

# **The Impact of 5S Implementation on Industrial Organizations' Performance**

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**ABSTRACT :** 5S is a systematic technique used by organizations comes from five Japanese words; Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain). This system helps to organize a workplace for efficiency and decrease wasting and optimize quality and productivity via monitoring an organized environment. It also provides useful visual evidences to obtain more firm results. There is a real need for empirical studies in field of new management systems and their impact on company's performance. As importance role of continuous improvement in today's organizations, and lack of sufficient evidence to show the positive impact of 5S on organizational performance, this paper aims to determine performance factors and characteristics in industrial organizations and identifying the effectiveness of 5S implementation on organizational performance as well. Surveying method is used and data collection is done by distributing questionnaire among five target organizations which have implemented 5S techniques. The target organizations are chosen from different industries and diverse field of work. The results of this research obtained from a comparative measurement of organizational performance before and after 5S implementation. The results show that 5S is an effective tool for improvement of organizational performance, regardless of organization type, size, its production or its service. Consequently, 5S techniques would strongly support the objectives of organization to achieve continuous improvement and higher performance.

**Keywords:** 5S, performance, total quality management, productivity.

## **I. INTRODUCTION**

### **1. Background of the Studies**

Nowadays in this dynamic and technological world, the secret of surviving for any kind of organization is to be competitive and pioneer in its products or services. One of the main parts of this way to succeed is continuous improvement and increasing the quality of product or service.

Usually, this improvement has been achieved through implementation of best practices which are chosen to meet a particular objective. With increasing of the competition in the world, two major challenges are in front of organizations' managers:

Firstly, in this competitive environment, managers have to make the best decisions and choose the best methods to achieve their objectives and not to lose very finite opportunities.

Secondly, lack of knowledge is one of the most important problems of managers about familiarity with an appropriate method to successfully improve the performance of organization.

In addition, the quality of performance also is vital to be evaluated and recognized. Such an evaluation can help managers to identify the improvement of performance.

5S is a way to improve the performance and organize the whole system which has been used first time by Japanese. It comes from five Japanese words start with S which is translated into English words to give the best explanation for them.

As it will be discussed later, using 5S as a total quality management method is very effective and efficient for improvement of whole organization. It has dramatic impact on safety and environmental issues, loss of resources and many others that this study is going to investigate and prove.

### **2. Problem Statement**

In recent years, researchers and practitioners are paying increasing attention to the phenomenon of new management systems and their impact on company's performance. There is a real need for empirical studies in this field. However, there is lack of knowledge in some improving methods and tools like 5S and the challenge is much greater [1, 2]. The most important problem and the primary reason for this research is lack of sufficient empirical evidence to prove that 5S has a positive impact on organizational performance.

Although some previous researchers are agreed with 5S positive impact on safety [3] and some believes it helps quality of product [4], but some acknowledges 5S as housekeeping [5-8]. Some links 5S with

TPM [2, 9, 10] and some believes 5S is more frequently framed in the "Lean" philosophy [11-14].

Poor performance is an issue that worries managers and employees alike. It is of concern to senior managers because it is a measure of how effectively the organization is led. Dealing with poor performance is an emotive issue for managers and organizations, therefore, that many organizations fail to address it. In our research, five different organizations shared their perspectives on the issue.

This study would like to show that 5S is a good management practice to create a performance improvement plan and a great work environment for employees where the companies are deal with poor performance problems.

There is a need to follow the method according to its framework to be easy to use and allow a practical and comprehensive measurement and also to cover most aspects of total quality management. It also allows a meaningful and practical analysis in the sense of being usable for total quality management approach and being applicable to organizations.

### **3. Objectives of the Study**

There are many practices in the world to improve the quality of products/services and performance of organizations, but generally companies looking for the best practice to implement and utilize for achieving their organizational goals and objectives easier, sooner and with less expenses.

Available techniques are different from each other in terms of their specific characteristics, factors and ways that consider for reaching their purpose.

This study aims to investigate the impact of 5S practices on performance of industrial organizations. Accordingly, the main objective of the research is to measure and compare of the organization's performance before and after implementing 5S practice.

So the objectives of this research are:

- To determine factors and characteristics of industrial organizations' performance.
- To identify effectiveness of 5S implementation on the organization performance.

### **4. 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 a 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.

### **5. Overview of the Project**

In this research several dimensions of performance are defined and then according to those dimensions or factors the study is going to investigate and measure related parameters of performance dimensions. After that, it employs a methodology which is designed and planned to gather data from industrial organizations which have implemented 5S practices. Finally, the research followed by data analysing and conclusions which summarize this study and present future research directions.

## **II. METHODOLOGY**

### **1. Introduction**

Achieving scientific objectives would not be possible without knowing science, except when the right methodology is chosen. This part explains about the type of research methodology for data collection from questionnaire, statistical population, sample, research model, research hypothesis, and validity and reliability of statistical tests used will be presented.

### **2. Methodology**

The study has followed descriptive research based on survey method. Like other researchers in this study the following steps have been done:

- After investigating the implementation methods in literature review, it is realized that 5S has an effective impact on improvement of organization.
- Next step was studying in terms of company activities and research about important factors and dimensions of organizational performance.
- Dimensions defined in previous step used to extract subfactors to measure the performance of organizations.
- Subfactors extracted from the performance factors were discussed within industrial experts who participated in the session.
- The information obtained from the literature review has been used in designing the questionnaire.
- In the first pilot run of questionnaire, weak points were found and improved. Performance factors and performance indicators also were confirmed by experts' opinions and judgments.

## **2.1. Data collection**

In order to having possibility of performance measurement before and after 5S implementation, this study has done in five different industrial organizations which have implemented and utilize 5S techniques. The companies that questionnaire is distributed are divided to different dependant companies and in case of data securities for these companies, their names will not be mentioned.

## **2.2. Statistical Society**

All statistical society is staffs and managers who are working in industrial organizations.

Minimum specifications intended for the sample community include:

- Being familiar with concept of performance and TQM
- Attend in at least one 5S practice implementation program and being familiar with concept of 5S

## **2.3. Sampling Methods**

Sampling method for this research study is based on simple random sampling. Simple random sampling is selected so that all samples of the same size have an equal chance of being selected from the entire population [15]. It means that the questionnaires were distributed among employees of organization by random, but considering the minimum requirements of respondent which are explained in previous part. The respondents must be familiar with concept of performance and 5S and attend in at least one 5S practice implementation program.

## **2.4. Data Collection Tool**

Major tools for gathering data in this study are consist of literature review, focus group and questionnaire. In present study to collect and compile the literature relevant to research all types of documents, books, journals, theses, internet resources and related statistics is used.

## **2.5. Questionnaire Design Process**

In this study to determine the performance of organization, performance factors were identified by studies of literatures and experts' opinion, judgement and confirmation. The performance factors are moderated into the following:

1. Setting up the new goals, decision making and directing the organization
2. Safety and environmental issues
3. Communication and information management
4. Customer satisfaction
5. Quality of product/service
6. Efficiency (avoid duplicating, reworking, rejection and failure in activities)
7. Decreasing costs, life cycle time and loss of resources
8. Motivation of workforce and employees' job satisfaction

In this study the organization performance was measured by applying performance indicators which are directional.

Directional indicators specify whether an organization is getting better or not. Key performance indicators, KPI, are quantifiable measurements that reflect the critical success factors of an organization. They will differ depending on the organization. A business may have as one of its key performance indicators the percentage of its income that comes from return customers [16].

A customer service department may have as one of its key performance indicators in line with overall company key performance indicators, percentage of customer calls answered in the first minute.

A key performance indicator for a social service organization might be number of clients assisted during the year.

Whatever key performance indicators are selected, they must reflect the organization's goals, they must be keys to its success, and they must be quantifiable and measurable. Key performance indicators usually are long-term considerations [17].

## **3. Questionnaire**

This research tries to gather professional opinions on the relative importance of performance indicators for successful management of industrial organizations from an expert perspective.

Questionnaire designed in this research has provided a framework for measuring the performance of industrial organizations before implementing 5S practices and compare it with those which are measured after 5S implementation.

The questionnaire was prepared according to 30 performance indicators which are directional and quantifiable.

The data obtained through questionnaires. The survey was designed with following structures and was provided for respondents. The questionnaire consists of 30 directional performance indicators that were marked according to Likert-type scale, before and after 5S implementation, including Very Poor, Weak, Medium, Good and Excellent options which are numbered from 1 to 5 respectively.

### **3.1. Questionnaire and its relationship with research method**

As described in the previous section, questionnaire investigates the influence of thirty indicators on organizational performance before and after 5S implementation. With an investigating the measurement between two situations and comparison of eight performance factors with analytical methods, before and after 5S implementation, the results will be achieved.

### **4. Intelligibility of Research**

In this research the best tool for data collection and measuring variables is questionnaire, so intelligibility of research is very important. Comprehensible questionnaire shows the consistent with the objectives of the research. Designing the right questions with clear meaning is the main situation for its intelligibility. The issue of content intelligibility for questionnaire is whether questions measure the major aspect of the research or not?

In present study main attempt was increasing the intelligibility of the questionnaire that has summarized as follow:

- Firstly, many studies have done through the study of books, articles, thesis, and expert's opinion and judgement was formed to complete the important concepts and indicators used in the research and how to measure them in order to clarify the appropriate questions to explore for designing the research questions.
- After designing the questionnaire, the primary questionnaire was distributed to an organization as a pilot run, to make sure that the questions are brief, clear and understandable. Then the questions were improved according to feedback of pilot run and finally distributed among target organizations.

After collecting data, the results were analysed by SPSS software. By applying Paired T-Test method and giving a form of best relationship between the indicators and performance factors.

## **III. RESULTS AND DISCUSSION**

### **1. Introduction**

Data analysis has an important role to verify the accuracy of hypothesis for each type of research. Today, for most researches that have relied on gathered information data, analysis has the most significant part of study. Now in this part, data collected from the real world will be analyzed using SPSS software.

In present study, questionnaire designed due to investigate the impact of directional indicators which are improved with 5S implementation and their affect on improvement of performance factors and consequently improvement of organizational performance in a holistic way.

The questionnaire has two parts, first part built-in questions about personal characteristics of respondents, educational level, training, profession and place of work, and the second part includes 30 questions which are related to research objectives.

Likert's five-item scale was used in its range and Cronbach's alpha method was used to assess the reliability of questionnaire. To evaluate the validity of questionnaire, experts' opinions and their helps and advices are used. Data are collected from five different industrial companies.

### **2. Raw Data and Results from Survey**

In this part of study, first of all the normality of data should be investigated and for this purpose SPSS software has calculated the Skewness for means of eight performance factors as well as overall mean of all indicators before and after 5S implementation. The Skewness must be between -1.00 and +1.00.

In the second step statistical analyses are done to show the relevance of 5S implementation and organizational performance. To achieve the desired results, Paired Sample T-Test technique is used to compare the mean of acquired data before and after 5S implementation. In this regard, statistical significance must be evaluated and the results must show whether observations reflect a pattern rather than just chance.

Significance level must be less than 0.05 and the significance level in all nine pairs (eight factors and one overall) is 0.000 and it proves that the observations before and after 5S implementation are significantly different and the secondary data are influenced by a high influential pattern.

### **3. Analysis of the Results**

In design stage of questionnaire, demographic questions have been considered to enrich the result of this study and improve the analysis of data.

In this part of research, it is supposed to investigate the impact of each demographic characteristic on improvement of organizational performance.

#### **3.1 Kind of organization: Governmental or Private**

The first characteristic that is being investigated is kind of target organizations which could be governmental or private. Two organizations out of five target organizations were governmental and the other three were private. Since the total number of distributed questionnaires was 100 and equally divided among five

organizations, so 40 questionnaires belong to governmental organizations and 60 questionnaires belong to private section.

In governmental section there is an improvement from 1.6100 to 4.3889 which is about 63% and in private section from 2.0900 to 4.2393 or 51% and since the slope of improvement in governmental section is more than private section, it could be concluded that in governmental organizations there are more opportunity for improvement of performance by implementing quality systems such as 5S.

### **3.2 Type of organization: Producer or Service provider**

The next characteristic is type of organizations under study which could be producer or service provider. Since two out of five organizations were service provider, so 40 questionnaires belong to service provider organizations and 60 questionnaires belong to production organization. The average performance of two type of organization before and after 5S implementation shows that in producer companies there is an improvement from 2.0900 to 4.2393 which is about 51% and in service provider companies it is from 1.6100 to 4.3889 or 63% improvement in performance.

By comparison between the slopes of performance improvement in two types of target organizations, it could be concluded that in service provider companies there is more opportunity for performance improvement by implementing of total quality systems such as 5S.

Training is an important and vital strategy for successful organization and without that it would not be expected high employees contribution and high level of productivity in the organization.

In this part the comparison is done between the companies which have given different types of training to their employees and those which have not. Total number of respondents who have received organization management training is 69 and on the contrary there are 31 respondents who have not received any training in field of organization management.

Those companies which have given organization management training to their employees, increasing in performance level is from 1.8599 to 4.3282 which is about 57% improvement while they have implemented 5S. But in those who have not given such training courses there is increasing from 2.0508 to 4.2032 which is about 51% improvement after implementing 5S.

The slope of performance improvement in those organizations with organization management training is more and it means that this type of training has had a positive impact on overall performance improvement of organization.

## **4. Analysis of Target Organizations**

In this section an individual analysis is performed for each one of target organizations separately. In this order the overall performance of each organization will be compared before and after 5S implementation.

### **4.1 Organization number one**

Organization number one is a private company which produces TV and video. The company manufactures electrical and nonelectrical parts and also has assembly lines. They have implemented 5S in their company and very satisfied with utilizing it. The overall performance of this company which was about 2.11 has improved after 5S implementation and reached to 4.12. It means 49% improvement in organizational performance which is very considerable in implementing a quality system.

### **4.2 Organization number two**

The next target company is organization number two which is governmental and paint manufacturer. Their activities involve chemical and mixing processes which are being done under cellular manufacturing system. They are utilizing 5S as a practical and beneficial quality method in their processes. It is about three years that 5S system has been implemented in the company, but its results are very surprising for both management team and the employees as well.

The overall performance before 5S implementation was 2.04 which is increased to 4.34 after that. The 53% improvement of overall performance was a dramatic and unbelievable improvement for the management team. They could reach to their targets just by implementing 5S as a quality developer system.

### **4.3 Organization number three**

Organization number three is a private service provider company. They provide heavy machinery services in construction fields. 5S could help them much in their organizational tasks and also in Repair & Maintenance department as well. They achieved a considerable improvement in communication and information management, which in this study is one of eight performance factors, by implementing 5S through the organization. They also had another remarkable improvement in minimizing safety and environmental issues.

The overall performance before 5S implementation was 2.08 which has risen to 4.20 after implementing the system. The 50% improvement in organizational performance was a big step toward continuous improvement which is main objective of the organization.

### **4.4 Organization number four**

Organization number four is a governmental company. They provide after sale services for cars sold to the customers. The company has had large distance to reach to the acceptable level of quality. The overall performance before implementing 5S has been 1.40 which is grown to 4.53 after implementation the system.

It shows that they achieved 70% improvement in organizational performance and the management team mentioned it as the biggest success of their organization so far.

There have been many opportunities for improvement in customer satisfaction section, quality of their services and setting up the new goals which could enhance the level of company and add value to their internal and external customers.

#### **4.5 Organization number five**

Organization number five is a private company which produces different electronic parts. In such company tidiness, cleanliness and organized grouping of activities are very vital. Systematize the activities which is the main part of 5S system would help to provide opportunities for promote the whole organization performance.

They could achieve to a high level of neatness and orderliness in the production and assembly lines by implementing 5S in their organization. There is a clear difference between organizational performance before and after 5S implementation. The overall performance before 5S which was 1.95 has promoted to 4.22 after performing the 5S techniques. It shows a 54% increasing in organizational performance of this company and it would be concluded that 5S does really work for improvement of organization in a holistic way.

#### **4.6 Overall organizational performance**

The summation of all directional performance indicators shows that there is a significant difference between overall organizational performance before and after 5S implementation. The average mark for overall organizational performance before 5S implementation was 1.91 which has been changed to 4.30 after implementation of 5S. So, generally it is concluded that implementing of 5S in an industrial organization can influence on the organizational performance and can improve it in a significant and meaningful way.

## **V. RESULTS AND DISCUSSIONS**

Individual analyses of five organizations successfully showed that 5S implementation has an effective impact on performance of organization. In addition investigating the impact of 5S on eight performance factors revealed that implementation of 5S is an effective way to improve and promote the organizational performance level. And finally the analysis of overall performance of five target organizations together proved the effectiveness and influential impact of 5S implementation on overall organization performance. The result of this study is strongly agreed with previous studies which indicated that 5S has positive impacts on organization performance.

On the other hand, this study has been performed in different companies with different kind of products and services and showed that 5S has had effect on organizational performance of all of them. It could be concluded that 5S is a useful quality management tool causes to improve performance in any organization without any limitation on different kinds of products or services.

## **VI. CONCLUSIONS AND RECOMMENDATIONS**

### **1. Introduction**

In the last section, after studying of 5S implementation and its impact on performance of organization, 5S practice as one of the most appropriate practices for industrial organizations, with focus on total quality management approach was proposed.

In addition, the performance factors and performance indicators in industrial organizations were investigated and addressed. In this part the conclusion of study and suggestions for future research will be expressed.

## **VII. CONCLUSIONS**

During research process, after getting familiar with 5S practice, its implementation and its benefits for industrial organizations, the results showed that the technique is very useful, applicable and beneficial.

The first objective, which was determining factors and characteristics of industrial organizations' performance has been achieved by reviewing 5S activities, TQM systems, their significant specifications in literature review, experts' opinion and judgment.

This could lead the research to identify eight performance factors and 30 directional performance indicators which were used in designing the questionnaire and its improvement by a trial run and expert's judgment to provide the data for the second objective.

The second and main objective of this research, which was identifying effectiveness of 5S implementation on the organization performance, has been achieved by using a comparative measurement between performance of organization before and after 5S implementation assisted by SPSS and Excel softwares.

According to the achieved results from the study, performed on five target industrial organizations, it could be concluded that 5S has positive effect on overall performance and could improve the quality, efficiency and productivity of industrial organizations.

### **VIII. RECOMMENDATIONS**

According to the results, future researches can be a comparative study of 5S affects on performance in similar organizations, review requirements of the implementation and deployment of 5S practice, and review of the key success factors for organizations that have been successful in implementing of 5S and other quality management systems. The methodology used in this research can be extended for more factors by involving more experts to get more accurate results. Future research also can be applied for any other industry and organization to achieve best form of relationship among directional indicators and overall performance and so on. Studying success factors and their effects on organizations or projects can be investigated and all details which will result in competitive advantage of company are also recommended for future study.

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