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A Case study of 5S implementation in Manufacturing Enterprises

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***Abstract*- In today's competitive world, it is quite necessary for an organization to maintain certain key strategical tools to survive in the market. Lean manufacturing is defined as a systematic procedure which helps in the process of waste management and elimination within an enterprise. Lean manufacturing involves 5S which is a set of principles and standards. This research paper emphasis on formulating key essential certifications that a manufacturing industry must procure so to maintain standards. 5S is one of the key tools that a company can acquire that helps it in continuous improvement culture. 5S proclaims for certain visual disciplines to be maintained. 5S strategical represents systematic approach for the overall improvement in quality, productivity and improvement. This research paper proposes the various aspects of 5S and value based analysis is done using certain analytical software's. SME's were approached with different questionnaires and proper survey data was collected, interpreted and used for analysis. Relationship between each category is realized and conclusion drawn.**

***Index Terms*—5S, Continuous Improvement Culture(CIC), Supply Chain Performance (SCP), Small and Medium Enterprises (SME).**

I. INTRODUCTION

Small and medium(SME's) today face various challenges like increased competition and to adapt and sustain to the ever-growing market needs as well as technological change alongside certain restrains relating to knowledge, innovation, and creativity. SME adapt various strategic tools and companies to maintain various standards and stand out of the crowd. One such methodology or tool that SME's should adapt is 5S methodology which engages overall maintenance of certain standards and disciplines.

II. LITERATURE REVIEW

5S constitutes of five Japanese words which stands for Seiri (sorting), Seiton (set in order), Seiso (sweep), Seiketsu (standardize) and Shitsuke (sustain) [5]. A 5S conceptual framework was first formalized into business (as conflicting it to a personal philosophy of way of life) in the early 1980s by Takashi Osada [5]. Implementation of 5S shows increase in efficiency, safety, productivity and quality standards of the enterprise [6]. Before implementing 5S system, it is quite necessary to develop a common language that is understood by all, such that communication within each organization is better [9]. 5S program implementation and study involves presentation and analysis of a real case study and specifically knowing the influence of 5S on some basic work environment problems and the compensation power on the choice of implementation of 5S [10]. Performance factors and characteristics in industrial organizations defines the effectiveness of 5S implementation on enterprise performance [1]. 5S strategy helps in reducing the time of manufacturing process and increases the area of work place. 5S approach focuses solely on minimizing several wastes during production process and which finally helps in the development of the enterprise performance [4]. Multiple steps are undertaken for the implementation of the 5S which emphasizes on benefits acquired by the enterprise. The successful implementation of 5S requires that everyone understand why it is being used and what the expected results are, as the removal of familiar (although unneeded) items and the reorganization of processes can be extremely unsettling [7].

Seiri (Sorting)

Sorting is the first step-removing all surplus items in which necessary and unnecessary materials available in the workplace should be sorted and classified [2].

Seiton (set in order)

The second step in a 5S launch is putting the necessary items neatly and systematically in a particular place so that they can easily be taken and returned in the original place after use so which improves the workplace 's visual management [10].

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Seiso (Shine)

The third "S" primarily focuses on sanitize phase which procures cleaning standards so that the workplace is lot more safe and comfortable to work at [8].

Seiketsu (Standardize)

Establishing standards of the best practice in the workplace to maintain the perfect hygiene and to ensure clean and tidiness always at the workplace [10].

Shitsuke (Sustain)

This "S" is the most difficult to implement since it involves sustaining 5S activities performed for a longer period [8].

III. AREA OF STUDY

This research paper focuses on the case study done on Small and Medium enterprises(SME's). Generally, in a SME the total area is segregated into sectional zones. Each zone must implement every 5S category and auditing was done to validate and check for complete 5S implementation.

IV. IMPLEMENTATION OF 5S

5S' refers to a set of five terms taken from Japanese literature, all beginning with the letter 's' when transliterated.5S involves 5 different sections (seiri, seiton, seiso, seiketsu and shiysuke) each having its own specification. Auditing of small and medium enterprises are done based on questionnaires developed in each S.

Category	*Item Description*
1S	No unnecessary items Red-Tag Campaign
2S	Material / Office items storage Tools and gauges/ Office equipment's Files & Documents
3S	Workplace Cleanliness
4S	Visual management systems
5S	5S control (Auditing) 5S control (Knowledge on 5S)

No unnecessary items

Items that are unnecessary in that task and location are removed from the workplace; only tools/accessories and products are essential are kept in work stations. No additional items are on top of machines, cabinets, or equipment. Reliability and Validation.

Red-Tag Campaign

Red tag is a zonal section where unwanted waste is to be disposed. Red tag campaign must be conducted at least once in 2 weeks. Red tag items are reviewed and disposal actions taken. Red tag area maintained properly.

Material / Office items storage

Bins, containers and materials necessary are stored neatly in clearly labeled location. WIP and other items are stored in correctly designated areas. Stacked items are not crooked or in danger of toppling over. No bins on floor. Material i**d**entification tags are available. No mix up of parts.

Tools & gauges/ Office equipment's

Tools, fixtures, gages, office equipment's are stored neatly in designated locations; storage is designed to ensure cleanliness and prevent damage.

Files & Documents

All files and racks are properly labelled. Color tapes pasted on files in an angular direction. Index available at each rack. Retrieval of documents is easy (Less than 30 seconds).

Workplace Cleanliness

All floors are clean and free of debris, oil and dirt. Floors are cleaned daily, at a minimum. Aisles are clearly marked with the correct color code; lines are straight, clean. Work tables, stands, walls, windows and other work surfaces are clean.

Visual management systems

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Standard Operating procedures/Instructions and other display boards (Zonal/Qty/Prod/Kaizen etc.) are up-to-date, in good condition, easily visible and neatly displayed in the designated location(s). Visual displays are evident in the work place wherever applicable.

5S control (Auditing)

Regular Monthly auditing with real time data, results to be graphed, counter-measures to be implemented. Clear action plan for improvement should be evident.

5S control (Knowledge on 5S)

People have adequate knowledge on 5S, My machine, SOP and Visual controls.

V. QUESTIONNAIRE DESIGN PROCESS

This research paper emphasis on which category among 5S must primarily be focused by SME to ensure overall improvement in 5s. Each category was given a range of values in the order of 5 point Likert scale with questionnaire developed based on literature review stated above. Pilot study was conducted to validate the content of questionnaires (Content validation).

VI. DATA COLLECTION

Data collection is the process of collecting relevant data as per the questionnaires developed. For this research paper the authors have approached 17 SME's out of which 10 SME's (6 Small enterprises;4 Medium scale enterprises) have responded with proper data with respect to the questionnaires. The designation of the people who have responded are as follows: Proprietary, Managing Director, Chief Executive Officer, Senior Manager and Managers of various organizations.

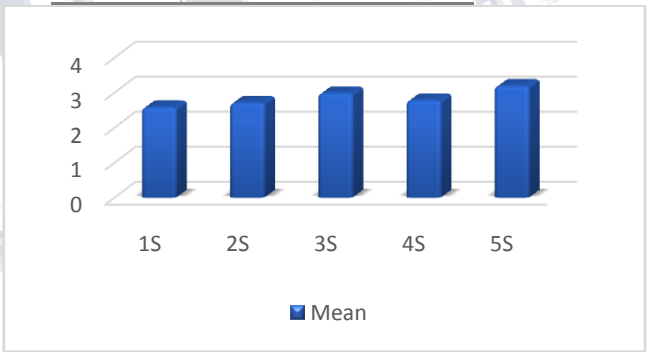
VII. DATA ANALYSIS

The descriptive statistics of each category in 5S is calculated and a comparison is performed.

Likert Value	*Description*
1	Poor
2	Average
3	Satisfactory
4	Good
5	Excellent

Category	*Items*	*Mean*
1S	1	2.65
	2	2.51
2S	1	2.74
	2	2.44
	3	2.96
3S	1	2.98
4S	1	2.78
5S	1	3.23
	2	3.15

Category	*Mean*
1S	2.58
2S	2.71
3S	2.98
4S	2.78
5S	3.19



Findings And Required Action

Category	*Item Description*
1S	Look for a better efficient way of waste disposal Use Red Tag regularly
2S	Items to be placed in designated location only
3S	Maintain proper visual displays
4S	Continuous improvement through analysis
5S	Proper Awareness

VIII. CONCLUSION

Advantages of implementing 5S in a Workplace:
1S:

- Better use of Workplace area
- Helps in Maintaining certain standards 2S:
- Increase in efficiency
- Less time wastage 3S:
- Improvised working conditions
- Increase in customer with neat and clean layout
- 4S:
- Standard of the company improves
- Improvement in safety procedures 5S:
- Scope for workers to take part in design and maintenance.
- Better awareness and less mistakes are committed.

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