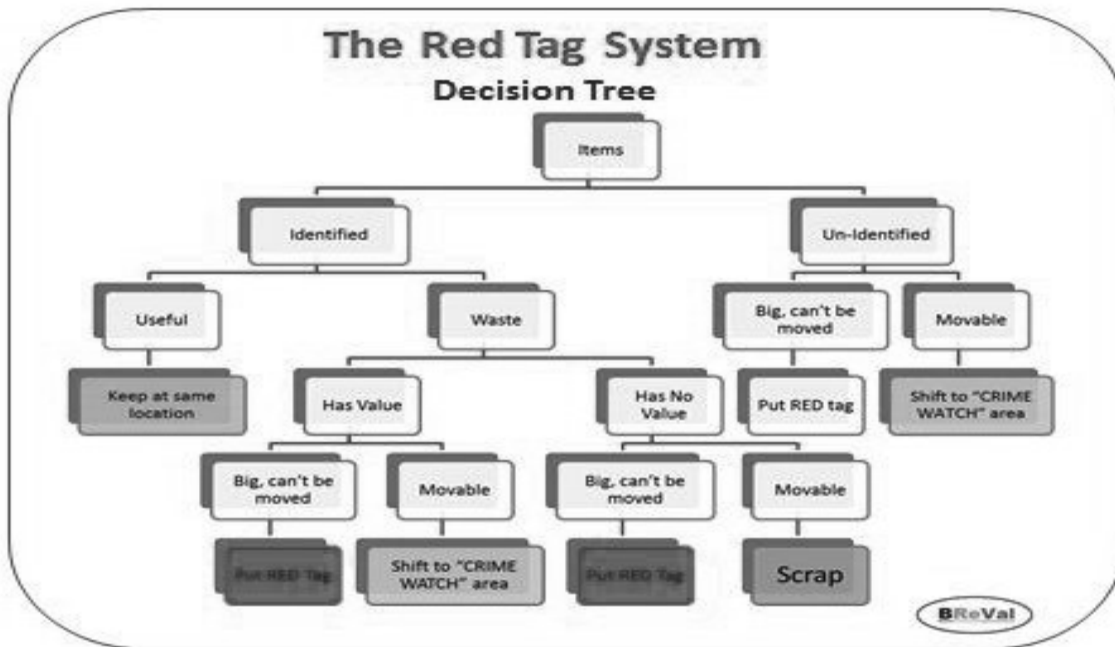
Fig.2 Flow Chart for the target items for red tagging

Review the red tag items. The review team would consist of senior members who can take decisions on disposal; it must include personal buying new items.

Steps in reviewing include:

- First a "purchase ban" on all item's red tagged till inventory lasts
- Review the items accordingly
- Keep the item where it is
- Move the items to a new location
- Store the item away from the work area
- Hold the item in the local red tag area for evaluation
- Disposal of the item
- Disposal of red tagged items is shown in table 2.

Table 2 Disposal of red tagged items

Treatment	Description
Throw it away	Dispose of as scrap or incinerate items that are useless or unneeded for any purpose.
Sell	Sell off to other companies' items that are useless or unneeded for any purpose.
Return	Return items to the supply company.
Lend out	Lend items to other sections of the company that can use them on a temporary basis.
Distribute	Distribute items to another part of the company on a permanent basis.
Central red-tag area	Send items to the central red-tag holding area for redistribution, storage, or disposal.

Example:

Seiri implemented at NobleExchange Environment Solutions Pune LLP.

• Zone Identification: The fig. 3 shows the different zones identified at NobleExchange Environment Solutions Pune LLP
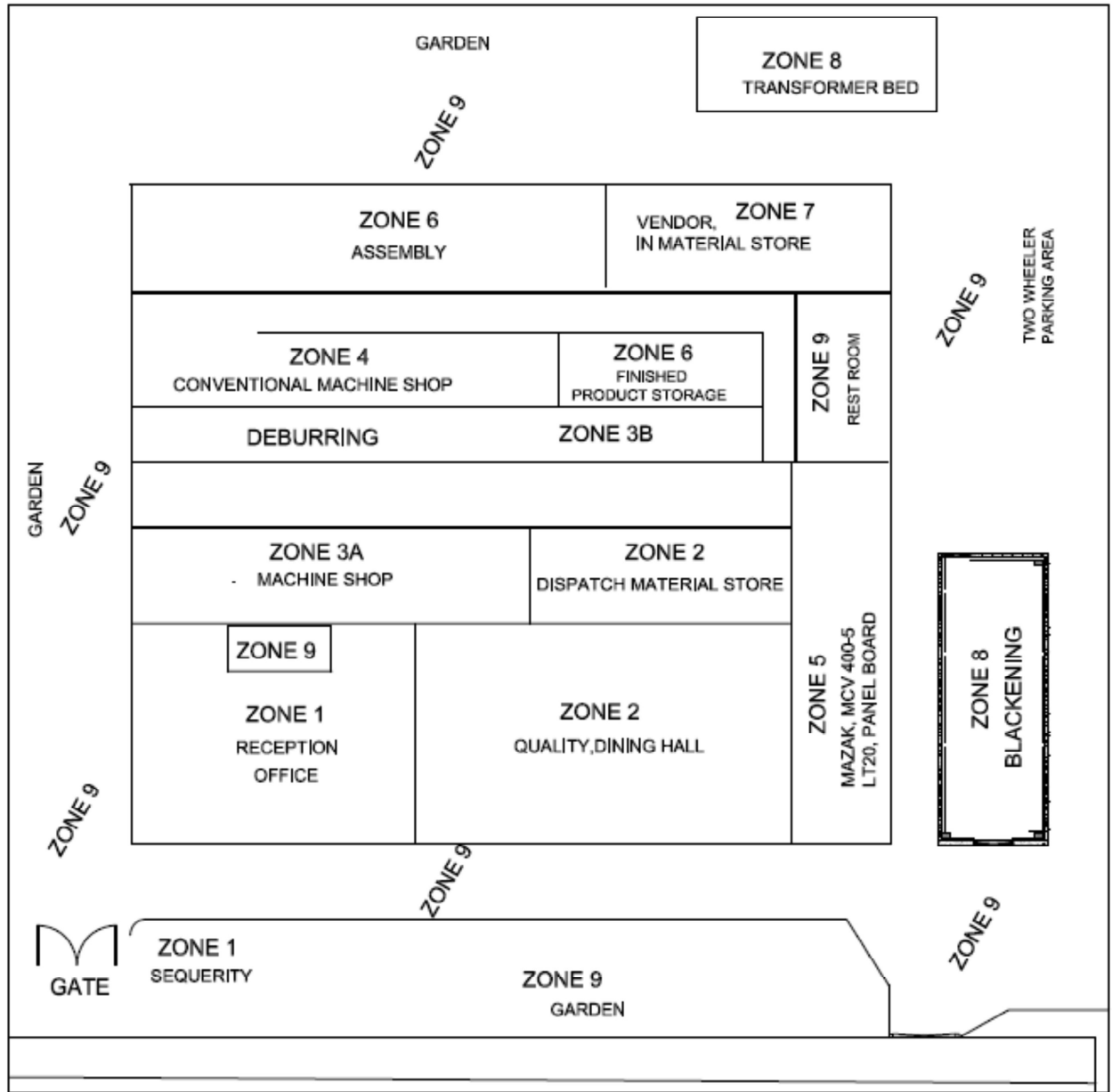
Fig. 3 Zonal Division at NobleExchange Environment Solutions Pune LLP

Red Tagging

Fig. 4 shows the central red tag area at NobleExchange Environment Solutions Pune LLP
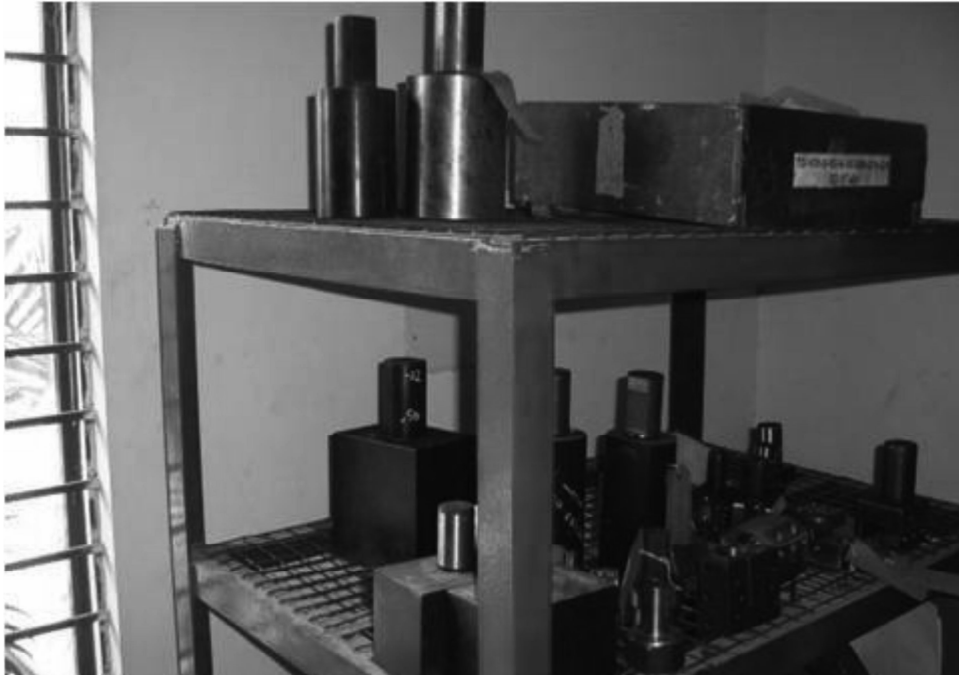

Fig. 4 Red Tag area at NobleExchange Environment Solutions Pune LLP

5.3.2 Seiton/Set in Order

Seiton means to arrange needed items so that they are easy to use and label them so that anyone can find them and put them away. The implementation of Set in Order/Seiton is done in two phases in the following manner:

Phase I: Deciding appropriate location

➤ Principles of Storing Jigs, tools, Dies for waste elimination

▪ Locate the items in the workplace according to their frequency of use

a) Place frequently used items near the place of use

b) Store infrequently used items away from the place of use

▪ Store items together if used together, and in sequence if used in sequence.

▪ Devise a "Just let go" arrangement for tools (e.g., suspend the tools)

- Make storage space larger than the item so that easy to put back
- Eliminate the variety of jig, tools and dies by creating multi-function jigs, tools and dies.
- Store tools according to function or product based on the type of usage

➢ Principles of Motion Economy for waste elimination

- Start and end each motion with both hands moving at once
- Both arms should move symmetrically and in opposite directions
- Keep trunk motions to a minimum
- Use gravity instead of muscle
- Avoid zigzagging motions and sudden change in direction
- Move with a steady rhythm
- Maintain a comfortable posture with comfortable motions
- Use the feet to operate on and off switches for ma-chines
- Keep materials and tools close and in front
- Arrange materials and tools in the order of their use.
- Use inexpensive methods for feeding in and sending out materials
- Stand at a proper height for the work to be done

➢ Make materials and parts easy to pick.

- Make handles and grips in easy to use and efficient shapes and positions
- 5S Map to decide locations. Steps in making a 5S Map:
- Make a floor plan or area diagram of the study area
- Draw arrows in process flow sequence. For every operation there is one arrow.
- Search for areas of waste based on principles shown earlier.
- Make new 5S map. Draw arrows again. (Use several iterations till most efficient one is reached)
- Find out the feasibility and time period to make the layout change
- Implement the new layout by moving parts, tools, machines etc.
- Continue to further improve the layout

Phase II: Identifying location

1. **Signboard Strategy**

   The signboard strategy uses signboards to identify what, where and how many.

- Location indicators (where does the item go)
- Item indicators (what item goes here)
- Amount indicators (how many items go here)

2. Painting Strategy

The Painting Strategy is a method for identifying locations on floors and walkways. Factors to keep in mind while using painting strategy are:

- U-shaped cell designs are more efficient than straight production lines
- In process inventory should be positioned carefully for best process flow
- Floors should be levelled or repaired before painting
- Walkways should allow for safety and smooth flow especially at the turns
- Divider lines should be 2 or 4 inch wide
- Paint colour must be standardized. Colours should be bright

3. Colour coding Strategy

Colour coding strategy can be used to indicate which items are used for which part. Examples:

- Different colours can be allotted to different oils and the oil bath to be marked the colour of the type of oil to be used
- If certain items are used for making the same part, then the items can be colour coded the same colour and kept in a location having the same colour.
- Inventory levels can be colour coded to indicate the critical, designed, reorder and excess levels

4. Outlining Strategy

Outlining is a method to show which jigs and tools are stored were. Outlining means drawing outlines of jigs and tools in their proper locations

Example:

Seiton implemented at NobleExchange Environment Solutions Pune LLP.

- **Deciding appropriate locating**: The appropriate location for storage of fixtures near the machine is shown in fig. 5

Fig.5 Deciding appropriate location

Identifying Location by the usage of signboard, painting, colour coding and outlining strategy is shown in fig. 6

Fig.6 Identifying Location

5.3.3 Seiso/ Shine

Seiso means to keep everything swept and clean. This is done with the objective of inspecting for problems and taking faster corrective actions. The implementation of Seiso is done in the following manner:

1. Determine Shine targets -

    *   Storage space, Equipment or Empty Space

2. Determine Shine assignments

    *   Divide job based on area of cleaning

    *   Divide job based on time of cleaning

3.   Determine Shine Methods

    *   Choose the right tools

    *   Shining should take 5 minutes

    *   How much to shine should be defined?

4. Prepare tools

    *   Keep tools near location of shine

5. Start to Shine

    *   Clean thoroughly

Example:

Seiso implemented at NobleExchange Environment Solutions Pune LLP The teams at NobleExchange Environment Solutions Pune LLP successfully implemented Seiso and the result is as shown in the fig. 7.

Fig.7 Seiso/Shine implemented in office area

5.3.4 Seiketsu/ Standardize

Seiketsu means to create a consistent way of doing tasks and procedures. This is done with the objective of ensuring that the condition does not deteriorate back to the condition it was before implementing 1S, 2S and 3 S. The implementation of Seiso is done in two phases in the following manner:

Phase I: Making it a habit

- Decide who is responsible for 3 S activities
- Everyone must know exactly what they are responsible for doing and exactly when, where and how to do it. For this 5S maps with responsibilities and frequency and 3S cleaning instructions on area of 3S is used.
- Integrate 3S duties into regular work duties

- Here, visual 5S (abnormal conditions are seen at a glance) and five-minute 5S (efficient and quick solutions are given for doing cleaning) are adopted on a daily basis.
- Check on how well 3S conditions are being maintained
- Audit must be done at regular interval to check the maintenance of 3S conditions.

Phase II: Prevention

- Prevent unneeded items from accumulating Normally, unneeded items keep accumulating at the work-place. These have to be cleared regularly doing 1S. To avoid this, find out "why" the unneeded item is even entering the workplace and try eliminating the cause.
- Prevent things from having to be put back

There are two ways to this:

a) Make it difficult to put things in the wrong place -

This relies heavily on discipline and visual controls

b) Make it impossible to put things in the wrong place

Use 5 W and 1 H approach and eliminate the need to put back as shown in table 3.

What?	• Is wrong • Is causing the problem
When?	• Does it happen
Where?	• Is the problem (Location)
Who?	• Does it • Is responsible for it
Why?	• Does it happen • Does he do it this way
How?	• Else could it be done • Do we improve the situation

Table -3   5 W and 1 H approach

To successfully apply this approach the following strategies are is adopted:

1. **Suspension**

   Suspend the tools with a spring balancer. Once the use is over the operator "just let's go" and the tool goes back to its desired position

2. **Incorporation**

   Here creates a flow of goods such that jigs, tools and measuring instruments are smoothly integrated into the pro-cess and hence stored in the place of usage

3. **Use Elimination -**   There are three ways to achieve this

   a) Tool Unification -This means combining the functions of two or more tools in a single tool.

   b) Tool substitution -This means use something other than a tool to serve the same function

   c) Method Substitution

Eliminate the method used to avoid using tools

Example:

Seiketsu/Standardize implemented at NobleExchange Environment Solutions Pune LLP

NEX successfully implemented Seiketsu. The fig 8 and 9 show the arrangement of files before implementation of Seiketsu and after the implementation. In the first arrangement there are possibilities of missing files. But in the second case it is much easier not to go wrong while placing and retrieving the files.

Fig.8 Before implementation of Seiketsu/Standardize

Fig.9 After implementation of Seiketsu/Standardize

5.3.4 <u>Shitsuke/Sustain</u>

Shitsuke means to make it a habit of properly maintaining correct procedures. It is done with the objective of achieving higher productivity and better quality through higher employee morale. To implement this:

c) Awareness - All need to understand what 5S is about

d) Time - Time has to be allocated to do the 5S

e) Structure - A Structure has to be formulated on how and when 5S activities will be done

f) Support - Management support needed in acknowledgement, leadership and resources.

g) Rewards and recognition - Efforts need to be recognized

h) Satisfaction and Excitement - This needs to be shared in the entire organization

Tools to implement Shitsuke/Sustain:

- 5S Slogans
- 5S Posters
- 5S Photo Exhibits

- 5S Newsletters
- 5S Maps
- 5S Pocket manuals
- 5S Department tours
- 5S Competitions

Example:

Shitsuke/ Sustain implemented at NobleExchange Environment Solutions Pune LLP

The fig.10 shows the trend chart for efficiency production area. It is a tool that shows how effectively 5S has been implemented and how well the improvements are being sustained.
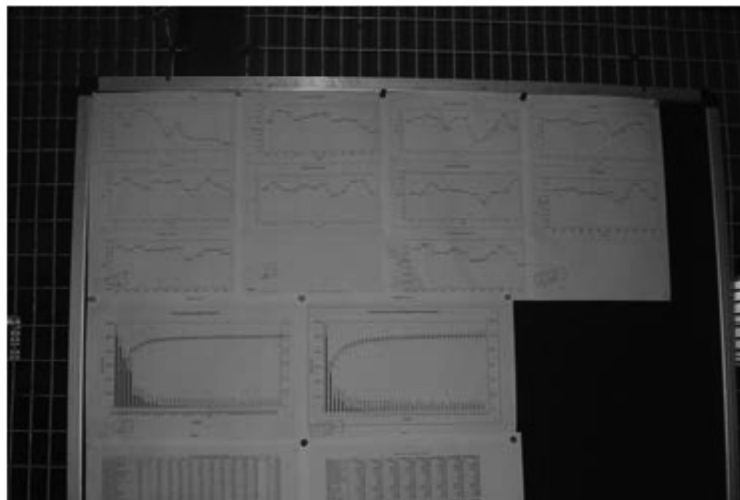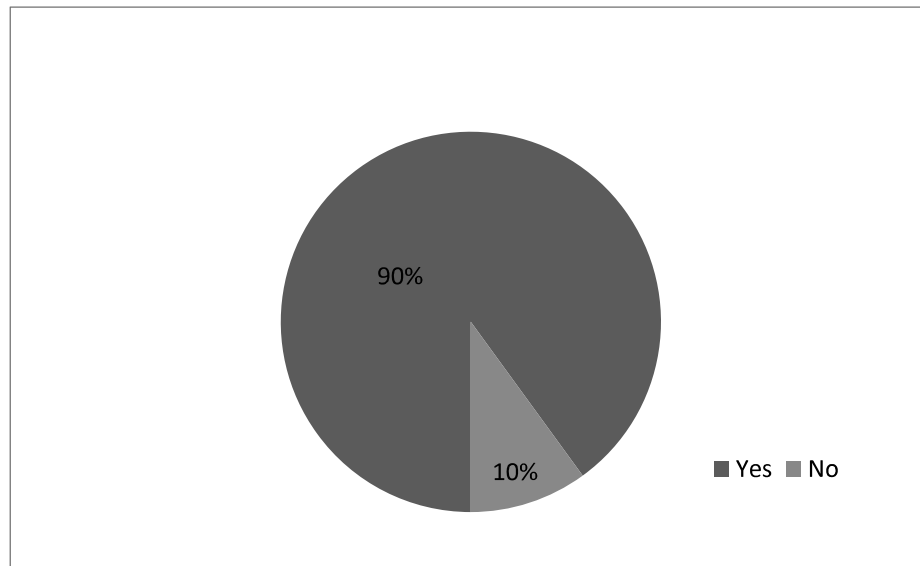

Fig. 10 Trend chart for Efficiency

Chapter-6 Data Analysis and Interpretation

1) Have you attended session for briefing training on 5S methodology?
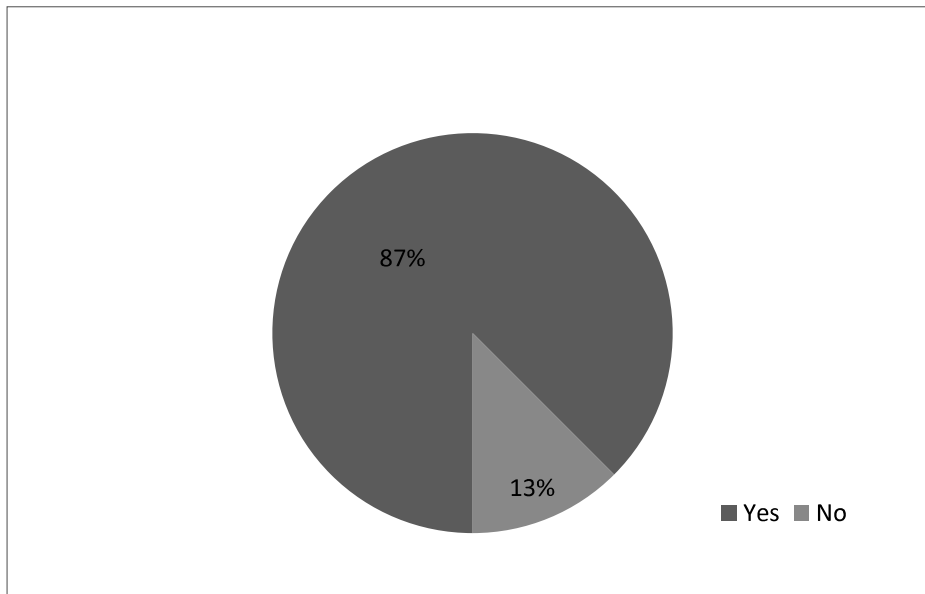
Sr. No	Item	Response	Percentage
1	Yes	36	90 %
2	No	4	10 %

Interpretation: -Maximum employees i.e., 90 % attended training session on 5S methodology and understand the concepts in 5S.

2) Do you think that this training session provide you necessary information for the implementation of 5S at our work place?

Sr. No	Item	Response	Percentage
1	Yes	35	87 %
2	No	5	13%

Interpretation: - Maximum employees received training and information on 5S methodology implementation in the plant.

3) Do you think there is commitment from all the employees towards the implantation of 5S methodology to ensure clean, safe and conducive working area?
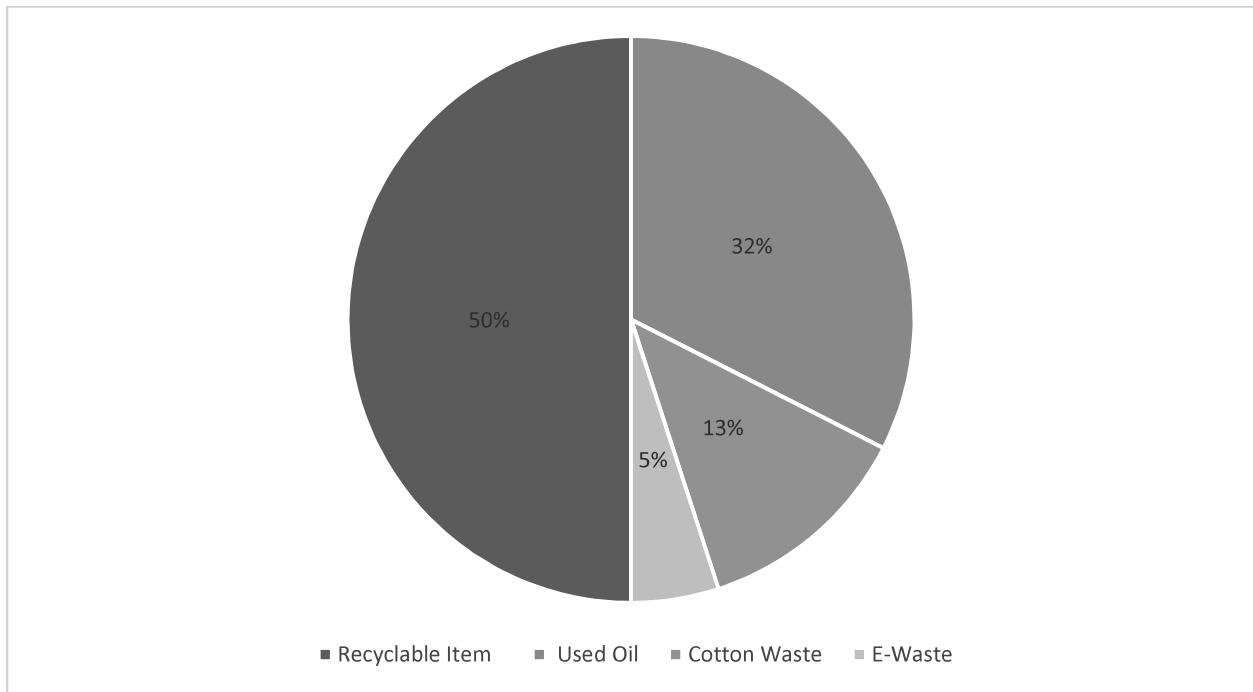
Sr. No	Item	Response	Percentage
1	Strongly Agree	30	75 %
2	Agree	7	17 %
3	Disagree	1	3 %
4	Strongly Disagree	0	0 %
5	Don't Know	2	5 %
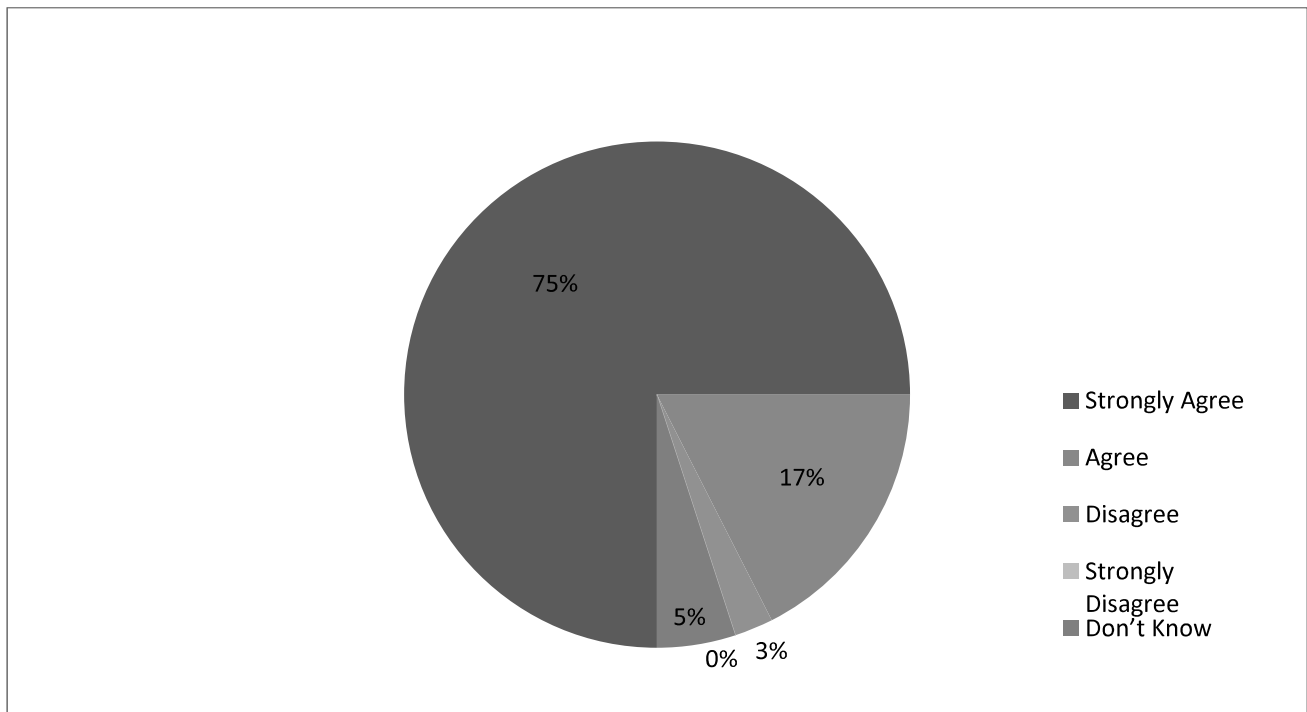
Interpretation: - Maximum employees agreed that they give commitment towards the implementation of 5S methodology to ensure clean, safe and conducive working area.

4) After the completion of production process which out of this following item must be dispose on priority?

Sr. No	Item	Response	Percentage
1	Recyclable Item	20	50 %
2	Used Oil	13	32 %
3	Cotton Waste	5	13 %
4	E-Waste	2	5 %

Interpretation: - After completion production process, Recyclable item (plastic etc) must be disposed on priority.

5) Is there any arrangement made in your company for returning of unused items after the production process??

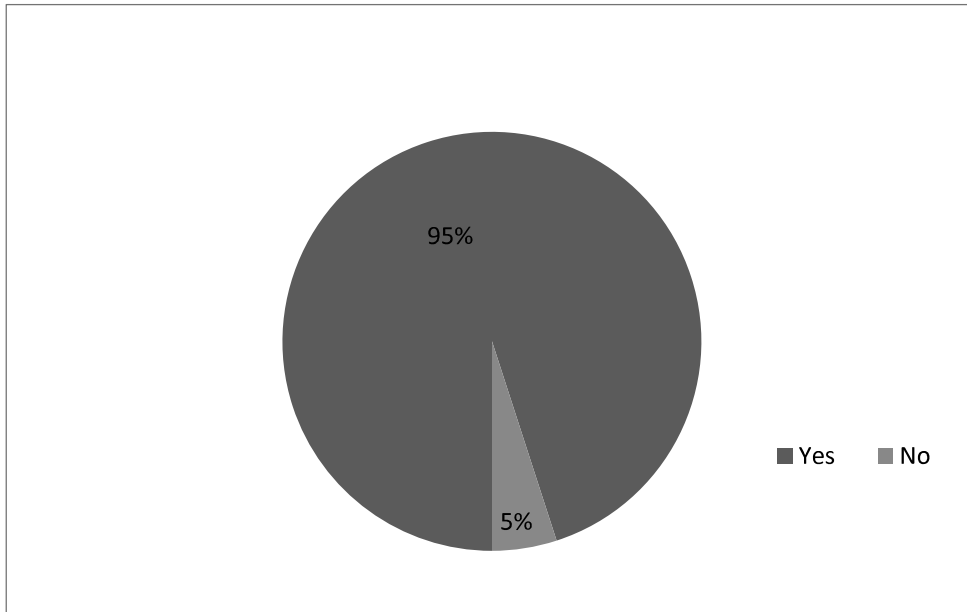| Sr. No	Item	Response	Percentage
1	Yes	37	92 %
2	No	3	8 %
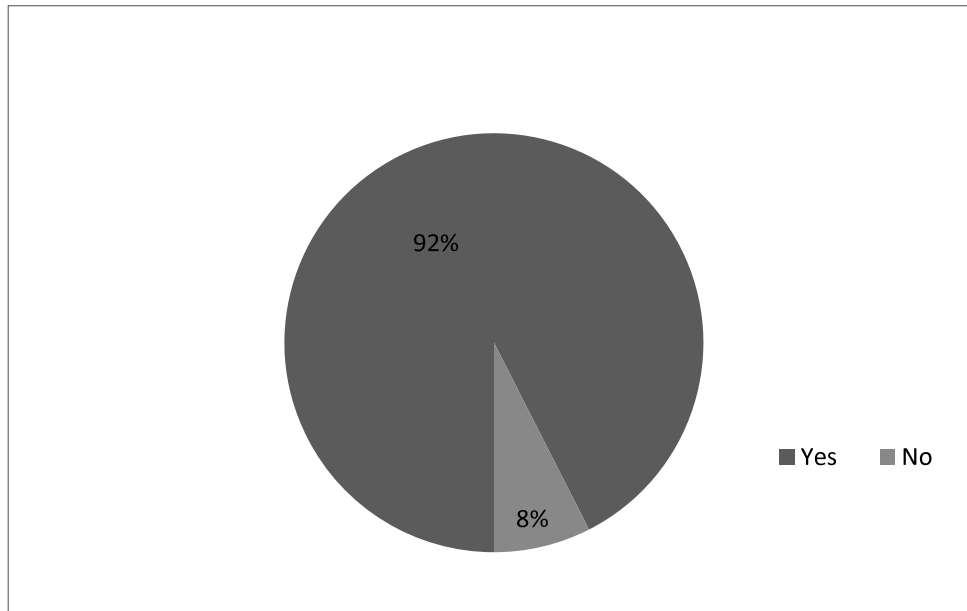
Interpretation: - Yes, there is arrangement in company made for returning of unused items after the production process.

6) Is there any specific cleaning schedule to ensure that working place is free from dust?
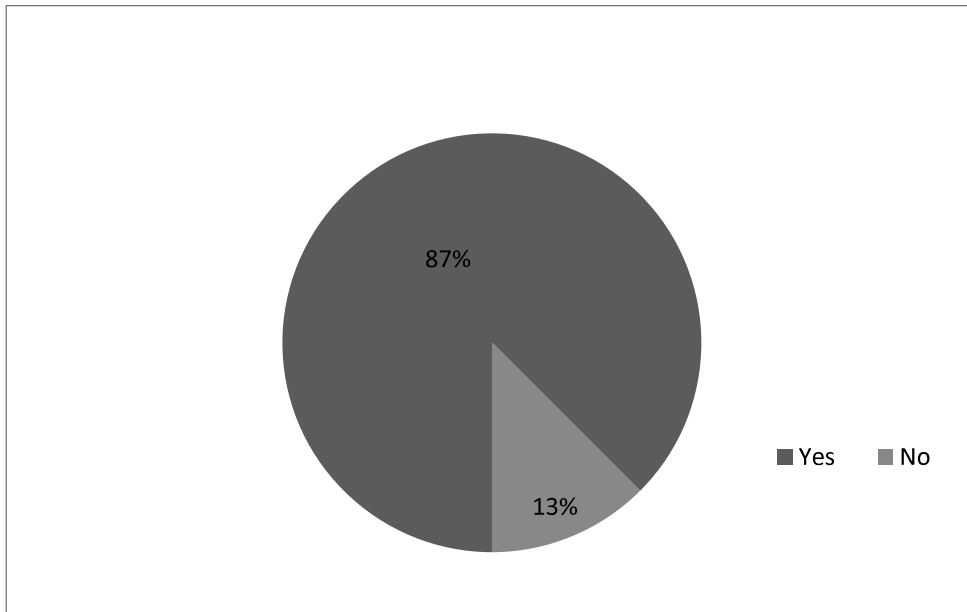
Sr. No	Item	Response	Percentage
1	Yes	38	95 %
2	No	2	5%

Interpretation: - Yes, there is specific cleaning schedule available to clean the workplace from dust.

7) Do you think 5S implementation helps to reducing the downtime of various machine in your plant?

Sr. No	Item	Response	Percentage
1	Yes	35	87 %
2	No	5	13 %

Interpretation: - Yes, 87% Employees agreed that after 5S implementation in Plant the downtime of various machine is reduced due to maintenance of machines in short duration.

8) Do people in your workplace struggle to locate documents or files, whether in physical or digital format?

Sr. No	Item	Response	Percentage
1	Yes	1	2 %
2	No	39	98 %
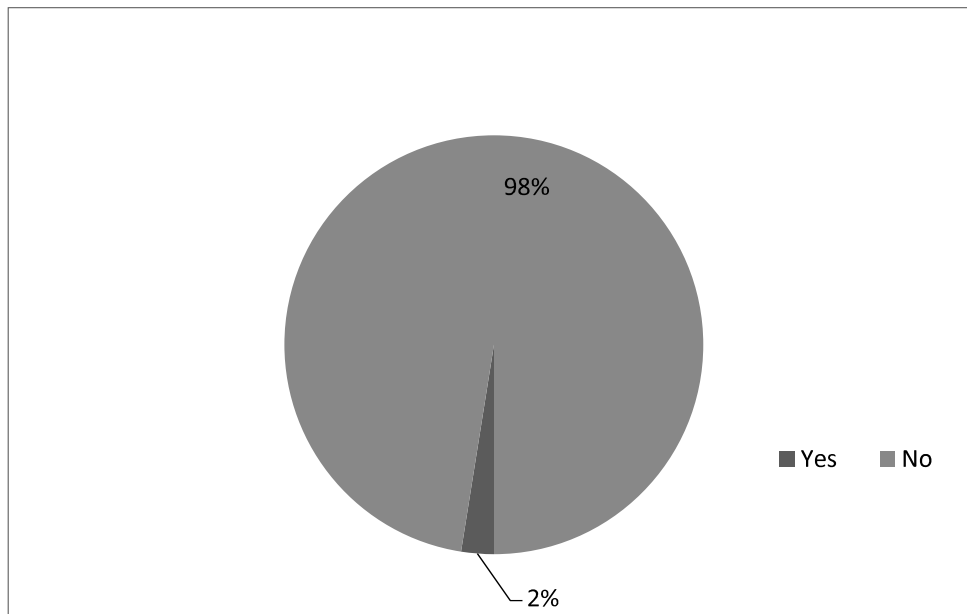
Interpretation: - After implementation of 5S, employees able to find documents, files in physical as well as digital format at designated location.

9) Are there loose, sagging electrical cables observed in the workplace?

Sr. No	Item	Response	Percentage
1	Yes	38	95 %
2	No	2	5 %
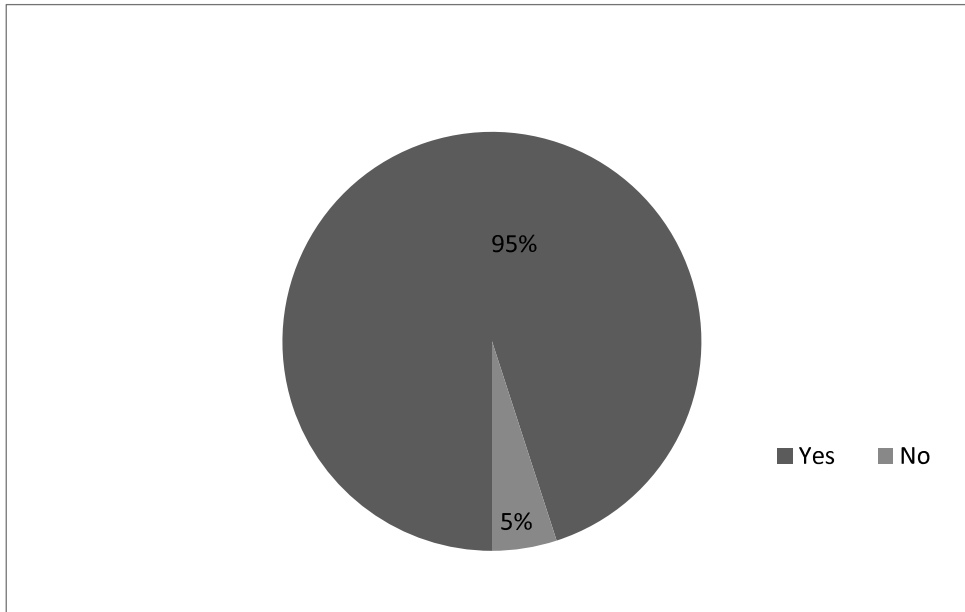
Interpretation: - From above table shows that there is scope to improve 5S implementation in sagging of electrical cables at workplace.

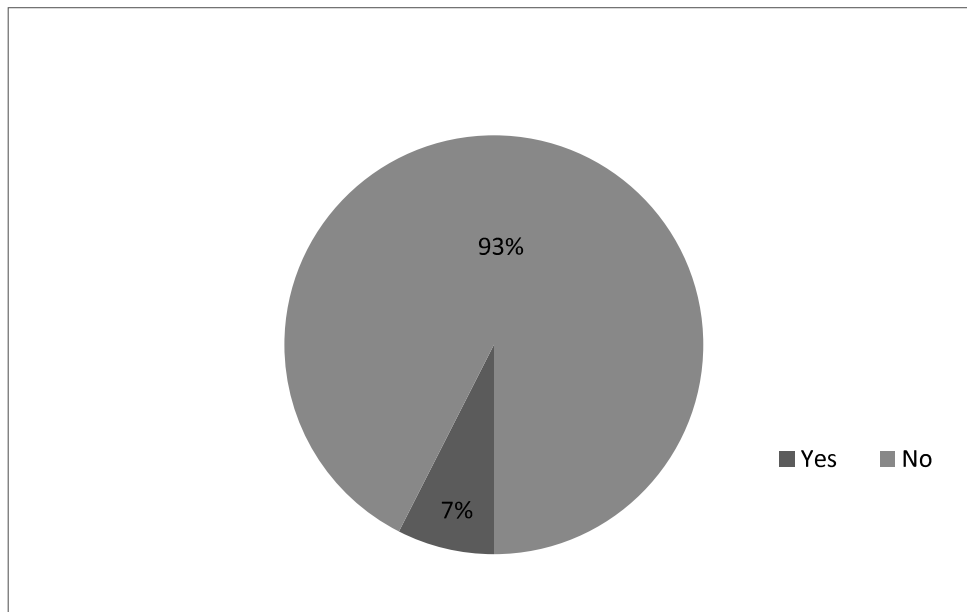**10)** Are there files, drawers, and cabinets that are un-labeled, or do they contain unmarked content that is hard to identify?

Sr. No	Item	Response	Percentage
1	Yes	3	7 %
2	No	97	93 %

Interpretation: - Yes, very few drawers and cabinets left un-labled. So, there is chances to complete 100% implementation of 5S by completing labelling to rest drawers and cabinets.

11) Is valuable space taken up by useless items which are not required?

Sr. No	Item	Response	Percentage
1	Yes	4	10 %
2	No	36	90 %
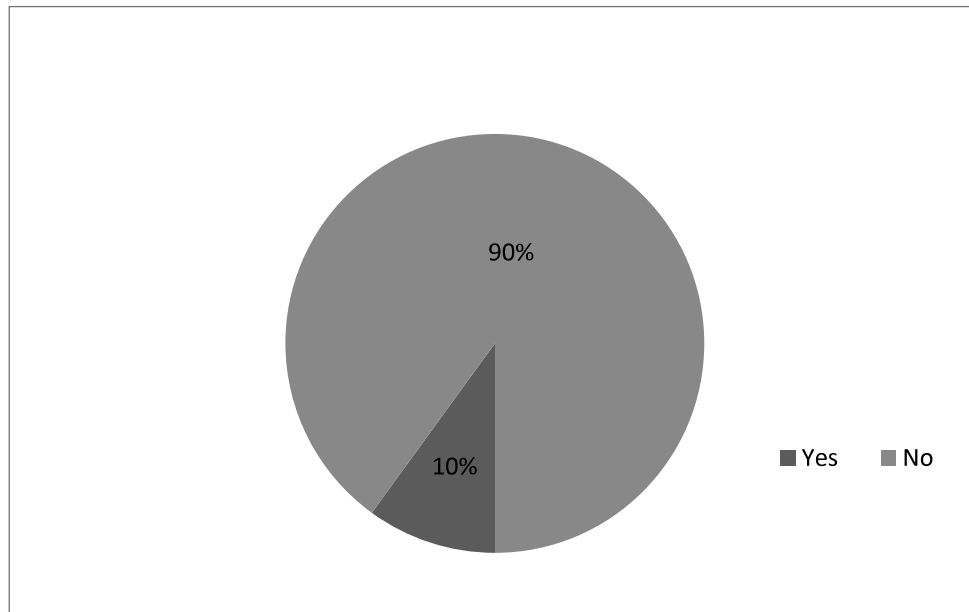
Interpretation: - Yes, very few spaces in plant are taken by not using items that will remove in next time or mark to red tag area to achieve 100 percent 5S implementation in Plant.

12) Are there papers in your workplace that are not used and are gathering dust?

Sr. No	Item	Response	Percentage
1	Yes	3	92 %
2	No	37	8 %
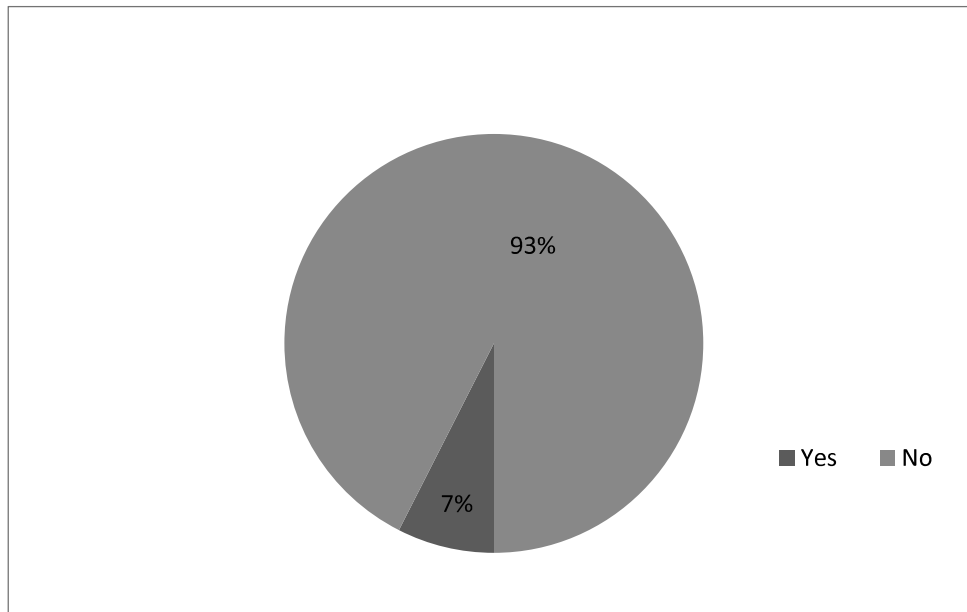
Interpretation: - Maximum area is under 5S implementation area, few spaces are in administrative office having papers nearby printer area.

13) Does everyone know how to keep the workplace organized and are fully aware of their roles and responsibilities?

Sr. No	Item	Response	Percentage
1	Yes	35	87 %
2	No	5	13 %
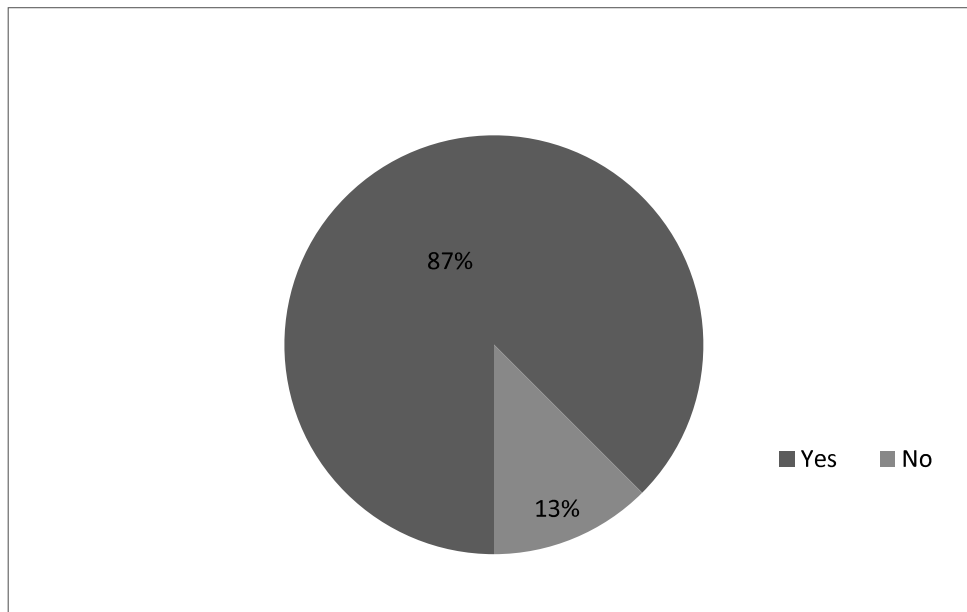
Interpretation: -Almost all employees know that roles and responsibilities to keep the workplace and plant area organized.

14) Does 5S implementation improve work efficiency?

Sr. No	Item	Response	Percentage
1	Yes	39	97 %
2	No	1	3 %
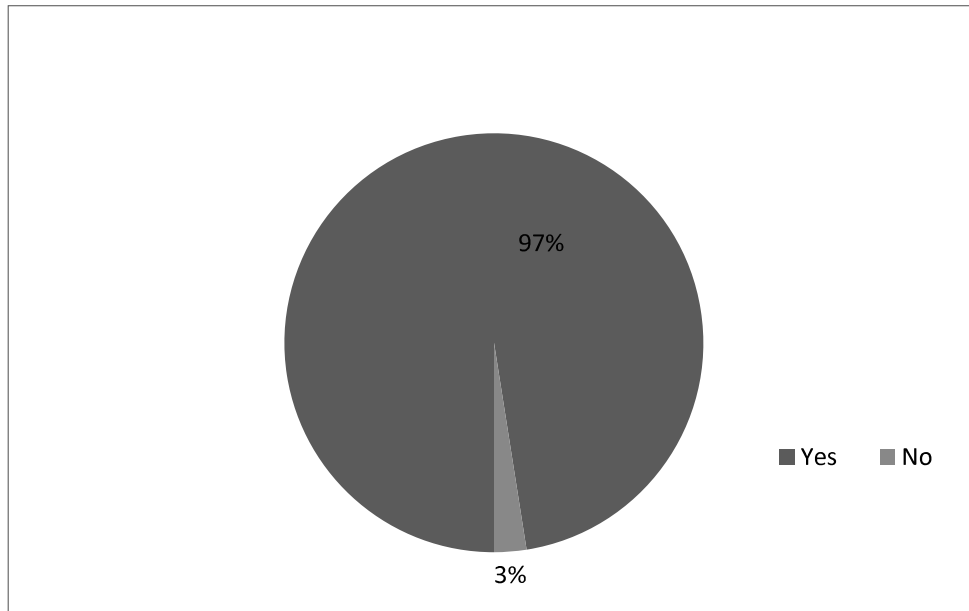
Interpretation: -From above chart it's clear that after 5S implementation the overall work efficiency and production improves.

15) Who should be part of the 5S implementation team?

Sr. No	Item	Response	Percentage
1	Senior Management	1	2.5 %
2	Middle Management	1	2.5 %
3	Direct Supervisors	1	2.5 %
4	Employees	1	2.5 %
5	Labors	1	2.5 %
6	All Team	35	88 %
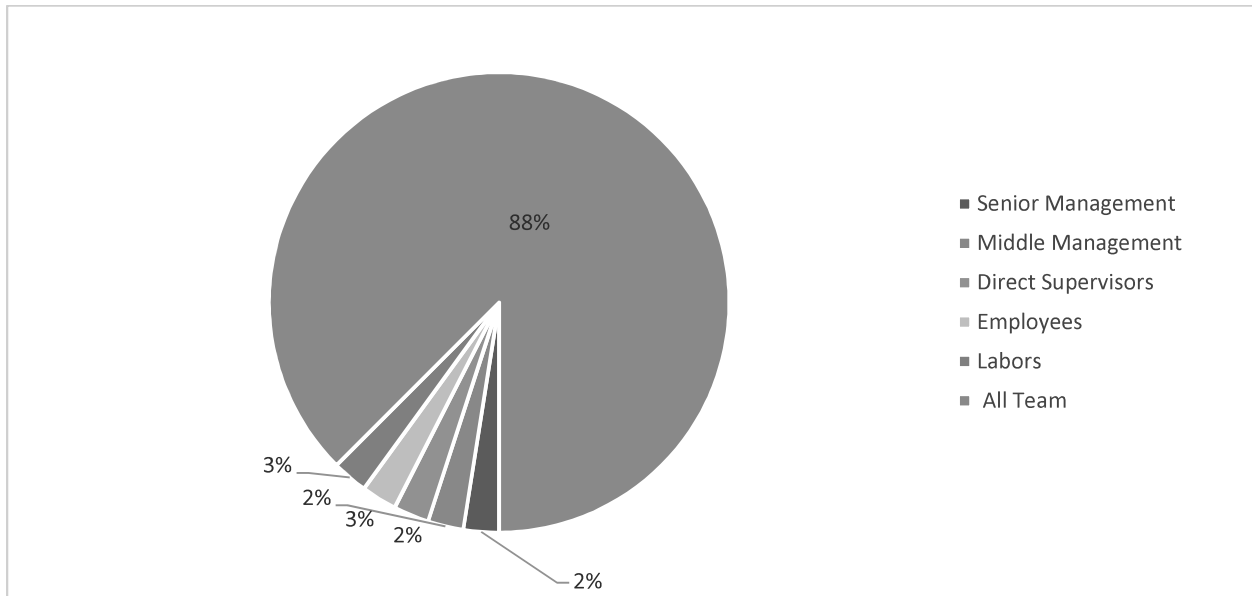
Interpretation: -5S implementation is not done individually; it's an all-team active team participation to achieve 100 percentage 5S implementation in Plant

Chapter-7 Findings, Suggestions and Conclusion

Findings:

1. The 5 pillars of workplace organization involve, to a degree, decreasing potential time wasted searching for, deciding how to utilize, and returning things. Under the 5S methodology, parts and devices are housed in a way that makes them effortlessly available and simple to use.

2. The 5S framework drives organizations to enhance efforts planned to eliminate waste from the production procedure and generally upgrade an organization's primary concern. This is done through enhancing items and administrations and accordingly bringing down expenses.

3. Standard 5S implementation results in significant reductions in required space for existing operations. The system involves getting rid of unnecessary items from the production facilities – freeing up space that can be used more effectively.

4. "Waste" to be eliminated is defined broadly and includes everything from carrying excess inventory to unsafe conditions – like a box of supplies left in a place where a worker may trip and fall or get injured.

5. Making it routine to implement proper procedures and discipline to avoid backsliding is one of the main objectives of the system. This practice improves the chances of avoiding dark, dirty, disorganized workplaces, which can foster lower morale among employees.

Suggestions

Following are the suggestions for successful implementation of 5S System for a more organized and productive workplace:

1. **Start small-** A common and effective method for a successful implementation of the 5S system is to first select target areas or zones to implement the system into. Narrow your selection by cost, need, risk, and safety to use to your advantage. Showing the success in a particular area of the organization will give others a reason to buy-in to the system, creating a sustainable foundation for a successful 5S system.

2. **Have the right supplies available-** Employees should always have the right supplies available and within easy reach at all time in order keep a successful 5S system up and going

- Label makers, labels, safety signs, sign makers, Tape, floor tape, colored tape, marking tape
- Tags, red tags, tags, Training materials
- Tool shadows, shadow boards, boards, Shine chart, cleaning supplies
- 5S cart with supplies, Camera, Bins, holders, organizers

3. **Provide proper training-** . Without the proper tools and training employees feel less engaged into the system. Classroom type sessions, videos, 5S events, and reading material are all effective ways to provide the initial training to 5S system up and running successfully.

4. **Show, don't tell what the ideal workplace should look like-** . Before and after pictures can help show a pattern of progression and track success. Place the before pictures outside the workspace so workers can visually track progression.

5. **Lead by example-** Leaders should understand all the fundamentals of the 5S system and be ready to explain and help fix any situations that arise.

6. **Clearly define your expectations-** Leaders should be able to provide both positive feedback and constructive feedback if certain expectations are not met.

7. **Provide the means to incorporate, not isolate-** Often times we see companies isolate their 5S initiative into a standalone process. This does not show the benefit of the system, instead it

confuses employees as to why it is they are supposed to buy into it. Incorporate the process into the big picture and fundamentals for improvement of the company. Form review groups and incorporate them into your leadership and group meetings. This keeps the focus on and provides data to improve upon.

8. **Daily enforcement-** Conducting weekly or monthly audits will always play a key role in your system, but daily reinforcement can be vital in your 5S success.

9. **Reward Excellence-** Take the time to reward your staff or teams that are outperforming others. Before and after pictures can be helpful here as well to show others what going above and beyond looks like.

10. **Audits-** Depending on the size of the area or zone conduct annual or bi-annual audits to force action and promote follow through. This will help shed light on specific areas of concern and define expectations for continued improvement. Provide immediate feedback of your findings and encourage continued improvement with your results.

These suggestions are designed to help you with the implementation of a successful and sustainable 5S system. When reviewing or conducting audits and looking for ways to improve your system, take a look back through these steps, identifying possible areas for improvement. Also, remember the 5S system is an ongoing process; it is designed for continuous improvement for your organization's long-term success.

Conclusion

Looking back on this project, it was much more challenging than we first expected. But along the way, we were able to learn a great number of lessons. We learned that manufacturing is a complex affair, and that the human factor plays a critical role. Learning to work with people is a skill that can only be learned through practice and in a real working environment. We also learned about working in industrial and corporate environments and were able to expand our understandings of everything that we had learned in academia up to that point. We were also able to walk away with a firsthand experience in using 5S to change the behavior of an organization and picked up invaluable skills in how to communicate ideas to others in an efficient and meaningful way.

Through working on such a challenging long-term project, we were also able to learn a great deal about working as a part of a group. We found communication to be paramount in making sure that individuals pull together as a team. Through our experiences, we learned the importance of being proactive and thoughtful communicators, and learned how to work through difficult situations. We also found that every project, no matter its nature, absolutely requires a clear and well-defined goal, and a definite scope. Without this, a project can, and will, stray from its mission. Another necessary skill is being able to plan things well in advance. We found foresight, and the ability to make plans that can adapt to change, to be critical to our eventual success. Finally, we found that self-assessments need to be performed regularly. Honest self-reflection is the only way to determine if you are on a path to meet your goals, or miss them.

In one line it can be defined as "Place for everything and everything in its place".

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Annexure

Annexure Part 1 Questionnaire

1) Have you attended session for briefing training on 5S methodology? **Yes/No**

2) Do you think that this training session provide you necessary information for the implementation of 5S at our work place? **Yes/No**

3) Do you think there is commitment from all the employees towards the implantation of 5S methodology to ensure clean, safe and conducive working area?
   Strongly Agree/Agree/Disagree/Strongly Disagree/Don't Know

4) After the completion of production process which out of this following item must be dispose on priority? **Recyclable Item / Used Oil/ Cotton Waste/ E-Waste**

5) Is there any arrangement made in your company for returning of unused items after the production process?? **Yes/No**

6) Is there any specific cleaning schedule to ensure that working place is free from dust? **Yes/No**

7) Do you think 5S implementation helps to reducing the downtime of various machine in your plant? **Yes/No**

8) Do people in your workplace struggle to locate documents or files, whether in physical or digital format? **Yes/No**

9) Are there loose, sagging electrical cables observed in the workplace? **Yes/No**

10) Are there files, drawers, and cabinets that are un-labeled, or do they contain unmarked content that is hard to identify? **Yes/No**

11) Is valuable space taken up by useless items which are not required? **Yes/No**

12) Are there papers in your workplace that are not used and are gathering dust? **Yes/No**

13) Does everyone know how to keep the workplace organized and are fully aware of their roles and responsibilities? **Yes/No**

14) Does 5S implementation improve work efficiency? **Yes/No**

15) Who should be part of the 5S implementation team?

Senior Management /Middle Management/ Direct Supervisors/ Employees/ Labours/All Team

Annexure Part 2 Checklist for 5S Workplace

Five S workplace scan diagnostic checklist

Category	Item	L0	L1	L2	L3	L4	Remarks
Sort (Organization)	Distinguish between what is needed and not needed						
	Unneeded equipment, tools, furniture, and so on, are present						
	Unneeded items are on walls, bulletin boards, and so on						
	Items are present in aisles, stairways, corners, and so on						
	Unneeded inventory, supplies, arts, or materials are present						
	Safety hazards (water, oil, chemical, machines) exist						
Set in Order (Orderliness)	A place for everything and everything in its place						
	Correct places for items are not obvious						
	Items are not in their places						
	Aisles, workstations, equipment locations are not indicated						
	Items are not put away immediately after use						
	Height and quantity limits are not obvious						
Shine (Cleanliness)	Cleaning and looking for ways to keep it clean and organized						
	Floors, walls, stairs and surfaces are not free of dirt, oil, and grease						
	Equipment is not kept clean and free of dirt, oil, and grease						
	Cleaning materials are not easily accessible						
	Lines, labels, signs, and so on are not clean and unbroken						
	Other cleaning problems of any kind are present						
Standardize (Adherence)	Maintain and monitor the first three categories						
	Necessary information is not visible						
	All standards are not known and visible						
	Checklists don't exist for cleaning and maintenance jobs						
	All quantities and limits are not easily recognizable						
	How many items can't be located in 30 seconds?						
Sustain (Self-discipline)	Stick to the rules						
	How many workers have not had 5S training?						
	How many times, last week, was daily 5S not performed?						
	Number of times that personal belongings are not neatly stored						
	Number of times job aids are not available or up-to-date						
	Number of times, last week, daily 5S inspections not performed						
	TOTAL						

Legend box (within Rating Level columns):

Number of Problems	Rating level
3 or more	Level 0 (L0)
3-4	Level 1 (L1)
2	Level 2 (L2)
1	Level 3 (L3)
None	Level 4 (L4)

Abbreviations:

Sr. No.	Abbreviation	Full form
1	ATL	Autonomous Team Leads
2	SOP	Standard Operating Procedure
3	VSC	Value Stream Coaches
4	E&TG	Education & Training Guide