Study of the Effect of 6S Implementation on Hazard in the FKMP UTHM Workshop

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Abstract

6S is a practice that is systematically practiced in the implementation of practical work in workshops. The purpose of this study is to evaluate how well 6S students are using practical work in the workshop. This study aims to determine the implementation level, knowledge, understanding, and application of the 6S by FKMP students in the workshop at Universiti Tun Hussein Onn Malaysia's Faculty of Mechanical and Manufacturing Engineering (FKMP). For this investigation, simple random sampling is used. FKMP students who had participated in workshops throughout the semester made up 100 respondents of the sample. A questionnaire with 30 questions was the tool that was employed to determine the reliability of the questionnaire. A pilot test was also carried out. Using the Cronbach Alpha model technique, the reliability of the outcomes of this pilot study shows a positive value. The statistical analysis was carried out using SPPS (Statistical Product and Service Solutions) version 27. Using descriptive statistics like mean, percentage, and standard deviation, to analyze data. The results showed that the 6S practices in terms of knowledge, understanding, and application are at a high level overall.

1. Introduction

Effective workshop management is one of the important components of education in employment, including workshop training. This issue is appropriate to the process of education and instruction itself because the practical work completed in the workshop is the primary element of learning and teaching that depends on research, methods, and skills. Hence, it is important to know about the workshop to have workshop more systematic, in control, and safe. A systematic and safe workshop means a safety procedure is being implemented in the workshop. The safety in the workshop has to be improved and comply to ensure the production runs smoothly and avoid an accident in the workshop. A condition or a group of conditions that create a risk of harm is simply referred to as a hazard. The word "hazard" in this context refers to mishaps and reckless behavior. Undoubtedly, the attitudes and beliefs of those who work for the organization have a big impact on workplace safety. The risky student attitudes, such as arrogance, sloppy housekeeping, tired work, and disregard for safety procedures, can also increase the number of accidents in the workshop. The most frequent mishaps in a workshop include being caught by machinery, being cut by sharp objects, slipping, colliding, and many others.

Hence, 6S initially known as 5S + Safety is a proper approach to help the workshop be in control with less risk. Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardization), and Shitsuke (discipline/sustain) were the first inspirations for the abbreviation 5S [4]. Recently, the sixth S stands for safety and has become a new aspect of the 5S method. Lean management is based on the 6S methodology, which was

developed by the Toyota Production System between 1948 and 1975. With less waste and inventory than its rivals, the Japanese company was able to produce products of greater quality [1]. They incorporate safety as the sixth phase in the 6S process, focusing on guaranteeing workplace security and risk analysis.

Lastly, 6S is proven can improve safety because a clean workshop environment can result in a reduction of workshop injuries experienced by the user. Also, decreasing needless travel inside the workspace environment and reducing exposure to hazardous substances elsewhere in the building both lower the risk of accidents. Thus, this paper aims to study the impact of 6S implementation on the hazard in the UTHM FKMP workshop.

2. Materials and Method

In this study, the development of questionnaires for the survey was conducted first followed by data collection and analysis of the collected data. The questionnaires were distributed among 100 FKMP students while the data analysis was conducted using Statistical Product and Service Solutions (SPSS).

2.1 Development of Questionnaire

The questionnaire in the survey contains four parts which are sections A, B, C, and D. Section A is about respondents' demographic parts. While Sections B, C, and D are questions regarding 6S implementation. Starting from section B a total of 10 items about students' knowledge in 6S practices will be asked. For section C, students' understanding level in 6S practice with 10 items will be asked. Last but not least, for section D, students' implementation level of 6S practice in the workshop would be asked to know better the implementation level of 6S practice among students in the FKMP workshop. Questions in the form of a Likert scale are used to control the questions presented to be consistent with the research questions to achieve the objectives of the study. In addition, this form of a question is easier to analyze for analysis.

Table 1 *5-point Likert Scale*

Level	Description	
1	Never	Completely Disagree
2	Rarely	Disagree
3	Sometimes	Neutral
4	Often	Agree
5	Always	Completely Agree

2.2 Data Collection

Due to the quantitative methodology used in this study, the data were mostly gathered through surveys and direct observation of students in FKMP UTHM workshops. Hence, the data collection in this study is mainly through surveys and field observation. 100 respondents of FKMP students is the sample for this study.

2.3 Raw Data Analysis

In this study, Statistical Product and Service Solutions version 27 (SPSS) software was used to process the raw data collected. The information obtained through the questionnaire was analyzed quantitatively according to the sequence of research questions using descriptive statistical methods. The SPSS system also generated the data into mean and standard deviation [3]. It also helps the researcher to easily analyze whether the hypothesis is accepted or rejected. The statistics used to answer each research question are shown in Table 2 below.

Table 2 *Data analysis based on each research question*

Research Question	Method of Data Analysis
What is the level of student knowledge in the implementation of 6S practices at the FKMP UTHM workshop	Mean and Standard Deviation
What is the level of understanding among students regarding the implementation of 6S practices at the FKMP UTHM workshop	Mean and Standard Deviation
What is the level of student application in the implementation of 6S practice in the FKMP UTHM workshop	Mean and Standard Deviation

3. Results and Discussion

The final results of the study were divided into three parts. which are the results of Students' knowledge level in 6S, results of students' understanding level in 6s, and lastly results of students' implementation level in 6s practice in the workshop.

3.1 Results on Students' Knowledge Level in 6S Practice

Based on the overall mean value which is 3.80, student's level of knowledge in 6S practice is found to be at high level as shown in Table 3.

Table 3 *Descriptive analysis of the student knowledge level*

Item	N	Level of Students' Knowledge	Mean	Std. Deviation	Interpretation
SB_Q1	100	I know the principles of 6S practices in the workshop.	3.69	1.06	High
SB_Q2	100	I can clearly understand the content of the principle of 6S practice in the workshop	3.65	1.04	High
SB_Q3	100	I can explain the objective of implementing 6S practices in the workshop well.	3.50	1.06	High
SB_Q4	100	I know in basic, seiri(sort) is to throw away or dispose of unused materials/things in the workshop.	3.78	0.86	High
SB_Q5	100	I know in basic, seiton(set in order) is to organize and store things neatly in the workshop.	3.86	0.82	High
SB_Q6	100	I know in basic, seiso(shine) is to clean the place thoroughly so that there is no dust/debris in the workshop	3.87	0.85	High
SB_Q7	100	I know in basic, seiketsu(standardized) is to standardize each item/tool according to its type and function in the workshop.	3.83	0.82	High
SB_Q8	100	I know in basic, shitsuke(sustain) is to always practice the principle of 6s to be more disciplined while in the workshop.	3.84	0.85	High

SB_Q9	100	I know basic safety while in a workshop there is part of the 6S element that should always be aware such as wearing personal protective equipment (PPE), working under safe conditions, etc.	4.00	0.82	High	
SB_Q10	100	I know by practicing 6S in the workshop will keep the machines away from chips and oil and the machine can be used for a longer time.	4.01	0.82	High	
Overall			3.80	0.82	High	

3.2   Results on Students' Knowledge Level in 6S Practice in Workshop

According to the results in Table 4, the overall mean value is 4.24, indicating that the student understanding of 6S practices is at a high level.

Table 4 *Descriptive analysis for student understanding level*

Item	N	Level of Students' Understanding	Mean	Std. Deviation	Interpretation
SC_Q1	100	6S practices require me to aside unused item, sweep, organize, and standardize while working in the workshop.	4.14	0.79	High
SC_Q2	100	6S practice requires me to separate items that can be used from those that are not used.	4.10	0.75	High
SC_Q3	100	6S practice requires me to arrange the equipment according to the designated storage place.	4.27	0.75	High
SC_Q4	100	6S practice requires me to keep the practical workplace environment clean.	4.26	0.71	High
SC_Q5	100	6S practice always makes me more disciplined while in the workshop.	4.29	0.67	High
SC_Q6	100	6S practices make the workshop tidy and organized.	4.25	0.76	High
SC_Q7	100	6S practices make the practical work environment safer.	4.31	0.69	High
SC_Q8	100	6S practices can ensure that students avoid accidents in the workshop.	4.30	0.70	High
SC_Q9	100	6S practice can help the implementation of practical work in the workshop better.	4.27	0.69	High
SC_Q10	100	6S practice allows me to keep implementing it when I am in the industry in the future.	4.28	0.75	High
Overall			4.24	0.53	High

3.3   Results on Students' Knowledge Level in 6S Practice in Workshop

According to the results in Table 5, the overall mean value is 4.22, indicating that the implementation of 6S practices is at a high level.

Table 5 *Descriptive analysis for student application level*

Item	N	Level of Students' Application	Mean	Std. Deviation	Interpretation
SD_Q1	100	I rearrange the used tools/equipment to their original storage place in the workshop.	4.16	0.76	High
SD_Q2	100	I separate the non-reusable material and dispose of it.	4.06	0.76	High
SD_Q3	100	I will standardize the workshop tools/equipment according to the size that has been set in the specific storage and location.	4.14	0.75	High
SD_Q4	100	I will do the proper housekeeping on the machines as well as the floor area in the workshop.	4.31	0.69	High
SD_Q5	100	I will always ensure that the workshop area is clean, neat, and organized.	4.33	0.68	High
SD_Q6	100	I disposed of the unused material in the designated place in the workshop.	4.25	0.73	High
SD_Q7	100	I always implement and practice the 6S practice in the workshop.	4.09	0.71	High
SD_Q8	100	6S practice requires me to maintain separate, organized, and clean practices.	4.23	0.75	High
SD_Q9	100	I can identify possible risks in the workshop and will try to improve the safety of the workshop by following workshop regulations.	4.28	0.65	High
SD_Q10	100	I will obey any safety precautions in the workshop to aim and promote a high level of productivity and safety throughout the workspace.	4.36	0.67	High
Overall			4.22	0.51	High

4. Conclusion

In conclusion, this study successfully collected and analyzed data on the 6S implementation level among FKMP UTHM students in the workshop. The analysis using SPSS showed that students have a high level of knowledge, understanding, and application of 6S practices. Posters about 6S in the Google Form questionnaire helped enhance students' knowledge, but further efforts are needed to improve 6S awareness, such as incorporating it into classroom learning. The data also revealed that students are adhering to safety procedures, indicating their awareness of safety protocols in both the workshop and industry settings.

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