Usability and User Satisfaction Evaluation on JTMK Project Selection System by Single Blind Method using System Usability Scale and Net Promoter Score

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Abstract

The continuous growth of technology gives a positive impact to the society in many aspects such as data management and education. Final Year Project / Integrated Project is a compulsory subject for students to graduate. The supervisor is required to select potential supervisees and guide them based on the given period of time. Therefore, JTMK Project Selection System by implementing single blind method is designed and developed in previous research study with the aim to facilitate the selection of potential supervisees based on the proposal report. A comprehensive evaluation is required to evaluate the usability related to the usability (acceptable / not acceptable) of the system and to identify the user satisfaction using this system. This research study implements System Usability Scale (SUS) to evaluate the system usability and Net Promoter Score to identify the user (supervisor) satisfaction. The results of SUS indicate that the system is good and acceptable (SUS Score = 73.25). The result of NPS is 80% shows that, the supervisors are satisfied with the system functionality. Future work is to study the perceived usefulness and ease of use of the system among supervisors by implementing the Technology Acceptance Modal.

Keywords: - System Usability Scale, Net Promoter Score, user satisfaction, web-based system, education institution

1. Introduction

The advancement of technology makes the management of digital information become more effective and easier to access by the specific user anywhere and anytime with the Internet connection. The existing technology also makes education become more interactive and increases the students understanding about the specific subject. According to (Raja and Nagasubramani 2018), with technology, lecturers able to make the class session become more enjoyable, and student are also able to acquire knowledge about a specific subject or course more effectively.

According to the Ministry of Higher Education, an engineering student who enrolled in any higher educational institution such as a local university and polytechnic are required to take the Final Year Project (FYP) / Integrated Project (IP) subject. This is to allow the engineering student to illustrate their ability to apply the information they've gained in their academic program (Halim et al. 2014). Therefore, engineering student needs to form a group which consists two to three members and prepare the project proposal. Then the specific supervisor is appointed according to the supervisor expertise (Khamaruddin et al. 2017). The supervisor is responsible to guide and assist their supervisees to ensure the project can be finished according to the time frame given (Bakar et al. 2015).

A previous study by (Rahman & Razak, 2022) has developed the Integrated Project Selection System and later has been rebranded into JTMK Project Selection System (JPSS) by implementing single blind method. According to the authors, this system is designed and developed with the aim to allow supervisors to select the potential supervisees based on the proposal report not

based on the students to prevent bias in selection of student project. This means the supervisor and student does not each other until the supervisor choose the student project.

JPSS has been uploaded to the specific web hosting and with specific domain and launched to the supervisors to use the system functionality anywhere and anytime with the Internet connection availability. Thus, a thorough assessment of the supervisors' ability to successfully deploy the JPSS web-based system is needed. One example of a method to evaluate a product is usability, which focuses more on how the user interacts with the application to perform the specific task (Al-khomsan et al. 2015). Usability acts as a main factor that influence the success of the web based system (Pradini, Kriswibowo, and Ramdani 2019). Then the more usable of the website means more users is accepted and used the website and vice versa (Al-Soud and Nakata 2010).

A technique that can be used to gauge system usability is the System Usability Scale (SUS). SUS is a frequently used standard questionnaire that is referred to as a "quick and dirty usability scale" for evaluating perceived usability (Lewis 2018).

To evaluate the user satisfaction with the JPSS, Net Promoter Score (NPS) can be implemented. NFS is the effective method for measuring the customer satisfaction and also for monitoring their loyalties (Sasmito & Nishom 2019).

In this research study, SUS and NPS are used to execute a thorough evaluation of the JPSS's successful implementation according to the previously stated description. This is being done to determine user satisfaction with the JPSS implementation and the system's usability.

2. Methodology

2.1 System Usability Scale (SUS)

SUS is invented by (Brooke 1996) and acts as an evaluation tool to evaluate the usability of the products. SUS consists 10 questions in the form of a questionnaire and using 5-point Likert Scale to scale each question. Each participant was requested to give a rate: "Strongly Disagree," "Disagree," "Neutral," "Agree," or "Strongly Agree"(Joshi et al. 2015). A previous study by (Bangor, Kortum, and Miller 2008) mentioned that SUS is very reliable with the Cronbach's alpha value is 0.911 (excellent). Other than that, (Wahyuningrum, Kartiko, and Wardhana 2020) has conducted a reliability test using Cronbach's Alpha for the SUS questionnaires. The SUS questionnaire can be used with confidence because Cronbach's Alpha value is 0.734. On the basis of the preceding study, it can be said that the SUS is validated and trustworthy (Cronbach's alpha value is greater than 0.60) to be used to assess the product's usability.

A previous study by (Setemen, Erawati Dewi, and Purnamawan 2019) has developed an Online Peer Assessment (PAON) system and implement SUS to measure the system reliability. The SUS result indicates that POAN system is reliable and can be accepted by the user with a "Good" rating (SUS score = 80.00). In addition, a prior study by, (Ahmad and Hussaini 2021) analyzed the usability of a mobile application for higher education at Universiti Kuala Lumpur. The SUS result shows that the mobile application is reliable and acceptable.

2.2 Net Promoter Score (NPS)

NPS is created by (Reichheld 2004) with the aim to measure user satisfaction about the specific product. NPS also one of the simplest methods to categorized customers according to their answers (Sasmito & Nishom 2019). NPS labels the users based on three categories which is Detractors, Neutral and Promoters (Cruz, Moreno, and Silupu 2019). Promoters is the user who is satisfied with the product, Detractors is the user who dissatisfied with the product and Neutral is user who satisfied for the time being and may dissatisfy in the future.

Previous study by (Pradini et al. 2019) adopted NPS in order to measure the user satisfaction towards SIPR web-based system. The author claimed that, the SIPR get NPS result is 80 %, which means the user is very satisfied with the system. Other than that, a previous study by (Ismail, Elisa Nalawati, and Putra 2021) has performed the usability test for the Donation application of Toddler Equipment by implementing SUS and NPS. The result of NPS is 45% indicates that the user satisfied with the application.

3. Result and Discussion

Research methodology can be defined as how the research can be done scientifically by adopting various steps (Patel and Patel 2019). In this research study, a research methodology from previous study by (Ahmad and Hussaini 2021) is adopted accordance with this research study. The research methodology consists 3 steps as shown in Fig. 1.

a. Step 1

Questionnaire for SUS dan NPS is developed based on the latest previous study by (Brooke 1996; Pradini et al. 2019; Wijaya, Munandar, and Utaminingrum 2019). Then the questionnaire will be uploaded to the Google form before distributing to the targeted respondents.

b. Step 2

About 30 respondents (supervisors) were selected from the academic institution who has been use the SPBSS. It is consistent with the previous study by (Memon et al., 2020) mentioned that, the appropriate sample size is between 30 and 500 respondents. The targeted participants receive a link to the Google Form that contains the SUS and NPS questionnaires.
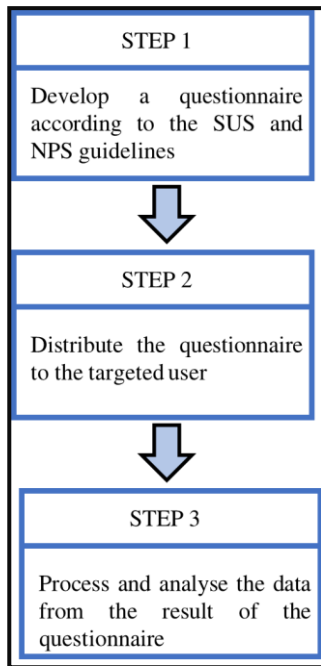
Fig. 1. Research methodology for SUS and NPS

Fig. 3. NPS value

Based on Fig. 3, respondents who score 9 – 10 can be classified into Promoters, who gives value 7-8 can be classified into Neutral and who gives value 1-6 can be classified to Detractors. According to the (Pradini et al. 2019) total value of user satisfaction can be calculated based on equation (4) below.

$$NPS\ Scores = \%\ of\ Promoters - \%\ of\ Detractors \qquad (4)$$

4. Data Acquisition for SUS and NPR

By giving the questionnaire to the intended respondents who were selected in a non-random manner, information is gathered (non-random sampling). The JPSS can only be accessed by the supervisor in this study, hence the respondents who worked as supervisors at the particular academic institution were chosen (Rahman & Razak, 2022). The questionnaire of SUS and NPS is distributed to the respondents via the specific Google Form URL. Detail of SUS and NPS questions can be seen in Table 1 and Table 2.This can further be enhanced by using an IoT web host application that allows the users to connect into the proposed system from remote area if there is internet connectivity. This shows the great potential of the IoT based platform to control the proposed system over the internet regardless of any range limitations.

c. Step 3

After the respondents have successfully answered and submitted the questionnaire, all the data will be analyzed according to the SUS and NPS guidelines. To calculate the usability of the system (SUS Score) three equation from the previous study by (Brooke 1996) is adapted as shown below.

$$Score_{Q1,Q3,Q5,Q7,Q9} = Scale\ Score - 1 \qquad (1)$$

$$Score_{Q2,Q4,Q6,Q8,Q10} = 5 - Scale\ Score \qquad (2)$$

$$SUS\ Scores = Sum\ of\ Scores \times 2.5 \qquad (3)$$

For questions 1, 3, 5, 7, and 9, the score is determined using equation (1). While the Score value for even question 3, 4, 6, 8, and 10 is determined using equation (2). Last but not least, in order to determine the final SUS score value from the questionnaire, equation (3) is applied.
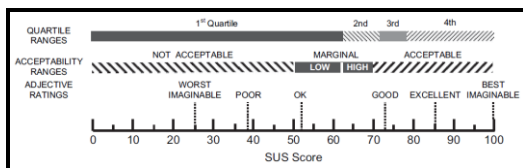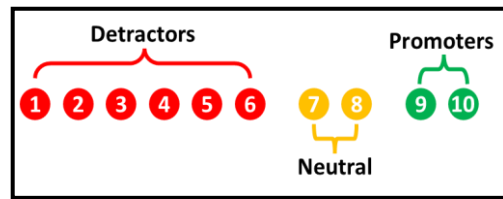

Fig. 2. SUS score categorization

According to (Brooke 1996) SUS score have a range between 0 to 100 and not in the percentage (%). SUS score can be categorized according to the Acceptability Ranges and Adjective Ratings as shown in Fig. 2 (Bangor et al. 2008).To calculate the NPS value this study will be adapted the formula from the previous study by (Pradini et al. 2019) as shown based on Fig. 3.

Table 1. List of SUS questionnaire

No	SUS Question
1	I think that I would like to use this system frequently
2	I found the system unnecessarily complex
3	I thought the system was easy to use
4	I think that I would need the support of a technical person to be able to use this system
5	I found the various functions in this system were well integrated
6	I thought there was too much inconsistency in this system
7	I would imagine that most people would learn to use this system very quickly
8	I found the system very cumbersome to use
9	I felt very confident using the system
10	I needed to learn a lot of things before I could get going with this system

Table 2. Item net promoter score (NPS)

No	NPS Question
1	Are you satisfied with the JTMK Project Selection System by implementing single blind method? Give a score of 1-10 for this website!

5. Result and Discussion

After the data (questionnaire) are collected, all the data will be analyzed and calculated based on the equations (1), (2), (3), and (4).

Table 3. Respondents SUS Score

Respondent	Questions										SUS Score
	1	2	3	4	5	6	7	8	9	10	
R1	4	0	0	4	4	4	4	4	4	1	85
R2	4	3	4	4	4	4	3	4	4	1	75
R3	1	1	1	3	2	2	3	3	3	1	82.5
R4	3	1	3	3	3	3	3	3	3	3	72.5
R5	4	1	3	2	4	3	3	2	3	3	87.5
R6	3	1	2	1	2	1	3	2	2	3	75
R7	3	3	3	3	2	2	2	2	2	2	75
R8	3	1	3	3	3	3	3	3	3	3	72.5
R9	3	1	3	3	3	3	3	3	3	3	77.5
R10	2	1	3	2	3	3	3	4	4	3	82.5
R11	4	0	4	4	4	4	4	4	4	4	82.5
R12	4	0	4	3	3	3	4	4	4	4	82.5
R14	4	0	4	4	3	4	4	4	4	4	85
R15	4	0	4	0	4	4	4	0	4	0	75
R16	0	4	0	4	0	4	0	4	0	4	82.5
R17	0	4	0	4	0	4	0	4	0	4	72.5
R18	3	1	4	4	3	2	1	4	4	4	87.5
R19	4	0	4	4	2	4	3	4	4	4	75
R20	4	0	4	4	4	4	4	4	4	2	75
R21	4	0	4	4	4	4	3	4	2	1	72.5
R22	3	1	3	4	4	4	4	4	3	3	77.5
R23	3	1	3	3	4	3	4	4	3	1	82.5
R24	4	0	4	3	4	4	4	4	4	4	82.5
R25	4	0	4	0	4	4	4	4	3	3	82.5
R26	3	1	4	3	3	3	4	3	3	3	85
R27	3	1	3	3	3	3	3	3	4	3	75
R28	1	0	4	4	3	4	4	4	4	3	82.5
R29	4	3	3	3	3	4	3	3	3	4	72.5
R30	4	0	4	4	1	4	4	4	4	4	87.5
										Total	2197.5
										Average SUS Score	73.25

Table 3 displays the average SUS score across all 30 respondents, the total SUS score, and each respondent's individual SUS score.

Table 3 SUS score data reveals that 72.5 is the SUS score with the lowest value, while 87.5 is the highest value. Single-Blind Project Selection System SUS average is 73.25.

Based on the average SUS score in Fig. 2, we can categorize the system adjective rating is "Good" and acceptability ranges is "Acceptable" (Bangor et al. 2008). Therefore, it can be concluded that the respondents agree the system is reliable, acceptable, and good. Other than that, the average SUS also proves that the system is useful and reliable for the supervisors to select the potential supervisees based on the proposal report not based on the students (single blind method).

Table 4. Respondents NPS Score

	Number	Percentage
Promoters	27	90 %
Neutrals	0	0 %
Detractors	3	10 %
Total Responses	30	100%
Net Promoter Score		**80 %**

The Net Promoter Score (NPS) collected from the respondent's questionnaire is displayed in Table 4. The NPS Score is obtained from the percentage of Promoters minus the percentage of Detractors. The percentage of Promoters is 90%, while the percentage of Detractors only 10%. The total percentage of NPS for the JPSS is 80%. The NPS results indicated that the respondents (supervisors) are satisfied with the JPSS functionality to select the potential supervisees based on the proposal report not based on the students.

4. Conclusion and Future Work

This research study aims to identify the usability and the user satisfaction towards the JTMK Project Selection System (JPSS) by implementing single blind method. The research study begins with the developments of the questionnaire based on the SUS and NPR guidelines and then distributed to the selected 30 respondents (supervisors). After that, all the questionnaire result from the non-random respondents are analyzed to identify the SUS and NPR score.

The SUS and NPR score results show the positive feedback from the respondents. The average of SUS score results is 73.25 (Acceptable and Good) and the NPR score is 80 %. The SUS score indicates that respondents concur that the system is useful and suitable for use by supervisors. Other than that, the NPR percentage score indicates that, respondents are very satisfied with the JPSS functionality.

In future works, Technology Acceptance Model (TAM) is adopted to measure the supervisor perceives about ease of use of JTMK Project Selection System (JPSS) by implementing single blind method for project selection.

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