Implementing 5S Technique in an Indian MSME: A Case Study

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Abstract

Purpose: This research paper aims to identify the process undertaken to implement 5S technique and describe the advantages obtained due to its implementation at an Indian manufacturing concern, categorized as Micro, Small and Medium Enterprise (MSME).

Design/methodology/approach: The case study approach was used because it is suitable to provide a description of a phenomenon (Eisenhardt and Graeber 2007; Yin 2009). Data about the implementation of 5S and benefits accrued from it was collected using several sources such as archival data including company website and information provided by the top management, interviews with company leaders and workers, and visual observation of the plant.

Findings: This case study found that implementation of 5S resulted in savings of around 83 percent on average in time taken to locate spares. The proper storage of spares and timely disposal of dead stock reduced the floor space requirement by 20 percent, resulting in savings of Rs. 1.20 crores to the company.

Practical implications: 5S technique can be successfully implemented by Indian MSMEs by focusing on factors such as commitment from top management towards 5S implementation at strategic planning stage, comprehensive training, use of visual cues and creation of a 'culture of quality'.

Originality/value: The paper presents the process, benefits and drivers of success for 5S implementation in an Indian MSME which will add value to academicians and practitioners interested in understanding the applicability of 5S in the MSME sector in the Indian context.

Keywords: 5S technique implementation, India, MSME, case study, benefits, success factors

I. INTRODUCTION

The increasing levels of competition in every sector, especially manufacturing, compel all existing organizations to be prepared for a process of continuous improvement in order to maintain organizational competitiveness (Singh, Rastogi and Sharma, 2014).

This pressure requires organizations to continuously focus on improved organizational performance by focusing on quality improvements (QIs), cost optimization, enhancement in productivity, flexibility, safety and ensuring timely deliveries. For this, organizations need to adopt practices, methods or techniques that facilitate continuous improvement (Patra, Tripathy and Choudhary, 2005).

One such method is lean manufacturing, which has proven to be successful in helping an organization to achieve quality enhancement, cost optimization, waste elimination, employee empowerment and delivery adherence (Ohno, 1988). Originally developed in the form of the Toyota Production System (TPS) in Japan, this technique now widely known as the 5S technique, has spread in popularity world-wide.

Several Indian organizations have adopted this technique and there is substantial research that documents the implementation of 5S by large Indian units. However, there is not much known about the extent to which smaller manufacturing concerns have adopted this technique.

In this context, the main objectives of this research are the following:

1) To find out the rationale behind the choice to implement 5S technique at a small Indian manufacturing organization
2) To identify the details of the process undertaken to implement the 5S technique
3) To describe the advantages obtained due to the implementation of 5S technique.

This research paper focusses on the implementation of the 5S technique at a small Indian manufacturing concern, identified as Micro, Small and Medium Enterprise

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(MSME). The investigation first focused on obtaining evidence about the rationale behind the choice of implementation of the 5S concept and then researched the actual implementation as well the benefits obtained.

The paper is structured as follows. The next section reviews the existing literature pertaining to the 5S lean manufacturing technique and its usage globally and in India. The methodology adopted for the research is discussed next, followed by the key findings. The discussion section ties in the findings with existing literature and shows the practical implications of this research, as well as its limitations and future scope of research in this area.

II. LITERATURE REVIEW

The concept of lean manufacturing has been propagated by several researchers and authors across the globe (Brayer and Walsh, 2002; Matt, 2008). Brayer and Walsh (2002) describe lean manufacturing as a philosophy of successfully tackling and eliminating waste in the manufacturing system. They also state that in modern manufacturing design, the deployment of lean manufacturing principles has been envisioned as a life sustaining requirement in meeting global competition.

Lean manufacturing is an approach for systematic identification and elimination of waste associated with manufacturing systems and services through continuous improvement by flowing the product or service in pursuit of organizational sustainability (Nash, Poling and Ward, 2006; Radnor, 2011). Lean manufacturing combines a management philosophy with a set of tools aimed at eliminating waste, optimizing workflow, reducing cost and improving quality (Koning et al., 2006; Thawesaengskulthai, 2010).

Womack and Jones (1996) put forward five principles of the lean thinking concept that focuses on waste or "muda" identification and subsequent elimination:

i. Specify value: create value for the customer.
ii. Value stream: to highlight non-value adding waste, identify the value stream.
iii. Flow: create value flow without interruption, waiting or scrap.
iv. Pull: produce only what is pulled by the customer.
v. Perfection: realization of ideal situation by consistent and holistic identification and elimination of non-value added activities or wastes associated with a business function or service.

One of the first countries to adopt the lean manufacturing philosophy was Japan. Despite being a small country with only 0.3 percent of the world's landmass and 2.3 percent of its population, Japan has emerged as a manufacturing leader due to its management tools and techniques (Hitomi, 2004). The first to develop the concept of lean manufacturing was the Japanese Toyota Motor Company. However, the roots of the concept can be said to have emerged from the early days of the Henry Ford-led Ford Motor Company (Hitomi, 2004).

5S is a subset of lean manufacturing as it fulfils the aims that lean production methods strive to achieve. For example, it aims at reduced wastage in a company and promotes maximization of time. The 5S philosophy was developed in Japan and was formally introduced at the end of the 1960s. The major framework for understanding and applying 5S was proposed by Osada (1991) and Hirano (1995). At first, 5S was implemented at Toyota Motor Corporation as part of their production system and was called Toyota Production System.

Hirano (1995) proclaims that the 5S steps are designed to improve efficiency, strengthen performance and provide continuous improvement in virtually all segments of the organisation. These steps involve a structured improvement program with a series of identifiable steps related to each other in a progressive manner. Later on, Ho (1999b) attempted to remove the complexity of Japanese words so that the 5S system can be easily understood and adopted by various organisations across the globe for realizing significant organizational performance improvements.

While some organizations believe that 5S is only a clean-up process (Hirano, 1995), Patten (2006) emphasizes that 5S is much more than clean-up. 5S is a philosophy for systematically achieving overall organisation cleanliness and standardization that is motivating and pleasing to all the employees in the organisation. 5S changes the approach of the employees toward their work, workplaces and improves communication among various business functions and departments (Hirano, 1995). A well-organized workplace provides a safe and efficient production environment, which boosts the employee morale, promotes the feeling of ownership, pride in their work and ownership of their responsibilities (Hirano, 1995; Patten, 2006). Thus, 5S contributes to building a quality-friendly environment in organizations (Osada, 1991). Integration of 5S is also an achievement in the field of quality. 5S ensures the involvement of each and every employee present in the organization to reach the expected results (Khanna 2009). The concept of 5S is intended to organize, clean, standardize and maintain discipline at the workplace in pursuit of sustainable improvements in the productivity, efficiency cost optimization and waste reduction in an organization (Osada, 1989; Marasinghe, 2012).

III. AN UNDERSTANDING OF 5S

The five fundamental elements or arms of the 5S system are as under:

Seiri: Sort

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The first element of 5S, Seiri (organisation) is about sorting or keeping the necessary things or items at their appropriate places (Hough, 2008). Introducing Seiri requires a combined effort of organisation and self-discipline (Ho, 1997). Seiri holistically discourages the age-old hoarder's mentality of employees at workplace, whereby large quantities of items or goods are retained irrespective of their immediate utilization. Seiri calls for effective utilization of workplace space and also maintains that the goods or items should be segregated strictly in accordance to their relevance and frequency of utilization in order to create an efficient workplace (Osada, 1991). Seiri helps in estimating the material or goods requirements at present and in the future and avoids piling of irrelevant items, thereby eliminating hindrances in the flow of work (Chapman, 2005). The benefits of this first element of 5S thus include saving of space, reduction in search time, safe and clean workplace and easier detection of damage (Sorooshian et al., 2012).

Seiton: Set in order

Neatness reflects efficiency at the workplace and is usually analyzed by the time taken in getting and putting back items during the working period (Lanigan, 2004). The objective of the second element of 5S, Seiton, is to develop economical use of workspace with neat and orderly storage of goods. Seiton requires prioritization of the necessary and important goods/equipment to maximize ease of location. It involves asking the key questions - who, what, why, where, when and how (Imai, 1986) in respect of each item (Ho, 1997). This activity involves ensuring a designated location for each item, thereby enabling employees to have control over the operations and helping them to meticulously plan materials, supplies or tools requirements (Chapman, 2005). The benefits of Seiton are rapid processing, reduction of errors, increased discipline, generation of creative ideas and high employee morale (Sorooshian et al., 2012).

Seiso: Shine

The third S, Seiso, means "cleaning", which emphasizes self-inspection, cleanliness and creating a faultless workplace (Kobayashi, Fisher and Gapp, 2008). The Japanese believe that cleaning of the workplace leads to cleaning of the mind. Seiso includes three primary activities which include getting the workplace clean, maintaining its appearance, and using preventive measures to keep it clean (Gürel, 2013). Shining at the workplace eliminates dirt, dust, fluids, and other debris. Ho (1997) emphasizes that every employee should accept the responsibility of clearing out their individual areas. Implementing Seiso involves developing an effective maintenance schedule to clean equipment and machinery and free the workspace from contamination, usually through a checklist (Chapman, 2005). The benefits of Seiso include early identification of machine breakdown (Chapman, 2005), reduced equipment failure, improved product quality, improved safety at work and cheerful work environment (Sorooshian et al., 2012).

Seiketsu: Standardize

The fourth S, Seiketsu, means standardization, that is, maintaining one's workplace so that it is productive and comfortable by repeating Seiri-Seiton-Seiso (Osada, 1991). This phase involves developing of standard operating procedures for establishing improved workplace practices (Osada, 1991; Chapman, 2005) and requires uniformity in implementation. The condition of standardization can be achieved by total visual management (Hubbard, 1999). Visual management is an effective mechanism for continuous improvement because it can play an important role in production quality, safety and customer services by putting up appropriate labels, (Ho, 1997). The benefits of Seiketsu are low maintenance and overhead costs, increased employee loyalty and increased process efficiency (Sorooshian et al., 2012).

Shitsuke: Sustain

The fifth S Shitsuke stands for sustaining the previous four Ss. In line with the Japanese belief in self- discipline, Shitsuke is critical because it requires proactive changes in the behaviour of employees at all levels within an organisation (Kobayashi et al., 2008). Shitsuke refers to ingraining the ability of doing things the way they are supposed to be done. It helps and encourages employees in creating good habits and plays an important role in establishing the continuity of daily routine. It is a process of repetition and acts as an integral part of the safety requirements (Ho, 2010). This step requires practice and self-discipline among employees to make the 5S system a part of the organizational culture. Shitsuke delivers benefits such as increased labour productivity, higher product quality and reduced accidents at the workplace (Patten, 2006; Sorooshian et al., 2012).

IV. 5S AROUND THE WORLD

The early 1990s saw a significant and unprecedented evolution in the concept of lean manufacturing, especially post the publication of The Machine that Changed the World (Womack, Jones and Roos, 1990). Lean manufacturing was increasingly being accepted as a greatly profitable practice (Bhamu and Singh Sangwan, 2014). Over the course of time, a number of prominent researchers have explored the various range of tools for lean production methods, since it has been proven successful in a large variety of industries with many successful cases across countries such as Japan, the US, the UK, Germany, and Italy (Pearce, Pons and Neitzert, 2018).

After its introduction to the world as the Toyota Production System, the 5S system has been recognized as one of the most popular tools of lean manufacturing and has been implemented in various manufacturing companies around

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the globe, especially in North America and Europe. In particular, 5S has become a very widely used tool in healthcare, government, and financial services (Graban, 2009). It is widely accepted that 5S is a very good way to help the company to reduce the wastage and enhance profitability. Since its implementation and success in Japanese manufacturing, the 5S technique has proven to be effective and has paved the way for Japanese goods to be ranked as among the best in the world.

In a subsequent modification that is in line with the indispensability of the safety factor, US companies have adopted 6S, with the addition of a new S denoting safety. The concept of 6S includes safe behaviour and observation. There is an ongoing debate about whether the safety factor should be an additional element bringing the traditional Japanese 5S to 6S, or safety issues are covered appropriately in the originally developed 5S methodology (Davis, 2011).

Of the limited studies on the 5S technique in developing countries, the most prominent are those carried out in Malaysia (Abu, Gholami, Saman , Zakuan and Streimikiene, 2019) and Mexico (Sua´rez-Barraza and Ramis-Pujol, 2020). Abu et al's (2019) study on 5S implementation in Malaysia reiterated that this technique helps in increased efficiency, better utilization of space and a more organized workplace. Suarez et al (2020) not only supported the benefits of 5S technique, but also pointed out the driving factors that enable successful implementation of 5S: strong commitment from the management, intense training, implementation in teams and use of standardization and total production management.

Studies on the implementation of 5S in Taiwan emphasize its benefits to the organization in specific terms. For example, Hun Lin and Chi (2011) reported a reduction of 38 percent in time consumed looking for and retrieving drills and a reduction of 49 percent in the time for mills as a result of the 5S implementation. These studies also maintained that Shine made the working environment look better than earlier.

Implementation Of 5S in India

A review of the literature on the implementation of 5S in India showed similar results to that in other countries.

Gupta and Chandna (2020) examined the benefits of implementing 5S and found that 5S greatly contributed to increasing the efficiency of the company. One of the main benefits achieved with the 5S technique is the drastic reduction in the time taken to find a tool and the increase in safety levels. In more tangible terms, the implementation of 5S audit was found to improve the factory's audit score by 12 times in a span of 24 weeks (Gupta and Chandna, 2020).

A study of an Indian automotive parts manufacturer found that the 5S technique leads to considerable enhancements in the quality, production, cost optimization, employee's moral values and work ethics in the manufacturing unit (Randhawa and Ahuja, 2018). These researchers also demonstrated that not only does the manufacturing unit benefit both tangibly and non-tangibly but 5S principals are also more likely to adopt other quality improvement programs in the future.

The 5S technique is found to be of value to a venture irrespective of whether it is a miniature, small, medium or large-scale industry. The 5S tool can be integrated horizontally at a larger scale and it can be applied to most stations in the organisation. Not only this, the organisations using this method are considered as superior to competitors and are able to attract higher number of projects and investments (Gupta and Chandna, 2020).

Chadha, Singh and Kalra (2012) demonstrated that 5S is beneficial not only to manufacturing units, but also to those in the service sector by documenting implementation of 5S in the healthcare sector that led to positive changes in technique, heightened abilities and lessened emergency department period of life for all patients.

Challenges in Implementation of 5S

While a host of studies discuss the benefits of implementing the 5S system, there are many researchers who have also underlined the challenges that may be faced in implementing it.

Though each tool in the 5S arsenal has been explained exhaustively (Hirano, 1995; Rother and Shook, 1999; Smalley, 2004), companies sometimes face difficulties while attempting to apply these methods to new circumstances. In particular, this is true for the firms that operate in high variability, low volume environments where the general belief is that lean is not very helpful (Lander and Liker, 2007).

Most of these difficulties arise from trying to apply tools in a formulaic way when they were never intended to be used as a cookie cutter template. In fact, Lander and Liker (2007) strongly emphasize that the perspective of lean manufacturing as a toolkit in which to reach to grab the most applicable or handy tool represents a fundamental misconception of TPS.

Suarez et al (2020) have provided a set of factors that inhibit the successful implementation of 5S and these range from human resource issues such as lack of clarity among staff about the purpose of 5S, implementation that is isolated without linking departments to each other and a superficial focus on outward organization and cleanliness without regard for the deeper connotations of the 5S technique.

Surprisingly, Lander and Liker (2007) do not consider lack of time and absence of financial support as core barriers to implementation of 5S, proving that most managements are

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willing to implement this technique but may be hampered by a lack of understanding about the concept itself. Another widespread challenge in the implementation of 5S is the tendency to ignore cultural and human attitudinal issues (Abolhassani et al, 2016).

Implementation of 5S in SMEs

Over the years, the 5S technique has been implemented in large-scale plants as well as in SMEs. Abu et al (2019) found an average improvement of 50 percent in changeover steps and 60 percent in setup times as a result of 5S implementation in an SME. Panizzolo et al (2012) showed the success achieved by 27 Italian SMEs that had implemented lean methods relative to internal process. Lee et al (1994) also supported the use of 5S for SMEs by detailing affordable methods which are under their control and can be managed with the resources available. Rose et al (2011) proved that focusing on internal processes is vital for the implementation of 5S in SMEs.

Thus, a comprehensive review of the existing literature on 5S implementation around the world and in India shows its multiple benefits. It has also been found that there are several challenges in the implementation of 5S, both for large scale industries and SMEs. There is not much research on the implementation of 5S in Indian SMEs, and hence this research paper attempts to fill the gap in existing literature by undertaking a study on the implementation of 5S technique in Indian SMEs.

V. RESEARCH METHODOLOGY

In order to understand the implementation of the 5S technique in an Indian SME, the case study research approach was used because it is a suitable methodology for obtaining insights into social processes (Onwuegbuzie and Leech 2010; Yin 2009) and to provide a description of a phenomenon (Eisenhardt and Graeber 2007; Yin 2009).

The organization under study was contacted and permission was obtained to study their implementation process and the changes resulting from the implementation of the 5S technique. The selected company was well established and successful in Ahmedabad, Gujarat, a state in the western region of India.

Data was collected through structured interviews with the senior management, the floor manager, floor supervisor and the employees of the unit by direct observation in a single, natural setting as suggested by Meredith (1998).

Several data sources were used: archival data, which included company website and information provided by the top management, interviews with company leaders and workers and visual information observed during the visit. The data was collected in the following phases:

i. Archival data was analyzed prior to the visit, and it was complemented during the visit with a presentation from the factory manager which provided general information about products, production lines and improvement systems.
ii. An interview was conducted with the production manager for approximately 90 minutes to obtain relevant facts about the company's improvement systems, especially the ideation and implementation related to 5S technique.

Case Study and Findings

Table 1 shows the main business characteristics of the selected company, which shall be referred to as ABC Ltd.

Table 1: Basic Information about ABC Ltd.

Product Name	Rotary Printing Heads
Established in	2007
Annual Production (units)	70-100
Employees	25
Processes	5
5S Implemented in	2020

As the above table shows, ABC Ltd. is a small manufacturing unit, which is categorized as a Micro, Small or Medium Enterprise (MSME) in India.

The 5S system was implemented while the company was moving into new premises for this particular facility. Initially, the management had estimated requirement of 4500 sq. ft. of space. However, it was decided to implement 5S system and then take a final decision about the purchase of the space required. The motivation behind the decision of implementing 5S technique was reducing the wastage of time and resources which was costing the company an additional 10% in overheads.

Factory A is the company's second plant, established in 1965. Since the plant was being relocated to its new premises, the management wished to implement continuous improvement through the systematic implementation of 5S.

Before beginning the implementation, the management trained the staff members and educated them regarding the importance of reducing wastage. Subsequently, a plan for all the steps was systematically made and distributed among the employees. It took 6 months for all the systems to become a standard procedure that had to be followed. The processes were divided station wise to save space and the filing system was uploaded onto the server to give easy access to all the employees.

The following steps were followed to execute a systematic implementation of the 5S technique:

Seiri

A high degree of organisation was achieved by perfectly organising production planning. Different models/versions

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of the product were assembled in their own cell formation. Raw materials, spare parts, employees and workflow were scheduled according to client demand in order to be able to be more flexible and competitive.

Each spare part used in the production process was separated and neatly organized into its designated boxes with labels, as seen in Figure 1 below.

Figure 1: Designated Boxes of Spare Parts with Labels

By implementing Seiri, the factory management was able to reduce worker movements, the amount of space in use and the time taken to look for the correct spare parts. Additionally, by doing so, the factory was able to eliminate waste.

Seiton

Orderliness (Seiton) is the consequence of the previous step, organisation (Seiri). ABC Ltd introduced rules or principles to ensure that orderliness becomes a natural state in the factory. Order in the factory was maintained by visual management of materials, production charts and position marks. To ensure that everything within the factory is in order, a new shelving system was designed using a 3-way Coordinate System. Under this system, the first number indicates the shelf number, the second number indicates column number, the third one indicates row number. Figure 2 shows the shelving system after implementation.

Figure 2: Shelf with 3-way Number System

For the organization system to be widely disseminated, a master document was created marking the location of each item on the shelves and shared with all the employees.

Seiso

For implementing the third step of shine or clean, the management refocussed their efforts on cleanliness in the plants. Instead of the previous system of using an external cleaning agency, the responsibility of keeping the plant clean was made part of the workers' daily routine with the help of in-house cleaning staff. Workers were encouraged to clean their workplaces every day before starting to work.

Before the implementation of 5S, in the previous premises, the shop floor used to be littered with dead stock such as faulty gear boxes and magnetic beams. This used to create impediment to proper cleaning as well as take up a lot of valuable floor space. During the 5S implementation, all the dead stock was relocated into a separate room so that it can be sold later without any confusion with usable stock. This led to the shop floor becoming much more spacious and given the employees more space to work.

Seiketsu

Seiketsu or Standardisation is the tool that detects any abnormality in the processes. By detecting errors or abnormalities early on, the plant manager can ensure quick identification of problems and prompt corrective actions (Jaca, Viles, Paipa-Galeano, Santos & Mateo, 2014). At Factory A, standardization was implemented through the creation of a new record-keeping system that maintains records for each client. This enables them to maintain the records of customizations developed in the products for each client. Earlier, in the absence of this system, a lot of time and energy was wasted as incorrect spare parts would be sent from the stores to the shop floor, resulting in incorrect specifications. This would then lead to additional time for correcting the error and the additional cost of reworking the piece. Under the new record-keeping system, obtaining the correct spare parts is a streamlined process. It also enables the supervisors to identify errors at a very early stage by checking the client records. This saves a lot of time and expense.

Moreover, standardisation in plant operation is also implemented through visual signals. The use of signals and marks helps operators to understand and manage machines and processes in an easy way (Jaca et al, 2014). Factory A achieved visual standardization by clearly indicating instructions and procedures for maintaining machines visually on the machines, e.g. a sign for maximum and minimum oil levels for proper operation. Posters with important instructions were placed strategically to remind the employees about important checkpoints.

Shitsuke

The fifth step, Shitsuke, or Sustain, requires habit and discipline for success (Jaca et al, 2014). It is essential that

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the employees get into the habit of following standards and improving them.

In order to achieve this, Factory A decided to encourage continuous training and sending of consistent messages related to the improvement of products and processes to the employees. Before commencing operations, all the workers were trained for six months under a rigorous training programme, and they are required to repeat the training after working for three months. Factory A is also in the process of finalizing its Standard Operating Procedures (SOPs) in addition to the manuals already created for its workers, to better initiate new employees. The company also has a policy that its engineers, administrative personnel and managers must work on the shop floor for three to six months before working in the office area, in order to better understand the production process and suggest ways and means of adding value to the process.

At the time of the current study, Factory A has been six months into its implementation of 5S technique.

The benefits of 5S have become visible immediately. The reorganization of the workspaces, the shift to cellular production flow, and the reduction of space required due to proper storage of spares and timely disposal of dead stock, was reflected in a drastic reduction in the floor space required for the factory. As against the initial estimate of 4500 sq. ft. space being needed, the management found that it could carry out its operations very efficiently with just 3600 sq. ft. of space. This reduced requirement led to a savings of INR 1.20 crores to the company.

Additionally, the sorting and organization of spare parts and equipment led to impressive savings in time taken to locate spares by the workers. It also created savings because of almost-negligible level of wastage after 5S implementation. Table 2 below shows the savings in time and money that was accrued in three indicative categories.

Table 2: Savings in Time and Money with Respect to Spare Parts

Category	Time taken to Locate (Before 5S)	Time taken to Locate (After 5S)	Percentage Savings in Time	Amount Saved per annum (INR)
Screws	60 minutes	10 minutes	83.33%	16,000
Washers	56 minutes	10 minutes	82.14%	14,500
Bolts	58 minutes	10 minutes	82.76%	18,000

As Table 2 shows, in each of the cases, there has been a substantial reduction of 82-83 percent in time taken by the workers to locate the respective spare parts. This has also translated into an average cost savings of approximately Rs. 16,000 across all three categories on an annual basis.

VI. CONCLUSIONS

The 5S practice is both a philosophy and a set of guiding principles that lead to a continuously improving organisation. The 5S implementation is not an easy task. It involves assuming and consistently applying the five principles of 5S in their operational activity requirements, such as cleaning workplaces, reducing space in production lines, reducing power consumption, as well as training in improvement principles, skills and standardization (Jaca et al, 2014).

Previous studies have identified some drivers for successful implementation of 5S: investment in 5S training for top management and workforce; top management commitment to the 5S practice; inclusion of 5S practice in the organizational strategic planning; organizational focus on continuation of 5S practice; measurement of positive impact of the 5S implementation; and use of the 5S practice as a basis for advanced quality and continuous improvement (Ablanedo-Rosas, Alidaee, Moreno & Urbina, 2010). Our study reinforces these factors, as our case study of an Indian SME demonstrates that management commitment at an early stage of relocating the plant, as well as measuring impact of 5S within six months of its implementation led to increased and continued motivation from the side of the employees.

Leadership is a very important factor in 5S, just as it is in other quality improvement mechanisms (Ho 1998; Larsson, Backstrom, and Wiklund 2009). Previous studies have maintained that leaders need to be firm with the rules, while at the same time need to encourage and care for their employees. An important characteristic of these leaders is patience with the expected results and the conviction that results will be achieved by motivating their people (Jaca et al, 2014). This study supports this concept.

Apart from commitment from top management, another critical factor for the success of 5S is the creation of a 'culture of quality '(Ablanedo-Rosas et al, 2010). This can be achieved only if everyone in the organisation subscribes to the idea of quality as a lifestyle rather than an operational tool. Earlier studies have emphasized the importance of training to enhance the perception of the 5S practice and adopt it as a lifestyle (Ablanedo-Rosas et al, 2010; Kobayashi et al, 2008; Gupta and Chandna, 2020). The findings of the current study support this contention, as the organization in question carried out a long and rigorous training before implementation, as well as invested in a continuous training exercise to ensure creation of a 'culture of quality'.

Researchers have studied several values, especially in Japanese organisations, that enable employee participation in and commitment to improvement systems, and their long-term sustainability (Berger, 1997; Prajogo and Sohal, 2004). These attitudes are reinforced by providing consistent messages through various methods – visual patterns, sounds, training activities, social activities, rewards and recognition. These are all tools that have been shown to be effective in lean and improvement programmes by several authors (Holweg, 2007; Parry and Turner, 2006;

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Shah and Ward, 2003). The current study also shows how visual reinforcement can provide consistent messages to employees and facilitate successful implementation of 5S.

The findings of this study also support Ho and Cicmil (1996) who suggested that the 5S practice is universal to all organisations. This case study shows how a relatively small enterprise could effectively implement 5S and reap the benefits of the subsequent cost advantages and other efficiencies. While every organization is different in terms of products, processes and even management style, it is possible to implement 5S irrespective of these differences. The important issue is not the specific activities or actions undertaken as part of the five principles, but management practices which support and develop them in the company (Jaca et al, 2014).

One of the limitations of the study is that it covered only a single organization. Further studies can be carried out by studying the implementation process and benefits accrued by multiple organizations in the same industry. This would help the researchers to compare and contrast the implementation process, factors driving success and challenges for the entire industry.

This paper studies the implementation of 5S lean manufacturing technique by an SME in India. It demonstrates that factors such as strong leadership, commitment from top management towards 5S implementation at strategic planning stage, comprehensive training and use of visual cues are the main drivers of success. The case study also shows the immense benefits available to an organization in terms of lowered capital outlay, reduced cost of raw material and spares, reduced wastage, reduced errors especially in customised products and savings of time during the production process. This study makes it clear that continued commitment, consistency in message and patience with the results is required if 5S is to be implemented successfully.

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