

A Study of Adoption and Implementation of 5S Principles in Libraries in India.

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Abstract

This study examines the adoption and implementation of 5S principles in library systems in India, with a focus on awareness, impact, and challenges. Grounded in Total Quality Management (TQM), the 5S methodology offers a structured approach to improving workplace organization, efficiency, and service quality. Despite its proven effectiveness in industrial and service sectors, its application in library environments remains limited and underexplored, particularly in the Indian context.

The research adopts a descriptive and analytical design, collecting primary data from 80 library professionals through a structured questionnaire based on a 5-point Likert scale. Statistical techniques such as the Mann–Whitney U test, Chi-square test, one-sample t-test, ANOVA, and Friedman test were employed to analyze the data. Reliability and validity were confirmed through Cronbach’s Alpha, KMO, and Bartlett’s Test.

The findings reveal that a majority of library staff possess a significant level of awareness of 5S principles, particularly those who have received formal training. The implementation of 5S has led to notable improvements in workplace organization, resource accessibility, cleanliness, and overall operational efficiency. However, key challenges such as resistance to change, lack of training, limited resources, and insufficient management support hinder effective implementation.

The study contributes to the limited empirical literature on 5S in libraries and provides practical insights for enhancing efficiency and service quality through structured management practices.

Keywords: 5S Principles, TQM, Library Efficiency, Academic Libraries, India

1. Introduction

In the contemporary knowledge-driven economy, libraries serve as critical information hubs that facilitate academic, research, and professional development. With increasing demand for efficiency, accessibility, and service quality, libraries are required to adopt systematic management approaches. The 5S methodology, rooted in Total Quality Management (TQM), has emerged as a powerful tool to enhance organizational efficiency, eliminate waste, and improve service delivery.

Despite its proven effectiveness in manufacturing and service sectors, the adoption of 5S in Indian libraries remains limited and underexplored. Libraries in India often face challenges such as inefficient resource organization, lack of standardized procedures, and limited technological integration. These issues highlight the need for structured frameworks that can enhance operational effectiveness.

The present study is motivated by the lack of empirical research examining the adoption and impact of 5S principles in Indian library systems. It seeks to provide a comprehensive statistical evaluation of awareness, impact, and challenges associated with 5S implementation.

2. Literature Review

Recent studies indicate that the 5S methodology has evolved as a critical tool for improving efficiency, workplace organization, and service quality across sectors, including service and knowledge-based institutions. The structured approach of 5S facilitates systematic arrangement, waste reduction, and process standardization, making it highly relevant for library environments that require efficient resource management and user-centric service delivery (Kanabar et al., 2024).

Empirical evidence from recent research suggests that the implementation of 5S significantly improves operational efficiency, employee productivity, and workplace discipline. Kanabar et al. (2024) found that successful 5S adoption depends largely on management commitment, employee involvement, and continuous monitoring mechanisms. However, the study also identifies barriers such as lack of awareness, insufficient training, and sustainability challenges, particularly in developing countries.

In the context of educational institutions, recent literature highlights that 5S contributes to improved infrastructure management, effective space utilization, and enhanced organizational culture. The methodology supports systematic organization of resources, which is essential for academic institutions managing large volumes of information. Furthermore, integration of 5S with quality management systems enhances institutional performance and service consistency (Patel & Desai, 2023).

Specific research on library environments demonstrates that 5S implementation leads to improved accessibility of resources, reduction in search time, and enhanced user satisfaction. Studies reveal that disorganized shelving, poor classification, and inefficient workflows negatively impact library services, whereas 5S adoption improves layout design, cleanliness, and workflow efficiency (Sanjulião et al., 2020).

Recent case studies (2023–2025) further confirm that 5S implementation in libraries enhances operational performance by optimizing cataloguing processes, improving space management, and strengthening staff coordination. Additionally, 5S fosters a culture of continuous improvement, which is essential for sustaining long-term efficiency in library systems (Rahayu et al., 2023).

With the transition toward digital and hybrid libraries, the relevance of structured frameworks like 5S has increased. Contemporary research emphasizes that systematic organization, standardization, and accessibility. The core principles of 5S are essential for managing digital resources and ensuring efficient information retrieval systems (Chowdhury, 2025).

Despite these advancements, the literature reveals a significant gap in empirical studies focusing on the adoption and implementation of 5S in Indian libraries. Most existing studies are conceptual or based on limited case analyses, with minimal quantitative validation. Additionally, challenges such as resistance to change, lack of trained personnel, and budgetary constraints remain underexplored in the Indian context (Subaveerapandiyam et al., 2022).

Overall, recent research establishes that 5S is a highly effective methodology for improving library performance and service quality. However, there is a strong need for empirical, data-driven studies in India to examine its adoption, implementation challenges, and measurable outcomes.

3. Research Gap

The existing body of literature on 5S implementation reveals a significant lack of empirical and quantitative studies specifically focused on library environments. Most available research is descriptive or case-based, limiting the ability to generalize findings across different institutional settings. This gap is further pronounced in the Indian context, where studies on 5S adoption in libraries remain scarce despite the unique operational, infrastructural, and managerial challenges faced by Indian library systems. Additionally, there is an absence of comparative research examining the implementation of 5S across various types of libraries, such as academic, public, and digital libraries, thereby restricting a comprehensive understanding of its applicability and effectiveness in diverse library environments.

Moreover, the literature indicates insufficient integration of 5S principles with emerging digital and hybrid library systems, where structured organization and standardization are equally critical. There is also a lack of well-defined implementation frameworks and sustainability models that can guide library professionals in effectively adopting and maintaining 5S practices over time. Furthermore, limited longitudinal studies exist to assess the long-term impact and sustainability of 5S initiatives in libraries, making it difficult to evaluate their enduring benefits and continuous improvement outcomes. These gaps collectively highlight the need for systematic, data-driven research to establish robust models for effective 5S implementation in modern library systems.

4.1 Research Questions:

1. What is the level of awareness and understanding of 5S principles among library staff in Indian libraries?
2. How does the implementation of 5S principles influence the efficiency and organizational effectiveness of library operations?
3. What are the key challenges faced in the adoption and implementation of 5S principles in Indian library settings?

4.2 Objectives:

1. To evaluate the level of awareness and understanding of 5S principles among library staff in Indian libraries.
2. To assess the impact of 5S implementation on the efficiency and organization of library operations.
3. To identify challenges in the adoption of 5S principles in Indian library settings.

4.3 Hypotheses:

- H 1 A significant proportion of library staff in Indian libraries have limited awareness and understanding of 5S principles.
- H 2 Implementation of 5S principles has significantly improved efficiency and organization in library operations.
- H 3 Lack of training and staff resistance are significant challenges in the implementation of 5S principles in Indian libraries.

5. Research Methodology

The study adopts a descriptive and analytical research design to systematically examine the adoption and impact of 5S principles in library settings. Primary data were collected from a sample of 80 library professionals using a structured questionnaire designed on a 5-point Likert scale. The instrument was developed to capture three key dimensions, namely awareness of 5S principles, perceived impact on library operations, and challenges faced during implementation. A convenience sampling technique was employed to ensure accessibility and participation across different types of libraries, including academic, public, and special libraries.

The reliability and validity of the instrument were rigorously tested to ensure robustness of the findings. Cronbach's Alpha values ranging from 0.767 to 0.886 indicate acceptable to high internal consistency, while KMO values between 0.666 and 0.781, along with a significant Bartlett's Test ($p < 0.001$), confirm sampling adequacy and construct validity. Normality testing using the Shapiro–Wilk test revealed that awareness and challenges data were non-parametric, whereas impact-related data followed a normal distribution. Accordingly, appropriate statistical tools were applied, including descriptive statistics, Mann–Whitney U test, Chi-square test, Friedman test, one-sample t-test, and ANOVA, ensuring accurate and meaningful interpretation of the data.

6. Data Analysis

6.1 HYPOTHESIS 1

H1: A significant proportion of library staff in Indian libraries have limited awareness and understanding of 5S principles.

6.1.1 Normality Test

Normality of the variables was assessed using the Shapiro–Wilk test, which is appropriate for sample sizes below 200.

Table 6.1.1 Tests of Normality (Shapiro–Wilk)

Variable	Shapiro–Wilk Statistic	df	Sig. (p-value)
Familiarity with 5S concept	0.7498	80	0.000000000233
Received formal training on 5S	0.7723	80	0.000000000854
Understanding benefits of 5S	0.7111	80	0.000000000297
Ability to differentiate five elements	0.7912	80	0.00000000271
Library documentation availability	0.8114	80	0.0000000100

The Shapiro–Wilk test results indicate that all variables have p-values far below 0.05, confirming that the data significantly deviates from a normal distribution. Therefore, the assumption of normality is violated. Consequently, non-parametric statistical techniques were applied, including the Mann–Whitney U test and Chi-Square test.

6.1.2 Reliability Analysis

Table 6.1.2 Reliability Statistics

Cronbach’s Alpha	Number of Items
0.7678	5

The obtained Cronbach’s Alpha value of 0.7678 indicates acceptable internal consistency, as values above 0.70 are considered reliable for behavioral and social science research.

6.1.3 Validity Test

Construct validity was assessed using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett’s Test of Sphericity.

Table 6.1.3 KMO and Bartlett’s Test

Test	Value
Kaiser–Meyer–Olkin (KMO)	0.6669
Bartlett’s Test Chi-Square	200.7516
Df	10
Sig. (p-value)	0.000000000000

The KMO value of 0.6669 exceeds the acceptable threshold of 0.60, indicating adequate sampling adequacy. Additionally, Bartlett’s Test of Sphericity is highly significant, confirming that the correlation matrix is suitable for validity assessment.

6.1.4 Mann–Whitney U Test

To evaluate the influence of training on awareness of 5S principles, respondents were divided into trained and untrained groups.

Table 6.1.4 Mann–Whitney U Test

Statistic	Value
Mann–Whitney U	1262.50
Asymp. Sig. (2-tailed)	0.000003518

The Mann–Whitney U test result shows a statistically significant difference between trained and untrained staff ($p = 0.000003518$). This suggests that employees who received formal training possess significantly higher awareness of 5S principles.

6.1.5 Chi-Square Test

Responses were categorized into:

- Agree (4–5)
- Disagree (1–3)

Table 5 Chi-Square Goodness-of-Fit Test

Statistic	Value
Chi-Square (χ^2)	56.25
Df	1
Sig. (p-value)	0.00000000000000638

The Chi-Square test result $\chi^2(1) = 56.25$, $p = 0.00000000000000638$ indicates a statistically significant dominance of agreement responses. This confirms that the majority of respondents demonstrate awareness and understanding of 5S principles.

Based on the statistical results:

- Chi-Square test shows significant awareness
- Mann–Whitney test confirms training influence

Hypothesis	Decision
H0: There is no significant proportion of library staff in Indian libraries have limited awareness and understanding of 5S principles.	Rejected
H1: A significant proportion of library staff in Indian libraries have limited awareness and understanding of 5S principles.	Accepted

The statistical analysis conducted in this study provides empirical evidence supporting the proposed hypothesis. The Chi-Square goodness-of-fit test revealed a statistically significant predominance of agreement responses, $\chi^2(1) = 56.25$, $p = 0.00000000000000638$, indicating that the majority of respondents demonstrated awareness and understanding of the 5S principles.

Furthermore, the Mann–Whitney U test indicated a significant difference in awareness levels between trained and untrained staff, $U = 1262.50$, $p = 0.000003518$, suggesting that employees who received formal training possess significantly higher levels of awareness regarding 5S practices. The reliability analysis confirmed the internal consistency of the measurement scale with Cronbach’s $\alpha = 0.7678$, while the KMO value of 0.6669 and significant Bartlett’s Test ($\chi^2 = 200.7516$, $p < 0.001$) verified the construct validity of the instrument used in this study.

Taken together, these findings provide strong statistical support for the research hypothesis. Therefore, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. The results indicate that staff members demonstrate a significant level of awareness and understanding of the 5S principles, particularly among employees who have received formal training. This finding suggests that training initiatives and organizational quality management practices play an important role in enhancing employees’ awareness and implementation of 5S principles within the organization.

6.2 HYPOTHESIS 2

H2: Implementation of 5S principles has significantly improved efficiency and organization in library operations.

6.2.1 Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
0.812	5

The Cronbach’s Alpha value of 0.812 (>0.70) indicates good internal consistency, confirming that the questionnaire items measuring the perceived impact of 5S implementation in library operations are reliable.

6.2.2 Validity Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.781
Bartlett's Test of Sphericity	
Approx. Chi-Square	356.427
Df	10
Sig.	0.000

The KMO value (0.781) exceeds the acceptable threshold of 0.60, indicating adequate sampling. Bartlett’s Test is significant ($p = 0.000 < 0.05$), confirming that correlations among variables are sufficient and the data is valid for further statistical analysis.

6.2.3 Normality Test

Tests of Normality

Variable	Shapiro-Wilk Statistic	Df	Sig.
Perceived Improvement	0.972	80	0.087

The Shapiro–Wilk p-value ($0.087 > 0.05$) indicates that the dataset follows a normal distribution, confirming that the data is parametric. Therefore, parametric tests such as the One-Sample t-test and ANOVA can be applied.

Parameter	N	Mean	Std. Deviation	Std. Error Mean	T	Df	Sig. (2-tailed)	Mean Difference	95% CI Lower	95% CI Upper
Improved Workplace Organization	80	4.18	0.701	0.078	15.143	79	0.000000000000021	1.183	1.03	1.34
Reduction in Time for Locating Resources	80	4.10	0.735	0.082	13.415	79	0.0000000000000412	1.102	0.94	1.26
Improved Cleanliness and Maintenance	80	4.25	0.660	0.074	16.945	79	0.0000000000000003	1.250	1.10	1.40
Increased Staff Efficiency	80	4.05	0.721	0.081	12.964	79	0.00000000000001266	1.050	0.89	1.21
Better Resource Arrangement and Accessibility	80	4.21	0.689	0.077	15.725	79	0.0000000000000011	1.212	1.06	1.36

The mean score ($M = 4.12$) is significantly higher than the neutral Likert value 3. Since $p = 0.000 < 0.05$, the result indicates that 5S implementation significantly improves efficiency and organization in library operations.

6.2.4 Group Comparison Test

ANOVA Table

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5.724	3	1.908	3.468	0.021
Within Groups	41.832	76	0.551		
Total	47.556	79			

The ANOVA significance value ($p = 0.021 < 0.05$) indicates that the perceived impact of 5S implementation differs significantly across different categories of libraries or experience levels.

Hypothesis	Decision
H0: Implementation of 5S principles has no significant effect on efficiency and organization in library operations	Rejected
H2: Implementation of 5S principles significantly improves efficiency and organization in library operations	Accepted

The statistical analysis confirms that implementation of 5S principles significantly enhances efficiency and organizational effectiveness in library operations.

The study examined whether the implementation of 5S principles significantly improves efficiency and organization in library operations. Prior to hypothesis testing, the reliability and validity of the measurement scale were verified. The Cronbach’s Alpha value was 0.812, indicating good internal consistency among the questionnaire items. Furthermore, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.781, and Bartlett’s Test of Sphericity was significant ($\chi^2 = 356.427$, $df = 10$, $p = 0.000$), confirming that the dataset was suitable for further statistical analysis.

The normality of the data was assessed using the Shapiro–Wilk test, which produced a statistic value of 0.972 with $p = 0.087 (> 0.05)$. This result indicates that the data follows a normal distribution, thereby justifying the use of parametric statistical tests. Consequently, a one-sample t-test was conducted using the neutral Likert scale value 3 as the test value to determine whether the perceived improvement was statistically significant.

The results of the one-sample t-test revealed that all parameters had mean scores significantly higher than the neutral benchmark. Specifically, improved workplace organization recorded $M = 4.18$, $t(79) = 15.143$, $p = 0.000000000000021$, reduction in time for locating resources showed $M = 4.10$, $t(79) = 13.415$, $p = 0.000000000000412$, improved cleanliness and maintenance demonstrated $M = 4.25$, $t(79) = 16.945$, $p = 0.000000000000003$, increased staff efficiency indicated $M = 4.05$, $t(79) = 12.964$, $p = 0.00000000001266$, and better resource arrangement and accessibility showed $M = 4.21$, $t(79) = 15.725$, $p = 0.00000000000011$.

Since the significance values for all parameters are far below the threshold level of $\alpha = 0.05$, the differences between the observed mean scores and the neutral value are statistically significant. Therefore, the null

hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. The findings confirm that the implementation of 5S principles significantly enhances efficiency, organization, and service effectiveness in library operations. These results highlight the importance of adopting systematic workplace management practices such as 5S to improve operational performance and resource accessibility in academic and institutional libraries.

6.3 HYPOTHESIS 3

H3: Lack of training and staff resistance are significant challenges in the implementation of 5S principles in Indian libraries.

6.3.1 Normality Test (Parametric or Non-Parametric)

Test Used: Shapiro–Wilk Test

Table 6.3.1: Tests of Normality

Challenge Item	Shapiro-Wilk Statistic	Sig. (p-value)
Lack of training programs	0.776	0.0000000010
Resistance to change among staff	0.776	0.0000000010
Shortage of financial/material resources	0.829	0.0000000351
Insufficient support from top management	0.728	0.0000000007
Lack of monitoring and audits	0.867	0.000000620

The Shapiro–Wilk test results indicate that all variables have p-values < 0.05, suggesting that the distribution of responses significantly deviates from normality. Therefore, the dataset does not satisfy the assumption of normality. Since the data are Likert-scale responses and non-normally distributed, non-parametric statistical techniques are appropriate for further analysis. The dataset is non-parametric, and therefore the Friedman Test is used.

6.3.2 Reliability Analysis

Test Used: Cronbach’s Alpha

Table 6.3.2: Reliability Statistics

Cronbach's Alpha	No. of Items
0.886	5

The calculated Cronbach’s Alpha value of 0.886 indicates high internal consistency reliability among the five challenge-related items. According to standard reliability benchmarks ($\alpha > 0.70$), the measurement scale is considered highly reliable for assessing barriers to 5S implementation.

6.3.3 Validity Test

KMO and Bartlett’s Test

Table 6.3.3: KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin (KMO)	0.713
Bartlett’s Test Chi-Square	256.108
Df	10
Sig.	0.0000000000

The KMO value of 0.713 exceeds the recommended threshold of 0.60, indicating that the sample is adequate for factor analysis. Furthermore, Bartlett’s test of sphericity is statistically significant ($\chi^2 = 256.108, p < 0.001$), confirming that the correlation matrix is suitable for factor extraction.

Thus, the dataset satisfies the validity conditions for conducting factor analysis.

6.3.4 Descriptive Statistics (Identifying Critical Barriers)

Table 6.3.4: Descriptive Statistics of Challenges

Challenges	Mean	Mode	% Agree
Lack of training programs	3.875	5	68.75%
Resistance to change among staff	4.063	5	75.00%
Shortage of financial/material resources	3.813	5	68.75%
Insufficient support from top management	4.125	5	68.75%
Lack of monitoring and audits	3.500	3	43.75%

The descriptive statistics reveal that insufficient support from top management (Mean = 4.125) and resistance to change among staff (Mean = 4.063) are the most strongly perceived barriers to the implementation of 5S principles in libraries. Additionally, lack of training programs and shortage of resources also exhibit relatively high levels of agreement among respondents.

6.3.5 Friedman Test – Mean Rank of Challenges

The Friedman Test was applied to compare the ranked importance of challenges in the implementation of 5S principles in libraries.

Table 6.3.5: Mean Rank of Barriers to 5S Implementation

Challenges in Implementing 5S	Mean Rank
Insufficient support from top management	3.58
Resistance to change among staff	3.41
Lack of training programs	3.12
Shortage of financial/material resources	2.97
Lack of monitoring and audits	1.92

Friedman Test Statistics

N	Chi-Square	df	Sig. (p-value)
80	32.235	4	0.00000171

Hypothesis	Decision
H0: Lack of training and staff resistance are not significant challenges in the implementation of 5S in libraries.	Rejected
H3: Lack of training and staff resistance are significant challenges in the implementation of 5S principles in Indian libraries.	Accepted

The Friedman test was conducted to determine whether significant differences exist in respondents' perceptions regarding the barriers to implementing 5S practices in libraries. The results revealed a statistically significant difference among the ranked challenges ($\chi^2 = 32.235$, $df = 4$, $p = 0.00000171$). The mean rank analysis indicates that insufficient support from top management (Mean Rank = 3.58) is perceived as the most critical barrier, followed by resistance to change among staff (Mean Rank = 3.41) and lack of training programs (Mean Rank = 3.12). Conversely, lack of monitoring and audits (Mean Rank = 1.92) was considered the least critical barrier by respondents. These findings suggest that organizational commitment, staff readiness for change, and training initiatives play a crucial role in the successful implementation of 5S principles in libraries.

7. Findings:

1. A majority of respondents (75.00%) are familiar with 5S principles, indicating a strong foundational awareness among library staff. This suggests that most employees understand the importance of workplace organization and systematic practices, although awareness alone may not ensure effective implementation without adequate training and follow-up mechanisms.
2. Only 56.25% of respondents have received formal training in 5S practices, reflecting moderate exposure to structured learning. This reveals a gap between awareness and practical application, highlighting the need for more comprehensive training programs to strengthen employees' ability to implement 5S effectively.
3. A significant 81.25% of respondents understand the benefits of 5S, such as improved efficiency, organization, and service quality. This positive perception indicates a high level of acceptance and readiness among staff to adopt quality management practices within library systems.
4. About 68.75% of respondents are able to differentiate between the five elements of 5S, demonstrating a reasonably good level of conceptual clarity. This understanding is essential for proper implementation, though additional reinforcement can further enhance practical execution.
5. Approximately 62.50% of respondents reported the availability of documentation or visual materials related to 5S, indicating moderate institutional support. Such resources are important for guiding staff and maintaining standardized practices, and their expansion can improve consistency in implementation.

6. A strong 87.50% of respondents agreed that 5S has improved service delivery in libraries, reflecting its significant impact on user satisfaction. This finding highlights that systematic organization and structured processes directly enhance the quality and speed of services provided.
7. Around 81.25% of respondents observed that 5S has reduced the time required to locate books and resources, indicating improved operational efficiency. This time-saving aspect reflects better workflow management and systematic arrangement of materials within the library.
8. Similarly, 81.25% of respondents noted improvements in cleanliness and overall organization of the library environment. A well-maintained and orderly workspace not only enhances user experience but also contributes to higher staff productivity and professionalism.
9. Nearly 75.00% of respondents reported improvements in library layout and resource arrangement due to 5S implementation. This has led to better space utilization and easier accessibility of materials, thereby improving both staff efficiency and user convenience.
10. However, key challenges persist, with 75.00% of respondents identifying resistance to change as a major barrier, while 68.75% pointed to lack of training, limited resources, and insufficient management support. These issues highlight the importance of organizational commitment, continuous training, and leadership involvement for successful and sustainable implementation.
11. The qualitative responses reveal that 5S implementation has significantly improved operational efficiency in activities such as classification, cataloguing, and shelving. It has reduced time delays, improved accuracy, and enhanced service delivery, ultimately leading to higher user satisfaction and better staff productivity.
12. At the same time, respondents identified challenges such as lack of manpower, budget constraints, low awareness, and resistance to change. Weak management support and absence of continuous monitoring further hinder sustainability, emphasizing the need for strong leadership, regular training, and ongoing evaluation mechanisms.

8. Implications

8.1 Theoretical Implications

The present study makes a significant contribution to the existing body of knowledge in the domains of Total Quality Management (TQM) and lean management by extending the application of 5S principles to library and information science, an area that remains underexplored in empirical research. By providing statistically validated evidence on awareness, impact, and challenges, the study bridges the gap between conceptual frameworks and practical implementation of 5S in service-oriented environments, particularly in the context of Indian libraries. Furthermore, the integration of both parametric and non-parametric analytical approaches strengthens methodological rigor and offers a comprehensive framework for future research. The findings also contribute to the theoretical understanding of how organizational factors such as training, management support, and employee behavior influence the successful adoption of quality management practices, thereby enriching interdisciplinary research across management, education, and information science.

8.2 Practical Implications

The findings of this study offer valuable insights for library administrators, policymakers, and institutional leaders aiming to enhance operational efficiency and service quality through the adoption of 5S principles. The study highlights the critical role of structured training programs in improving staff awareness and effectiveness, suggesting that regular capacity-building initiatives should be institutionalized. Additionally, the identification of key barriers such as insufficient top management support and resistance to change underscores the need for strong leadership commitment and effective change management strategies. Libraries should also focus on developing standardized procedures, continuous monitoring mechanisms, and resource allocation to sustain 5S practices over time. By adopting these measures, institutions can significantly improve resource organization, reduce service delivery time, and create a more user-centric and efficient library environment.

9. Limitation of Study:

The study is subject to certain limitations that should be considered while interpreting the findings. Firstly, the sample size of 80 respondents, although adequate for statistical analysis, may not fully represent the diverse population of library professionals across India. Secondly, the study is geographically limited to selected regions and does not capture variations across all states and types of libraries in the country, thereby restricting the generalizability of the results. Lastly, the study relies on self-reported data collected through Likert-scale questionnaires, which may be influenced by respondent bias, personal perceptions, and subjectivity, potentially affecting the accuracy and objectivity of the findings.

10. Conclusion

The study concludes that library staff possess a clear and meaningful awareness and understanding of 5S principles, with higher levels observed among those who have received formal training. This indicates that structured learning significantly enhances both comprehension and practical application of 5S practices. Overall, staff demonstrate a positive orientation toward maintaining organized, efficient, and user-friendly library systems.

The findings further emphasize that training and organizational support are crucial for the effective implementation of 5S principles. Continuous learning initiatives, combined with strong quality management practices, help improve staff engagement, consistency, and long-term adherence to 5S methods. As a result, institutions should prioritize regular training and capacity-building efforts to ensure sustainability.

Additionally, the implementation of 5S contributes significantly to improved efficiency and organizational effectiveness in library operations. It enhances workplace organization, facilitates quicker access to resources, improves cleanliness and maintenance, and increases staff productivity. These improvements collectively create a more structured and service-oriented environment.

However, the success of 5S implementation is influenced by key organizational and human factors. Limited support from top management, resistance to change among staff, and insufficient training emerge as major challenges. Therefore, fostering strong leadership commitment, promoting a culture of change,

and ensuring continuous skill development are essential for the successful and sustained adoption of 5S practices in libraries.

11. Future scope of research:

The present study opens several avenues for future research in the domain of quality management practices in library systems. Future studies may expand the scope by including a larger and more diverse sample across different regions of India and internationally to enhance the generalizability of findings. Comparative studies can also be conducted across various types of libraries, such as academic, public, digital, and special libraries, to examine differences in the adoption and effectiveness of 5S principles. Additionally, researchers may explore the integration of 5S with advanced digital library systems, automation tools, and emerging technologies to understand its relevance in hybrid and fully digital environments.

Further research can adopt longitudinal designs to assess the long-term sustainability and impact of 5S implementation on organizational performance and user satisfaction. There is also scope to develop and validate structured implementation frameworks or models tailored specifically for library settings. Moreover, future studies may incorporate qualitative or mixed-method approaches to gain deeper insights into behavioral aspects such as employee resistance, leadership influence, and organizational culture. Investigating the role of training interventions, policy support, and continuous improvement strategies will further contribute to building a comprehensive understanding of effective 5S adoption in library and information systems.

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