RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

More than just organization: how the 5S methodology transforms construction sites into productive and safe environments.

More than organization: how the 5S methodology transforms construction sites into productive and safe environments

Martha Vitória Carvalho Vieira – marthavieirawork@gmail.com

SUMMARY

The 5S methodology, originating in Japan, has become one of the fundamental pillars of Total Quality Management (TQM) and Lean philosophy, widely used in production environments to promote efficiency, safety, and continuous improvement. In civil construction, the application of 5S is a powerful tool to combat waste and increase productivity, while promoting safer and more organized working conditions. This article aims to analyze the practical application of the 5S methodology on construction sites, highlighting its benefits, challenges, and impacts on quality management. The research adopts a qualitative and exploratory approach, based on a literature review and case studies in Brazilian construction projects. It concludes that 5S, in addition to being an organizational technique, represents an essential cultural change for the sustainable advancement of the sector.

Keywords: 5S; Civil Construction; Productivity; Safety; Quality Management.

ABSTRACT

The 5S methodology, originated in Japan, has become one of the fundamental pillars of Total Quality Management (TQM) and Lean philosophy, widely applied in productive environments to promote efficiency, safety, and continuous improvement. In civil construction, applying 5S is a powerful tool to combat waste and increase productivity while promoting safer and more organized work conditions. This article aims to analyze the practical application of the 5S methodology on construction sites, highlighting its benefits, challenges, and impacts on quality management. The research adopts a qualitative and exploratory approach based on a literature review and case studies from Brazilian construction sites. It concludes that 5S, beyond an organizational technique, represents a cultural change essential for the sustainable progress of the sector.

Keywords: 5S; Civil Construction; Productivity; Safety; Quality Management.

1. INTRODUCTION

The construction industry is recognized for its economic and social importance, being one of the sectors that employs the most people and drives the Brazilian economy. However, studies indicate that the sector still faces high rates of waste, delays, and workplace accidents. According to data According to Sinduscon (2023), it is estimated that up to 30% of the materials on a construction site are wasted due to lack of planning and proper organization. In this scenario, the adoption of Quality management methodologies, such as 5S, present themselves as an efficient strategy for to promote continuous improvement, reduce waste, and strengthen the safety culture and productivity.

The 5S methodology originated in Japan, in the context of post-war industrial reconstruction. with the goal of developing organized, clean, and disciplined work environments. Derived From the Japanese words Seiri, Seiton, Seiso, Seiketsu, and Shitsuke, this approach goes beyond cleaning. physics, encompassing cultural and behavioral aspects. In civil construction, its implementation has It has proven challenging, but with significant results in reducing costs and accidents. This article

RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

Therefore, this study seeks to analyze how the 5S methodology can transform construction sites into better work environments.
more productive and safer.

Given this context, the present research seeks to analyze in depth the effects

This text discusses the application of the 5S methodology in civil construction, highlighting its technical, operational, and human impacts.
The study aims to contribute to the dissemination of best practices and help companies adopt them.
method in an effective and sustainable way.

2. METHODOLOGY

This study is characterized as qualitative and exploratory research, developed
Based on a literature review and analysis of technical reports, the following were used as a foundation.
theoretical classic authors in the field of quality management, such as Shingo (1996) and Ohno (1997), in addition to
National publications focused on civil engineering. The methodology also includes case studies.
Practical applications of the 5S methodology in Brazilian construction projects, focusing on small and medium-sized enterprises.
Size. The data were collected from secondary sources, such as scientific articles and reports from...
PBQP-H and good practice manuals for construction companies. The analysis was conducted considering three axes.
Key points: (1) applicability of the five senses; (2) results and impacts; and (3) challenges and limitations.

2.1 Importance of Quality Management in Civil Construction

Quality management in civil construction is one of the fundamental pillars for...
sustainable development of the sector. In an environment characterized by short deadlines, great
Given the large number of workers and high turnover, process standardization becomes essential for
To ensure efficiency, safety, and customer satisfaction, the 5S methodology acts as a tool.
initial steps towards implementing more robust quality systems, such as ISO 9001 and the Program
Brazilian Program for Quality and Productivity in Housing (PBQP-H).

According to Junior (2018), 5S is the basis of any continuous improvement program, because
It establishes the culture of discipline and organization necessary to support more complex practices of
management. In practical terms, the method promotes behavioral re-education among employees and
It encourages individual responsibility for the work environment. This awareness is the
The first step towards developing teams that are more committed to results and quality.

Integrating 5S with quality policies provides direct benefits: reduction of
waste reduction, improved internal communication, and decreased rework. Therefore, the method
It ceases to be merely an organizational technique and becomes an applied management philosophy.
to the reality of Brazilian construction projects, contributing to the consolidation of a more efficient sector and
competitive.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

2.2 RELATIONSHIP BETWEEN 5S AND LEAN CONSTRUCTION

The concept of Lean Construction, derived from the Toyota Production System, is based on...
Eliminating waste and promoting continuous improvement. The 5S methodology is recognized as the foundation for this.
philosophy, therefore, establishes the basic conditions of order and efficiency necessary to apply
More complex tools, such as Kanban and Just-in-Time. In civil construction, Lean and 5S.
They go hand in hand: while the first seeks to optimize workflow and reduce variability, the
Secondly, it creates the physical and cultural environment conducive to these improvements happening. In this way,
The 5S methodology acts as a tool to support productivity, serving as a starting point.
for companies that want to implement a lean mindset.

3. THEORETICAL FOUNDATION

The 5S methodology is widely recognized as the basis for the implementation of
Total Quality Management (TQM) programs and the Lean system. Shingo (1996) emphasizes that 5S is not limited
It is not an operational practice, but it constitutes a management philosophy aimed at eliminating the
Waste. The five senses — Seiri (utilization), Seiton (organization), Seiso (cleaning), Seiketsu
Standardization and Shitsuke (discipline) are interdependent and aim to create an environment.
Sustainable and productive.

In the construction industry, the adoption of 5S is directly related to the guidelines of
The Brazilian Program for Quality and Productivity in Housing (PBQP-H), which seeks to improve the
quality and compliance with technical standards. According to Junior (2018), 5S is considered the
first step towards implementing more complex systems, such as ISO 9001 and Lean Construction,
because it establishes a culture of discipline and order. This methodology, therefore, represents a
An essential tool for advancing quality management in Brazilian construction projects.

3.1 HISTORICAL PERSPECTIVE AND EVOLUTION OF 5S

The 5S methodology originated in Japan in the 1950s and 1960s, amidst reconstruction efforts.
Post-war industrial design. Initially applied in Toyota factories, its objective was to create a base.
A solid foundation of discipline and efficiency precedes the adoption of more complex lean production methods.
Over time, the 5S methodology expanded beyond the factory environment and began to be adopted in administrative sectors.
Hospitals and educational institutions.

In Brazil, its spread began in the 1990s, driven by programs of
Total quality and the requirements of ISO 9001 certification. Currently, 5S is recognized as
a strategic tool, essential for increasing competitiveness and sustainability in
organizations, especially in the construction sector.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

3.2 The 5S Methodology as a Management and Safety Tool

The 5S methodology, in addition to promoting organization, acts as a safety management tool in the workplace. work. The methodology encourages risk identification, material control, and proper use. of the spaces, significantly reducing the chances of accidents.

In civil construction projects, where there is constant circulation of workers and equipment, the sense of Cleaning (Seiso) and standardization (Seiketsu) promote the creation of safe routines, which prevent Falls, electric shocks, and other incidents. According to PBQP-H (2021), companies that apply The 5S methodology routinely records reductions of over 35% in minor accident rates.

The 5S methodology also serves as a foundation for more complex security programs, such as... Occupational Health and Safety Management System (OHSMS). Thus, it can be considered a An element of integration between productivity, quality, and safety, essential pillars of a construction site. modern.

4. DEVELOPMENT

The application of the 5S methodology on construction sites can be structured in five stages. corresponding to its principles. Each sense plays a fundamental role in transforming routine. operational, ensuring greater safety and efficiency. Furthermore, the successful implementation It depends on the engagement of leaders and collective commitment.

4.0 Practical Application of 5S in Brazilian Construction Projects

The practical application of 5S on Brazilian construction sites has shown results. Significant improvements in productivity, safety, and work environment. Companies that have adopted the method They reported significant improvements in the organization of spaces, in the control of materials, and in the reduction of waste. of waste. A case study conducted on a medium-sized residential construction project in Curitiba. Studies have shown that, after six months of implementing the 5S methodology, there was a 28% reduction in cement waste. and an 18% reduction in the average travel time for workers between the warehouse and the work area.

The program's implementation began with weekly training sessions aimed at masters of construction, engineers, and workers. Each team was responsible for a specific sector, such as... Material storage, cleaning, and tool control. Designated areas were created. for waste, recyclable materials and equipment in use, in addition to the installation of signage. Visuals with colors and icons that are easy to understand.

The results were not limited to operational gains. There was also an increase noticeable in team engagement and the perception of safety. Employees began to... to identify with the workspace, spontaneously taking care of maintaining cleanliness and...

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

order. Thus, 5S has become established not only as a management tool, but as an instrument of

Valuing the worker and strengthening the organizational culture.

4.1 SEIRI (SENSE OF UTILIZATION)

It consists of eliminating what is unnecessary. In construction, it involves separating materials,

Useful equipment and tools are replaced by obsolete ones. This reduces wasted space and time.

Companies that implemented Seiri reported a 20% reduction in the time spent searching for materials.

4.2 SEITON (SENSE OF ORGANIZATION)

It ensures that each item has a defined location. The adoption of standardized layouts,

Intelligent signage and storage reduces accidents and facilitates workflow.

4.3 SEISO (SENSE OF CLEANLINESS)

Seiso aims to keep the environment clean and safe. In addition to preventing accidents, it helps to...

Identify structural flaws and leaks early.

4.4 SEIKETSU (SENSE OF STANDARDIZATION)

It maintains the continuity of the first three senses through standards, routines, and indicators.

performance.

4.5 SHITSUKE (SENSE OF DISCIPLINE)

It involves consolidating acquired habits, promoting engagement and

Team commitment.

5. RESULTS AND DISCUSSION

The results obtained through the application of 5S in Brazilian construction projects demonstrate gains.

significant impacts on productivity and safety. Research from PBQP-H (2021) indicates an average reduction of

30% in material waste and 25% in the time spent on repetitive tasks. Furthermore,

A significant improvement in the organizational climate was observed, as employees went through

to value the work environment.

Despite the benefits, implementing 5S faces challenges, such as cultural resistance and...

The lack of continuity. Many managers treat the program as a one-off action, without the

proper follow-up. Shingo (1996) emphasizes that the success of 5S depends on

Commitment from leadership and team empowerment. Therefore, it is recommended that the

The program should be integrated into existing quality and safety management systems, such as ISO 9001.

and NR-18.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

5.1 Sustainability and Innovation in the Application of 5S

The application of the 5S methodology directly contributes to sustainable practices in the construction industry. aligning with contemporary demands for environmental responsibility and the rational use of resources. By reducing waste and promoting the reuse of materials, the 5S methodology acts as an instrument. operational sustainability, decreasing the volume of waste destined for landfills and reducing the consumption of inputs.

Furthermore, the integration between 5S and digital technologies is gaining prominence. The use of management applications, monitoring sensors and real-time communication platforms This has allowed construction companies to monitor indicators of organization, cleanliness, and productivity. more precisely. This synergy between traditional practices and technological innovation demonstrates that the 5S remains current and adaptable, even in the face of the digital transformations in the construction sector. Civilian crosses.

5.2 Critical Evaluation of the Application of 5S in Civil Construction

Although the 5S methodology has become established as an effective tool in organizations. and in the productivity of construction sites, its application still presents practical limitations in Brazilian context. The temporary and dynamic nature of the works makes it difficult to maintain standards. stable organizational and cleanliness standards. Furthermore, there is high staff turnover and a lack of... Continuous training reduces the effectiveness of implemented actions.

Another critical point lies in measuring results. Many companies lack... Objective indicators to evaluate the impact of 5S on productivity, safety, and costs. The creation specific metrics — such as material waste rates, travel time and Security incidents — it is essential to consolidate 5S as a strategic tool.

Finally, it is observed that the success of the program depends heavily on leadership. When Managers and engineers take an active role in monitoring practices, and the results are... significant and sustainable. However, in contexts where 5S is treated as an isolated action, the initial gains... They tend to be lost over time. Thus, more than a methodology, 5S requires Institutional commitment and constant monitoring to ensure its effectiveness.

5.3 Social and Human Impacts of 5S on Construction Sites

Implementing the 5S methodology brings about transformations that go beyond technical results. Involving all employees, the methodology fosters a sense of belonging and teamwork. team. An organized and clean environment generates satisfaction and well-being, reflecting in motivation and... Reduction of absenteeism.

Studies conducted by Junior (2018) indicate that construction sites that apply the 5S method effectively... Continuous [works] show an average increase of 22% in worker productivity, associated with improving the organizational climate. This human aspect reinforces the multifaceted nature of 5S, which

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

It is not limited to physical organization, but contributes to the formation of a culture of respect.
Responsibility and cooperation.

6. Challenges and Barriers to Implementing 5S

Despite the numerous observed benefits, the implementation of 5S faces challenges.
considerable, especially in the context of the Brazilian construction industry. The first obstacle is...
Cultural resistance. Many professionals still see 5S as an extra task, and not as part of the process.
from the productive routine. This perception limits team involvement and reduces the program's effectiveness.

Another challenge is the lack of continuity. In many companies, the 5S methodology is implemented haphazardly.
punctual, without constant monitoring or internal audits. As Shingo (1996) points out, the
Maintaining best practices depends on leadership's commitment to monitoring results and reinforcing them.
Positive habits. Without management engagement, these practices tend to be lost over time.

The initial implementation cost can also be seen as a barrier, especially in
Small-scale projects. However, several studies indicate that investments are quickly...
offset by efficiency gains, waste reduction, and increased productivity. By
Finally, continuous training and recognition of best practices are essential to consolidate the
methodology as part of organizational culture.

7. CONCLUSION

The 5S methodology represents a milestone in modern construction management, by combining concepts of
Operational efficiency and human value. Its practical application demonstrates that the construction industry...
can achieve high standards of quality and productivity without compromising safety and well-being.
The well-being of workers. By promoting clean, organized, and disciplined environments, the 5S methodology transforms...
The routine of the construction sites establishes a culture of collective responsibility. More than a technique.
In terms of organization, the 5S methodology is a philosophy that encourages critical thinking, standardization, and improvement.
continuous. The results obtained in different studies prove that its application contributes to
Reduce costs, avoid rework, and increase team satisfaction.

Looking ahead, it is recommended that construction companies invest in programs to
training and monitoring systems that ensure the continuity of the method. Thus, with the
By consolidating the 5S methodology on construction sites, it's possible to envision a more sustainable future for the company.
sector, with standardized processes, greater appreciation for professionals and reduced impact.
environmental. The dissemination of this methodology therefore represents not only a technical advance,
but also an ethical commitment to efficiency and dignity in the workplace.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

8. FINAL CONSIDERATIONS

The final considerations of this study reinforce that the 5S methodology represents a A competitive advantage for the construction industry, combining efficiency, safety and... Sustainability. Its implementation requires planning, training, and commitment. It is a collective effort, but its results are broad and lasting.

It is recommended that future research further analyze the quantitative impacts of 5S. especially in safety and economic performance indicators. Integration with tools Digital technology, combined with the principles of Lean Construction, emerges as a promising path. to consolidate modern and sustainable practices on Brazilian construction sites.

REFERENCES

Brazilian Association of Technical Standards (ABNT). *NBR ISO 9001:2015 – Quality management systems – Requirements.* Rio de Janeiro, 2015.

BALLARD, Glenn; HOWELL, Gregory. *Lean Construction: Principles and Practices. Journal of Construction Engineering and Management,* vol. 125, n. 5, p. 282–289, 1999.

BRAZIL. Ministry of Labor. *Regulatory Standard NR-18 – Working Conditions and Environment in the Construction Industry.* Brasília, 2022.

CAMPOS, Vicente Falconi. *TQC: Total Quality Control (Japanese style).* 10th ed. Nova Lima: Falconi, 2004.

FALCONI, Vicente. *The True Power: Management Practices that Lead to Revolutionary Results.* 2nd ed. São Paulo: INDG, 2015.

FORMOSO, Carlos Torres; ISATTO, Eduardo Luis; HIROTA, Eduardo Hidemi. *Application of lean production principles in the management of construction projects.* Porto Alegre: Federal University of Rio Grande do Sul, 2002.

JUNIOR, Osvaldo F. *Total Quality Management and the 5S Method in Civil Construction.* São Paulo: Pini, 2018.

KOSKELA, Lauri. *Application of the New Production Philosophy to Construction.* Stanford University: Center for Integrated Facility Engineering, 1992.

LIKER, Jeffrey K. *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.* Porto Alegre: Bookman, 2008.

MATTOS, Aldo Dórea. *Lean Construction: Introduction and Basic Concepts.* São Paulo: Pini, 2015.

Year V, v.2 2025 | Submission: 06/11/2025 | Accepted: 08/11/2025 | Publication: 10/11/2025

MIRANDA, Ricardo; SOUZA, Rafael. *Sustainability and operational efficiency in construction sites: a 5S-based approach. Revista de Engenharia e Pesquisa Aplicada,* v. 12, n. 3, p. 45–58, 2020.

OHNO, Taiichi. *The Toyota Production System: Beyond Large-Scale Production.* Porto Alegre: Bookman, 1997.

OLIVEIRA, Pedro Henrique de; FERREIRA, Tiago Alves. *Innovation and digital transformation in the Brazilian construction industry. Revista Construção e Tecnologia,* São Paulo, v. 17, n. 4, p. 60–71, 2021.

PBQP-H. *Brazilian Program for Quality and Productivity in Housing.* Ministry of Cities, 2021.

SANTOS, Adriano L. dos; PEREIRA, Luiza F. *Quality and productivity management in civil construction: integration between 5S and Lean Construction. Revista Gestão & Tecnologia de Projetos,* São Paulo, v. 17, n. 1, p. 90–105, 2022.

SHINGO, Shigeo. *A Study on the Toyota Production System.* São Paulo: IMAM, 1996.

SILVA, Flávio M.; MOURA, Cíntia R. *Critical evaluation of the implementation of 5S in public works in Brazil. Brazilian Journal of Civil Engineering,* v. 10, n. 2, p. 55–66, 2019.

SINDUSCON-SP. *Performance indicators in civil construction.* São Paulo, 2023.