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Lean 5S Model: A Strategic Facilitator For Accreditation Preparedness In Technical Teaching Institutes

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Abstract–*Now days in context of higher education, technical educational institutes are continuously seeking ways to improve institutional effectiveness complain with regulatory standards and stay establish in competitive in academic marketplace. The preparation for accreditations such as NAAC and NBA is a highly challenging task for technical institutes. These accreditation system required extensive documentation, standardized procedures and ongoing improvement mindset. This paper address the adaption of lean Manufacturing principles specifically the 5S methodology as the tool of strategy to meet the requirement of accreditation process. This paper suggests a model that how a customized 5S model can address key bottlenecks in academic, administrative, and infrastructural domains, thus enhancing accreditation readiness and embedding a culture of quality and accountability.*
Keywords *Lean Manufacturing, 5S, Technical Education, Higher Education, Institutional Effectiveness, Quality Assurance, NBA Accreditation, NAAC*

INTRODUCTION

The 5S approach (from the Japanese' manufacturing practices) consists of five elements: Sort (Seiri), Set in order (Seiton), Shine (Seiso), Standardize (Seiketsu), and Sustain (Shitsuke). Originally grounded in manufacturing and used to promote organization of the workspace, operational efficiency and continuous improvement, 5S is now garnering attention in a variety of sectors including health care settings and educational settings [1][2][3].

In technical teaching institutes, the need for an accreditation emphasizes Resource optimization, Quality Assurance and Stakeholder's satisfaction, and in this background, implementation of 5S would streamline the process, inculcate the culture of quality and would lead to nearly meet the standards fixed by accreditation authorities such as NBA and NAAC. To earn NBA and NAAC accreditation, institutions must not only prove their academic competency but also their infrastructure, documentation, safety standards and quality improvement efforts. The 5S technique (a concept developed in Japan) provides an effective and low cost pretense for closing those gaps and being in compliance with the expectations of accreditation. This paper mainly focuses on the challenging issues, which the technical teaching institutes face while undergoing the process of NBA/NAAC accreditation. It highlights how implementation of a customized 5S model can help overcome these barriers and create a culture of quality and accountability. The paper proposes a 5S framework adapted specifically for educational environments, integrating academic, administrative, and infrastructural domains.

LITERATURE REVIEW

The significance of education in national development cannot be overstated. Education fosters expertise, excellence, and knowledge—key drivers of economic and social progress. As a result, the need to formulate effective strategies for the advancement of higher education has become a global priority (Ali et al., 2010)[16]. Over the last twenty years, quality improvement in higher education has gained traction in India through accreditation efforts led by NAAC and NBA. NAAC focuses on institutional accreditation, while NBA highlights program-level accreditation for technical education. Tools like the NAAC Student Satisfaction Survey are crucial for ensuring institutional quality (Patil & Kulkarni, 2022)[25]. NBA's significance increased after India joined the Washington Accord, which made program-level accreditation necessary for global recognition. The AICTE now requires NBA accreditation for program expansion and ongoing approval. At least 60% of eligible programs must obtain accreditation after 2023 (AICTE, 2021).

Outcome-based assessment also enhances quality assurance in engineering education (Beena & Suresh, 2021)[26].

The integration of quality management methodologies such as the 5S principles into educational institutions offers both opportunities and challenges. In healthcare, 5S is not only feasible but also drives quality improvement and supports organizational change toward accreditation—resulting in better orderliness, documentation, and staff engagement, all integral for compliance with standards such as NAAC or equivalent healthcare accreditation [1]. In manufacturing, 5S reliably delivers productivity, safety, and management benefits, reinforcing its relevance as a foundational step toward process excellence and further quality initiatives [2][3]. Several empirical studies underscore the adaptability and impact of 5S in non-manufacturing settings. For example, in healthcare environments, 5S has been implemented successfully to improve workplace organization, streamline processes, and drive up the quality and safety of service delivery, even within resource-constrained contexts. In Senegal, a health center that adopted 5S saw substantial improvements not only in reduced workplace disorder but also in increased efficiency, patient-centeredness, and overall staff motivation. The staff reported enhanced quality in daily service and behavioral change among workers and patients, supporting a more accreditation-ready institutional culture [1]. Similarly, in Turkish university hospital laboratories, systematic 5S deployment led to a marked increase in safety, improved employee satisfaction, and a substantial decrease in procedural non-conformities—critical metrics for laboratory and institutional accreditation under standards such as ISO 15189 and, by extension, for NAAC/NBA readiness [5].

Moreover, 5S interventions have a documented history of aiding adherence to standard operating procedures (SOPs), improved process visibility, and catalyzing the culture of continuous quality improvement that is integral to successful accreditations. For instance, both the Senegal and Turkey studies highlighted above show that 5S led to better documentation, organized workplaces, and more engaged and accountable teams, thereby aligning directly with the systematic quality measurement, documentation, and team involvement required by NAAC and NBA frameworks [1][2].

Although many foundational 5S studies arise from manufacturing [2][3][4], the successful transplantation and efficacy of these methodologies in education, health, and laboratory management have been well documented in scholarly literature and international practice. Thus, the claim that 5S is integral to, and supportive of, NAAC/NBA processes in technical and higher education institutions is not only plausible but empirically validated. As the author of A Guide to Lean Six Sigma Management Skills goes on to write, "Mental discipline is very important to Seiso. An attitude of cleanliness leads to clean and clear thinking, which is reflected in all aspects of work" [7, 8, 9,10, 11]. The NAAC is responsible for assessing and accrediting higher education institutions in India, and has recently up- dated its framework for promoting quality and excellence. This research paper indicates that many institutions have not systemically invested in building internal capacities in assimilating and implementing the accreditation processes The table below summarizes research articles from 2015 to 2024 related to the 5S methodology, drawn exclusively from the provided research articles set. Each entry includes citation details (title, year, publication), sector, main benefits, and key conclusions,

Table 1: Summarizes research articles

Title	Year	Publication	Sector	Observed Benefits	Key Conclusion
Implementation of 5S management method for lean healthcare at a health center in Senegal: a qualitative study of staff perception	2015	Global Health Action	Healthcare	Improved workplace orderliness, reduced clutter, clearer labeling, enhanced service efficiency, safer patient environments, greater staff motivation	5S implementation improved the quality of healthcare services and staff motivation even in resource-constrained, disorderly environments, and was viewed as adaptable to similar settings [1].

An application of 5S concept to organize the workplace at a scientific instruments manufacturing company	2015	International Journal of Lean Six Sigma	Manufacturing	Significant reduction in tool-search time (from 30 to 5 minutes), higher 5S audit scores, overall productivity gains	5S is a powerful, practical tool for boosting productivity and can be implemented in various industrial settings to achieve measurable workplace improvements [2].
5S impact on safety climate of manufacturing workers	2016	Journal of Manufacturing Technology Management	Manufacturing	Improved safety climate, especially increased management commitment and involvement, improved employee perceptions of workplace safety	Implementing 5S events leads to statistically significant improvements in workplace safety climate, reflecting broader benefits in management practices [3].
Implementation and Benefits of the 5S Method in Improving Workplace Organisation – A Case Study	2025	Medical Technology and Public Health Journal	JNE Express Operations Department	researchers can then measure the level of productivity in terms of quantity and quality, add workload variables, and conduct research not only on one expedition service company.	5S Safety (Sort, set in order, Shine, Standardize, Sustain, and Safety) is recognized as a factor influencing employee productivity[19]
Implementation And Benefits Of The 5s Method In Improving Workplace organisation – A Case Study	2024	Management Systems in Production Engineering	automotive in-dustry.	It focuses on the implementation of5S in an organization involved in the production and processing of metal components for the automotive industry.	The implementation of 5S brings a number of benefits to the organization, including:- reducing time wasted searching for tools,- improving safety,- boosting employee morale,- building the culture of the organization.[6]

Implementation of 5S Methodology in Educational Institutions: Benefits, Challenges, and Strategies for Sustainability Enhancement	2024	Kalam Cendekia: Jurnal Ilmiah Kependidikan	Makassar Tourism Polytechnic	This study examines the potential benefits and barriers to 5S implementation at Makassar Tourism Polytechnic	5S integration increased operational efficiency, better discipline among students, strengthened teamwork, and improved campus security.[20]
Implementation of 5S Methodology in Higher Education Institute	2019	International Research Journal of Engineering and Technology	Higher Education Institute	focused on how to use 5S to rearrange the workplace and improve efficiency. improve the productivity, quality and morale of staff of higher education institute.	provided evidence that 5S is a great way to assist this organization. 5S provides a method to rearrange the layout and improve the discipline. The 5S implemented in this study successfully improved the efficiency of the employees.[21]
Lean Six Sigma for higher education institutions (HEIs) Challenges, barriers, success factors, tools/techniques.	2012	International Journal of Productivity and Performance Management,	higher education institutions	discusses whether LSS can be a useful and systematic approach to tackle operational and strategic issues within the HE industry. The authors use secondary data from literature to justify the need for this powerful approach and the benefits of adopting this business process improvement strategy within the HEIs	The paper presents the challenges and barriers to be encountered during the introduction of LSS in the higher education sector, most useful tools and techniques for process improvement problems, success factors which are essential for the implementation and sustainability of LSS.[22]
Implementation of 5s methodology for performance improvement in a medium scale industry: A case study	2017	International Journal For Research & Development In Technology	Medium Scale Industry	The case study was conducted implantation of 5s in medium scale company located in Addis Ababa, Ethiopia.	5S rules bring the great changes in the company, increasing the efficiency and effectiveness of the processes, improvement of the layout, productivity, improve the quality, and working

					conditions in the company [23]
Roadmap for Lean Implementation in Testing Laboratory	2019	Springer Nature Singapore Pte Ltd.	Testing Laboratory	Case study testing laboratory	suggest roadmap for lean tool implementation in testing laboratory

5S is no longer confined to the shop floor. Its principles and practice drive order, safety, documentation, and continuous improvement in health centers, laboratories, and educational institutions, all of which are vital for the standards and documentation that NAAC/NBA require [1][5][23]. The literature decisively confirms that implementing 5S outside of manufacturing fosters accreditation readiness—and thus, technical teaching institutes and academic organizations striving for NAAC or NBA accreditation benefit directly from strategic 5S adoption.

below illustrates a conceptual mapping between 5S elements and key NBA/NAAC criteria, backed by motivations found within the cited literature:

Table 2: 5S Elements and key NBA/NAAC criteria

5S Element	Core Description	NBA Criteria/NAAC Key Indicators	Literature Support	Observed Outcomes
Seiri (Sort)	Eliminate unnecessary items	Resource Utilization, Criteria I, II	[1][2][5]	Waste reduction, optimal use
Seiton (Set)	Arrange essential items for flow	Infrastructure, Criteria II, IV	[2][3]	Enhanced efficiency, order
Seiso (Shine)	Cleanliness and inspection	Health & Hygiene, Criteria II	[1][4][5]	Safe environment, reduced errors
Seiketsu (Standardize)	Standard operational practices	Standardization of SOPs, Criteria VI	[3][5]	Consistency, audit compliance
Shitsuke (Sustain)	Discipline, continuous improvement	Quality Culture, Continuous Improvement	[3][4][5]	Sustained gains, engagement

METHODOLOGY

This study uses the 5S method as a framework to help institutions prepare for accreditation processes like NBA and NAAC. The 5S approach—Sort, Set in Order, Shine, Standardize, and Sustain—aims to improve the efficiency of institutional systems. This focus particularly includes faculty readiness, student documentation, academic achievement tracking, and the overall operation of academic activities.

The process started by identifying common patterns among departments and finding operational gaps. In the Sort (Seiri) phase, all documents related to NBA accreditation—such as student details, lecture plans, teaching files, lab manuals, attendance records, and feedback forms—were reviewed. Irrelevant or outdated records were discarded, and important documents were organized according to a master list that met accreditation criteria.

In the Set in Order (Seiton) stage, the sorted documents were arranged systematically by year and criterion. Lab equipment was also organized based on subject requirements since many labs are shared

among different programs throughout the academic year. This setup made it easy to find and verify each item or document during internal or external audits.

The Shine (Seiso) phase focused on cleaning and maintaining both physical spaces (like labs, classrooms, and faculty offices) and digital storage (cloud storage, departmental folders). Cleaning routines and allocated free times were set to keep facilities ready for audits and visually appealing.

Next, in the Standardize (Seiketsu) phase, institutional processes were defined by creating Standard Operating Procedures (SOPs). Functional committees were established, and roles and responsibilities were clearly laid out. Staff and faculty received training to understand their duties and authority, ensuring consistency in academic and administrative tasks.

Finally, in the Sustain (Shitsuke) phase, steps were taken to maintain the 5S practices over time. Regular academic audits, 5S audits, and awareness campaigns were conducted. The 5S framework was integrated with the IQAC (Internal Quality Assurance Cell) to make the methodology part of the system and ensure it supports the ongoing quality improvement goals needed for accreditation.

Table 2: 5S–Accreditation Alignment Model

Tools	Goal	Application in Institution	Contribution to NBA	Contribution to NAAC	Result
Seiri (Sort) – Sorting	Remove all unnecessary items from the workspace.	Remove outdated files, broken lab equipment, irrelevant records.	Supports Criteria 6 & 10(Facilities & Continuous Improvement) by ensuring relevant data and resources are maintained for program delivery.	Helps in Criteria 4 & 6(Infrastructure and Governance), enhancing preparedness for audit and quality assessment.	efficient and smooth flow enhancing preparedness for audit and quality assessment.
Seiton (Set in Order) – Arrangement	Organize the workspace so that all necessary items are easily accessible.	Maintain only essential academic, administrative, and student-related documents.	Aids Criteria 5 & 9 (Teaching–Learning Process, Student Support) through improved accessibility to academic resources.	Helps in Criteria 2 & 6(Curriculum Design & Governance), showing evidence of proper academic and administrative organization.	improved accessibility to academic resources. proper academic and administrative organization
Seiso (Shine) – Cleaning	Keep the work area clean and tidy.	Regular cleaning of labs, classrooms, and common areas. Ensure functional infrastructure, clean washrooms, and tidy hostels.	Supports Criteria 2 & 6 (Program Curriculum and Facilities) by maintaining a learning-conducive environment.	Helps meet Criteria 4 & 7(Infrastructure & Best Practices), demonstrating a clean, safe, and student-friendly campus.	Safe and peaceful environment improve learning-conducive environment.
Seiketsu (Standardize) – Standardization	Establish standards for organization and cleaning.	Establish SOPs for labs, document control, class	Strengthens Criteria 2, 3, 7 (OBE, Course Outcomes, Institutional	Meets Criteria 6 & 7(Governance, IQAC) by	Consistency across departments., systematic

		scheduling, exam handling, feedback mechanisms. Use templates for lesson plans and outcome mapping.	Support) by ensuring consistency across departments.	embedding systematic quality practices.	quality practices.
Shitsuke (Sustain) – Sustain	Maintain and improve established 5S prac-tices.	Conduct 5S audits, create awareness drives, form quality circles, and link 5S with IQAC/NBA core teams	Aligns with Criteria 10(Continuous Improvement), showcasing sustained quality enhancement culture.	Fulfils Criteria 6 & 7(Governance, Institutional Values) by demonstrating long-term commitment to quality systems.	quality enhancement culture. long-term commitment to quality systems

CASE STUDY - Case Study: Implementation of 5S in the Mechanical Engineering Department of XYZ Engineering College for NBA Accreditation

Background: XYZ Engineering College, established in 2008, offers more than 12 undergraduate and postgraduate programs. To ensure long-term sustainability and competitiveness in the academic landscape, the management is committed to pursuing NBA accreditation as a means to assure and enhance the quality of education.. The Mechanical Engineering Department of XYZ Engineering College began preparations for NBA (National Board of Accreditation) accreditation. This process involves a thorough outcome-based assessment that requires a lot of documentation, organized academic practices, and ongoing record-keeping with support for 3 to 7 years. To make the preparation easier and lessen the pressure of gathering historical data and documents, the department chose to implement the 5S methodology as a starting point before preparing the Self-Assessment Report (SAR).

Methodology Implementation:

Initial Planning and Awareness: Department held a workshop for faculty and students to explain the principles and significance of the 5S methodology. Faculty received a set timeline to sort and organize department documents.

Document Preparation and Sorting (Sort): A list of necessary documents was created and organized based on NBA requirements. Unnecessary and outdated documents, like incomplete student journals and extra assignment records, were identified and discarded. Labs, which faculty and students shared, were cleared of excess materials. For instance, only five representative journals were kept for records.

Organization and Arrangement (Set in Order): Key files, such as subject files, personal files, lab manuals, and teaching files, were organized by year. Each file was clearly labeled and tagged. Dedicated storage areas and cabinets were set up for quick access.

Cleaning and Maintenance (Shine): Both physical and digital spaces were cleaned and organized. Unused items were removed, creating more space for better use.

Standardization (Standardize): SOPs (Standard Operating Procedures) were created for maintaining records and accessing documents. People in charge were assigned for each document type and storage area.

Sustainability and Monitoring (Sustain): Monthly audits of documentation were introduced to ensure ongoing compliance with the 5S system. The department connected the 5S system with its IQAC for quality assurance.

Results and Impact:

The time needed to find any document decreased significantly. Faculty members felt less stress when preparing documentation for the SAR. Students discovered the labs were more organized and better suited for practical learning. The overall environment became cleaner, more structured, and focused on

quality. The implementation of the 5S methodology in the Mechanical Engineering Department of XYZ Engineering College greatly improved operational efficiency and audit readiness. The department shifted from a reactive stance to a proactive approach in documentation and quality assurance, facilitating a smooth and effective NBA accreditation process.

Table 3: Before and After 5S Implementation

Criteria	Before 5S Implementation	After 5S Implementation
Document Organization	Scattered, unlabelled, difficult to locate	Systematically tagged, stored year-wise
Lab Condition	Cluttered with old records and materials	Cleaned, organized, minimal excess materials
Document Retrieval Time	High, often delayed	Quick and efficient
Faculty Stress Level	High during audit preparations	Reduced due to clear documentation procedures
Student Experience	Disorganized learning environment	Comfortable, well-structured, engaging lab spaces
Audit Readiness	Time-consuming and reactive	Proactive and ready at any time
Role Clarity	Unclear responsibilities	Defined in SOPs with responsible in-charges

RESULT & CONCLUSION

In this present scenario of higher education all technical institutions are in a compulsion to improve their quality standards and to move towards assessing these standards through accrediting agencies NBA, NAAC etc. These accrediting activities require significant preparedness, adherence to detailed documentation, and institution-wide commitment to a culture of quality.

Application of 5S approach in higher technical educational institutions It lays the path for systematic quality up gradations, which seem to be supporting : NBA-level accreditation (program) through advance documentation, preparedness and OBE mapping. Institutional Accreditation (NAAC), Infrastructure Development, Implementation of Safety Measures and Quality Improvement Processes. Schools that embrace 5S are experiencing a more seamless process in accreditation, less deficiencies, higher success rates with both NBA and NAAC.

Table 3: Tangible Outcomes of 5S Implementation in Accreditation

S.No.	Impact Area	Before	After
1	Data Availability	Scattered, incomplete, outdated records	Organized, up-to-date, and retrievable evidence files
2	Program Readiness (NBA)	Low outcome documentation, unprepared CO-PO mapping	OBE documentation structured, evidence of improvements maintained
3	Campus Infrastructure (NAAC)	Unclean labs, lack of maintenance records	Clean, safe, and well-maintained learning environments
4	Faculty & Staff Engagement	Reactive, isolated participation	Systematic participation via quality circles and training
5	Student Satisfaction	Unsystematic grievance redressal, poor infrastructure	Improved learning environment, clear support systems
6	Accreditation Success	Incomplete compliance, repeated deficiencies	Improved score in both NBA and NAAC due to systematic practices

Meeting the stringent accreditation requirements — needing to have structured documentation, demonstrating continual developments and evidence of 3 to 7 years of historical data on a wide range of aspects (e.g., faculty performance, infrastructure usage, academic results) — is a time-consuming and

stressing process for institutions. For example NAAC's Criterion 4 has provision for seven years data, which is a tough task for unorganized/under-prepared colleges."

Since accreditation can feel like an endless checklist, using the 5S approach gives colleges a simple way to cut the clutter and keep moving forward. By encouraging tidy workspaces, self-discipline, agreed-upon routines, and small, steady upgrades, the system lets an institution build:

A clean, calm campus where every tool and idea has its place, Data folders that anyone can find and understand in minutes, Labs that are safe, organized, and stocked with what staff and students need. Notes and records that look the same each time and pass reviews with ease. This paper discusses how to implement the 5S method as a way to make the NAAC and NBA accreditation processes smoother. The case study shows that after using the 5S framework, documentation became more organized and easier to access. This change greatly lowered the time and effort needed for accreditation readiness. Additionally, the arrangement of documents, workspaces, and laboratories improved significantly. This created a cleaner, more efficient, and quality-driven academic environment. In short, 5S supports the boxes that auditors want to tick and, at the same time, grows an everyday habit of quality, ownership, and service that lifts teaching, spreads trust among partners, and guards the schools reputation for years to come.

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