

BENEFITS OF APPLYING THE 5S MODEL TO INDUSTRIAL COMPANIES IN PERU

¹BERTHA DIAZ-GARAY, ²MARIA TERESA NORIEGA ARANIBAR

^{1,2}Industrial Engineering degree program, Universidad de Lima Perú
E-mail: ¹bdiaz@ulima.edu.pe, ²manorieg@ulima.edu.pe

Abstract - The following study aims at analyzing the benefits of applying the 5S Model to Peruvian industrial companies by means of descriptive, non-experimental, mixed methods research on Peruvian industrial companies that have won the 5S National Award. Techniques such as surveys and interviews were employed. This study found correlation between implementing the 5S Model and management models such as quality, environment and occupational health and safety. The research concluded implementing the 5S on the studied organizations has generated improvements in the work environment, waste reduction, worker's performance and reputation.

Keywords – 5S, Continuous Improvement, Waste Reduction, Lean Manufacturing, Management Models.

I. INTRODUCTION

5S methodology is the basis of improving processes in organizations and it aims at eliminating all sorts of waste. Classifying, organizing, cleaning, standardizing and discipline in the work environment allow companies to optimize their resources. Increased production and better resource management will result in higher productivity.

Hirano (1997) emphasizes “Not only are the 5S the foundation to support a company's survival, but also part of a unique corporate culture”. He recommends to deeply grasp their meaning: Seiri (Sort), clearly distinguishing between what is necessary and belongs in the workplace and what is unnecessary and must be removed or disposed of. Seiton (Set in order) organizing the way essential things are stored so that anyone can easily find and use them. Seiso (Shine) cleaning the floors and keep in everything in order. Seiketsu (Standardize) consistently keeping everything in order, clean and organized. Shitsuke (Sustain) always following specified work procedures (standardized).

Hernández Lampera (2015), conducted a study at Caucho Metal in Colombia that showed, as a result of implementing the methodology, productivity and quality boost based on performance measures, as well as organizational climate improvement and reduction in identified risks in the workshop.

Ur Rehman, A., Usmani, Y. S., Umer, U., & Alkahtani, M. (2020) demonstrated, by applying a Lean approach in a manufacturing company, the whole facility's performance index improved from 0.77 to 0.86, and all factors' total productivity increased by 11,45%.

Manzano and Gisbert (2016) in their SME oriented study suggested that, by applying the 5S, other improvement objectives can be set whether they are in facility layout, the pull system or defect prevention.

Durana (2016) states implementing the 5S methodology allows for the elimination of waste in

locations, as well as unnecessary transportation, delays, unrequired movement, poorly defined work flux or workers' mistakes. Likewise, he concludes the satisfactory application of the 5S has created an excellent basis for the application of other optimization methods related to company processes.

According to Osada (1991), cited by Gapp et al. (2008), some of the benefits from implementing the 5S are:

- Organization (seiri and seiton), to maximize efficiency and efficacy by reducing the workload and human error through simplifying processes;
- Cleanliness (seiso and seiketsu), to maximize efficacy contributing to a healthy life, safety and wellbeing, as well as improving transparency; and
- Discipline (shitsuke), through instruction and education to better the morale which leads to a greater work/life quality and standards.

Bayo-Moriones, et. al (2010) indicate, despite the 5S methodology's simplicity and applicability, a number of factors may affect its implementation in manufacturing plants, so they suggest efforts in promoting these methodologies be made in order to improve productivity and raise competitiveness between companies.

Karthik and Silkson John (2019) implemented the 5S in a company at the process of inspecting crankshafts, finding an improvement in workers' time usage and also a reduction of accidents per year.

Therefore, implementing the 5S methodology also makes a social impact on company workers, improving the work environment and reducing the number of accidents due to changes made in the workplace, perceived as beneficial to their own safety and wellbeing.

The management system at Thorsman & Co. (UK) Ltd. (TCE), a branch of a Swedish group, was studied by Bamber et al. (2000), the group ultimately proposed a system scheme that places the 5S and

Total Productive Maintenance (TPM) at its core, thus integrating environmental management, quality management and systems of workplace health and safety. Their proposal concludes presenting the TPM as facilitator of this integration and the 5S as key element for its achievement.

Hama and Hama (2017) recommend implementing the 5S with the TPM simultaneously, and point that, this way, as a single system, it can provide several benefits to companies, for this it is important to consider employees as the main component who, by acquiring skills and capabilities, will allow to reduce delays, waiting time, inventories, defects, injuries and their associated costs.

Jaca (2014), analyzed a case study of Japanese companies to identify the key aspects of the successful implementation of the 5S, whose results show the best management practices are based on these principles, furthermore, she describes and discusses the more important principles associated with the success of the 5S Method.

The initiatives for improvement projects are rendered a failure by variables that manifest during research: rather than from within the company, the driving force comes from external pressure points; organizations set unrealistic goals, in the hopes of immediate results after applying these techniques, which may lead to failure; the workforce's motivation and expectations are important, however they may generate greater interest in economic returns rather than the learning and improvement they will undertake; reluctancy to change on the end of

employees, due to impossibility to grasp what will take place or to the experience of failure in past attempts, will obstruct any effort made. Lack of commitment from the higher ranks or weak leadership will prevent implementing these initiatives (McLean et al. 2017).

This study has taken four companies that have been awarded the 5S National Award as reference. This Award is an initiative by the AOTS KenshuKiokay del Perú organization, who, since 2014, publicly acknowledges the achievements of Peruvian organizations that demonstrate having successfully implemented the 5S. It seeks promoting the exchange of successful experiences applying this system as a management tool that drives continuous improvement in organizations. This event is open to micro, small, medium and large enterprises, schools, colleges and public institutions in manufacture, mining, trade, service, education and public sectors. (AOTS Perú, 2020).

Also, there are other initiatives in Latin America that acknowledge those companies that have implemented this model successfully, such as those carried out by AOTS-Mexico and AOTS-Argentina (AOTS Monterrey, 2020; AOTS Argentina, 2020).

II. MATERIAL AND METHODS

Four companies in the industrial sector that took part in the 5S National Award were considered for this study, in order to understand their leaders' perception on the benefits of implementing the 5S. The following table describes these companies.

Company/Area	5S and organization management
COMPAÑÍA MINERA PODEROSA Gold Mining Large enterprise	PODEROSA's guidelines are founded upon the Statement for Sustainability, signed by the appointed members of the Board and General Management. This document describes the company's commitment with each of its interest groups and reaffirms the COLPA (Classify, Organize, Clean, Prevent, Self-discipline) philosophy. The company offers decent, safe, fitting environments for their collaborators and visitors through 5S-COLPA practices. Every year the 5S are included in the Strategic Planning as part of set goals and are evaluated by the board. The Senior Management makes its involvement at implementing the 5S evident by keeping the workers motivated in maintaining the COLPA in their workplace aiming at being more efficient and preventing accidents and pollution.
ARIS Industrial Textiles, Chemicals and Ceramics Large enterprise	At ARIS the Board, consisting of members of Senior Management, is the main advocate of the 5S. It is committed with the methodology defining the 5S Objectives and providing the necessary support. The company's strategic goals have been set in the corporate Strategic Planning so they aim to improve the organization's performance through continuous improvement supported in its values and the 5S-SOLED (Separate, Organize, Clean, Standardize, Discipline) Program. The Senior Management is directly responsible for the Program and its management is included in operative processes; the department of Organizational Development and Quality being the facilitating entity in charge of promoting, training and managing and improving the program's support system.
FACUSA	Senior Management at FACUSA is committed to developing the 5S Improvement Program, providing the necessary resources. The organization's leaders take part in the launching of the system, reviewing the results of its implementation, approving plans for

Manufacture of cutlery and kitchen utensils Medium enterprise	improvement and verifying the guidelines for strategic objectives and their impact on the organization's results. To lead the 5S System on behalf of the Senior Management, the company has appointed the Corporate Operations Manager, who takes responsibility and has the authority to: make sure to establish, implement and uphold the necessary processes for the 5S Improvement Program; make sure the 5S Improvement Program is implemented, controlled and upheld; oversee the 5S Improvement Program's development and report to General Management on its state and improvement needs.
LÁCTEOS VERANO Manufacture of dairy products Small enterprise	In order to implement the 5S-COLED (Classify, Organize, Clean, Standardize, Discipline) system, Lácteos Verano appointed a committee formed by the head of each department and chaired by the General Manager and owner of the company. The following teams have been formed as support for the committee: facilitators, support team and auditing teams. In its commitment as an organization, the committee has established: <ul style="list-style-type: none"> • Develop the basis for management systems by constantly applying the 5S-COLED system throughout all the company's operations, promoting improvement teams. The 5S-COLED system is made evident in the Integrated Management System's Policy as a fundamental pillar for Lácteos Verano's management systems, also its objectives are aligned with the organization's strategic goals.

Table 1: 5S application and organization management by company

Descriptive, non-experimental, mixed methods research was conducted on Peruvian industrial companies; qualitative and quantitative techniques such as interviews and surveys were used. The procedure's validity was ensured by the participant's consent for recording and the register for each survey.

This investigation aims at identifying the benefits of implementing the 5S according to improvements in the workplace, waste reduction, employees' performance and the reputation it may bring. For this, the following dimensions were established:

WORK ENVIRONMENT IMPROVEMENTS	TIME AND MATERIAL WASTE REDUCTION	EMPLOYEE PERFORMANCE IMPROVEMENT	COMPANY REPUTATION
<ul style="list-style-type: none"> • Better room distribution • Organize workstations • Eliminate sources of dirt • Better lighting • Reduce risk of accidents 	<ul style="list-style-type: none"> • Easy access to work tools • Reduce machinery failure • Eliminate the non-essential • Reduce inventories • Better use of material 	<ul style="list-style-type: none"> • Greater employee discipline • Care for work elements • Better communication • Achieve production goals • Reduce work errors 	<ul style="list-style-type: none"> • Greater corporate reputation • Client satisfaction • Boost system of recognition • Promote teamwork • Better organizational climate

Table 2: Dimensions of Research

III. RESULTS

Next are the results from studying these four companies, each of them reflects on how implementing the 5S model impacted their leaders, employees and the company itself. Their experiences are detailed according to the four dimensions set for this research.

3.1. Experience on implementing the 5S model

For these companies, the experience of implementing the 5S model has proven it to be a powerful tool to

promote and establish order, discipline, teamwork and a sense of belonging to both the position and the company itself. The model, on some cases, came as an alternative tool for reducing costs and optimizing company resources usage during an organizational crisis, whether it was due to a market issue or to economic or social environments.

Adopting each of the S generated a culture shift that pushed new improvements in a virtuous cycle that renders the model from a tool into the default behavior of the organization's members.

ARIS, one of the interviewed companies, started adopting the methodology back in 1995, appointed auditors, a committee and begun the first inspections. It was first noted that nobody acted, everyone was waiting for someone else to do the job. The implementation's momentum made a strong impression on the factory manager and the workers since they saw how important it was for the company that everything worked correctly.

PODEROSA began quality control in 1997 and two years later started the 5S plan, developed and carried out through the last twenty years, which allowed to overcome crises applying quality circles, total quality, keeping operative costs under control.

LÁCTEOS VERANO adopted the 5S mid-2018 and states adopting the model was not difficult since they had already been given awards and acknowledgments by the Ministry of Labor on good working practices. Regarding health and safety policies, the employer must commit to abide by the law and partake in company activities.

The employer must provide adequate environments and equipment, perform continuous improvement and adopt a system compatible with every other management system.

FACUSA started a process of continuous improvement in 2002 automating its processes and relocating personnel in facilities because optimization resulted in increased production capacity and workmanship productivity. 5S methodology found its way inside the company's DNA and employees began assimilating its concepts.

There was an awareness phase through five to fifteen-minute lectures on the advantages of working in clean, organized environments where everything has its place, every place has its label and operating time is reduced due to better organized workstations. This way a virtuous cycle was generated where employees grew fond of the methodology and began identifying themselves as more committed by witnessing the impact.

3.2. Work environment improvements

One of the first results after implementing the 5S manifests as organization and cleanliness, details in the first three S (seiri, seiton, seiso), directly affecting the work environment and the employees since they feel they regain their space and a pleasant atmosphere for working.

The results from a survey made to supervisors and team leaders from the companies in this research confirm employees noticed organized workstations and the removal of tasks calling for superficial cleaning consequently led to a reduction of risk of accidents.

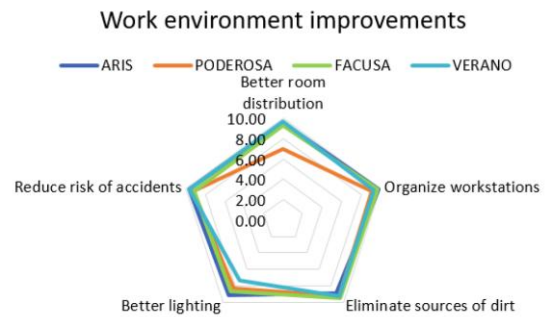


Fig. 1. Work environment improvements

One of the first tasks to perform is to identify what to improve in the working area. Commonly found issues are large inventories, unused objects, underutilized space, poorly kept bathrooms, deteriorated products, overly greased machinery, oil on the floors. Inquiries on products, facilities and spaces were conducted, it was later noticed that facilities that adopted this methodology (clean and organized) performed better and were more productive.

It was then concluded this methodology was the ideal foundation for continuous improvement. After further implementation, results were also observed in financial evaluations. (ARIS, 2020)

When clients enter the facility, they find everything clean and organized and every employee wearing the appropriate attire working with utmost discipline. The 5S allow for these results. Every workstation, office and storage room are neatly tidied up, so there is greater room availability. Each area has labels and signs. The 5S keywords are written on the steps of every entrance staircase. (VERANO, 2020)

The 5S have been implemented with heavy use of visual aid content, VISUAL FACTORY, which helped workers meet 5S standards. Every element's placement is properly labeled and easily identifiable, so they are readily available for workers in the area. Employees have access to pictures showing where to store tools and work elements in order to simplify their tasks. (FACUSA, 2020)

3.3 Time and material waste reduction

Lean Manufacturing has the 5S at the core of its system, establishing the elimination of waste as a main axis for achieving a company's productivity and quality goals. Reducing time and material waste are improvements that can be directly achieved after implementing the 5S.

The companies included in this research share the same approach to results obtained while making better use of material and elimination of the non-essential. Regarding work tools management and reduced inventories, the companies agree on results being due to implementing the model.

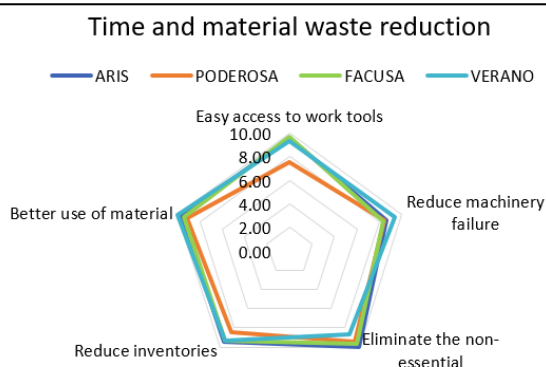


Fig. 2. Time and material waste reduction

ARIS (2020) considers the 5S program to be the basis for continuous improvement so it made of it the foundation to develop good judgement in its 950 employees so they keep one goal in mind, speaking about standardize, organize, clean and perform with discipline. At the same time, the company set the goal for 1000 improvements a year, later increased to 3000, raising the goal to 6500, where every action, however small, is considered an improvement.

VERANO (2020). It was difficult distinguishing between the essential and the non-essential, the useful and not, etc. Not everything was disposable. It was decided to establish shared resources among employees or making donations for their homes. Appointing improvement teams reduced residual material and energy usage in the boilers saving fuel this way.

According to PODEROSA (2020), classifying, organizing and cleaning have contributed to improving processes, every boss is responsible of promoting discipline in their workers and ensure COLPA is applied in quality circles. Having lived according to COLPA, should there be any fault, it is due to an incorrect use of COLPA or the 5S. It is an integrated system, COLPA and inspections are one single unit. They are focused in order, respect and discipline habits. A key component is leadership from Senior Management.

At FACUSA (2020) implementing the 5S has provided greater flexibility reducing machinery calibration times allowing to implement the Lean Manufacturing system, using such tools as Poka-Yoke and Single Minute Exchange of Die (SMED).

3.4. Employee performance improvement

The cultural shift taking place in the organizations that implement the 5S is not as simple as it may seem. Companies observe how difficult it is to change behavior in people, who already have a culture that prevents them from grasping the importance of their input in organizing, sorting and cleaning activities at work, even less in their daily lives.

Nevertheless, as soon as the employees realize these simple habits prove to be beneficial in their job and simplifies their workload begins a cycle of

improvement affecting their levels of performance and productivity.

There is almost complete agreement between the studied companies on the positive impacts of the 5S regarding: developing good habits in employees, reducing errors at work, achieving production goals, looking after work elements and developing better communication.

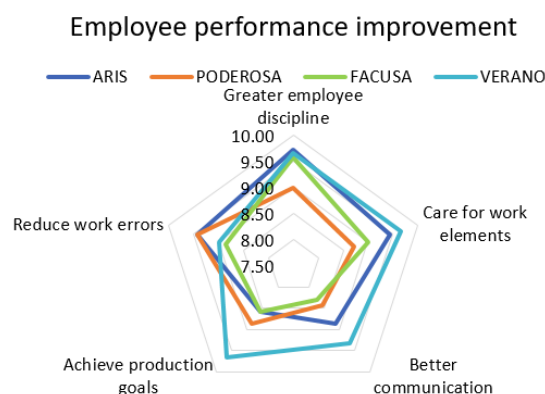


Fig. 3. Employee performance improvement

Implementing the 5S allowed an important change in the employees' attitude, overtaking their initial resistance; they were reluctant to even accept help in cleaning tasks. A sense for a single, collective goal was achieved promoting order and cleanliness. This first stage allowed everyone to communicate in the same language. Change was noticed by the employees in cafeterias, locker rooms, bathrooms and for this, they took care not to return to a previous state. However, maintenance is a constant task requiring timetables, inspection, monitoring and their superiors' involvement. (ARIS, 2020)

At FACUSA (2020) it was necessary for the higher ranks to explain to the employees how these non-essential elements delayed their work, disorganize their workstation and how the grade they would obtain in an audit directly reflected the importance of adequately applying the 5S methodology. The supervising team sets the quality standards for processes and the operator controls the quality according to the standards approved by the quality department. Quality at source was implemented; employees have been empowered so they themselves control the quality of their processes. VERANO (2020). Employees take part in yearly training programs, mostly on health and safety in the workplace as well as quality tools. Any new personnel unable to join the work team receives counseling. There is greater communication management and facility personnel to achieve goals. Discipline makes for greater quality in every aspect of production. Our clients are top-notch, so we must meet delivery deadlines; regarding competitiveness, they consider this highly influential. There have been no returned products.

Achieving change has not been difficult for PODEROSA (2020) however, there always are things to rectify. Changing the personnel's behavior completely is hard to achieve. In countries like USA or Japan rules are taken seriously and everyone abides by them, an example for this is self-management of garbage. That is what we are aiming at here at PODEROSA, said their manager:

A shift in culture, I believe we are making progress, after twenty years one could say things have changed. The drivers were the best at grasping the concept. Whenever there are visitors to the mine, drivers are required for transport between locations. One visitor was assigned a driver for a visit to the mine, on the way there the visitor tossed a plastic wrap out the windows after eating some crackers. The driver stopped the vehicle and informed the visitor that behavior was unacceptable in the company. (PODEROSA, 2020)

Workers' involvement begun with a group of facilitators who, being appointed to different processes, were the connection to the Quality Department. This department imparted training and facilitators audited, and they were consulted and oversaw everything related to quality, safety and environmental circles.

Workers apply this methodology at home as well. They are highly enthusiastic about partaking in tasks and receiving prizes. They look forward to bringing their COLPA experiences into their homes.

3.5. Company reputation

While the subject companies are renowned for their achievements and are well positioned in the market, they all agree on implementing the 5S model and participating in the 5S National Award has reinforced their company reputation adding great value at organizational level "may the personnel feel proud of their organization, may they feel this award is the result of their work". The resulting pride and congratulation strengthen the identity bond between collaborators and their organization, they take control over their workstation, their area, their facility, their company their achievements as a single team.

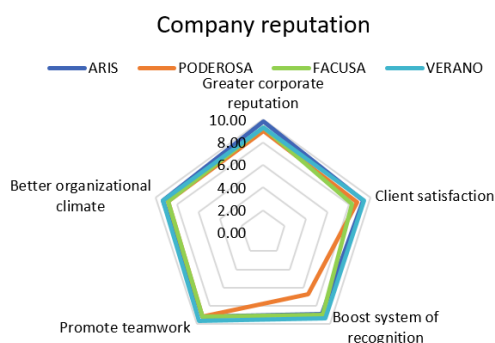


Fig. 4. Company reputation

In their experience, ARIS (2020) mentions having the model implemented was on itself a chance for

growth. Having senior company members involved was crucial, so the decision to participate in the 5S National Award was made, considering themselves ready they decided to evaluate themselves using an external model. Obtaining the award was immensely gratifying, all personnel congratulated each other, each one told of the improvements they had made and how they made their contribution. This recognition expanded their experience. This experience was extended through some suppliers, encouraging them to learn from it. The same was done, subsequently, through clients and other companies interested in learning the model.

The company conveys their improvements by means of lectures, formats, photos and videos to unsuspecting visitors, amazed by how the 5S were set in motion. The best achievement is client satisfaction, according to their manager:

Everything validates the fact that our participation has allowed us to maintain competitiveness, within Peru and abroad. After closely following the company's evolution for almost twenty years, I believe the 5S philosophy, for every person and organization, is something that allows for improving quality of life, brings order and organization. The more effort put into order, the less work there is to be done. Teamwork and organizational climate improve. We encourage every company to adopt the 5S philosophy because it will help them grow. (ARIS, 2020)

VERANO (2020). The personnel's reaction towards the Award was of great joy and willingness to continue making efforts that reaction was unexpected and was of great motivation. Having an organizational culture directed at continuous improvement was important to achieve this.

In 2015, PODEROSA changed its approach to having the workers feel proud to belong in the company. The 5S, improvement circles, etc. make the workers feel proud of receiving the award and having taken part in these subjects. Discipline, order and respect among workers can be seen day by day, among everyone. Regarding contractors, they engage in every 5S-COLPA policy. Every company willing to work with PODEROSA must be aligned, from the beginning, with COLPA knowledge and requirements.

To FACUSA all initiatives and improvements from 5S methodology were the basis for their systems for quality control, environment, safety, Kaizen and later develop a Lean Manufacturing culture. Support from senior management has been the most important factor, they have helped shift collaborators' approach, resulting in people committed with order, cleanliness, honesty at the job, discipline, which is one of the fundamental values of the company.

According to FACUSA's corporate manager, the company's reputation has developed since they started this reform process, leading with change, participation, consensus for decision-making and greatly appreciating human talent.

IV. DISCUSSION

The results show how, by implementing the 5S, companies have achieved superior results since this model has allowed them to simplify implementing quality, environmental, safety and workplace health management models. This observation is also present in other studies regarding leadership, teamwork and continuous monitoring as key factors implementing the Total Quality Management (TQM) based on 5S Model, it seems to be a feasible and promising system to initiate management improvements on public hospitals in developing countries. (Withanachchi, N., Y. Handa, K. Karandagoda, P. Pathirage, N. Tennakoon, and D. Pullaperuma. 2007).

The leaders of these companies acknowledge the great contribution implementing the 5S model in their organizations, allowing to apply some management model more easily in some cases or ensuring their integrated system functionality in other. Likewise, Gapp (2008) concludes for Japanese organizations the 5S have two components: the first being a top-notch management and organization system bearing a complex philosophical meaning, and the second being providing a tool portfolio to facilitate the means to reach such high level. This deeper understanding of the 5S and its associated intent builds a culture to develop management strategies, presented as an Integrated Management System.

Yusof et al. (2014) made a comparative chart containing the different approaches organizations adopt to sustain their implementation of QE/5S (Quality Environment/5S), concluding the best way to implement the 5S in an organization is through training, promotion and auditing. For the subject companies this is a fundamental pillar, where a high level of commitment is present in their leaders towards providing resources and promoting the 5S

This study concurs with the results found by Torodovic and Cupic (2017), who analyzed a branch of a Serbian rubber products manufacturer, ultimately stating that Lean tools such as the 5S may positively affect operative efficiency and profitability indicators in organizations, adding to short and medium-term performance.

The culture shift seen in companies comes from a training, motivation and involvement process for the personnel in 5S activities. This practice allows habit changing and performance improvement. The methodologies, tools and techniques developed by Japanese companies focus on engaging all workers through training and changing their habits using improvement tools (Dahlgaard-Park, 2011).

Kobayashi, K., Fisher, R., & Gapp, R. (2008), Bonilla (2015) indicate in their research, subject companies were invested in their personnel's continuous training

and professional development to reinforce their skills and have them be supporting elements for continuous improvement. They argue this plays a part in developing loyalty and commitment between workers and the company. This study confirms such claims since, according to the companies' leaders, a committed human group who identify with their organization is achieved through implementing the 5S. Kobayashi's investigation (2008), also found Japan emphasizes the use of the 5S as a strategy towards achieving corporate excellence, requiring input both at work and at home. Habits acquired in the workplace extend to the homes and daily lives of employees. These companies comment on the results' effect on the families and schools within their influence areas.

Prajogo, D. I., and A. S. Sohal. (2004), concluded in their case study how important it is to adopt a strategic approach on quality and continuous improvement projects in organizations, closely following the changes in the corporate environment and adjusting the strategy accordingly. Secondly, a quality management system must be implemented and be aligned with the company's commercial strategy. In the subject cases such alignment has been observed in their improvement processes generated by the 5S. In their 5S National Award application, these companies described the concurrence between their 5S master plan and their companies' strategic objectives. Likewise, the 5S are included in their quality policies that are their development axis.

Rahman, M. N. A. Deros, B. M., & Rose, A. N. M., (2013), indicated there may be three barriers preventing success from Lean techniques: resistance to change on the side of company personnel, lack of information and worker inefficiency; this study's subject companies manifested their commitment with their collaborators, imparting continuous training and motivation to partake in these systems for continuous improvement. A key aspect for achieving these results is participative leadership promoting the 5S model, empowering workers to own the results of their jobs and improvements on their facilities or production areas.

Dieste, M., Panizzolo, R., Garza-Reyes, J. A., & Anosike, A. (2019), established a direct relation between lean manufacturing and organic production approaches since these methods have improved their environmental measures. They also highlight the environmental measures positively affected by adopting lean practices. While the positive impact of the 5S in facility environmental management is not explicitly described, one of the model's main results is the reduction or elimination of waste. This better, more efficient use of resources, such as material, water and energy, directly affect environmental management. In the same manner, eliminating sources of dirt allows to pinpoint and target improvements regarding oil leaks, grease, corrosive material, dust, shavings, etc.

V. CONCLUDING REMARKS

Senior Management partaking and commitment when implementing the 5S are vital for their development and sustainability, acknowledging personnel encourages their practice and continuous improvement. This is a significant practice in companies implementing the 5S, regardless of their size, to promote continuous improvement.

Implementing the 5S in the subject companies has generated improvements in their work environment, waste reduction, employee performance and company reputation.

The 5S boost discipline at work and promote workers' partaking in early detection of potential order disruption, dirt-generating anomalies, lack of maintenance to equipment and machinery.

The 5S allow for pleasant work atmosphere and their constant practice guarantees infrastructure preservation, this helps proper process operation.

These companies' participation in the 5S Award has generated satisfaction and pride among their personnel for receiving this acknowledgement.

While this study's subject consists of only four companies, rendering this a limited research, it should be noted they all concur on the benefits from implementing the 5S despite belonging in different business sectors.

We recommend conducting further research on other sectors or more companies involved in 5S to compare their experiences.

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