

User Acceptance of Interactive Student Activities Management System: A Proposed Theoretical Model

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Abstract: Interactive Student Activities Management System (iSAMS) is a web-based system in Universiti Teknologi MARA Cawangan Melaka that provides information on student bodies and activities. iSAMS developed to react as an integrated management platform during the COVID-19 outbreak since student activities are essential and need to carry out. This research's main objective was to investigate how the iSAMS interface and functions affect users' intentions and attitudes when using the system. Thus, we explored the key predictors of user acceptance of iSAMS and proposed the theoretical model for user acceptance. A conceptual structural model was developed by integrating heuristic evaluation (HE) and technology acceptance model (TAM) to identify which key predictors influence the user acceptance of iSAMS. We adopted HE and TAM in developing the model, and as the outcome, we categorized HE into three categories: system support, user interface design, and navigation. Then, we identified three of TAM's predictors, which are perceived usefulness, perceived ease of use, and behavioural intention to use. The hypothesis supported each of the predictors as the measurement since we required improvements for the iSAMS usability. The proposed research framework is simple to implement and can be adapted for other developed systems since it is essential in determining the system's usability and user acceptance.

Keywords: Heuristic Evaluation, Integrated Management System, iSAMS, Technology Acceptance Model.

Introduction

During the Coronavirus disease (COVID-19) outbreak, it has affected the educational activities surrounding the world inclusive the norm method of learning delivery face to face and the extra-curricular activities change the medium to online learning using virtual platform [1], [2]. As announced by the Ministry of Higher Education, all universities in Malaysia must conduct online teaching and learning activities until December 2020 [3].

It is to ensure the education continuity, and despite the changes, the activities need to be carried out as additional points to the students. The activities conducted to strengthen students' comprehension, skills development physically and mentally and improve their employability. Student Affairs Division (SAD) in Universiti Teknologi MARA (UiTM) Melaka Branch, Malaysia (UiTMCM) handles the students' activities manually, where students need to prepare the paperwork, submit to the SAD office, waiting for approval, conduct the activities, and finally, the report submission. The current implementation worsens due to UiTMCM having three campuses with seven faculties, 120 active students' clubs with more than 30 activities, and 30 to 40 pages of documentation per activity. Each of the proposals involved a few forms and paperwork with the required attachments. These documents need to be submitted to the SAD office after getting the signature, comments, and approval.

Unfortunately, all the mentioned process flows cannot be performed during the pandemic, and we overcome the hassle by proposing the Integrated Student Activities Management System (iSAMS). The integrated management system (IMS) of iSAMS enables the acceleration process of process flow to start with the proposal, tracking the status, redundancy of activities, reducing turnaround time, minimizing errors, improving report quality, and collection of report tracking [4]. The integration is the documentation and recording elements initiated from the first phase of the requirements, design, and development until the testing phase. Despite [5] claimed the risk of IMS such as the high cost involved to purchase and repairing parts, yet [6], [7] denied it with the fact that the integration is needed in different management systems since it was able to eliminate the conflicts between individual simultaneously operate in the organization. We can conclude that IMS improves communication effectively [8] for each party involved, and the process is transparent leads to an efficient working environment.

Indirectly, IMS benefits SAD through iSAMS in maintaining the activities' budgets since it could monitor the duplication of activities throughout three campuses in UiTMCM. Also, iSAMS development fulfills the purposes of having a systematic IMS for both parties' benefits. It is embedded in the SAD and tracks all information on club activities from the first day of the establishment, the program tentative, attendance, report, and the details of the process and progress. As supported by [9], [10], there is a need for better planning and management of students' activities that cover preferences and justification for students' participation. Gheorghe et al. [11] affirmed the need for the IMS implementation in university as the university curriculum's strategic decision to improve the education process and attract investors' partnerships in the country and abroad. All the documents and participation reports in the activities such as academic workshops, leadership activities, community engagement, and the students' club will be saved systematically and able to retrieve [12].

As in the Oxford dictionary, the word 'acceptance' is defined as the action of consenting to receive or undertake something offered. As mentioned by [13], users' acceptance is the user's willingness to use any information technology system developed to ease and support the tasks. Users' feedback is collected and analyzed. The resistance of anyone in the group may reflect the adoption of the overall rate. Furthermore, there was a need to identify the motivation and purposes of a new system been developed and help the project's success. Handayani et al. [14] claimed the difficulties in determining the users' acceptance of a system, but it is the most critical human research area. Customer satisfaction is the consumers' perception of the offered product or service, whether it has met or exceeded the expectations. The quality of the products or services must comply with the standard to measure satisfaction [15].

Therefore, this research's main objective was to evaluate the iSAMS web-based interface and functions' user acceptance. We applied the heuristic evaluation (HE) and the technology acceptance model (TAM) by identifying the key predictors that influence the system's acceptance. The theoretical framework is developed for better understanding and as the methodology to ease the user acceptance process. With the identified key predictors, we measured the system's effectiveness towards the user's perception and improved the relevant aspects as a future improvement. These to aligned with the importance of having the integration system through iSAMS, UiTMCM able save cost on the storage required for filing the submission paper works and the activities report, the wastage for stationery, save the time consuming, and reduce manpower effort to ensure the successfulness of students' activities.

This paper is organized as follows. In section 1, the researcher reviewed the background and importance of the developed system. The related work in section 2 explained the techniques adopted, followed by the proposed acceptance model and the research hypothesis. Finally, section 5 concludes the ideas of the paper.

Related Works

In this research, we study the theoretical framework and a definition of the acceptance, adequate how the system works, and explore the quantitative data collection methodology in measuring the acceptance process stages. Two types of user acceptance have been discussed: the heuristic evaluation (HE) focuses on evaluating usability and the Technology Acceptance Model (TAM).

Heuristic Evaluation

Users interact over a system's user interface and use the system to understand the system flow. Thus, the user interface represents the totality of the system for users. In designing and developing the system, assessing a user interface's usability is mandatory to change any requirement from system errors and bad user interface design. Heuristic evaluation (HE) is the usability evaluation technique used to identify the major usability problems on time and reasonable cost. In the HE's progress, experts will use the system and identify any system error elements. This method is considered popular due to its low cost, less commitment, and ease of application. With the minimal time used and minimal training, the evaluation can be performed on any platform such as desktop or prototypes after completing the design phase.

HE was standard evaluation methods formally developed by Nielsen [16] using ten major usability heuristics. Later, Zhang [17] proposed the 14 heuristics evaluation by adding another four features using Nielsen's ten usability and Shneiderman's eight golden rules [18], which later called as '14 heuristics the Nielsen–Shneiderman Heuristics' due to the HE been widely used on their work. Table 1 shows a detailed explanation of each heuristic. HE is considered as the famous evaluation technique that has been used in many research. It includes the enhancement of experimental to obtain the quantitative results using HE [19], telepsychology web, and virtual reality system for the elderly [20], social websites for blind people [21], and examine the user interface characteristics and behavioural intention using Treelt application.

Table 1: The 14 Heuristics Nielsen-Shneiderman

Heuristics	Usability	Details
H1	Consistency	Users should not have to wonder whether different words, situations, or actions mean the same thing. Standards and conventions in product design should be followed
H2	Visibility	Users should be informed about what is going on with the system through appropriate feedback and display of information
H3	Match	The image of the system perceived by users should match the model the users have about the system
H4	Minimalist	Any extraneous information is a distraction and a slow-down
H5	Memory	Users should not be required to memorize a lot of information to carry out tasks. Memory load reduces users capacity to carry out the main tasks
H6	Feedback	Users should be given prompt and informative feedback about their actions
H7	Flexibility	Users always learn, and users are always different. Give users the flexibility of creating customization and shortcuts to accelerate their performance
H8	Message	The messages should be informative enough such that users can understand the nature of errors, learn from errors, and recover from errors
H9	Error	It is always better to design interfaces that prevent errors from happening in the first place
H10	Closure	Every task has a beginning and an end. Users should be notified about the completion of a task
H11	Undo	Users should be allowed to recover from errors. Reversible actions also encourage exploratory learning
H12	Language	The language should always be presented in a form understandable by the intended users
H13	Control	Do not give users that impression that the systems control them
H14	Document	Always provide help when needed

For rating purposes, we provide the evaluation details following the proper procedure while conducting the survey as in Table 2. The rating result depends on the division of the user. Some will experience it, in terms of their interaction with the system, the usability issues, and an issue for the first-timer encounter or persistently affect them. The highest severity rating is a persistent problem with a significant impact that most users will encounter.

Table2: The severity rating scale of heuristic evaluation

Scale	Details
0	Not a usability problem at all
1	Cosmetic problem only. Need not be fixed unless extra time is available
2	Minor usability problem. Fixing this should be given low priority
3	Major usability problem. Important to fix. Should be given high priority
4	Usability catastrophe. Imperative to fix this before the product can be released

It is essential to understand and aware of the HE technique's advantages and disadvantages. Nielsen claimed that an individual evaluator would only catch 35% of the usability problems than 3-5 evaluators with 60-75% detection. It is recommended to use 3-5 evaluators to get the best ratio since it is also easy to conduct, even for those without usability training. The sufficient is to provide 2-3 hours of training with clear examples and feedback. As for HE's drawback, it does not indicate the elements of the interface that follow usability guidelines. Despite it only required minimal training, yet there is a need to understand the required heuristic. Also, HE only focuses on a single device or application, so it will not identify the problem because it uses the environment. Thus, we combine the other techniques called the Technology Acceptance Model (TAM) to increase the percentage of the raised problems.

Technology Acceptance Model

In research into information systems, consumer adoption of information systems has earned relatively comprehensive attention. Empirical studies on the acceptance of information systems by users have developed theoretical mechanisms for user acceptance when implementing the systems to help researchers and practitioners better understand adoption and use processes. Technology Acceptance Model (TAM) has been introduced by [22] recognized as the perceived usefulness and easy to use model for user acceptance of information system.

As in Figure 1, TAM postulates two predictors: the perceived usefulness and perceived ease of use. Both are considered the main fundamental determinants of computer acceptance behaviour. Perceived usefulness (PU) is defined as the extent where a user feels when using a system could improve efficiency. Perceived ease of use (PEOU) influences the PU and reflects the user's believes when using a system should be smooth without an extra task.

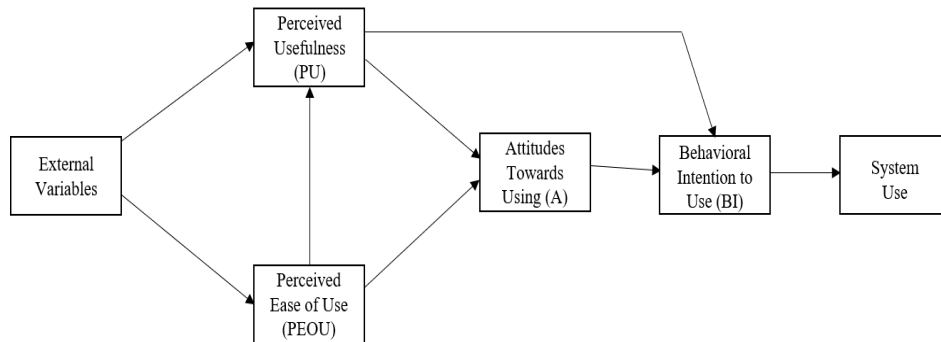


Figure 1: Technology Acceptance Model

TAM describes how users consider and use a particular technology due to the causal relationship between device design features, perceived utility, perceived user-friendliness, a disposition to use, and usage. TAM denotes the consumer's adoption, and the purposes define the successful usage of an information system using a system. It is measured by the perceived utility, ease of use, and attitudes towards using the system. Considered PU and PEOU are, therefore, the two key predictors assess the effectiveness of acceptance and usage.

TAM also postulates that PU is determined and has a direct effect on PEOU and external variables. Also, PEOU posits by external variables such as training, user support, documentation, and system features. Various research used TAM as an approach for user acceptance towards the person's attitude (A) influenced by PU and PEOU. It denotes the estimation of the relative weight as in Eq (1).

$$A = PU + PEOU \tag{1}$$

The system used is determined by behavioural intention to use (BI), where the BI is jointly determined by the person's attitude (A) and PU by the regression with the estimation of the relative weight as in Eq (2).

$$BI = PU + A \tag{2}$$

It included research by [23] using the TAM for decision making for solving the problem in adoption the mobile business intelligence, [24] describing the people's intentions to use mobile treatment application, [25] enhanced TAM for web-based learning, and [26] study on the acceptance of internet of things in the smart home environment.

iSAMS Acceptance Model and Research Hypothesis

Thus, from the review presented, the study proposed the user acceptance model, which enables the investigation of whether iSAMS user interface design can be accepted. The ideas consist of mapping the category of HE's usability and development of the proposed acceptance model with the hypothesis involved. The mapping ensures that the iSAMS can be accepted from both the perspective user interface and the system's functionality. The 14 usability's HE proposed was overlapping several features. Thus, we grouped it into three factors: system support, user interface design, and navigation, as in Table 3.

Table 3: Mapping Category of Heuristic Evaluation

Category		
System Support	User-Interface Design	Navigation
H7. Flexibility	H1. Consistency	H3. Match
H8. Message	H2. Visibility	H4. Minimalist
H9. Error	H6. Feedback	H5. Memory
H11. Undo	H10. Closure	H14. Document
H12. Language	H13. Control	

System Support

The system should prevent the user from feeling anxious about the computer and cater to the aspects of possessed good system support. It can help users make any mistakes during the session, and this process helps to enhance the intention to operate it. It has to facilitate the user in the convenience while using the system, in terms of technical and support to prevent and error recovering [27]. There are five usability HE, which is flexibility, message, error, undo, and language. Therefore, it leads to the first hypothesis proposed:

H1: System support has a positive effect on the behavioural intention in using the iSAMS.

User-Interface Design

Designing a good user interface is considered an important phase and always been emphasized because it allows users to operate the system functions. It leads to the potential to enhance the system performance as well as the usefulness of the system. It is related to the arrangement layout of the system contents such as buttons, font colour, font size, and the scheme of the system perspectives from different disciplines. There are five usability HE, which is consistency, visibility, feedback, closure, and control. Thus, the second hypothesis proposed:

H2: User-interface has a positive effect on the perceived usefulness in using the iSAMS.

Navigation

Navigation is defined as a link supporting access to the contents and loading it to a new page or another section within the current page [28]. The perspective of system navigation follows the user selection on a certain button using the depth-first search technique, and the process is repeated until the users find the information or complete the session. Since the iSAMS use the web-based system, the constraints differ in terms of the screen size and exceed an unnecessary amount of information. So, the third hypothesis proposed:

H3: Navigation has a positive effect on the perceived ease of use in using the iSAMS.

Perceived Ease of Use, Perceived Usefulness and Behavioural Intention

Perceived ease of use (PEOU) defined as user believes when using a system should be smooth without extra task [29] and feel free from thinking of engaging mentally and physically with the system. The positive relationship among PEOU and intention to use during the research on the library system. Besides, [30] confirmed that PEOU correlates with PU and BI in conducting the meta-analysis of 88 TAM-related studies for the system acceptance. Thus, the fourth and fifth hypothesis proposed:

H4: Perceived ease of use has a positive effect on the perceived usefulness in using the iSAMS.

H5: Perceived ease of use has a positive effect on the behavioural intention in using the iSAMS.

Figure 2 illustrates the theoretical research framework of the iSAMS and the relationship between the five predictors selected. We highlighted the relationship accordingly from H1 until H5. Thus, we conclude the relationship's propositional logic using the conditional statement or the implication as in Eq (3), Eq (4), Eq (5), Eq (6), and Eq (7).

$$N \rightarrow \text{PEOU} \quad (3)$$

$$SS \rightarrow \text{BI} \quad (4)$$

$$\text{UID} \rightarrow \text{PU} \quad (5)$$

$$SS \vee \text{PU} \rightarrow \text{BI} \quad (6)$$

$$\text{PEOU} \vee \text{UID} \rightarrow \text{PU} \quad (7)$$

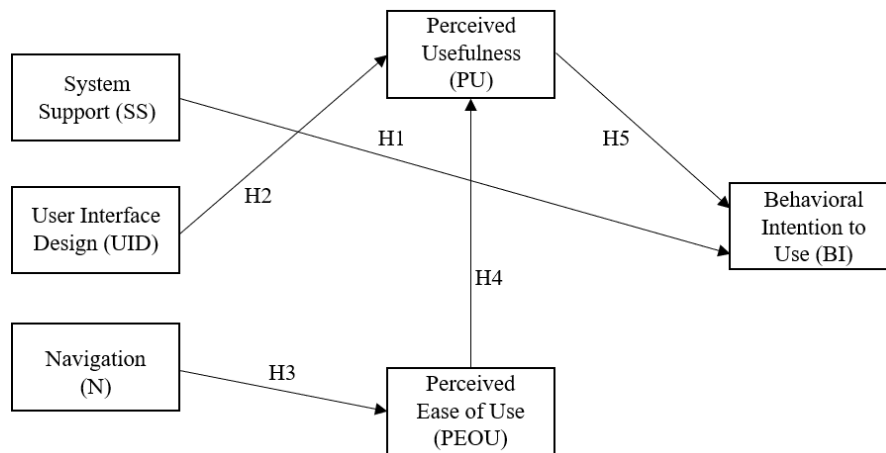


Figure 2: iSAMSTheoretical Research Framework

System Support

To further investigate the relationship proposed by the model and the user acceptance of the predictors, a quantitative research methodology will be conducted through a survey to collect numerical data. A structured questionnaire based on the six predictors' details will be generated as the instruments for the research objectives to study the user acceptance and perception towards the iSAMS. A panel of iSAMS users and experts in the process flow reviewed the questionnaire to validate the contents. Student Affairs Division in UiTM will be the administrator, and respondents need to answer the given questionnaire through Google Form application. They have to choose the best-described degree of agreement on the following 5-point Likert-scale responses (1= 'Strongly Disagree', to 5= 'Strongly Agree').

Conclusions

In this research, the main objective is to test the user acceptance of the iSAMS interface and functions. iSAMS is a web-based system that manages all students' activities under the Student Affairs Division in UiTMCM. Thus, we proposed it to be evaluated using two structural models for user acceptance models, which are heuristic evaluation (HE) and Technology Acceptance Model (TAM). HE consists of 14 usability heuristics, and we categorized it into three predictors and integrated them with TAM. Finally, using both the theoretical background of each process and connection, we develop the theoretical research framework for iSAMS. We reviewed and presented the combination approach to furnishing the gap encountered. The process followed by generating a hypothesis for each category, in which five hypotheses were proposed. For future work, we propose to use a structural equation modeling with partial least squares technique after completion of data collection through a survey.

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