

Quality Environmental Practice Evaluation System (5SPAS)

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Abstract : The Quality Environmental Practice Evaluation System (5SPAS) is a system which can only be implemented in an organization with corrective and remedial action. According to the literature, private organizations' systems are accessed solely on the perception of internal 5S practice. Meanwhile, the researchers in this study focused on the Institute of Quality Management, Universiti Utara Malaysia (IPQ UUM) internal and external 5S practices, as well as data gathered from auditors and IPQ staff. IPQ UUM had previously exclusively used the system manually. Thus, it is difficult to conduct an evaluation of quality environmental practice. As a result, there is a limit on how these actions can be carried out. Hence, this study created a web-based application for the IPQ UUM to conduct the evaluation. The aim of this work is to identify system requirements for the 5SPAS. Prototyping methodology has been adopted in the study. Firstly, the functional requirements were gathered through interviews. Three main functionalities have been identified: managing users, managing 5S practice evaluation criteria, and managing reports. Then, based on the requirements gathered, a prototype was created. Furthermore, the work must evaluate the usability of the 5SPAS using the Technology Acceptance Model (TAM) or any other appropriate metrics. Field testing was also conducted to assess the usability of the 5SPAS. Based on the field-testing results, it shows that overall, most of the respondents agree that 5SPAS is useful (83.34%), ease of use (81.65%), design (80%), and satisfaction (78.35%). The respondents also stated that 5SPAS is an awesome and good system. As a result of this work, users should be able to implement the 5SPAS effectively and efficiently. It can also serve as a future reference model for developers and researchers working on similar systems, such as developing a mobile application for 5SPAS.

Keywords: Quality Environment, 5S Practice, Evaluation, Web-Based Application

1. Introduction

The organization requires practical effort to monitor its personnel in order to maintain quality environmental practice evaluation, also known as 5S practice, as a work culture. The 5S practice is an

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acronym for five Japanese words: *Seiri* (sort), *Seiton* (order), *Seiso* (shine), *Seiketsu* (standardise), and *Shitsuke* (sustain) [1]. 5S practices were first used in Japan's manufacturing sector in the mid-1950s [2]. Hiroyuki Hirano developed 5S practices, which are a system for increasing worker productivity by introducing a guideline for properly organising the job [3]. The 5S practice is regarded as an effective technique for improving workplace housekeeping, environmental performance, and health and safety standards [4].

According to Mahzan and Hassan [5], the performance assessment of private organizations is based only on the perception of internal 5S practice. However, the problem is that the data findings are provided by auditors who lack sufficient knowledge and practical experience with 5S. Meanwhile, researchers in this work seek to address those problems by focusing on Institute of Quality Management, Universiti Utara Malaysia (IPQ UUM) internal and external 5S practices, as well as data collected from auditors and IPQ UUM staff. Previously, IPQ UUM had only used the system manually (i.e., Lime Survey) [6]. It is difficult to acquire data, calculate scores, manage Kaizen reports, and maintain information and evidence linked to quality environmental practice assessment because the system was utilized manually.

To address this issue, the quality environmental practice evaluation system (5SPAS) was created. Hence, the aim of this work is to identify system requirements for the 5SPAS. Next, researchers want to develop the audit scoring system for the 5SPAS using prototyping methodology. Furthermore, researchers need to evaluate the usability of the 5SPAS using the Technology Acceptance Model (TAM) or any suitable metrics.

2. Materials and Methods

2.1 Materials

The Microsoft Visual Studio software tools are the primary integrated development environment (IDE) tools. In addition, the development platform of SQL Server (MSSQL) has been used for critical functions such as user authentication and database storage. ASP.NET with C #, HTML, JavaScript, SQL, CSS, and Bootstrap languages were utilized for the design system and code components.

2.2 Methods

The development method used for building a web-based system is prototyping [7]. System prototyping performs the analysis, design, and implementation phases concurrently in order to quickly develop a simplified version of the proposed system and give it to the users for evaluation and feedback (**Figure 1**). Prototyping is to better understand and extract 5SPAS users' requirements. It will help to more quickly refine real requirements rather than attempting to understand a system specification on paper. The functional requirements were gathered through interviews and content analysis. Then, a prototype named 5SPAS was developed based on the gathered requirements, and field work was carried out to evaluate the usability of the 5SPAS prototype.

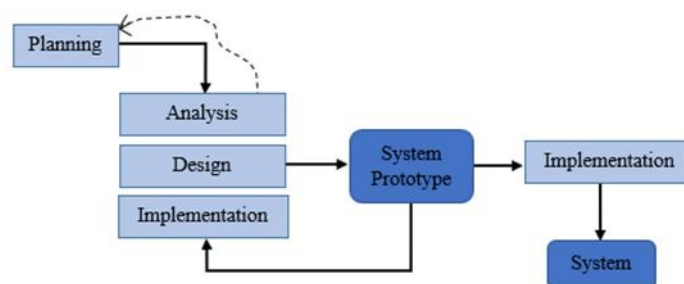


Figure 1: System Prototyping

3. Results and Discussion

3.1 Results

The 5SPAS is a web-based application system that is implemented for the IPQ staff as an admin and for the auditors of the quality environment practices 5S. This system has three main functions, which are managing users, managing evaluation criteria of the quality environmental practices 5S and managing the Kaizen report (**Figure 2**). All user requirements functions were successfully developed by 5SPAS.



Figure 2: Quality Environmental Practice Evaluation System (Homepage & Manage evaluation criteria of quality environmental practices 5S)

3.2 Discussions

The assessment approach was then used to gather information on the field tests in order to evaluate this system through a post-task questionnaire that was adopted from [8]. Researchers collected data using the Google Form application, and respondents filled out the questionnaire using the Google Form application. The type of evaluation that the researchers conducted to evaluate the system is a usability evaluation. This question was answered by 30 participants from the IPQ UUM staff and auditors. Before answering the questionnaires, participants need to read and agree to the participant consent form and the procedure to ensure it will be free from any manipulation or exploitation by unauthorized parties.

Based on a post-task questionnaire, the researchers divided it into two sections, as shown in **Table 1** below. For section A is demography and background information, and for section B is 5SPAS system evaluation. This questionnaire uses a five-level Likert scale which is strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5).

Table 1: The Post-Task Questionnaire Instrument

Section	Aspects	Number of Question
A	Demography and Background Information	4
B	5SPAS system evaluation	21 include comment/suggestion

For section A, which is the respondent's demographic, this section will take part in the 'Type of User', 'Gender', 'Age Group', and 'Education Levels' of the respondents. Section B is the 5SPAS system usability evaluation. This section has been divided into overall task satisfaction (2 questions) and four aspects of the TAM Metrics (i.e., Usefulness (5 questions), Ease of Use (4 questions), Design (5 questions), and Satisfaction (4 questions). The respondents also give their comments or suggestions in this section. Each of these aspects were answered by respondents regarding the 5SPAS system. Overall, the respondents answered 4 questionnaires in **Table 2**, 20 questionnaires in **Table 3** and the comment/suggestion part.

Table 2: Usability Evaluation Test of 5SPAS Results Data (Demography)

Section A: Demography			
No	Question	Frequency	Percent age
1.	Type of user		
	IPQ Staff	13	43.3
	Auditors	17	56.7
2.	Gender		
	Male	10	33.3
	Female	20	66.7
3.	Age Group		
	20 – 29 years old	6	20
	30 – 39 years old	9	30
	40 – 49 years old	10	33.3
	50 years old and above	5	16.7
4.	Education levels		
	SPM	1	3.3
	STPM/Diploma	5	16.7
	Degree	10	33.3
	Master	11	36.7
	PHD	3	10

Table 3: Usability Evaluation Test of 5SPAS Results Data (5SPAS System Evaluation)

Section B: 5SPAS System Evaluation			
No	Question	Percentage of Neutral	Percentage of Most Agree
1.	Overall, I am satisfied with the ease of completing the task	23.3	76.7
2.	Overall, I am satisfied to complete the task.	23.3	76.7
Usefulness of 5S Practice Audit System (5SPAS)			
3.	5S Practice Audit System enhances my effectiveness on accessing the system.	16.7	83.3
4.	Can sign up/register an account in 5S Practice Audit System.	20	80
5.	Can login the 5S Practice Audit System with register username and password.	13.3	86.7
6.	5S Practice Audit System does everything I would expect it to do.	13.3	86.7
7.	5S Practice Audit System is useful in overall.	20	80
Average percentage for Usefulness		16.66	83.34
Ease of Use of 5S Practice Audit System (5SPAS)			
8.	5S Practice Audit System is easy to use.	20	80
9.	5S Practice Audit System is user friendly.	20	80
10.	I was able to interact with the 5S Practice Audit System clearly and understandably.	16.7	83.3
11.	I can easily remember how to use it.	16.7	83.3
Average percentage for Ease of Use		18.35	81.65
Design of 5S Practice Audit System (5SPAS)			
12.	The design of 5S Practice Audit System is interesting.	20	80
13.	The design of 5S Practice Audit System is user-friendly.	20	80
14.	The colour contrast of the 5S Practice Audit System is well-balanced.	23.3	76.7
15.	The font are pleasant/ easy to read.	16.7	83.3

16. Images/ illustration used are suitable.	20	80
Average percentage for Design	20	80
Satisfaction of 5S Practice Audit System (5SPAS)		
17. I am satisfied with 5S Practice Audit System.	20	80
18. I would recommend 5S Practice Audit System to my friend.	23.3	76.7
19. 5S Practice Audit System works the way I want it to work.	23.3	76.7
20. 5S Practice Audit System is wonderful and pleasant to use.	20	80
Average percentage for Satisfaction	21.65	78.35

Overall, the analysis results of the respondents’ feedback about the usability evaluation of 5SPAS based on Technology Acceptance Model (TAM) metrics shows that most of the respondents agree with the usefulness, ease of use, design and satisfaction of 5SPAS (**Figure 3**). The outcomes of the evaluation comments and suggestions suggest that 5SPAS is awesome and a good system. Respondents also perceived that 5SPAS does everything they would expect it to do.

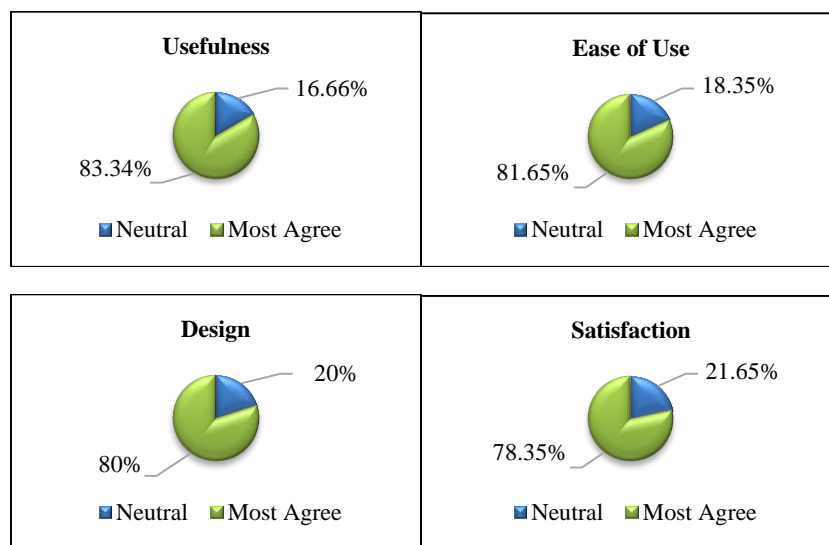


Figure 3: Pie Chart for Overall Average Percentage of TAM Metrics

4. Conclusion

This web-based application system was developed by IPQ UUM and auditors to manage quality environmental practice evaluation. Thus, this is in line with the world without borders in the field of information technology, which is increasingly advanced. Therefore, this project can be used as a future reference for developers and researchers who may wish to conduct similar research or projects in the future, such as creating a mobile application for 5SPAS, and users may be able to implement the 5SPAS effectively and efficiently.

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