

Implementation of 5S Methodology in Higher Education Institute

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Abstract - The significance of education in the development of a nation cannot be underestimated. It is education that develops expertise, excellence, and knowledge that lead to the universal development of any economy. Higher education institutes in India are also adopting quality measures to improve the quality of education. 5S is a systematic technique used by manufacturing as well as service organizations. The 5S process is the most fundamental component of the lean philosophy. 5S is the starting of a productive life for everyone. The present research studies the implementation of 5S in higher education institute. This system helped to organize the workplace and due to which there was decreased wastage, increased workspace, optimized quality as well as productivity was increased via monitoring and organized environment. It also provided visual evidence to obtain more results for the organization.

Key Words: 5S, Higher education institute, Likert scale.

1. INTRODUCTION

The significance of education in the development of a nation cannot be underestimated. It is education that develops expertise, excellence, and knowledge that lead to the universal development of any economy. This has created a necessity to develop strategies for the development of higher education in almost all the countries of the world (Ali et al., 2010) [1]. Thus the success of higher education institutions depends on how the educational leaders work to implement the strategies. Higher education, on one hand, can effectively provide the qualified human resource in the form of committed professionals to develop the economy of a country and on the other hand good citizens with great values to balance the economic and cultural development of the nation. However, the quality measures play a important role in the education provided by the higher education institutes. Therefore it becomes important to assure quality with sustainable improvement in higher education. Universities and higher education institutes in India are also adopting quality measures to improve the quality of education. India has the third largest higher education sector in the world. However, only a few higher education institutes like Indian Institutes of Technology and Indian Institutes of Management are providing world-class education (Dukkipati, 2010) [6]. Realizing the fast growth of the education sector in India, many private companies are looking for relevant acquisitions and alliances in this space. Major investments are being seen in the areas of pre-schools, higher education institutes, private coaching and tutoring, teacher training, development and provision of multimedia

content, educational software development, skill enhancement, IT training and e-learning.

1.1 Service Sector

The portion of the economy that produces intangible goods is known as the Service Sector. It is also called the tertiary sector which comes after the agriculture and manufacturing sectors. Service sector covers a wide variety of activities such as health care, tourism, trade, education, engineering, communications, transportation, information technology, banking, insurance, and management.

The Service sector in India today accounts for more than half of India's Gross Domestic Product (GDP). According to Media report press release data for the financial year 2015-2016, the share of services contributes to 53.3 percent of the GDP, whereas industry, and agriculture in shares 29.3 percent, and 17.4 percent respectively. This shows the importance of service industry to the Indian economy and as service sector now accounts for more than half the GDP marks a watershed in the evolution of the Indian economy and takes it closer to the foundational of a developed economy.

1.2 Research Objective

The objective of this study was to

1. Implement and evaluate the impact of 5S in a higher education institute.
2. Analysis of results obtained in the first step with the help of paired T-test.

2. LITERATURE REVIEW

2.1 About 5S - An Overview

5S is a philosophy of work that allows you to develop a systematic plan to continuously maintain the classification, order, and cleanliness, allowing immediately increased productivity, enhance security, climate labor, staff motivation, quality, efficiency and, accordingly, the competitiveness of the organization. This methodology was developed by Hiroyuki Hirano and is called 5S because of the initials of the Japanese words Seiri, Seiton, Seiso, Shitsuke Seiketsu meaning classification, order, cleanliness, standardization, and discipline.

Ho (1999) described the 5S practice as a technique to establish and maintain a quality environment in an

organization. 5S stands for five Japanese words, Seiri, Seiton, Seiso, Seiketsu and Shitusive that is a technique practiced in Japan for a long time. Most Japanese 5S professionals consider the 5S not only improves the physical also the thinking processes. After its immense popularity in Japan, its benefits spread across the western countries and translated in English. [9]

Zidel (2006) describes the 5S event as a sequence of activities starting with "Sort" where one gets rid of everything that is not used or will not be used in the next couple of weeks. [17] Esain et al. (2008) suggested sorting out necessary supplies in an area, and the unnecessary supplies are disposed of or moved. [7]

For better organization of workplace, Esain et al. (2008) suggested the first step is determining the volume of use of supply and placing frequently used supplies close to a workstation that can considerably reduce excess travel. [7]

Pheng and Khoo (2001) carried out an effective "Shine" 5S event by maintaining a good image of cleanliness, assigning individual responsibility for cleaning, discarding out unnecessary things, visibility in tracking problems, daily inspection, lubrication and cleaning equipment which is a part of preventive maintenance. [12]

Zidel (2006) referred to standardization as to establish procedures to keep the area organized. [17] This fourth phase also enables to standardize work routines such as equipment and material usage (Esain et al., 2008). [7]

Ho (1999) identified sustain as a practice of discipline in day-to-day activities. [9] The culture of the organization is very big factors that prescribe how this phase turns out for an organization (Cooper et al., 2007). It takes a very dedicated effort to keep 5S alive. [5]

People do not require having a high education to run 5S. Any position of the employees in the organization can obviously do it. Anyone in the firm should understand and practice 5S (Skaggs, 2010). A lot of researches show many advantages once the organization runs 5S such as creating organized workplaces (Skaggs, 2010), promoting the clean work environments (Barker, 2008), improving safety (Prabwo, N.D.), and increased product quality and productivity. 5S should be examined an everyday continuous improvement activity for individuals and small groups (Breyfogle, 2008). [16, 2, 3, 13]

Implementation of 5Ss leads to benefits such as less searching, decreased walking and motion, reduced downtime, fewer safety hazards and accidents, improved flow, fewer mistakes, and better utilization of space (Chapman, 2005). [4] This framework also improves safety in the workplace, and according to Hirano without the organization and discipline provided by implementing 5Ss other lean tools and methods will probably fail (Shil, 2009). [15]

2.2 5S in Education Sector – An Overview

According to Gapp et al. (2008) Regardless of the organization size or type, 5S can be used for upgrade activities within environments such as homes, schools, communities, and workplaces. [8]

Jiménez et al. (2015) shows the experience in 5S methodology implementation in order to optimize the work and safety of the university engineering laboratories. Teaching, control and maintenance of the resources and activities involved were performed in less time and with a considerable reduction of cost after the implementation of 5S. There was an increase in available area for the location of the resources. The researcher decided that the introduction of the 5S methodology leads to systematic risk reduction. [10]

Radnor and Bucci (2011) highlight the main findings from an independent analysis of the implementation of the Lean improvement methodology in Business Schools and Universities in the United Kingdom. It says that lean has expanded beyond manufacturing to become an improvement methodology firstly in the service sector and more recently in public sector organizations looking towards improving efficiency and customer value. The statistics data collection was done through semi-structured interviews with individuals in five Business Schools and Universities known to be involved in Lean implementation. [14]

Maggie and Liu (2006) share the experience of implementing the 5S system in a library which serves as a reference to the library association in the continuous improvement of the library environment. It also attempts to analyze the validity of "library as place" and its compatibility with the impact of information technology development. The work concludes that the 5S system provides a framework and guidelines for creating and maintaining a compatible and pleasant environment for library staff. [11]

ISO Certificates require a lot of hard work and with a system like 5S, it is clearly easier to achieve the requirements of those. 5S is continuing and it's kind of improving itself all the time. It is self-pushing and on-going operations. 5S is a perfect tool for controlling and for continuous improvement. Waste decrease and quality standard develop. (Ho, 1999) [9]

3. RESEARCH METHODOLOGY

The purpose of this research was to explore and identify an effective approach to implement the Lean tool 5S that will improve the productivity, quality and morale of staff of higher education institute. The goals were to arrange store and record room, proper utilization of laboratories and to optimize the usage of library space. 5S provides a method to rearrange the layout and increase the discipline. This study focused on how to use 5S to rearrange the workplace and improve efficiency.

3.1 Problem Statement

The present study was conducted in a different area of an institute where 5S is implemented as a lean tool. The purpose of the 5S event was to eliminate waste, generate more space, rearrange layout and increase efficiency. Some of the original goals of the 5S event were:

1. The institute library has around 100 racks and approximate 12000 books. It is around 30 daily newspaper and 20 technical journals. Due to lack of observation, some books are damaged and some books are out of syllabus. All the books are placed on a shelf but not a proper place which produces trouble for both staff and students. Book-bank books are placed on a floor which consumes a lot of space. Another problem related to taking a lot of time for issuing the book.

2. An institute the laboratories of mechanical and civil branch are placed in a workshop where efficiency or working of the machine are directly affected by the open atmosphere. Demonstration kits are used by an electronic branch in laboratories where most of the kits are damage due to improper handling. Software corruption is a big issue in computer science branch.

3. Recordable and storable items both are placed in a single room so it is a very difficult task of searching any item or record. The room is very small so all items are placed anywhere in the room. So there were complaints of congestion and untidiness.

4. Students and faculty take more time in travel to reach its laboratories/ classroom which reduced its efficiency.

5. The institute has a scholarship section which is nearer to the chairman chamber and has a space problem. Account section is nearer to the reception so the students always keep here and produce a lot of noise which creates a bad impression on visitors. There is a lack of sitting arrangement for visitors.

6. An institute has 240 computers in a central lab and around 200 computers on another lab. On the demand of exam conducting committee, increasing the number of computers is very difficult task.

3.2 Research Question and Hypothesis

The research question in this study was to implement and evaluate the impact of 5S in a higher education institute. This study used the questionnaires to understand the changes in employee's efficiency before and after the implementation of the 5S event.

Hypotheses are defined to confine the statistical analysis of the specific research questions. There are four hypotheses considered in this research study. These hypotheses tested

the effects of 5S implementation on the higher education institute.

H_{o1}: 5S will not increase the arrangements in the administrative office.

H_{a1}: 5S will increase the arrangements in the administrative office.

H_{o2}: 5S will not increase the arrangements in the storeroom.

H_{a2}: 5S will increase the arrangements in the storeroom.

H_{o3}: 5S will not increase the arrangements in the library.

H_{a3}: 5S will increase the arrangements in the library.

H_{o4}: 5S will not increase the arrangements in laboratories.

H_{a4}: 5S will increase the arrangements in laboratories.

3.3 Questionnaires Survey

The purpose of the research was explained to the participants. The participants were given necessary instructions for answering the questionnaire like the number of questions and answering category. The same paper-based questionnaire was conducted in two phases i.e., before and after the implementation of 5S. After the questionnaire was provided to the participants, they were required to answer the questions with 5 points Likert scale. There were 30 questions in total. Approximate 5 minutes time is required to complete this survey.

The survey tool was administered to 30 members of higher education institutions during the month of July 2016. The pilot survey was administered through a hard copy version. The questionnaires included a total of 30 questions with 4 different components. The final score and section wise scores were obtained by adding the points as per the Likert scale. The maximum score that could be obtained was 142 and the minimum score that could be obtained was 115.

4. RESULTS AND DISCUSSIONS

The 5S event was conducted in higher education institute. As a result of the 5S implementation, some changes were made to the college layout and the process.

1. In-library old, damage and out of syllabus books are separate from lots of books. Another work related to the separation of old newspapers, magazines, and journals. All these are having a resale value which produce around 5000/- Rs. Due to this work, 9 racks are completely blank which are used for placing the newly ordered book. After that remaining books are rearranged according to branch wise (CE/CS/EC/ME/MBA) and then title wise alphabetically in order. For easily identification purpose color-coded sticker is used on books and shelves. Due to this process, the

time taken for searching books will reduce just half of before time. Now book-bank books are placed in racks so around 20% more space will get for the library. Color-coded library card and issue register are used for reducing the book issuing time. A rack will be placed near the library gate for placing the bags. A Digital library with 20 computers is also started in the library for reading E-journals. Library also has a photocopy machine which is used by the students for copying the topic from different books.

2. In laboratories not working apparatus/ instrument/ equipments/ kits/ hardware are separate from working. If they are able to repair then after repairing take into the work. The problem arises due to dust and moisture all the apparatus/ instrument/ kits/ hardware are regularly cleaned for working in a proper way. All the apparatus/ instrument/ kits/ hardware are routinely checked by service engineer which maintain its accuracy and idle time. For taking the reading in the easiest way, the machines are set according to ergonomics. Proper sitting arrangements are provided for students when they complete our practical and want calculation. Numbers of the students operate one practical at a time so that visualization problem arises to several students. For this purpose, students are divided into several groups and perform different practical at a time.

3. All items are classified in recordable and storable items. After that two separate rooms will be provided for record and store purpose. All the records are classified on the basis of the exam, departmental and office in a record room. For reducing the searching all records are properly labeled which indicate its importance. In the storeroom, all items are classified on the basis of stationary, labs, computer, workshop, electricity and plumber work. Record room/ store room will be fireproof, dust and moisture proof for safety purpose.

4. On the demand of online exam conducting committee, we are changing the layout of the computer lab and increased 60 another computer for this lab. For this purpose, we shifted our computer science department staff room from a central computer lab to outside in place of the waiting room.

5. The front office is shifted from in front of the chairman office to a new big place. In this location office divided into account, scholarship and establishment section so around 70% more space are produced for students and staff both. Now visitors feel the comfortable atmosphere as compare to before.

6. Students and faculty take more time in travel to reach its laboratories/ classroom which reduced its efficiency. For this purpose, we change college layout. From this layout changing, the departmental classroom, laboratories and staff room are closer than before hence increased its efficiency and saving a lot of time.

4.1 Descriptive Statistics

The survey was conducted to cover 30 respondents and all respondents return the questionnaire. Hence the respondent rate of this survey was 100%. Once, the data were accumulated, they were categorized into a diverse range of participants with different age, gender, experience, and work area.

A paired T-test was performed to compare the mean scores, standard error and standard deviation for the subcategories from time A and B.

For Administrative Office Null hypothesis was rejected. Arrangements in administrative office before implementation of 5S ($M = 28.17$, $SE = 0.353$) than to after implementation of 5S ($M = 31.87$, $SE = 0.321$), $t(29) = -15.703$, $p < 0.05$. The t-test result shows that increase in arrangement after implementation of 5S.

For Storeroom Null hypothesis was rejected. Arrangements in store room before implementation of 5S ($M = 22.67$, $SE = 0.399$) than to after implementation of 5S ($M = 26.17$, $SE = 0.336$), $t(29) = -18.394$, $p < 0.05$. The t-test result shows that increase in arrangement after implementation of 5S.

For Library Null hypothesis was rejected. Arrangements in library before implementation of 5S ($M = 38.30$, $SE = 0.359$) than to after implementation of 5S ($M = 41.23$, $SE = 0.294$), $t(29) = -13.063$, $p < 0.05$. The t-test result shows that increase in arrangement after implementation of 5S.

For Laboratories Null hypothesis was rejected. Arrangements in laboratories before implementation of 5S ($M = 32.93$, $SE = 0.395$) than to after implementation of 5S ($M = 35.97$, $SE = 0.388$), $t(29) = -17.906$, $p < 0.05$. The t-test result shows that increase in arrangement after implementation of 5S.

5. CONCLUSION

This study has 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.

The 5S organized store room, record room, and library so that the time spent finding any item was reduced. By streamlining the library and computer lab, the available blank space was used to create a new digital library and an additional computer lab. By changing the layout, the front office is now quite bigger than before and there is enough room for visitors to sit. Students and faculty members now have to travel a short distance to move from one place to another.

REFERENCES

- [1] Ali. M. and. Shastri R. K. (2010). Implementation of Total Quality Management in higher education. *Asian Journal of Business Management*, 2 (1), pp. 9-16.
- [2] Barker, Michael (2008). What is the "standardization" of lean manufacturing 5s? Retrieved from <http://www.whatisleanmanufacturing.com!5S-Standardize.html>
- [3] Breyfogle, Forrest (2008). 5s (sort, straighten, shine, standardize, sustain) as part of a lean six sigma dmaic project execution roadmap (dmaic = define-measure-analyze-improve control). Retrieved from <http://www.smmiersolutions.com/blog/forrestbreyfogle/2008/07/01/5-s-sort-straighten-shine-standardize-sustain-as-part-of-a-lean-six-sigma-dmaic-project-execution-roadmapdmaic-define-measure-analyze-improve-control>
- [4] Chapman, C. D. (2005). Clean house with lean 5S. *Quality Progress*, 38(6), 27-32. Retrieved From <http://proquest.umi.com.ezproxy.emich.edu/pqdweb?did=854788191&sid=1&Fmt=4&clientId=594&RQT=309&VName=PQD>
- [5] Cooper, K., Keif, M., & Macro, K. 1. (2007). *Lean Printing Pathway to Success*. Sewickly, PA, USA: PIAIGATF Press.
- [6] Dukkipati U. (2010). *Higher Education in India: Sustaining Long-Term Growth*. Washington DC: Center for Strategic and International Studies.
- [7] Esain, A., Williams, S. and Masey, L. (2008). Combining planned and emergent change in healthcare lean transformation. *Public Money & Management*, Vol. 28 No. 1, pp. 21-6.
- [8] Gapp, R., Fisher, R., & Kobayashi, K. (2008). Implementing 5S within a Japanese Context: an integrated management system. *Emerald Insight*, 46 (4), 565-579.
- [9] Ho, S. M. (1999). The 5S Auditing. *Managerial Auditing Journal*, 14(6), 294-302
- [10] Jiménez M., Romero L., Domínguez M., Espinosa M. M. (2015). 5S methodology implementation in the laboratories of an industrial engineering university school. *Safety Science* 78, pp. 163-172.
- [11] Maggie L., Liu Y. (2006). Library as Place. Implementation of 5S System, *Journal of East Asian Libraries*, No. 139.
- [12] Pheng, S.L., and Khoo, S.D. (2001). Team performance management: enhancement through Japanese 5-S principles. *Team Performance Management: An International Journal*, Vol. 7, Nos. 7/8, pp.105-111.
- [13] Prabwo, Noeradji. 5s: workplace organization and standardization. Retrieved from <http://www.plant-maintenance.com!atiicles/5S.pdf>
- [14] Radnor Z., Bucci G. (2011). *Analysis of Lean Implementation in UK Business Schools and Universities*. ISBN 978-0-9567461-1-5.
- [15] Shil, N. C. (2009). Explicating 5S: Make you productive. *Interdisciplinary Journal of Contemporary Research in Business*, 1(6), 33-47.
- [16] Skaggs, Todd (2010). Essential in lean manufacturing is the 5-s philosophy. Retrieved From <http://www.tpmonline.com!articles on total productive maintenance/leanmfg/5sphilosophy.html>
- [17] Zidel, T. (2006). *A Lean Toolbox - Using Lean Principles and Techniques in Healthcare*