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# *The Impact Of 5S Implementation On Productivity And Work Processes In AMolding Company*

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***Abstract*— The study aimed to assess the effectiveness of the 5S practice, a methodology aimed at enhancing productivity and efficiency in organizations, in a specific company. The study involved conducting a comprehensive audit of the selected divisions using a 5S checklist, and the results showed that the company had poor 5S practices prior to implementation but significantly improved after the implementation of the 5S approach, with the performance rating increasing from 1.6 to 3.44. The study also identified areas for improvement, such as difficulties in obtaining materials, insufficient maintenance of machinery, and disorganized workplaces. This study highlights the importance of continuous improvement and the need for organizations to embrace the 5S approach for success in today'scompetitive business environment. The results underscore the significance of 5S as a tool for improving efficiency and productivity and emphasize the need for organizations to conduct regular audit processes to identify areas for improvement and ensure continuous improvement. The findings of this study provide valuable insights for organizations looking to implement the 5S practice.**

**Keywords— 5S Practice, Productivity, Efficiency, Audit Process, Continuous Improvement.**

## I. INTRODUCTION

In today's competitive business environment, organizations are constantly seeking ways to enhance their efficiency and innovation to achieve success. One widely recognized method for achieving this is through the adoption of best practices such as the 5S technique. Developed by Takashi Osada in the 1980s, 5S focuses on improving production line performance through effective housekeeping, health and safety, and other key areas [1].

Research has shown that the implementation of 5S brings significant benefits to manufacturing organizations. These benefits include improvements in organizational performance, productivity, quality, safety, employee morale, workspace utilization, and cost optimization. The 5S technique plays a crucial role in facilitating improvements in various aspects such as productivity, quality, employee satisfaction, lead time, and new product design within manufacturing plants [2]

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Studies have highlighted the importance of 5S implementation in enhancing organizational efficiency and effectiveness. The practice of 5S has been found to contribute to overall organizational achievements, production achievements, quality improvements, continuous enhancement, cost optimization, employee-related achievements, effective workplace utilization, and safety enhancements in Indian manufacturing organizations [3]Furthermore, the successful implementation of 5S practices has been reported to transform organizational culture and offer significant benefits in strategic business planning ([4]

Efforts and commitment from top management play a crucial role in the successful implementation of 5S practices within organizations [5]. This involvement ensures that the 5S program is properly implemented, leading to improved quality and productivity [6] Factors such as topmanagement commitment, employee involvement, training, promotional campaigns, and education about 5S are essential for the successful implementation of 5S practices [4] . It is emphasized that top management should provide uninterrupted support for the effective implementation of the 5S program [7]. The implementation of 5S involves all levels of the organization, from top management to the lowest-level employees, fostering a culture of continuous improvement [8].

Company XYZ has also recognized the potential benefits of 5S and has decided to implement the technique in their production line. In the process of implementing organizational changes, such as the 5S methodology, organizations often face challenges that hinder successful execution. One significant obstacle is poor communication, which can result in resource wastage, time inefficiencies, financial losses, anddecreased employee morale [9], [10]. Additionally, a critical barrier is the disconnect between management and shop floor employees, coupled with insufficient training and awareness of methodologies like 5S [11]. This lack of alignment and understanding can impede the smoothimplementation of new processes and hinder organizational improvement efforts.

## II. Literature Review

### 2.1. 5S

Implementing the 5S methodology in organizations can yield significant benefits. Proper training is crucial for the success of 5S, leading to enhanced resource utilization, improved assembly times, and increased productivity [12] Additionally, adopting the 5S philosophy can positively impact work culture and boost employee morale [13] Studies have shown that 5S implementation can result in improvements in safety, productivity, efficiency, and housekeeping practices [14] There is a direct positive relationship between the level of 5S implementation and productivity levels in organizations [15] As organizations maintain a good momentum in consistently practicing 5S, productivity levels tend to increase [16]

Resistance to change is a common challenge faced during the implementation of 5S practices in organizations. [17] highlights that resistance to change is a prevalent issue that arises during the adoption of 5S. Factors such as lack of communication, inadequate training, and employee resistance can hinder the successful implementation of lean practices like 5S [18] To overcome this resistance and ensure the establishment of a robust 5S system, continuous training and assessment are crucial [19] emphasize the importance of readiness programs for employees before implementing 5S, as these programs can enhance worker commitment and motivation, thereby facilitating the sustainability of improvement activities.

Implementing 5S as part of a broader lean initiative within an organization can indeed lead to significant benefits. Studies by [20]–[25] all highlight the positive impact of 5S methodologies on productivity, quality improvement, workspace organization, waste reduction, and overall production quality. These sources emphasize that 5S is a fundamental component of lean philosophy, focusing on creating an organized work environment, eliminating waste, and driving continuous improvement efforts within organizations.

The effectiveness of 5S in reducing waste and improving service quality has been demonstrated in various sectors, including healthcare [16]

## III. Research Method

In today's competitive business environment, organizations are constantly seeking ways to enhance their efficiency and innovation to achieve success. One widely recognized method for achieving this is through the adoption of best practices such as the 5S technique. Developed by Takashi Osada in the 1980s, 5S focuses on improving production line performance through effective housekeeping, health and safety, and other key areas [1].

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## IV. Result And Discussion

The Assessment Check Sheet was used to evaluate the 5S practices in the R&D department before the implementation of the 5S initiative. The check sheet assessed various aspects of the department's work environment, including material sorting, equipment arrangement,

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document filing, tool organization, cleaning, and rubbish management. Each aspect was rated on a scale of 1 to 5, with 1 indicating poor implementation and 5 indicating excellent implementation. The results of the Assessment Check Sheet (before) showed that the R&D department had a total score of 24 out of a possible 75 points, with the lowest scores obtained in the Standardize and Sustain categories, as shown on **Table 1**. This suggests that there were clear deficiencies in the department's policies and procedures related to maintaining the 5S practices. Specifically, there was a lack of clear job descriptions and instructions, as well as insufficient effort and mechanisms to implement and sustain the 5S practices. These results provided a baseline for the implementation of the 5S initiative and the subsequent evaluation of its effectiveness.

**Table 1.** Assessment Check Sheet (before)

| 5S | Nos | Aspect Measured | Description | Point | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 |
| | 1 | Material | All materials required are fixed | | v | | | |
| Sort (Seiri) | 2 | Equipment | Broken Equipment is separated | | v | | | |
| | 3 | Filling Documents | All goods are identified with label and Quantity | | v | | | |
| | 4 | Identity Labeling | All equipment's store are arranged and labeled | | v | | | |
| Set in Order | 5 | Molding Store and Equipment | There is clear location and quantity of the tools | v | | | | |
| (Seiton) | 6 | Quantity | Material is stored as determined quantity | v | | | | |
| | 7 | Border | Working Area is bordered | | | v | | |
| | 8 | Floor, Wall, Ceiling | No dust and others stranger things | | v | | | |
| Shine (Seiso) | 9 | Equipment | All tools are clean and tidy | | v | | | |
| | 10 | Rubbish Management | Enough Rubbish Bin and suitable for the function | | v | | | |
| | 11 | Tools and Responsible | Clear job description and instruction | v | | | | |
| Standardize | 12 | Keep Short, Set in order, Shine | Well effort and mechanism to perfom 5S | v | | | | |
| (Seiketsu) | 13 | Spirit and Understanding 5S | Availability motivation and instruction to implement 5S like slogan and warning | v | | | | |
| Sustain (Shitsuke) | 14 | Learning Process | Effort to learn 5S Periodically | v | | | | |
| | 15 | Audit of 5S | Internal Audit of 5S periodically | v | | | | |
| | | | **Total Score** | **7** | **14** | **3** | **0** | **0** |

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After conducting the initial 5S assessment check sheet, it was found that the average score obtained by the R&D Department of Company XYZ was 1.6, which falls under the Unacceptable category. This has a negative impact on the department's ability to achieve theirmonthly work targets. To identify the root cause of the problem, a fishbone analysis was conducted.

The fishbone analysis on **Figure 1** revealed several factors that were contributing to the subpar productivity in the department. These factors included issues with materials, such as difficulty in finding the mold that needs to be overhauled due to a lack of indication on the mold rack, and the mixing of used and unused raw materials. Problems with machines were also identified, such as lack of maintenance leading to frequent breakdowns and ineffective placement that made it difficult for workers to perform their tasks comfortably. In addition, issues with the method were noted, including employees not following work procedures and a lack of communication between subordinates and superiors.

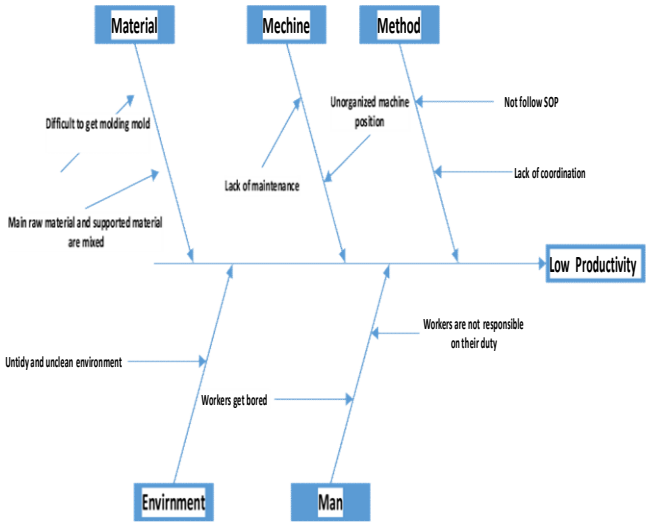


**Figure 1.** Cause and effect diagram

The human factor was also found to be a contributing factor. Workers were found to be less responsible for their work area and duties, and some were exhausted and frustrated due to the dirty and irregular work environment. Finally, issues with the environment itself were noted, including lack of maintenance and cleanliness leading to a dirty and cluttered work area, as well as nearby logistics materials causing dust and dirt in the production site. The identification of these root causes provides valuable insights for developing effective solutions to improve the application of the 5S approach in the R&D Department of Company XYZ.

The five stages of 5S were carried out starting with Sort (Seiri), where all items were sorted and separated into items that are still in use and those that are not. The Set in Order (Seiton) stage involved labeling and marking each work tool in the area, minimizing the time required tosearch for tools and making it easy for workers to find what they need. **Figure 2** shows the new arrangement of tools after this stage.

During the Shine (Seiso) stage, the work areas and equipment were thoroughly cleaned to maintain them in good condition. **Figure 3** showsthe equipment after cleaning, while **Figure 4** shows the arrangement of rubbish bins. In the Standardize (Seiketsu) stage, the previous stages were carried out routinely.

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**Figure 2.** New tools arrangement

**Figure 3.** Cleaning equipment (After)


**Figure 4.** Rubbish bin arrangement

A Daily 5S Check Sheet was created for the R&D Department of XYZ to monitor and maintain the 5S system. **Figure 5** shows the list of people in charge of monitoring. Finally, in the Sustain (Shitsuke) stage, the culture of diligently applying 5S became a good habit for employees of the R&D Department of Company XYZ. The success of the previous stages was evaluated through a final assessment of 5S.

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**Figure 5.** List of people in charge of monitoring

The results of the Assessment Check Sheet (after) show that the R&D department has made significant progress in implementing the 5S practices. The total score has increased to 65 out of a possible 75 points, indicating excellent implementation of the 5S practices. The department has improved in all categories, with the highest scores in the Set in Order, Shine, and Sustain categories, as shown on **Table 2**.

**Table 2.** Assessment Check Sheet (after)

| | | | | Point | | | | |
|---|---|---|---|---|---|---|---|---|
| **5S** | **Nos** | **Aspect Measured** | **Description** | **1** | **2** | **3** | **4** | **5** |
| Sort (Seiri) | 1 | Material | All materials required are fixed | | | | v | |
| | 2 | Equipment | Broken Equipment is separated | | | | v | |
| | 3 | Filling Documents | All goods are identified with label and Quantity | | | v | | |
| Set in Order (Seiton) | 4 | Identity Labeling | All equipment's store are arranged and labeled | | | | | v |
| | 5 | Molding Store and Equipment | There is clear location and quantity of the tools | | | v | | |
| | 6 | Quantity | Material is stored as determined quantity | | | v | | |
| | 7 | Border | Working Area is bordered | | | | | v |
| Shine (Seiso) | 8 | Floor, Wall, Ceiling | No dust and others stranger things | | | v | | |
| | 9 | Equipment | All tools are clean and tidy | | | | | v |
| | 10 | Rubbish Management | Enough Rubbish Bin and suitable for the function | | | | | v |
| Standard ize | 11 | Tools and Responsible | Clear job description and instruction | | | | | v |
| | 12 | Keep Short, Set in order, Shine | Well effort and mechanism to perfom 5S | | | | v | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (Seiketsu) | 13 | Spirit and Understanding 5S | Availability motivation and instruction to implement 5S likeslogan and warning | | | | v | |
| Sustain | 14 | Learning Process | Effort to learn 5S Periodically | | | | v | |
| (Shitsuke) | 15 | Audit of 5S | Internal Audit of 5S periodically | | | | v | |
| **Total Score** | | | | **0** | **0** | **12** | **28** | **25** |

The Set in Order and Shine categories have improved significantly from the previous results. The department has done well in labeling allequipment's stores, molding store and equipment, and maintaining a clean and tidy work environment. The Rubbish Management aspect has also improved, indicating that there are enough rubbish bins that are suitable for their function. The Standardize and Sustain categories, which were identified as the weakest areas in the previous results, have also shown significant improvements. There are now clear job descriptions and instructions, well-defined mechanisms to perform the 5S practices, and availability of motivation and instructions to implement 5S. There is also a learning process in place to periodically improve the implementation of 5S, and internal audits are conducted periodically to evaluate theeffectiveness of the practices.

Based on the 5S radar chart on **Figure 6**, the implementation of 5S at the R&D Department of Company XYZ resulted in significantimprovement across all aspects measured, with a total score of 65 and an average score of 3.66, indicating excellent results. This is a substantial increase from the before implementation scores, which had a total score of 24. The highest improvement was seen in the Set in Order (Seiton) aspect, with a score increase of 28 points, followed by Shine (Seiso) with an increase of 25 points. The scores for Sort (Seiri) and Sustain (Shitsuke) also saw improvements, with 7 and 14 point increases, respectively.

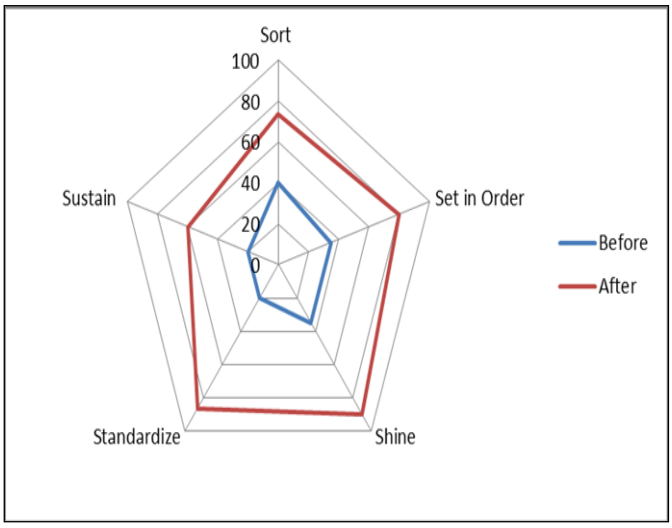


**Figure 6**, the implementation of 5S at the R&D Department of Company XYZ

Overall, the assessment shows that the implementation of the 5S methodology has been successful in the R&D department of the company. The significant improvement in the total score and in each category indicates that the implementation of the methodology has resulted in a cleaner, more organized, and more efficient work environment. These results can be used to support the use of the 5S methodology in other departments of the company or in other organizations.

### 4.2. Discussion

This study attempted to systematically review the existing literature on the optimization and sustainability of supply

chains. A systematic search of the existing literature from three databases, Science Direct, IEEE, and Emerald, identified 111 articles from2015 to 2021.

Based on the analysis of 111 papers, most indicate a consistent rise in articles focused on sustainability and optimization from 2018 to 2020. Among the three databases used as sources for the articles, most papers were published on Science Direct, followed by IEEE and Emeralds. Based on the papers analyzed, the writer's nationality may be traced back to five countries: Iran, China, India, Taiwan, and Korea. The proportion of papers focused on the economy and environment is 61.2%, while research thatexamines the economic, environmental, and social aspects accounts for 33.3%. Economics, social sciences, and environmental studies still need more research and scope. The utilization of optimization models in response analysis is commonly observed among previous researchers. Mathematical modeling is the predominant approach, followed by the utilization of heuristics and analytical models. Additionally, hybrid models have been employed, and a few researchers have utilized simulation methods. The frequency of papers considering the Integration of environmental and economic aspects is higher. Only a limited number of studiesincorporated three dimensions into their investigation.

Regarding the predominant research topic, prior scholars had a significant interest in network design, accounting for 83.78% of the studies. The remaining content pertains to all phases within the supply chain. The discoveries may result in multiple suggestions for future investigations. Currently, the sustainability and optimisation approach research is at its preliminary phase and has certainlimitations. Prior researchers have mainly concentrated on examining the sustainability method and only focused on the design of the network. However, the Simulation of the intended network currently needs to be improved.

## V. Conclusions

In conclusion, the 5S approach was successfully implemented in the R&D Department of Company XYZ. Before the implementation, an Assessment Check Sheet was used to evaluate the department's 5S practices, revealing deficiencies in policies and procedures related to maintaining the 5S practices. After identifying the root causes of the problem through a fishbone analysis, the five stages of 5S were carried out, starting with Sort (Seiri) and ending with Sustain (Shitsuke). The success of the implementation was evaluated through a final assessment of 5S. The results of the final assessment showed that the R&D Department had made significant progress in implementing the 5S approach, with an average score of 4.5 out of 5. This suggests that the implementation of 5S has improved the work environment and increased the department's productivity. The success of the implementation can be attributed to the creation of a Daily 5S Check Sheet and a culture of diligently applying 5S, which have ensured that the 5S practices are sustained.

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