

# Studying the Implementation of 5S System in Egyptian Garment Enterprises

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**Abstract**—This paper explores the implementation of 5S elements in the Egyptian garment enterprises. The paper depended on a survey questionnaire (established from Summit Business Solutions, New York) and observations to collect data from the respondents. The observations are based on the on-site visits and interviews with the managers, supervisors and labors. The enterprises divided into three groups according to the nature activity. The first group of enterprises encompassed 49.52% of the total samples, the second and third group of enterprises represented 50.48%. The results of this research indicated to the influence of the nature activity in implementing 5S systems and conclude that sustain is a difficult element which involve encourage workers for developing and practicing a highly discipline. In addition the results demonstrate that although the enterprises may achieve a higher executing of 5S elements but it may realize a low coherence in implementation.

**Keywords**—5S elements, garment enterprises, implementation, lean manufacturing.

## I. INTRODUCTION

5S is one of a common tool which is used to achieve a lean workplace and an essential quality in a workplace that can retain visual order, motivate employee morale, and increase efficiency and effectiveness [1]. 5S performed from 5 Japanese word which translated to equivalent english words: Seiri (Sort), Seiton (Set in order), Seiso (Shine), Seiketsu (Standardize) and Shitsuke (Sustain). Upon the World War II era these elements was carried out for efficient production [1]. 5S is an orderly and methodical system aimed to amelioration productivity and waste reduction [2].

## II. LITERATURE REVIEW

### A. Lean Manufacturing

Although the root of lean manufacturing referred to the early days of Ford Motor Company, the developing was occurred by the Japanese automobile industry. Lean manufacturing is a management philosophy which targets to decrease waste and optimize costs and quality [3].

Nowadays, lean manufacturing systems have been developed to realize a more concentration in customer value. Value was identified as the capability of enterprises for achieving customer requirements in minimal time. In this respect, concept of value divided into two categories as added-value and non-added-value, where added-value concentrate in

delivering a service or a product to a customer while non added-value should be removed [7].

### B. 5S in Manufacturing

Generally, 5S is the most utilized lean technique. One of the main foundation for implementing lean manufacturing in organization related to 5S along with Kaizen system as shown in Fig. 1 [6]. Practically, 5S system was considered in different angles. Some researchers regarded 5S as a methodology that help employess to create and innovate, while others viewed it as an orderly tool [2]. However, all decided that 5S is one of the best approaches for improving production [4]. 5S can be executed in different work area at any organization.

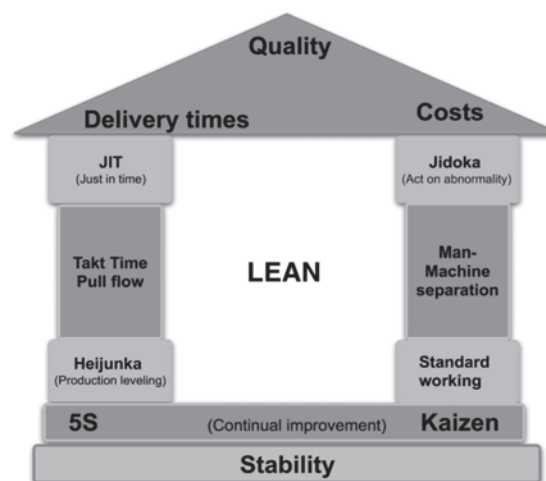


Fig. 1 House of lean

5s methodology originated in Japan with 5 practices which are Sort, Set in order, Shine, Standardize and Sustain [8]. Sort is a first phase which means segregate necessary item from unnecessary in work area. The second phase set in order focuses on organizing the items by labeling and putting it in place where it is easy to get them. the third 'S' is Shine, this is the method of deep cleaning for work area and put it back to its original condition. Once the first three of the 5S's have been implemented, standardize is the next phase which concentrate on establishing best manufacturing practices through allow employees to involve in development and documentation. Sustain is the final phase which regarded as the most difficult principle where its purposed to ensure that all 5S principles are implemented throughout the entire organization by means of commitment and accountability.

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In a simple way, 5S can be defined as a housekeeping while in industrial sector it can be termed as an orderly tool for improving work environment [5].

### III. EMPIRICAL RESEARCH

The research based on data collected from survey questionnaire, established from Summit Business Solutions, New York. The findings in this research related to a sample of 40 respondents. We received a total of 36 responses, which represented a response rate of 90%. The enterprises in the sample divided into three groups according to their nature activity as follows: Group (A) Enterprises for manufacturing export garment only. Group (B) Enterprises for manufacturing domestic and export garment. Group (C) Enterprises for manufacturing domestic garment only. The first group of enterprises encompassed 49.52% of the total sample, the second and third group of enterprises represented 50.48% of the companies in the sample.

### IV. RESULTS OF THE EMPIRICAL RESEARCH

#### A. 1S: Sorting

The aim of our empirical research is to explore the implementation of applying 5S system in Egyptian garment enterprises. The results in table I refer to the implementation percentage of sorting check items in the samples. The findings indicate to the sorting culture for the Egyptian enterprises, whereas the average of implementing sorting check items achieve (80.5%), in addition the result present the sorting policy, where visual control attain the highest interesting (84.1%) while sorting machines and equipment the lowest (80%).

At the same time the results obvious that enterprises produce export garment only (group A) triumph the highest sorting implementation while enterprises produce domestic garment only (group C) the lowest.

TABLE I  
 IMPLEMENTATION OF SORTING CHECK ITEMS

1S	Check Items	Group (A)	Group (B)	Group (C)	Mean
	Materials and Parts	80%	80%	80%	80%
	Machines and Equipment	80%	75%	75%	76.6%
Sorting	Jigs, Tolls and Dies	80%	80%	75%	78.3%
	Visual Control	97.5%	80%	75%	84.1%
	Written Standards	95%	80%	75%	83.3%
	Mean	86.5%	79%	76%	80.5%

#### B. 2S: Set in Order

The respondents were asked to determine the implementation of set in order in their locations. The results are presented in Table II.

According to the total mean (83.8%) we can conclude that the samples have a good realization about the benefits of applying set in order (2S) in their utilities, but on the other hand the results show variances in the achieving the check items between the three groups, where group (B) attain a high score in a locations indicators item, while group (C) attain a less score in quantity indicators item. The explanation

correlated to the nature activity for each group. Group (B) which manufacture a garment for domestic and international markets, give more importance to mark shelves and other storage areas with locations indicators and addresses than others two groups in order to enhance more organization which assure reducing in intergrading between different production lines, while group (C) place less importance to quantity indicators, due to the nature of the domestic market which are more flexibility to receive different quantity of garment products with different items than international market which determine quantity of products with specified items. In addition, the results refer to the superiority of the group (A) than other two groups.

TABLE II  
 IMPLEMENTATION OF SET IN ORDER CHECK ITEMS

2S	Check Items	Group (A)	Group (B)	Group (C)	Mean
	Locations Indicators	87.5%	90%	80%	85.8%
	Item Indicators	90%	80%	80%	83.3%
Set in Order	Quantity Indicators	85%	85%	77.5%	82.5%
	Demarcation of Walkways and In-Process Inventory Areas	90%	85%	80%	85%
	Locations Indicators	82.5%	85%	80%	82.5%
	Mean	87%	85%	79.5%	83.8%

#### C. 3S: Shine

The results in Table III present the implementation of allocated check items for shine within each group. Floors and machines are the most important item in three groups, while the least important items varied from group to another those variances correlated to the employees' habits which differ according to shine policy at each group. In generally the results indicate that habitual cleanliness placeless implantation at the three groups.

On the other hand, the results demonstrate that all groups give more interesting to implement shine rule in their utilities (89.8%) to assure increasing in the efficiency and detecting the error as fast as it can, in addition group (B) are the most executing for shine items than other two groups.

TABLE III  
 IMPLEMENTATION OF SHINE CHECK ITEMS

3S	Check Items	Group (A)	Group (B)	Group (C)	Mean
	Floors	97.5%	95%	95%	95.8%
	Machines	95%	95%	95%	95%
Shine	Cleaning and Checking	85%	90%	80%	85%
	Cleaning Responsibilities	90%	95%	85%	90%
	Habitual Cleanliness	85%	85%	80%	83.3%
	Mean	90.5%	92%	87%	89.8%

#### D. 4S: Standardize

Table IV illustrates the type of sources to implement standardize within different groups. The results present that the respondents in all three groups maintained the first three "S" i.e. Sorting, Orderliness and cleanliness, and documented on a daily basis. The procedures are very clear and used actively. Furthermore, the results show more achievement from group (A) and group (B) in implementing standard procedures than group (C).

TABLE IV  
IMPLEMENTATION OF STANDARDIZE CHECK ITEMS

4S	Check Items	Group (A)	Group (B)	Group (C)	Mean
Improvement	Improvement memo	90%	85%	85%	86.6%
	Improvement idea	85%	85%	75%	81.6%
Standardize	Key procedures	90%	90%	85%	88.3%
	Improvement plan	85%	90%	85%	86.6%
	First 3 Ss	95%	95%	90%	93.3%
Mean		89%	89%	84%	87.3%

### E. 5S: Sustain

In fact, sustain is known as the most difficult principle to execute. Table V present the scores of sustain check items within each group. The result exhibit that respondents face exertions to sustain 5 S systems, where the three groups realize the lowest scores in sustain check items compared with other items for pervious S. The results reflect sustaining policy in Egyptian garment enterprises, where the respondents give more important to sustain tools and parts while less important to activity board. In beside of that result indicate to the influence of the nature activity in implementing sustains practice within each group where group (A) gain the highest performance in sustaining the 5S procedure than other two groups. The explanations related to the international market requirements which need more discipline commitments in all aspects of production to assure the competitiveness superiority.

TABLE V  
IMPLEMENTATION OF SUSTAIN CHECK ITEMS

5S	Check Items	Group (A)	Group (B)	Group (C)	Mean
Improvement	Training	80%	80%	80%	80
	Tools and parts	90%	85%	85%	86.6%
Sustain	Stock controls	75%	75%	70%	73.3%
	Procedures	85%	75%	75%	78.3%
Activity boards		80%	65%	65%	70%
Mean		82%	76%	75%	77.6%

According to the consequences, we can examine the strength and weakness elements of 5S system in Egyptian garment enterprises. Fig. 2 illustrates that shine and standardize achieve the highest implementation rate within the three groups while sustain the lowest, which mean that garment firms encountered barriers and have to encourage workers for developing and practicing a highly discipline.

In order to identify the best implementation of 5S system in the three groups, radar chart areas were applied. Fig. 3 presents that group A attain the biggest area while group C the smallest.

On the other hand, by calculating coefficient of variation for each group we can observe that group A reach more coherence in implementing 5S than other groups, while group B reach less coherence in spite of attaining a higher average implementation than with group C, as it shown in Table VI.

### V. CONCLUSIONS

1. The nature of the target markets impact on the implementation of 5S system within Egyptian garment

enterprises. Enterprises which manufacture export garment only (group (A)) are more effective in executing 5S elements.

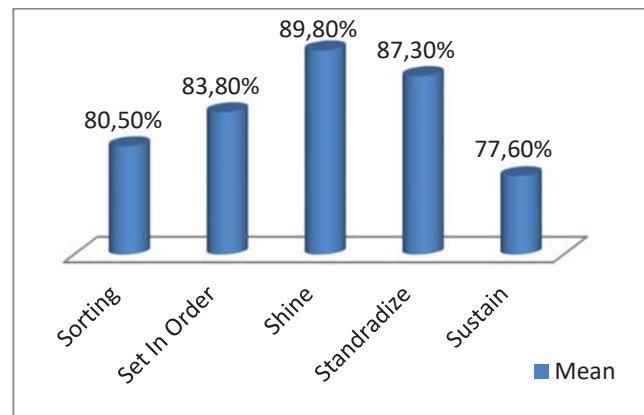


Fig. 2 5S implementation rate

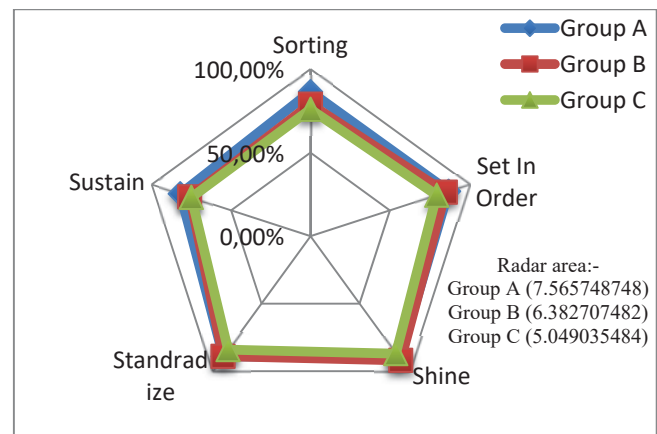


Fig. 3 Radar chart area for enterprises groups

TABLE VI  
COEFFICIENT OF VARIATION FOR EACH GROUP

5S	Group A	Group B	Group C
Sorting	86.50%	79%	76%
Set in Order	87%	85%	79.50%
Shine	90.50%	92%	87%
Standardize	89%	89%	84%
Sustain	82%	76%	75%
Radar Area	7.565748748	6.382707482	5.049035484
Mean	87.00%	84.20%	80.30%
STD	0.032210247	0.066858059	0.051429563
COV	3.70232722	7.940387007	6.404677893

2. Sustain procedures are the most difficulty in implementation which need motivation system from administration to encourage workers for developing and practicing a highly discipline.
3. Egyptian garment enterprises place shine and standardize as the most important elements in 5S policy.
4. Enterprises which manufacture export garment only achieve the highest implementation, while enterprises which manufacture garment for domestic markets only

achieve the lowest.

5. Although group (C) achieved a less result in executing 5S system than group (B), but it realizes a higher coherence (according to the coefficient of variation) in implementing the elements which indicate that it can improve its abilities by more practicing faster than group B.

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