

The Usability Evaluation of the E-services Unified System in King Abdulaziz University

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Abstract: Usability is considered one of the most important features of any systems, which used to measure how easy the system is to use. Measuring the system usability degree from the user perspective has been a breakthrough recently helping in the assessment of the overall system quality. With the consideration of the usability of the system as a crucial factor for evaluating it, the decision of deciding which affective usability factor affects usability more than others is one the problems that faces researchers. The work proposed in this paper concentrates on evaluating the usability of the e-services unified system in KAU university website from the viewpoint of university's administrative and academic staff. Previous usability models are studied to be able to determine the most important and common factors that affect the usability of any system. The factors determined are classified and used to set the adopted proposed model to facilitate the measurement of KAU university website usability. The research findings indicated that all factors have positive impact on the system usability with different degrees. The most significant factor was safety and the last and least affecting factor was the universality.

Keywords: Usability, Usability evaluation, QUIM model, Usability factors

1. Introduction

The system usability is an assessment tool to indicate how successfully a user could find the required information and accomplish some tasks using the system [1]. Most usability problems happen because the designers build the system from their own perspective without considering user's viewpoints [1]. The usability evaluation is very important condition for system survival especially in the intense competition environment [2]. If the website or the system is difficult to be used and users face problems in the system navigation, they would immediately leave the website to find another alternative. Among the benefits of usable user interfaces are the increasing of human productivity, performance and commercial viability. Usability is important not only to increase the speed and accuracy of the work, but also to ensure the safety of the user [3]. Moreover, the success of the software depends on how we can present it in a way to be friendly with user attitude. Therefore, it is important to study user's interaction with the system to understand the way that it could be customized by the user.

The studies indicated that it is important to measure the system usability degree from the user perspective by using suitable evaluating model in order to assess the overall system quality. There are several models used to assess the system usability with different measurement factors. Some important usability factors are mostly shared among the different models. QUIM model is the most comprehensive model, which includes majority of these important factors. However, QUIM model will be followed in this study. The Academic websites are aiming to provide information to a wide variety of users such as students, lecturers, faculties, and guests. Universities websites can be used to attract students, lecturers and funding organization from other places and increasing popularity of institutions all over the world [4]. Usability is one of the most important features of

any system and could be used to measure the ease of any system's usage [2].

This paper surveys and studies the usability among different professionals' perspective and researches to be able to determine the most important and common factors that affect the systems or websites usability. According to the literatures, there is no researches to measure the usability of KAU website. The aim of this study is to evaluate the usability of the e-services unified system in the KAU university website from the viewpoint of university's administrative and academic staff. The researcher selected KAU e-services unified system among many other systems, because the system is being daily used by students and faculty members to accomplish their duties and academic tasks. This system combines many e-services and programs in one unified platform via the university website. The aim of the study is to evaluate the usability of the e-services unified system in king Abdulaziz university website using eight usability affecting factors. Moreover, this is important since the research findings will help KAU administrators to improve their systems by include users perspectives with system design. In addition, this research will contribute in highlighting the system gaps and usability problems to help system designers recover these gaps and provide good usability and user interfaces for this online system. Also it will contribute in system improvement by show user's perspectives about the system to be considered during the design process.

2. Usability Definitions

Usability is one of the important characters to enhance the quality of products such as web sites or software. There is no agreed definition of the usability concept [5]. The term usability has been defined diversely by different scholars and it has been discussed in human-computer interaction (HCI)

literature [6]. According to Nielsen [7], “usability often refers how well users can use the functionality of the system “. In addition, The ISO has developed different standards on usability. First standard definition is "The capability of the software product to be understood, learned, used and attractive to the user, when used under specified conditions.” [8]. Second standard definition is “the effectiveness, efficiency, and satisfaction with which specified users can achieve specified goals in specified context of use” [9,8]. While Eason’s defined the usability as “The degree to which users are able to use the system with the skills, knowledge, stereotypes and experience they can bring to bear” [10]. Moreover, Nielsen was defined the usability as a quality attribute that measure how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process [2]. Usability means that the people who use the product can accomplish their own tasks so quickly and easily. This definition rests on four points: (1) Usability means focusing on users; (2) people use products to be more productive; (3) users are busy people want to accomplish their tasks; and (4) users determine when a product is easy to use [11]. According to IEEE standard the usability is “The ease with which a user can learn to operate, prepare inputs for, and interpret outputs of a system or component” [12]. Based on Benbunan-Fich, the usability is defined as “ how well and how easily a user, without formal training can interact with an information system of a web site”[5].

3. Related Work

Different studies in the literature conducted by researchers and survey, are all focusing on usability evaluation in e-learning systems and websites [6, 13, 14]. Mohamed Hussain et. al. [6] recognized the importance of providing a good usability for the e-learning website. They used Shackel’s model to evaluate the usability of the e-learning websites, which considers the acceptability factor as the highest level of the usability concept. This study concluded that e-learning websites are appreciated based on the characteristics of usability by users. Therefore Nicholas Kipkurui et. al. [13]., recognized the importance of providing a good user interface and consider the several challenges facing the usability of these systems. The results from this study indicated that the learnability factor affect the usability of e- learning system. Abdulhameed Alelaiwi et. al. [14] assessed the user interface usability of the (blackboard) e-learning system. They found that users with HCI knowledge seemed more Accurate regarding user interface and they are able to find system gaps more easily. On the contrary, users without HCI knowledge are easily satisfied because of fewer expectations and less HCI knowledge.

Other studies reviewed the usability models and evaluation tools [12, 5, 15, 16]. Ahmed Seffah et. al. [12] reviewed the existing usability evaluation methods and highlighted the limitations and gaps of these standard models. They designed an integrated tool for measuring usability based on the factors affecting the software quality. This consolidated model is called Quality in Use Integrated Measurement (QUIM). Nur Sukinah et. al. [5] proposed model for

evaluating the usability of web sites derived from other usability standards. They compared and analyzed 6 acceptable and standard existing usability models to determine the similar attributes between them. Joel Mvungi et. al. [15] Reviewed and compared several types of Web evaluation method that mentioned in previous studies and classified them into tow Essential types according to the purpose of using. Ankita Madan et. al. [16] conducted a survey research to study different usability evaluation methods depending on the related literature review.

Others focused on evaluating usability of academic and universities websites [4, 1, 17, 18]. Sharmistha Roy et. al. [4] recognized that lack of appropriate techniques and attributes for evaluating usability might affect the usefulness of the website. To address this issue, they conducted a study to evaluate the software usability and accessibility of websites of three popular academic Institutes based on user perception. Jabar M. et. al. [1] conducted a study to evaluate the usability of three Malaysian university websites from the student perspective. The evaluation process depend on four usability factors which were Content Organization and Readability; Navigation and Links; User Interface Design and Performance and Effectiveness. They used a questionnaire called (WEBUSE) (standing for WEBSITE USability Evaluation) which was developed earlier in a previous study [17] as a websites usability evaluation tool. Md Rahman et. al. [18] reviewed the exist definitions of website usability and several ways that have been used to evaluate the academic websites. Based on this experience, they conducted a study to develop a usability assessment tool to evaluate usability of the University of Dhaka from the students’ perceptions. The other objective of this study was to identify the factors influencing the usability of the University website. They considered five usability factors in this study which were Interactivity and functionality; Navigation, searching and interface attractiveness; Accuracy, currency and authority of information; Accessibility, understandability, learnability and operability; Efficiency and reliability.

4. Research Methodology

The goal of this research is to evaluate the usability of e-services unified system in king Abdulaziz university website from the system users’ viewpoint. The research has been conducted using a quantitative method. The survey questionnaire was adopted for this study to test the research model and to allow for an in-depth examination of the factors affecting the usability of the system. Also the survey questionnaire will fit the researcher’s overall aims and objectives for this study.

The research community includes the king Abdulaziz University administrative and academic staff with both female and male sections in all branches. The university staff were selected because they are eligible to access most of the system’s e-services and they have direct interaction with system almost every day to accomplish their job tasks. Therefore, they can evaluate the system with accurate and comprehensive perspective.

4.1 Participants

One of the first considerations for conducting usability study is to understand target participants as it is an important tenet for evaluating usability [7]. The study used a random sampling approach; since the research community is very large and it is difficult to reach every member in the population. According to the information given from the deanship of the Graduate studies in KAU University, research community includes total 5426 of academic staff (2382 female, 3044 male) and total 6481 of administrative staff (2443 female, 4038 male) as shown in figure 1.

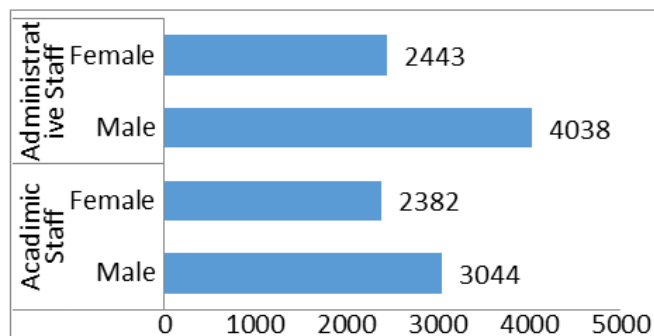


Figure 1: The Research community

4.2 Procedure

An online version of the questionnaire was mostly used to collect data from the participants. The questionnaire online link was distributed by email and posted to several KAU staff groups on WhatsApp application, as this was the most popular social networking application. Also the research services unit in the Deanship of Graduate Studies distributed the questionnaire to university staff e-mails. The total number of questionnaires Responses from both male and female section was 226 (24 male section and 202 from female section).

4.3 Material

The main instrument used to collect data in this study is the Questionnaire .It was prepared by the researcher depending on the study model and reviewed by two doctors from KAU University. It is worth noting that the questionnaire was written in English and translated into Arabic. It contains two parts. The first part was prepared to assess participant's demographic information and contained 9 questions related to age, gender, educational level, Job field, Work experience, Mother tongue, computer skills, the Internet speed and computers & hardware equipment Adequacy. The second part of the questionnaire is about the factors affecting system usability. This part contains 47 questions organized as following:

5 questions for each of Efficiency; Effectiveness; Usefulness and Universality, 4 questions for each of Satisfaction and Learnability, 7 questions for Safety and 12 questions for Accessibility.

In this questionnaire, two measurement scales were used, namely Likert, multiple choices (in general questions). The Likert format provides a statement to which the respondent must take one of five positions ranging from 'Strongly disagree' to 'Strongly agree' whereas (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree) .

4.4 The Research Model

The researcher adopted the study model based on the QUIM consolidated model, since it is the most comprehensive usability model according to the literature review [5,3]. QUIM contains 10 factors; eight of them were selected and applied in this study. The eight factors include Efficiency, Effectiveness, Satisfaction, Learnability, Accessibility, Universality, Usefulness and Safety. Figure 2 illustrates the research model which shows the relationship linking the eight factors (independent variables) with the usability of system (dependent variable). Moreover, it is worth to say that the questions are written to measure each of these factors depend on specific Predefined criteria which illustrated in table 1 [3]. Also the researcher adopted some measurement questions from existing standard questionnaires for evaluating usability.

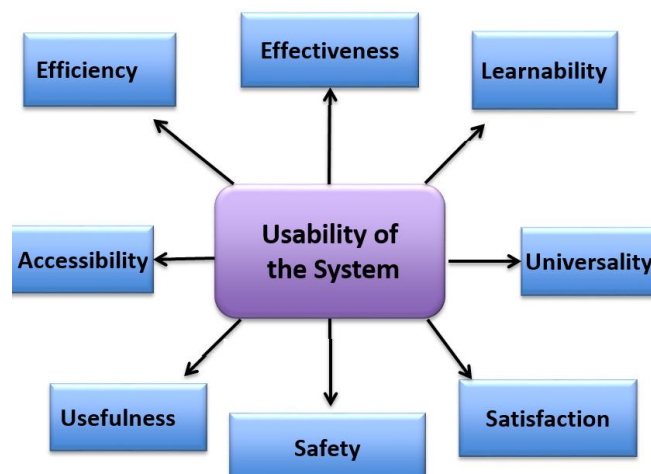


Figure 2: The Research Model

5. Study Hypotheses

In order to investigate the research problem, the following hypotheses tested:

- H1: System Efficiency has a positive impact on the system usability.
- H2: System Effectiveness has a positive impact on the system usability.
- H3: User Satisfaction has a positive impact on the system usability.
- H4: System Learnability has a positive impact on the system usability.
- H5: System Accessibility has a positive impact on the system usability.
- H6: System Universality has a positive impact on the system usability.
- H7: system usefulness has a positive impact on the system usability.

H8: system safety has a positive impact on the system usability.

H9: The combined of all factors has a positive impact on the system usability.

6. Results

In this study, Statistical Package for Social Sciences (SPSS) version 20 was used for the data analysis.

6.1 Measures of Reliability by Cronbach's alpha:

One of the most popular reliability statistics in use today is Cronbach's alpha. It is used to determine the internal consistency or average correlation of items in a survey instrument to gauge its reliability. Results show that the values of Cronbach's Alpha Coefficient ranged from (0.7893) to (0.961) which indicating an exceptionally high reliability for questionnaire and its factors. The Self-Veracity of the questionnaire was calculated as another test to measure the Reliability. The result shows that veracity coefficient is also high and significant value (0.981) that refers to the strong questionnaire output reliability.

6.2 The internal consistency and the veracity

This test will describe the internal consistency between the questionnaire statements and factors by calculating Pearson correlation coefficients. Results shows that there is a positive and strong correlation between each factor items and the overall degree of the factor, which indicates the validity and high degree of internal consistency veracity of the statements of each factor. In addition, results show that there is a positive and strong correlation between the study factors towards the overall questionnaire and all are significant at level (0.01), which indicates the high degree of constructivist consistency veracity of study factors.

6.3 The T Test Analysis

Table 2 shows the results of the study hypotheses validity test by using the Statistical method of the mean and the One-Sample (T Test) at significant level: $\alpha = 0.05$ [19]. Each of study hypotheses is tested separately by analyzing its items or statements, and these items will arrange in descending order by the mean of the participant's opinions according to the scale of the agreements limits.

7. Discussion and Conclusion

This research aimed to evaluate the usability of the e-services unified system in the KAU university website from the viewpoint of university's administrative and academic staff. The main instrument used to collect data in this study is the Questionnaire. The researcher adopted the study model based on the QUIM consolidated model using eight usability factors. The T-Test was used to measure the effect rate of each usability factors. In addition, the pearson correlation coefficient was used to measure the internal consistency veracity of the study factors. This correlation was found strong at significant level 0.01 for all

factors. After analyzing the data, the researcher concluded that all the eight factors have a positive impact on the system usability with different degrees. This result corresponds to the researcher's hypotheses. Based on the weighted mean, the prioritized order of the factors effect was Safety, efficiency, usefulness, satisfaction, effectiveness, accessibility, learnability and universality. It was noted from data analysis that the overall response of the questionnaire statements and for most factors was "Agree" which means that most of the respondents approve the strong effect of these factors on the KAU unified system. Moreover, the study results indicate that the most significant factor was system safety. This significant value of safety factor reflects the strong capability of the system to Provide protection for users and limits the risk. The efficiency factor also appeared very strong which indicates the strong capability of the system to enable users achieving their tasks with appropriate amounts of resources. In addition, the usefulness of the system was founded high value which implies that KAU unified system provide a strong and critical practical utility for the users. Moreover, the results show a relatively high degree of user satisfaction about the system but it needs to increase the interface design attractiveness to be more satisfied for the users. As well as, the system effectiveness was found relatively high which reflects the ability of KAU unified system to enable users achieving their tasks with accuracy and completeness. However, it is noted from analysis results for this factor that it needs to provide a mechanism for reviewing, confirming, and correcting information in the system. The system accessibility also founded in satisfied rate but it needs more improvements. The most important observed weaknesses regard to this factor was system availability for using by people with disabilities. Therefore, it has been suggested that system designers must increase the attention about this point and provide special accessibility for disabled users. In addition, other weaknesses regarding the accessibility factor include the difficulty of searching and finding the information in the system, lack of settings customizing property, Inaccessibility of user guidance by users, the difficulty of determining the current location within the system pages. However, it has been suggested that system developers need to give more attention about these comments to improve the system accessibility, which in order important to increase the overall system usability. This result agreed with Md Rahman et. al. study [18] which indicated the importance of the accessibility factor to measure the system usability. Regarding the learnability factor, the findings indicate two associated weaknesses about the lack of mistakes recovery mechanism, which make it difficult for users to learn how to overcome system problems easily and quickly. These critical weaknesses reduced the rate of this factor in system usability and this agreed with Nicholas Kipkurui et.al. study [13], that the learnability factor affect the usability of the system which means if a system is not easy to learn then it will affect its usability. According to the findings, the last and least effecting factor was the universality; the most of responses regarding this factor was nature. This reflects that there is a shortage in the capability of the system to accommodate

a diversity of users with different cultural, backgrounds, and languages. Therefore, it is needed to concentrate more on improving this factor to raise the system usability. However, this study conclusion agreed with Mohamed Hussain et. al. study [6] conclusion, that e-learning websites are appreciated based on the characteristics of usability by users. Therefore, designers and educational administrators must consider all the usability characteristics to attract users towards their e-learning websites and systems.

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