

## **CHAPTER 2**

### **LITERATURE SURVEY**

#### **2.1 INTRODUCTION**

Basically 5-S related to performance improvement through an appropriate house keeping methodology. Though 5-S was considered as TQM tool, today it is foundation of all quality related improvement techniques. In spite of its popularity and application, 5-S has been subjected to research by very few. Hence, 5-S concepts may fade away from research first and then from practical application areas. To over come this situation, this research includes an annotated bibliography of books, journal articles and internet resources dealing with the progression of 5-S.

#### **2.2 BOOKS AND BOOK CHAPTERS ON 5-S**

**Osada, T. The 5S's: Five Keys to a Total Quality Environment, Asian Productivity Organization, Tokyo, 1991.**

This book coined the concept as the five principles to a total quality environment. Seiri, Seiton, Seiso, Seiketsu and Shitsuke are the five Japanese words which are collectively called the 5-S principles. The best part of this book is, it explores the basic philosophy behind the 5-S campaign, explains how every workplace can benefit from its use, discusses

how a company can mount a successful 5S movement, and deals into each of the 5S's in detail. The role the 5S's play both on the shop floor and in the office environment is also included.

This book describes how the implementation of 5S helps to identify hidden problems that may have otherwise remained unnoticed. Some of the important benefits of implementing 5S are summarized as:

- Orderliness (Seiri and Seiton) – to maximize efficiency and effectiveness by reducing people's workload and human errors through simplifying processes;
- Cleanliness (Seiso and Seiketsu) - to maximize effectiveness by contributing to a healthier life, safety and wellbeing as well as enhancing transparency; and
- Discipline (Shitsuke) – through training and education to enhance the level of morale which leads to increased quality of work / life and work standards.

**Hirano, H. Five Pillars of the Visual Workplace: The Source book for 5S Implementation, Productivity Press, Portland, Oregon, 1995.**

This book has been written for three categories of readers:

- (i) People active in the rationalization factories, clerical offices, and sales offices.
- (ii) Top managers who are ultimately for their companies.
- (iii) Professional rationalization consultants.

This book describes cases where the 5S's are not implemented thoroughly to impress how fundamental they are to corporate survival.

The 5-S's remain the basic formula for organization and orderliness are still the foundation for achieving zero defects, cost reduction, safety improvements, and zero accidents. Hirano combines Total Quality Control (TQC) with Total Productivity Maintenance (TPM) and 5S's. The best part of this book is implementation of checkpoints for each 'S'. Several case studies illustrate the establishment of 5-S promotion organization.

This book covers tools and techniques for making the first two Ss more visible; namely, the red-tag strategy and the signboard strategy and it also includes 5S promotion tools for building sustenance. The conclusion of this book is world class facilities beginning with the 5S's, and facilities that fail, fall apart beginning with the 5S's.

**Imai, M. Gemba Kiizen: A common Sense, Low cost Approach to Management, McGraw-Hill, London, 1997.**

Imai attributes 5-S as an integral part of the workplace management and critical to the kaizen process. Further more, Imai states that a lack of 5-S in kaizen leads to inefficiency, waste, low morale, poor quality, high costs and an inability to meet delivery terms.

**Larry, R. and Madelyn, M. Implementing World Class Manufacturing: A Bridge to Your Manufacturing Survival, WCM Associates, Fort Wayne, Indiana, 1999.**

This shop floor manual explores housekeeping and workplace organization that are directly linked to achieve discipline in manufacturing. World Class Manufacturing cannot be achieved without the discipline and culture of 5S in place. It concludes, probably 50% or more of the time

saved in the setup reduction module is achieved by externally “organizing” and being ready with everything in its place to do the setup. The best part of this book is 5S implementation rules. This book describes nine rules related to Leadership, Training, Facility, Continuous improvement, ‘Ceiling down’ strategy, Auditing, Reward and Sustain.

### **2.3 MAGAZINE AND JOURNAL ARTICLES ON 5-S**

**Ho, S.K.M. and Cicimil, S. “Japanese 5-S practice”, The TQM Magazine, Vol.8, No.1, pp.45-53, 1996.**

This article introduced the 5-S implementation with five steps; they are top management commitment, a promotion campaign, keeping records, 5-S training and evaluation of the results. This article consists of two case studies to explain the implementation of 5-S and its benefits. First case demonstrates how the 5-S was successfully put into practice in a large organization which consequently became a standard. Second example shows that the 5-S can be related to any working background if there is a common objective. Ho states that evaluation of 5-S should be simple and also ensure the total quality environment. 5-S helps to improve the quality and productivity along with safety work place and no waste.

**Ho, S.K.M. “Workplace learning: the 5-S way”, Journal of Workplace Learning, Vol.9, No.6, pp.185-91, 1997.**

This article provides a translation of the 5-S as: Seiri - organization, Seiton - neatness, Seiso - cleanliness, Seiketsu - standardization and Shitsuke - discipline. It also describes 5-S in western organization, even though they have already practiced some 5-S aspects.

Ho concluded that 5-S audit sheet is essential tool to implement 5-S which is foundation of all quality improvement programmes like TQM in both manufacturing and service organizations. Shitsuke (discipline) is considered as integral part of industrial safety. The author also insists that every one has the habit of following safety rules.

**Ho, S.K.M. “5-S practice: a new tool for industrial management”, *Industrial Management and Data systems*, Vol.98, No.2, pp.55-62, 1998.**

This article explain the 5-S audit methodology and implementation of 5-S in Hong Kong industries and also commission of a 5-S practice work book which is developed by the author. Ho states that 5-S helps to impress the customers and also to create an effective quality process which is the foundation of good products and services. Implementation of 5-S improves the industrial management along with the physical environment improvement. The 5-S audit sheet includes a safety check point under 5<sup>th</sup>S as “Wear your safety helmet/ gloves /shoes etc.”

**Ho, S.K.M. “The 5-S auditing”, *Managerial Auditing Journal*, Vol.14, No.6, pp.294-301, 1999.**

The objective of this paper is to describe the 5-S auditing methodology so that it can be understood and implement easily. This paper includes the world’s first 5-S audit checklist and also presents ten successful case studies conducted in Hong Kong business environment by the industry department. Ho concludes that the 5-S is the foundation of TQM and the practice of 5-S helps everyone in the organization to live a better life.

**Ho, S.K.M. “Techniques: Japanese 5-S – where TQM begins”, The TQM Magazine, Vol.11, No.5, pp.311-320, 1999.**

The author introduced the new 5-S paradigm which can broadly be summarized by five key steps: action, behavior, mission, vision and culture. This paper describes the 5-S campaign in Hong Kong which is fully supported by Hong Kong Government to improve the competitiveness of industries. This article also shared the experience of 5-S lead auditors training and case studies from the manufacturing, services and public sectors.

**Kwang, K.L., Pervaiz, K.A. and Mohamed, Z. “Techniques – Managing waste and looking beyond: the IMI approach”, The TQM Magazine, Vol.11, No.5, pp.304-310, 1999.**

This article describes that Japanese organizations practicing 5-S principles to obtain reduction in wastages and high quality production by efficient utilization of machinery and equipment. The authors introduced frame work for 5-S which contains Investigation cycle, Method cycle and Implementation cycle (IMI cycle). This framework helps to develop a total improvement program, employee involvement and continuous improvement. It also states that results of 5-S can be driven through Methods, Man, Machines and Materials (4M elements). Experience of 4Ms helps to identify the key areas that need to be improved by 5-S.

**O'hEocha, M. "Case studies – a study of the influence of company culture, communications and employee attitudes on the use of 5-Ss for environmental management at Cooke Brothers Ltd", The TQM Magazine, Vol.12, No.5, pp.321-330, 2000.**

This article clearly states that 5-S practice is one of the necessary activities for Environmental Management System (EMS). The author lists the benefits of 5-S which includes easy retrieval of items, improved employee involvement, reduction of waste, elimination of pollution, improved house keeping and safety working environment. This article also describes the barriers of 5-S implementation as middle management involvement, organization structure, poor planning, space constrain, poor communication, lack of motivation and low morale.

**Sui Pheng, L. "Towards TQM – integrating Japanese 5-S principles with ISO 9001:2000 requirement", The TQM Magazine, Vol.13, No.5, pp.334-340, 2001.**

This article discusses the similarities between 5-S principles and ISO 9001:2000 requirements. It also states that the integration of 5-S with ISO 9001:2000 leading to TQM and also proposes a checklist for integration. Sui concludes that this integration helps to impress the ISO 9001:2000 external auditors when they made initial visit in the organization, regularize the maintenance activities and review of quality management system implementation.

**Sui Pheng, L. and Khoo, S.D. “Team performance management: enhancement through Japanese 5-S principles”, *Team Performance Management: an international journal*, Vol.7, No.7/8, pp.105-111, 2001.**

This article describes that how 5-S principles are utilized to improve the team performance management to obtain the organizational goals. It also states that 5-S helps to increase the employee participation for generating new ideas to develop the organization and also produce better quality products and services. The authors state that the 5-S audit worksheet to be customized which is suitable for individual department or working environment. This audit sheet should ensure that all aspects are included and also easy to complete the auditing with less cycle time.

It also suggests that the audit sheet is to be revised when new ideas are introduced and 5-S audit scores should be analyzed statistically to study performance of 5-S activities. This article concludes that 5-S helps to improve the working condition and efficiency which results higher quality, thus attracting more customers and also increasing output and profits.

**Peter, B. and Mick, W. “Facilities change- implementing 5-S: an Australian case study”, *Managing Auditing Journal*, Vol.17, No.6, pp.329-332, 2002.**

This article reports out a case study on 5-S implementation in Australian offices. It also describes the integration between 5-S principle and the organization internal culture changes. The authors states that the Australian offices introduced 5-S practice in their business to improve the process and TQM. They also suggest that 5-S audit sheet to be modified to achieve the objectives of organization for improve the total involvement.

This case study concludes that 5-S was implemented at the right time and correct reasons to achieve the objectives of the strategic business plan in the Australian organizations.

**Warwood, S.F. and Knowles, G. “Research and concepts – An investigation into Japanese 5-S practice in UK industry”, The TQM Magazine, Vol.16, No.5, pp.347-353, 2004.**

This article provides the results of 5-S practice for work place in the UK organizations. It listed out the benefits of 5-S, which includes better house keeping, safe working environment, high quality, improved efficiency, high productivity, elimination of waste, reduction in lead time, improved work flow, change in working culture, visual factory, improved customer satisfaction, and standard operations. The authors states that 5-S is a tool for improve the industrial safety and it also helps to eliminate the safety hazards in the working process. 5-S is a initiative activity for Lean manufacturing, ISO 9001 /14001, TQM, Just-In-Time (JIT), TPM and Six Sigma. This article concludes that scope for application of 5-S in more in the non-manufacturing environment and the success of 5-S implementation depends on the maturity of the 5-S programme.

**Nimnath, W., Wimal, K. and Yujiro, H. “A performance improvement programme at a public hospital in Sri Lanka: an introduction”, Journal of Health Organization and Management, Vol.18, No.5, pp.361-369, 2004.**

This article describes the performance improvement at the hospital which won several national awards for better service. This study identifies that one of the key reasons for improvement is 5-S. It also states

that 5-S activity rearranges the system completely compared to most of the continuous quality improvement (CQI) approach which focus on the problem solving techniques. The authors conclude that 5-S helps to initiate the CQI process.

**Nihar, K.P., Jayanta, K.T. and Choudhay, B.K. “Implementing the office total productivity maintenance (Office TPM) program: a library case study”, *Library Review*, Vol.54, No.7, pp.415-424, 2005.**

This paper summarized the office TPM implementation in Indian Institute for Production Management library, India. It also describes the benefits of office TPM in Library and also explains the methodology and roadmap used during the implementation. The authors states that office TPM is considered as the sixth pillar of TPM and it helps to improve the administrative efficiency. In this article the library is considered as plant and magazines, books, computer peripherals, photo copiers and binding are considered as equipments. The implementation of 5S helps to obtain the higher customer satisfaction by improving the efficiency of the system during office TPM. It concludes that the effectiveness of the library can be improved through zero delay, zero error and zero waste through the involvement of every one in the library during the 5-S practice.

**Suresh Permil Kumar, R., Sudhahar, C., John, F.D., Senthil, V. and Devadasn, S.R. “Performance analysis of 5-S teams using quality circle financial accounting system”, *The TQM Magazine*, Vol.19, No.5, pp.483-496, 2007.**

This article describes the utilization of Quality Circle Financial Accounting System (QCFAS) for the evaluation 5-S performance and also

the implementation study in an Indian company. The authors states that the research on 5-S has been only moderate even though it is considered as initiation of all quality related improvement activities. This article mentioned that the reason behind the poor uptake of 5-S is due to the non availability of proper performance evaluation method.

The authors states that the success and failure of 5-S depends on communication, organization culture and attitudes of employee. This article found that other than O'hEocha (2000) and Ho (1999), no one studied the 5-S evaluation method. The concludes states that QCFAS is a useful tool for evaluating the performance of 5-S teams in terms of profit and loss account and the balance sheet.

**Handa, Y., Karandagoda, K.K.W., Pathirage, P.P., Tennakoon, N.C.K. and Pullaperuma, D.S.P. "TQM emphasizing: 5-S principles", International Journal of Operations & Production Management, Vol.24, No.9/10, pp.994-1011, 2007.**

This article describes the evaluation of organizational development programme, analyze how it helps to improve management activities and identify factors that influenced at the public hospital which had the highest total factor productivity growth in Sri Lanka during 1997 to 2001. In this case study, Balanced Score card methods is applied to evaluate the performance of the hospital. The changes in organizational management following TQM implementation is identified through value chain analysis.

The authors concluded that 5-S based TQM implementation contributed significant improvement in performance and it also helped to eliminate the existing problems through staff of public hospitals in

Sri Lanka. This article states that the implementation of 5-S is to be streamlined by effective leadership, training, team work and monitoring.

**Rod Gapp, Ron Fisher and Kaoru, K. “Implementing 5-S within a Japanese context: an integrated management system”, *Management Decision: an international journal*, Vol.46, No.4, pp.565-579, 2008.**

The objective of this article was to study the organizational and management awareness of 5-S in Japan by using computer aided lexical analysis. The result states that the overall involvement of Japanese management is high to implement 5-S. This article states that sixth S “Safety” helps to reduce the industrial accidents significantly. It also identifies 5-S having two elements in the Japanese organizations, one is high level management system and another is provision of techniques.

The authors described four key areas for development and implementation of the 5-S management approach they are management, activity, training and improvement. This article concludes that 5-S having more benefits for service sectors and the 5-S principles helps to achieve the various international standards with lower costs.

**Vinod Kumar, K. “5 ‘S’ and TQM status in Indian organizations”, *The TQM Journal*, Vol.21, No.5, pp.486-501, 2009.**

This article describes the implementation of TQM, quality tools and 5-S in large, medium and small organizations of India. This study was conducted through survey and the results states that only 43 percent of Indian organizations are following 5-S techniques even though it is considered as foundation of Total Quality Management (TQM). The author

sates that the Indian organizations are monitoring the rejections in terms of percentage instead of part per million (ppm). This survey identifies that the TQM index for large, medium and small scale organizations are 560, 467 and 320 in India. Vinod Kumar described that the correlation between 5-S and TQM index and quality tools is very high. The author concludes that poor uptake of 5-S is one of the reasons for lower TQM index of Indian organizations.

## **2.4 PROGRESSION OF 5-S**

In Japan, initially first 3S of 5-S principles was introduced as a management system during 1950s and 3-S is considered as a house keeping phase of continuous improvement. Afterwards, 4<sup>th</sup>s and 5<sup>th</sup>S was introduced along with Kaizen and Visual methods (Kodama 1959; Ohno 1988; Miki 1995; Nikkan 1991). In this stage, the Japanese believed 5-S principles helped to improve their thinking process also (Ho et al 1996). Imai (1997) states that lack of 5-S in continuous improvement leads to inefficiency, waste, low morale, poor quality, high costs and an inability to meet delivery terms. Corbett and Rastrik (2000) describe the long held consensus that culture is an important of business success and quality improvement. The 5-Ss in theory are a set of straightforward steps to continual improvement.

Previous researches have reported that 5-S was a tool for work place organization to improve the quality environment (Becker 2001; Chin and Pun 2002; da Silveira 2006; Eckhardt 2001; O'hEocha 2000). It is considered as a first step for all quality improvement activities like TQM, TPM (Ho et al 1996; Osada 1989; Warwood and Knowles 2004; Bamber et al 2000; Nihar et al 2005; Chin and Pun 2002; Cindy

et al 2005; Nimath et al 2005), Six Sigma, JIT (William 2003; Cowton et al 1994; White and Pearson 2001) and Lean (Kathleen et al 1999; Hines et al 2004; Pavnaskar et al 2003; Mazany 1995; Melton 2005; Ron Basu 2008; Waring et al 2010; Don and Anne 2005). 5-S principles includes all the clauses of ISO 9001 and ISO 14001 (Sui-Pheng 2001; Zutshi and Sohal 2005; David Hoyle 2005; Tice et al 2005). 5-S implementation helps to identify the covered problems (Rod Gapp et al 2008; Andrew et al 1996) and considered as problem solving tool (Hyland et al 2000). 5-S is a high level management method that enhances both management decisions and strategy (Hirano 1998; Zutshi and Sohal 2005) and is a tool for safety (Ansari and Moldareess 1997; Karen 1996).

The 5-S principles help to show efficiency in time, transferring the working environment and improving the spirits of all employee levels. It focuses on elimination of delay, error and waste through employee participation (Nihar et al 2005), and to improve the industrial management process (Ho 1998). 5-S benefits described by various articles are safe working environment, visual improvement, smoother work flow, improved quality, productivity, cultural change, reduced lead times, improved staff involvement, pollution prevention fast retrieval time and less environmental risk (O'hEocha 2000; Ho 1997; Suresh et al 2007; Bamber et al 2000; Nihar et al 2005; Osada 1991; Sui-Pheng and Khoo 2001; Warwood and Knowles 2004). Hence, 5-S is the need of the hour. The barriers of 5-S practice are lack of employee's attitude, low morale, improper communications, poor planning, limited resources, lack of recognition and poor management structure (Warwood and Knowles 2004; O'hEocha 2000).

Furthermore, equipment setup times can often be drastically reduced by implementing 5-S. Valuable time is lost in searching and gathering the

tools and supplies needed to perform the setup. 5-S is also a crucial part of total productive maintenance. While operators are doing the cleaning they should also inspect the equipment – listening and watching for anomalies and taking action before a breakdown occurs (Ho et al 1995; Rod Gapp et al 2008; Ron Moore 2007). Because of these reasons, a 5-S system forms an integral part of all improvement tools and also the foundation for Lean (Waring et al 2010; Mimi 2010; Tsu and Shane 2004; Cooney 2002; Ron Basu 2008; Esparrago 1988; Wenda and Linda 1992).

Implementation of 5-S programme is done by the following steps (Ho 1998; Warwood and Knowles 2004; O’hEocha 2000):

1. Obtain commitment from both the top management and every one in the organization.
2. Creating awareness on 5-S.
3. Draw up a promotional campaign.
4. Keeping records in the form of photos, charts, etc.,
5. Training on 5-S.
6. Evaluation of 5-S programme.

In the above steps, the last step of auditing is one of the important steps to sustain and improve the performance of 5-S activities. But, no literature touched this topic other than Ho (1999 a, b) and O’hEocha (2000). Peter and Mick (2002) pointed out Ho’s (1999 a) audit sheet require modifications to achieve the aims of the organization.

## 2.5 CONCLUSION

6-S is defined as a house keeping tool, lean tool, problem solving tool, management tool, tool for safety, quality improvement tool and etc. In simple, 6-S is a first step of all improvement activity. 6-S focuses on effective work place organization, simplification of the work environment, and reduction of waste while improving quality and safety. 6-S includes Lean, TPM, TQM, JIT, ISO 9001/14001 and Six Sigma. Hence, 6-S is the need of the hour.

The reason for the very low uptake of 6-S may be the missing of proper assessment mechanism. The degree of employees involvement depends on communication through proper auditing system However, apart from O'hEocha (2000) and Ho (1999) no one has dealt the 6-S auditing.

Sui- pheng and Khoo (2001) pointed out the following requirement for a best 5-S auditing system:

- Comprehensive evaluation should be in the form of checklist.
- Audit sheet should be customized for each department.
- Audit sheet should ensure that all aspects are covered.
- Auditing should take less time.
- Audit scores can be analyzed statistically.
- Audit sheet can be revised when new ideas are developed.
- Audit results should be visible and acceptable.

Ho included one check point for safety in the 5-S audit sheet. Osada mentioned that Sort and Simplify help to improve the safety. Implementation of sixth 'S' helped to reduce the industrial accidents noticeably. Even though a number of articles describe the benefits of 5-S is

in terms of Safety, no paper has dealt with Safety assessment along with 5-S audit to support the same. The above points clearly shows that this is an area where research work would be valuable to provide an effective auditing system which includes 6<sup>th</sup> 'S' as Safety.

In this context, three modules of work on 6-S were carried out and presented in chapters -3, 4 and 5 of this thesis. After completing these works a need of carrying out Toyota's A3 reports was realized. Accordingly a module of work on Toyota's A3 report was carried out. The research papers on A3 reports reviewed in chapter - 6.