

CHAPTER 8

CONCLUSION

8.1 INTRODUCTION

This research work was focused on design and development of computational based 6-S auditing methodology and improving 6-S performance through A3 reports. During the first stage of research work 6-S audit work sheets were developed and implementation study was conducted at LCA Production group in HAL, Bangalore. After the development of '6S-Safety house', the implementation study was conducted at various divisions of HAL, Bangalore to conform its performance. Similarly, '6S-Safety Library' was implemented in various libraries functioning under HAL, Bangalore. Following this, an implementation study was conducted at Tool crib, LCA Production Group in HAL, Bangalore for introducing A3 Repots in 6-S activities to determine improvement in performance. This report consists of four implementation studies.

However, due to the paucity of time and difficulty in undertaking extensive traveling, the data on the performance of 6-S activities could be gathered only at HAL, Bangalore. This chapter includes the conclusion of this research work and further work required in this research scenario.

8.2 PROGRESSION FROM 2-S TO 6-S

The implementation of these five S's companywide can yield marvelous results – preventing accidents, reducing down time, enhancing operational control of processes, and creating a healthier corporate climate (Osada 1989). The 5-S principles are the basic requirements for increased efficiency in producing better quality products and services with little waste. The success of 5-S is shown by its recognition in industries. Toyota is one of the pioneering firms to adopt the 5-S principles (Sui-Pheng and Khoo 2001; Warwood and Knowles 2004; Engelman 1993; Womack and Jones 2003).

Lean Manufacturing, TPM, TQM, JIT, Kaizen, Six Sigma and Environmental Management Audit Schemes include 5-S as a base for their successful implementation (Abramovitch 1994; Dennis and Nick 2004; Klefsjo et al 2001; Vais et al 2006). Safety is one of the most important aspects in the 5-S activity. Sort and Simplify help in improving safety (Osada 1991). Ho (1997) points out that shitsuke (Sustain) is an integral part of industrial safety.

8.3 SOLUTION FOR RESEARCH PROBLEMS

At the commencement of this research work four questions were posed as the Research problem. During the course of this work solutions were obtained for all the questions (Table 8.1).

Table 8.1 Research Question and Obtained solution

Q.No.	Research Question	Obtained solution
1.	What are the check points to be introduced in the 5-S audit work sheet to improve the industrial safety along with house keeping?	World's first 6-S-audit work sheet was developed for Shop floor, Stores and Office. It includes ten check points for Safety (Table 3.6, 3.12,3.18).
2.	Why are standard deviations of audit scores high when auditing is carried out in same areas by different auditors?	Due to the non-customized audit worksheets and usage of common audit sheets for different work environments. To overcome this problem, a customized software based audit system was developed with check points (Table 3.21, 3.22, 4.4 and 4.5)
3.	Why are most of the Service sectors not implementing 6-S even though the implementation is easier than in Manufacturing sectors?	Due to the non availability of an effective auditing system for service sectors like Library and Hospitals. '6S-Safety Library' was developed from '6S-Safety house'(Fig – 5.2 to Fig 5.7).
4.	What are the methods to be followed for improving the performance of 6-S activities through proper communication?	A3 Reports help in improving communication during the 6-S activities. It has been proven by implementation studies. (Table - 6.2 and Table - 6.3)

8.4 BENEFITS OF '6S-SAFETY HOUSE' AND '6S-SAFETY LIBRARY'

The following positive effects were observed after the implementation of '6S-Safety house' software at HAL, Bangalore:

- Absence of conflicts between auditor and zone responsible person during the audit.
- Easy understanding of zone responsibilities with respect to area of improvement because of clear and multiple check points.
- 'Safety' awareness created among the personnel.
- Autonomous audit is possible.
- Auditor had 100% confidence on the assessment.
- Cases requiring 'Not Applicable' were totally eliminated because of area wise (Shop floor, Office and Stores) specific audit system.
- Easy understanding of 6-S principles by the personnel.
- Sustenance has improved.

The following improvements were observed after the implementation of the '6S-Safety Library' software at HAL, Bangalore:

- Reduction in man and books movement in the Library.
- Reduction in cycle time for issuing books.
- Reduction in searching time.
- Reduction in number of Hands off.
- Improvement in 'Safety' awareness.
- High customer satisfaction.

8.5 BENEFITS OF A3 REPORTS IN 6-S ACTIVITIES

The following benefits were identified while implementing A3 reports in 6-S with in the organization during the case study:

- A perfect match for any type of issue or process improvement.
- Encouragement for personnel in identifying problems.
- Stimulation group dialog for addressing issues.
- Elimination of jumping to solutions before even defining the root causes.
- Empowerment of the personnel for sharing responsibilities to improve their work.
- Improvement in the thought process together.
- New mentors could be identified and encouraged.

8.6 SCOPE FOR FUTURE WORK

The implementation study for ‘6S-Safety house’ was confined to an Aeronautical company; the results of this research work needs to be confirmed by conducting further audits in different types of industries and institutions. The implementation study for ‘6S-Safety Library’ was restricted to an Industrial Library; therefore it is essential that the results of this research work be confirmed by conducting further audits in different types of Libraries.

Even though this auditing system is effective for all types of industries and service sectors, it may be time consuming for big plants like Thermal power plants, Cement factory and Steel Plant. To overcome this

problem, fuzzy assessment needs to be developed for 6-S auditing. Further work should include introduction of a seventh 'S', Security, in the auditing.

8.7 CONCLUSION

Indian organizations are calculating huge rejection rates in terms of percentages instead of Parts Per Million (PPM) because of passiveness in quality improvement supporting tools like 6-S (Vinod 2009). The success of 6-S implementation depends on personnel involvement and motivation, which in turn depends on proper communication and sharing of knowledge. However Standardization and Sustain activities focused on these factors followed by auditing the gap is still an option in 6-S improvement process.

Even though Safety has been considered as a part of 5-S, no system is available for 6-S auditing and is often a shaky subject since the audit scores would depend on the expectations of the auditor. A good communication methodology is required for improving the performance of 6-S activities. Moreover it is mandatory that the auditing system be customized. To minimize this subjectivity, this research work has led to the design of 6-S Audit Worksheets for Shop floor, Stores and Office and development of a software named '6S-Safety house'.

Many service industries have already implemented 6-S principles in their regular activities. This research work developed a software named '6S-Safety Library' which helps in promoting 6-S activities in service sectors like libraries. The implementation results show that this auditing system helps in reducing deviation in the audited scores. This research work also resulted in development of A3 reports for improving the performance of 6-S activities through proper communication and helped in showing

large amount of information in a well-organized manner to management and people working in the organization.

It may be concluded that 6-S auditing software helps in avoiding the ambiguity in the 6-S auditing system thereby ensuring maximum efficiency and reliability, and that A3 report is one of the best tools for improving the 6-S activities at a faster rate.