Impact of 5s in the Academic Life of Undergraduate Students: A Case Study

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Received: 5 April 2021 Accepted: 1 May 2021 Published: 15 May 2021

Abstract

The aim of this paper is to determine the impact of the 5S tool on a student’s academic career. Some factors were considered from the 5S tool and the result of the students were considered to be dependent on these factors - Time maintenance, Competitiveness, Confidence, Other skills, Punctuality, Organizing skill, Comprehensiveness, Proactivity, Readiness. Based on this, some hypotheses were generated. Kruskal Wallis H test was done on the dataset along with Mann Whitney U test. As a result, the null hypotheses were rejected. The result showed that 5S had a significant impact on a student. The Pvalue was significantly less which assures that the result was as intended. The ?satisfactory? result group showed a difference with the ?not satisfactory? result group. Which confirms our objective. This research gives an idea of how a lean manufacturing tool can be used on subjects other than manufacturing organizations. However, the study was only done on students of Bangladesh. For more elaborate use of 5S, the worldwide population can be considered as the respondents of this study.

Index terms— 5S tool, undergrad students, academic career, kruskal wallis H test, mann whitney U test, significance level.

1 a) Problem Statement

5S is a method that has 5 steps that work for organizing a workplace for more efficiency and ensures proper management of time and energy to make sure optimization is done. Undergraduate students try hard to cope with the overall environment of their institutions and face problems with time maintenance. It is seen in general that some students face a downfall of their result, miss classes, they have lack of ambition, etc. These as a result can impact their mental state creating anxiety and suicidality.

5S can contribute to arranging tasks of school and home in a proper manner. The main motive of using 5S is to make their visions clear and strategic. It helps students to gain perspective and reach for their goals.

b) Objectives 1. To practice the five main segments of 5S in the aspect of a student’s academic life. 2. To ensure improvement of the result of a student. 3. To discuss the effects of 5S steps in a student’s academic life.

2 c) Organization of the Case Study

This paper follows a sequence of our work. Chapter 2 has covered the literature review. We have elaborated on the paper we reviewed and the research gaps of those papers. Chapter 3 covers the theoretical background of this paper. Chapter 4 has the methodology of our research. And then the data collection process and result analysis were covered in chapter 5. Chapter 6 ends with the conclusion of this paper. We have mentioned some of the future work suggestions we have from our work.
5 A) REVIEW OF LITERATURE

3 II.

4 Literature Review

This chapter contains the significance of our study through the literature review of papers that we have followed. Findings, suggestions for future work and the limitations of the papers are mentioned in this chapter.

5 a) Review of Literature

Students of undergrad level struggle from the beginning of their university journey to pull off a good result. But many factors prevent them from achieving that. For example, a journal of college students development suggested that Personal or career-related motivation to attend college in the fall was a positive Introduction known as a lean tool that is used in a manufacturing environment system of an organization is used normally used to organize a workspace. It is a well-practiced systematic tool based on 5 pillars: Sort, Set in Order, Shine, Standardize, Sustain. These steps include going through everything in a space, rejecting the unnecessary and keeping the necessary things, arranging everything in order, cleaning, and setting up procedures for performing these tasks on a regular basis. From these components, we have considered some factors-Time maintenance, Competitiveness, Confidence, Other skills, Punctuality, Organizing skill, Comprehensiveness, Proactivity, Readiness. We have examined if these factors can impact a student’s academic career. This decision was made based on their result which we found through the survey. The survey was done through a five-point Likert chart questionnaire. We had generated some hypotheses after which we conducted statistical analysis on the data set. Based on the nature of the data, a nonparametric Kruskal-Wallis H test was performed. The null hypothesis was rejected, and the alternative hypothesis was accepted through the process.

Application of the SS tool can bring about good changes in an educational institution as well as in students. A study by (Abu Bakar, N., Uzaki, K., Mohamed Naim, A., and Abd Manaf, N. A, 2020) showed that implementing the 5S tool can improve quality management and it helps policymakers in university to develop a conducive environment for students. 5S application the higher education institute showed a method to rearrange the layout and improve the discipline and can also improve the productivity and quality (Chourasia, Ravi, and Archana Nema, 2019). Not only the performance of a system but 5S can also develop the relation among peers in an institution. (El-Sherbiny, Naglaa A., Eman H. Ibrahim, and Asmaa Younis, 2019) took an initiative on engaging the undergraduate medical students in implementing the 5S-KAIZEN at the Faculty of Medicine, Fayoum University and as a result, they found that 5S immensely improved the communication between medical students and the healthcare providers. This tool can also be used in the classroom where everyday cleaning and organizing the study area is hard. Implementing 5S in a classroom can improve and optimize the classroom environment. (Moreno López, Stephanie L, 2020).

Not only in a student’s life or educational institution but many organizations can benefit from the use of the 5S tool. This tool is a must in institutions where a safety issue is necessary. The 5S tool helps to improve the ergonomics of the surveying laboratory (Ebute, Mercy Akumna, 2018), helps make better use of the laboratory area (Sari, Ammaria Dila, Fety Ilma Rahmillah, and Bagus Prabowo Aji, 2017), saves time when looking for tools and materials due to its location and gives good visual control. It also optimizes the work and safety of the university engineering laboratories (Mariano Jiménez Calzado, Luis Romero Manuel Domínguez, M.M Espinosa, 2015).

If proper steps of SS are undertaken and can be executed properly it will emphasize the overall benefit of an organization ??Kumar, Kaushik, and Sanjeev Kumar, 2012). According to (Gapp, Rod, Ron Fisher, and Kaoru Kobayashi) the 5S tool can be identified as the strategic platform for the managerial decisions required for the development of an integrated management system. It is necessary for the spontaneous and continuous improvement of the working environment and working conditions in an organization (Mahalik, Pradeep, 2016).

5S can organize a workplace for efficiency, it helps to decrease waste and optimize quality, productivity via monitoring (Shaikh, Saad, 2015). It has an important role in the manufacturing industries. A study by (Veres, Cristina, et al, 2018) points out that 5S implementation increases the productivity of the automotive industry. (Kumar, Pavan, 2017) & (Roy Balinado, Justine Roy O., and Yogi Tri Prasetyo, 2020) both implemented 5S in the manufacturing industry and found it to have a significant impact on the company’s performance quality of
employees, department operations’ productivity, and workplace safety. The 5S application makes a company more competitive and productive; furthermore, it does provide a solid foundation for achieving operational excellence. All of these papers have mentioned the effective use of the 5S tool in educational institutions, manufacturing industries, and laboratories. However, the 5S tool can contribute to a student’s day-to-day life. We can see above that some papers have mentioned the bad effects a student faces due to the downfall of their academic result. After investigating the effects of the 5S tool we are hopeful that it will have a positive impact on improving a student’s academic career.

6 III.

7 Methodology

This chapter contains the research methodology of our case study. It also mentions the significance of our research method and the solutions.

8 a) Research Methodology

Throughout this study, our prime focus was to observe the impact that 5S method has upon the academic life of undergraduate students. The data were analyzed by manipulating the variables. The whole study was carried out as quantitative research. Descriptive statistics were used to show students’ demographic characteristics. Five-point Likert chart was used to analyze the impact 5S tool has in the academic lives of undergraduate students.

9 b) Alternatives

The survey of our study was done with 5 point Likert chart questionnaire. After doing a normality test on our data set it showed that the data set was not normally distributed. But as we could not identify the exact distribution, it followed, the dataset was considered to be non-parametric. Then One-way ANOVA test was carried out on the dataset. In ANOVATEST-1. The dependent variable must be continuous. 2. There should be homogeneity of variance. 3. Independent variables have two or more categorical or independent groups. 4. The dependent variable must be approximately normally distributed for each level of the independent variable.

Our dataset accepted all of the above conditions except for the continuity of the dependent variable. So the one-way ANOVA could not be accepted. Instead, we selected the KruskalWallis H test, the non-parametric equivalent of ANOVA. KruskalWallis H test does not follow a distribution. So this method was well suited for our study.

10 c) Proposed Solution Method of Analysis

Throughout the case study, a pre-test of the questionnaire, a survey, processing the data, analysis of the data, and finally an interpretation of the data was carried out. The data were collected through the survey and then converted to an excel file. Then the excel file was imported into SPSS for further analysis. Firstly, a normality test named the Shapiro-Wilk test was done on the data set. The collected data was found to be not normally distributed. Later on, a nonparametric test Kruskal-Wallis test was carried out. The Kruskal-Wallis H test was done on some independent and dependent factors that we had considered earlier for the convenience of our study. Here the dependent variable was nominal, and the independent variables were ranked. The level of significance was considered 95%. To identify the difference between the sub-groups of each independent variable, a Mann-Whitney U test was done on each of them.

11 Hypothesis Generation

5S tool has five components-Sort, Set in order, Shine, Standardize, and Sustain. Based on these components we have hypothetically considered some factors that might have an impact on a student’s academic life. After reviewing currently available papers, we generated the hypotheses and experimented on them for useful interpretations. 1. H1o: Time Management 2. H2o: Competitiveness 3. H3o: Confidence 4. H4o: Other Skills 5. H5o: Punctuality 6. H6o: Organizing Skill 7. H7o: Comprehensiveness 8. H8o: Proactivity 9. H9o: Readiness These are the null hypotheses we have developed indicating that each of the factors does not help in developing a student’s academic life. On the other hand, the alternative hypotheses suggest that they do.

12 Data Analysis Demographic Information

Demographics is the information of a population-based on factors such as age, gender, and race. Respondents for this study were mostly students from different universities of Bangladesh. Gender, the educational background was collected from the students to justify the conclusions of this study.

13 Gender of the Sample

Table ??1 shows the gender distribution of the sample. From the table, it can be seen that the majority of respondents are male. Fig. ??1 is the Pie chart of the gender of the population. Education of the Sample Table
B) RESULT ANALYSIS

2.2 shows the percentage of the field of study of the sample. From the table we can see that highest number of population are from B.Sc background.

14 Reliability of Survey Items

Our survey questionnaire had five-point Likert type questions. The survey had questions regarding factors of the 5S tool that could impact the academic lives of undergraduate students. Reliability refers to the consistency of a research study or measuring test. The reliability of our data set was measured using SPSS.

15 The table below is the Reliability Statistics table.

This gave us the Cronbach’s alpha coefficient. If the coefficient scores over 0.7, it refers to high internal consistency. In this case, ? = .961, which shows the questionnaire is reliable. The normality of data is a prerequisite for many statistical tests because normal data are an underlying assumption in parametric testing. There are two main methods of assessing normality: graphically and numerically. A normality test was done on our survey data to identify the right statistical method for our data set.

16 Normality Test:

The above table presents the results from a well-known test of normality-the Shapiro-Wilk Test. The Shapiro-Wilk Test can handle both small and large sample sizes. For this reason, we used the Shapiro-Wilk test as our numerical means of assessing normality. As we can see the Sig. value of the Shapiro-Wilk Test is lesser than 0.05 for all factors, so the data is not normal. It significantly deviates from normal distribution.

17 Kruskal-Wallis H test using SPSS:

After doing a normality test the data showed non-normal distribution. So we have used nonparametric test the Kruskal Wallis H test for our data set. Here we have th dependent variable as 'Result' which had three levels -Not satisfactory, Moderate, Satisfactory. About nine factors were considered as the dependent variables. Each factor had 5 levels as we had done the questionnaire in a 5 point Likert chart. Both the independent and dependent variables were ordinal data. We have conducted the whole process in SPSS software. In this process, the grouping variable was considered as the result and the test variable was taken as Time Management, Competitiveness, Confidence, Other Skills, Punctuality, Organizing Skill, Comprehensiveness, Proactivity, and Readiness. After the Kruskal Wallis H test, Mann Whitney U test was done on the data set as a post hoc test.

18 Result and Discussion

This chapter contains the data collection method, result analysis of our method. At the end the discussion part covers the findings and limitation of our study.

19 a) Data Collection

20 Selection of Samples

Students from different universities from all over Bangladesh were considered as the population for this study. About 150 respondents were part of this study. The survey was carried out online and in-person through simple random sampling.

21 Collection of Data

Data were collected through primary sources. Students from different universities were approached directly. A survey was done with a five-point Likert chart type questionnaire with about 150 respondents with the majority of students from engineering universities.

22 b) Result Analysis

Here KruskalWallis H test is used to identify the impact 5S has on the academic career or students. The significance level for the test was considered 95% for a given factor. Based on KruskalWallis score a conclusion is drawn on Null Hypothesis.

The KruskalWallis test score had shown a significant difference in the levels of independent variables. To identify where the difference is we have done Mann Whitney test as post hoc test. The dependent variable Result had three levels -Not satisfactory, Moderate, satisfactory. The significance level divided by three is 0.015. So the Mann Whitney test score was compared with 0.015. If Asymp. Sig. is more lesser than 0.015 we can conclude that the levels have a statistically significant difference. This is what we expected from the study, for 5S tool to make statistical difference between the groups.

For 95% significance level we have seen that the P-value for the factor Time Management is 1.3825E-8 which is significantly lesser than ?-value (0.05). In this case, we reject the null hypothesis. So time management factor of 5S has a good impact on student’s academic life. In the same way P-value for Competitiveness, Confidence,
Other Skills, Punctuality, Organizing Skills, Comprehensiveness, Proactivity, Readiness is $1.1079 \times 10^{-17}$, $1.1267 \times 10^{-20}$, $3.7992 \times 10^{-16}$, $8.5566 \times 10^{-20}$, $2.4994 \times 10^{-20}$, $1.423 \times 10^{-19}$, $4.9295 \times 10^{-19}$, $5.1716 \times 10^{-21}$. P-value for each of the factors has been lesser than $\alpha$-value(0.05). In this case, we can reject the null hypothesis for all of the considered factors and conclude that each factor of 5S has a significant impact on improving a student’s academic career.

23 c) Discussion

The method of our research gave us the result we had anticipated. The P-value of Kruskal-Wallis test was significantly low than the confidence level that we considered. As a result we had to reject the null hypothesis. The null hypothesis was taken negatively. The alternative hypothesis proved that 5S has a deep impact on changing a student’s academic career. All of the independent variables that we had considered of 5S tool and examined with respect to the student’s result had shown a significant difference among the groups. Improvement of the nine factors—Time maintenance, Competitiveness, Confidence, Other skills, Punctuality, Organizing skill, Comprehensiveness, Proactivity, Readiness will help to change the academic result of a student. However, we think the result was too obvious for we had lesser respondents for the survey due to the pandemic situation. If there could be a diversity in the respondents, the study can be more uniform regardless of the geographic location.

24 Conclusion and Future Work

a) Conclusion

The main objective of our study was to see if the 5S tool could impact a student in his academics. The academic progress of the students was measured through their results and how much satisfied they were with them. The methodology and result of this study suggested that there was a good level of impact that 5S can have in a student’s academic career. A student’s success depends on the encouragement he gets while being in his academic life. A bad grade can put a negative impact on his mental stability and makes it harder to reach goals. So it is very important to identify the reasons why a student faces these issues and solve them with effective methods. This research proved that the 5S tool can help a student improve time management, competitiveness, comprehensiveness, readiness, other skills. It also enhances confidence, proactivity, and punctuality.

25 b) Future Work

More lean manufacturing tools can be used to solve the challenges that students face in their undergrad life. Students from all over the world pursuing higher education could be held as subjects. A better statistical tool could give more insightful results.
Figure 1: Fig. 3.1: Fig. 3.2:

Figure 2:

Figure 3: Fig. 3.3:

Figure 4: Fig. 3.4:
Figure 5:

Figure 6:
Figure 7:

Figure 8:

Figure 9:

Figure 10:

Figure 11:
31

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Gender Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
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<td>.7</td>
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<td>100.0</td>
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Figure 15: Table 3.1.
B) FUTURE WORK

Table 3.2: Field of Study

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<td>Other</td>
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Figure 16: Table 3.2:

Table 3.3: Time Management

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<tr>
<td>Valid neutral somewhat likely</td>
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<tr>
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Figure 17: Table 3.3:
most unlikely

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Figure 18: 1% 1.30%, 1% Field of Study
Reliability Statistics

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<td>.961</td>
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Figure 19: Table 3.4:

Time Management

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<th>Statistic</th>
<th>Shapiro-Wilk df</th>
<th>Sig.</th>
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</thead>
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<td>.000</td>
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<tr>
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<td>.000</td>
</tr>
<tr>
<td>CGPA</td>
<td>.805</td>
<td>25</td>
<td>.000</td>
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<tr>
<td>Somewhat Likely</td>
<td>.774</td>
<td>30</td>
<td>.000</td>
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<tr>
<td>Most Likely</td>
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<td>.000</td>
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</table>

Competitiveness

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Figure 20: Table 3.5:
Figure 21: Table 3.6:

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<tr>
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<tr>
<td>Asymp. Sig. (2-tailed)</td>
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<tr>
<td>a. Grouping Variable: CGPA</td>
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B) FUTURE WORK
Kumar and Kumar. Nor Aziah, title=Intention to Implement 5S Management Among Students in Higher Education Institutions, Nashirah Bakar, Abu, Kiyotaka Usaki, Asmadi Naim, Abdul Mohamed, Manaf. 2020.


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[Title=5s Techniques to Optimize Classroom Organization ()] Title=5s Techniques to Optimize Classroom Organization, 2020. (Publisher = {Polytechnic University of Puerto Rico})


[Ebuetse and Akunna ()] title=Implementation of 5S at a, Mercy Ebuetse, Akunna. 2018. Survey Laboratory in Western Kentucky University


[El-Sherbiny et al. ()] ‘title=Initiative on engaging the under-graduate medical students in implementing the 5S-KAIZEN at Faculty of Medicine, Fayoum University’. Naglaa A El-Sherbiny, Eman H Ibrahim, Asmaa Younis. journal = {Journal of Educational Research and Reviews} 2019. 7 p.


