# *5S PRINCIPLES: A REVIEW OF THE LITERATURE*

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***Abstract:*** This paper aims to provide an extensive overview of the literature on 5S and identify any potential gaps from the perspectives of practitioners and scholars. The paper provides an overview of the application of 5S and emphasizes the successes that have been attained through the deployment of 5S initiatives for long-term organizational performance.

***Keywords:*** Quality, 5S, sort, set in order, shine, standardize, sustain

## *I. INTRODUCTION*

The five pillars of a continuous improvement program are called 5S, or, in Japanese, Sort, Set in Order, Shine, Standardize, and Sustain. Seiri (i), Seiton (ii), Seiso (iv), Seiketsu (v), and Shitsuke (vi). A 5S program aims to reduce wastage of time and materials by arranging and labeling objects in close proximity to workers and operations. There is a place for everything and everything in its place according to the 5S principle, which also helps to reduce wastage of inventory, time, and space. The application of 5S leads to increased productivity and improved product quality, which in turn reduces expenses and boosts efficiency.

## *II. INITIAL CHALLENGES FACED WHEN INITIATING 5S*

Avishkar et al. (2021) look into organizations that want to produce well while making constant improvements. A well-designed tool, 5S creates a methodical workplace with visible controls and organization. Each member of the organization's dedication, involvement, and contributions, as well as unwavering support from the higher authority of the organisation, are the two most crucial components of a successful 5S implementation. Lack of 5S awareness and poor communication between upper management and workers and employees contributed to poor management. The 5S initiative initially faced many challenges because the workers and employees were resistant to the 5S activity. Many of these challenges were overcome with the aid of inspiration for the organization's staff in the form of awards and recognition. When 5S was first implemented, there were a lot of challenges since workers and employees did not adapt to the 5S activities. Many of these challenges were solved with the use of incentives such as awards and recognition for the members of the organization. A research

conducted on the manufacturing and packaging industries found that integrating 5S significantly increases worker efficiency. As a result, after applying 5S, process effectiveness has been noticeably increased by 25 Percent. Thus, it can be concluded that proper workplace upkeep, item organisation based on frequency of use, and sorting of things all increase productivity.

## *III. PROBLEMS OCCURRED BEFORE IMPLEMENTATION OF 5S PRINCIPLES*

Gupta et al. (2022) interprets the following issues that existed before the 5S Principle was implemented in the company (automotive industry); (i) misusing storage space for bins, completed goods, and raw materials. (ii) Time lost looking for raw materials because there isn't a permanent place to store them. (iii) Low productivity as a result of inefficient workplace management, which wastes time looking for tools and supplies. (iv) The presence of undesirable materials at work, which lowers employee morale while they are working. There are various benefits that follow the application of the 5S principles in the automotive industry. (i) The 5S concept is very straightforward and simple enough for everyone to understand, requiring only a high level of commitment and familiarity with conventional discipline. It is possible to use this technique at all levels. (ii) 5S will promote discipline, teamwork, and a greater sense of responsibility and compassion for the business. (iii) 5S will guarantee the delivery system toward a world-class standard and produce hygienic, productive work environments. (iv) The cornerstone for the effective adoption of 5S practices is the management's ongoing commitment and involvement, which is provided by all citizens. (v) Maintaining exceptional service delivery performance requires constant application of 5S. All things considered, the 5S system is a good place to start for any improvement initiatives hoping to reduce waste in the manufacturing process and, in the end, boost a business's production by raising the quality of goods and services while cutting costs.

## *IV. 5S CONCEPT TO EVALUATE THE PERFORMANCE OF A MANUFACTURING COMPANY*

Ratanakvisal et al. (2021) inspects the 5S concept to evaluate the performance of a Malaysian manufacturing company. Globalization has altered the requirements for the effective application of the 5S concept, including product designs, life cycles, production modifications, and technological advancements in manufacturing capacities. As a result, manufacturing industries have had to adapt by putting proactive measures in place to stay competitive. Nonetheless, an organization's performance is important because it can show how well or poorly a business is running. Empirical findings showed that 5S had a major impact on an organization's productivity. Every variable in the 5S concept has a significant relationship with productivity, according to the analysis. By properly applying the 5S concept and identifying errors and defects, the company's productivity can be increased by using the research as a guide.

## *V. IMPACT OF 5S IMPLEMENTATION ON OCCUPATIONAL SAFETY IN AN AUTOMOTIVE INDUSTRY*

Fernandez et al. (2019) analyzed how implementing 5S has affected workplace safety in the automotive industry. Lean is emerging as a preeminent body of work that epitomizes both the value of concentrating on value creation and ongoing improvement. Lean Manufacturing was put into practice, which improved quality while cutting costs and getting rid of non-value-added tasks. The

ISO 45001: 2018 - Occupational Health and Safety Management Systems standard was released in March 2018 by the International Organization for Standardization (ISO). This new standard, which is meant to replace OHSAS 18001, is based on the same high-level framework as environmental (ISO 14001) and safety systems (ISO 9001). The document offers a set of ready-to-use, straightforward procedures and guidelines for enhancing workplace safety in international supply chains. This standard is applicable everywhere, including factories, partners, and production facilities. This is anticipated to lower the amount of illnesses and injuries related to the workplace. This paper examines how the application of lean tools, specifically 5S, could improve occupational safety conditions in a case study conducted in one of the biggest automakers' plants in Europe. The results demonstrated that the total risk could be reduced by up to 64 percent using the used risk assessment tool by applying 5S+1S, or 6S, on the designated location. Furthermore, the implementation of 2S (Seiton or Set in Order) was found to have the greatest influence on overall safety.

## *VI. 5S TECHNIQUE BY IMPLEMENTATION OF LEAN MANUFACTURING*

Goswamy et al. (2019) examined in today's world, the 5S technique for continuous improvement of the manufacturing process through the application of lean manufacturing helps to meet and satisfy end users by enabling the production of products based on customer demand. This research paper's primary goal is to examine and analyze how applying 5S to an automotive ancillary unit can reduce waste and increase productivity. The low level of awareness regarding the 5S terminology in manufacturing units can be attributed to inadequate training and communication gaps between upper management and shop floor employees. The company EECL Limited is currently engaged in the production of automotive components and operates production facilities in India. It supplied parts to a significant Indian automaker, with a 50 million dollar turnover in 2017. The management of the company wishes to enhance the current system in order to increase productivity because it is not a smooth line. The industry as a whole is cleaner, safer, and has a better environment as a result of applying 5S, and product quality has increased.

## *VII. IMPACT OF 5S METHODOLOGY*

Sangode et al. (2018) examined the effects of the 5S methodology—which emphasizes sorting, organizing, shining, standardizing, and sustaining—in manufacturing companies. Using this methodology, the manufacturing system can become lean by removing waste that would otherwise arise from an untidy and unhealthy work environment. This essay aims to comprehend how several manufacturing companies in the Nagpur area of India have adopted the 5S methodology. For the study, a sample of ten manufacturing facilities was selected. The chi-square test was employed to substantiate the hypothesis that companies adopting 5S achieve operational efficiency. It was a conceptual model that put 62 engineers from a chosen organization's manufacturing department to the test. The results demonstrated that every hypothesis contributed significantly to the productivity prediction. The research study conducted on the ten manufacturing units demonstrated that the implementation of 5S has a notable effect on improving workplace efficiency. The manufacturing sector's automotive divisions had the highest efficiency level mean. Therefore, it can be said that keeping the workspace neat and orderly, properly sorting objects, and arranging all necessary items according to frequency of requirement all directly affect productivity.

## *VIII. IMPACT IN AN AUTOMOTIVE COMPANY*

Veres et al. (2017) investigated the effects of the 5S method in a car company that sets an example for developed nations to follow in the dynamically changing economic environment. The Toyota Production System, which includes the 5S method, is the most widely used management model in the automotive industry. Its goal is to maximize efficiency and productivity by promoting discipline and cleanliness in the workplace. The Austrian business Hirschman Automotive, which manufactures auto parts and has facilities in Morocco, Mexico, China, the Czech Republic, and Romania, is the subject of this case study. Its total revenue in 2016 was 300 million euros, with investments accounting for 12.5% of that amount and 4768 workers as of January 2017. The results of the analyses that were done indicate that there is a positive correlation between the 5S Level and Productivity in an automotive cable production plant, indicating that the initial goals have been achieved. This means that the company's performance improves when the 5S method and standards are implemented and upheld.

Randhawa et al. (2017) examined the manufacturing performance gains made by Indian manufacturing companies using strategic 5S methods. This paper's goal is to assess the qualitative and quantitative advantages that the strategic 5S implementation initiatives have brought to the Indian automotive parts industry. Based on the study's empirical findings, the manufacturing industry has seen significant improvements in quality, production, cost optimization, employee morale, and work culture when the 5S program is implemented effectively. The industry benefited from the comprehensive application of 5S principles in both tangible and intangible ways. The research shows that because of the many benefits that 5S provides, industries across the globe have been using it continuously, from Asia and Europe to the United States and the United Kingdom. Furthermore, case studies and literature have shown that all practitioners, industrial managers, personnel managers, and HR professionals view the 5S technique as a useful tool for bringing about overall organizational improvement, beginning with the foundation and establishment of various quality programs. Overall, the study unequivocally shows that the implementation of the 5S program has enabled manufacturing organizations to significantly improve plant performance in comparison to its prior state.

Agrahari et al. (2015) examines 5S, a fundamental manufacturing system, in the context of the small-scale industry. The 5S methodology shows notable gains in cleanliness, productivity, and efficiency. The 5S methodology shows notable gains in cleanliness, productivity, and efficiency. In India's economy, the small-scale sector holds a prominent and unique position. It has become a very effective instrument in creating comparatively more jobs than agriculture. The demands of the world's markets are always shifting, and they call for affordable, high-quality products. Small-scale industries in India must be able to innovate, increase operational effectiveness, and boost productivity in order to survive and grow. A workspace that is well-maintained, spotless, efficient, and of superior quality is a key component of the 5S methodology. The study was carried out in the manufacturing company V.M. Auto Pvt. Ltd. During the study, it was executed that selection of process parameters/procedure in chosen production process, on each workplace. The objective of their research was to increase the storing place with 30 create and preserve standards and service procedures specific to the workshop, reduce unproductive time with 10%, redefine access, working and storage spaces, readjust the location.

Patel et al. (2014) conducted research on how to use the lean manufacturing 5S methodology to address the issues facing the Indian ceramics industry in order to improve process efficiency across the board and eliminate losses for the business. Through a case study, the paper aims to decrease process wastes, streamline workflow, uphold appropriate quality control, and enhance storage facilities, safety, security, and process cost savings in an organization. Components made of ceramics are manufactured in batches. Certain processes are completed on an individual basis, while others are completed on a lot basis. A flowchart explaining the ceramic insulator product manufacturing process is created using the operation data. There are two processes for producing. The use of the 5S principle and the visual management system (GAMBA) has improved space utilization, employee safety, reduced error scope, increased productivity, and improved inventory management. It has also increased machine efficiency, maintained and cleaned devices, improved machine efficiency, promptly informed about damages (or potential sources of damages), improved the work environment, and eliminated the company's causes of accidents.

## *IX. CONCLUSION*

Instead of being seen as a one-time project, the 5S strategy requires standardization and consistency in rules in order to guarantee long-term implementation plans that meet organizational objectives. Updating the organization's education and training programs is essential for a successful 5S implementation. This study can also serve as a guide for properly applying the 5S concept to identify errors and defects and increase productivity within the organization. It is advised that all businesses concentrate on appropriately separating the essential and superfluous products in the production line in order to increase productivity even further.

***Conflicts of Interest:*** "The authors certify that they have no competing interests with regard to this research."

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