The Effectiveness of Web Systems and Mobile Applications for their End-Users

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ABSTRACT

Nowadays, people are turning to the internet to search for information and are completing their work using web systems or mobile applications as their medium. This study was conducted to determine the relationship between web systems and end-user effectiveness and performance. This study collected information using primary data, with a population of 200 students from University Sultan Zainal Abidin (UniSZA) in the Faculty of Informatics and Computing. According to Krejcie and Morgan's 1970 table, the sample size is 132. By using SPSS software, the Pearson Correlation formula tests the input. Based on the testing data, the effectiveness of the user using a web based system is 0.633, whereas the effectiveness of using a mobile application is 0.973. In conclusion, there is a moderate relationship between using web systems and the effectiveness of the end-user. Furthermore, there is a strong relationship between using mobile applications and the effectiveness of the end-user. This study recommends that future researchers and the developers of web systems or mobile applications should design better and more suitable questionnaires to achieve excellent results. Developers need to be aware of the relationship between web systems and mobile applications and their end-users so that they can improve their systems and applications.

Keywords: *Effectiveness of End-User, demographic factors, Web System, and Mobile Applications.*

I. INTRODUCTION

In this era, millions of people worldwide are surfing the internet search for information. People used the internet as a daily routine in day-to-day activities. Thus, in technology development, significant advances are as often the result of a series of evolutionary steps. Nowadays, people are surfing the internet by using a computer or mobile phone to do their work. To surf the internet, people need to use a web system or mobile applications as their platform. A web system or website has a unique link. The mobile applications are a software application developed specifically for use on small wireless computing devices such as smartphones and tablets rather than desktop or laptop computers. Furthermore, mobile applications designed with consideration for the demands and constraints of the devices and to take advantage of any specialized capabilities they have. Both of these can use to surf the internet.

The problem statements are people need to turn their internet for search information if they want to use the web system and mobile applications. Moreover, end-users are annoyed with the web system and mobile applications because some of it represents the poor design or too crowded with inappropriate graphic. Next, end-user also irritated with the mobile applications because they need to install on their gadgets before they can fully use it And if the applications of the file storage are bigger then the gadget will be running slow and cannot install many applications.

In completing this study, there are a few objectives of this research. First, the objective is to determine the relationship between web systems towards the effectiveness of the end-user. Second, the objective is to determine the relationship between mobile applications towards the effectiveness of the end-user.

II. RELATED WORK

Web systems had developed before the mobile application had introduced. The web system was a platform for people to find the information to do work, gain knowledge, entertainment, and others. There were many methodologies to develop the web system and need to do a study about the web system. Some engineering introduced MIDAS, a model-driven methodology based on MDA for the development of Web Information Systems (WIS). They apply the MDA metamodel to the Web Platform using XML and relational technology. It was an MDA-based approach for the web information system development.

Besides, the web system can develop in many ways and platforms based on people that develop the web system. Some people introduced the web system used

the Web-based Assessment and Test Analyse (WATA) system and examine its impacts on teacher education. They need to investigate this system and based on the investigation might provide some guidance to help those who interested in the development of Web-based assessment and encourage to develop the web system. Besides, the developers need to provide effective navigation and user-friendly that the user will easy to use it. Developers must use the good label and accurate the links. The link that hits dead is one of the most annoying design faults in a web system or website (Haine, 1998) [1]. Moreover, security is an important issue with the development of the web system. Developers must protect the copyrights of the web system and the websites. Every time if the developers of the web system updated the web system, the developers need to secure the system. Next, stress the use of security. When developers do web systems about finances, they need to enable a secure transaction to implement the technology. According to Tadjer (1998) [2], "The words 'secure server' help to make the consumer feel safe. Also, an optional to a security practices page and legal notices for visitors to read also add calming effect". According to a survey conducted by Hamilton (1997) [3], speed was the number one complaint of web users which is 77% based on the form the survey of that population. Speed is most important when developers want to develop a web system.

Mobile Applications are the software applications designed to run on smartphones, tablets, and other mobile devices. Applications are commonly known as "mobile apps" or "apps". In this era, mobile applications have become one of the primary tools people use daily whether in personal lives or professional lives. Mobile applications began with the first development of the mobile device and the first mobile phones whose microchips required the most basic of software to send and receive voice calls in 1973 (Bates, 2014) [4] (Rajput, 2015) [5]. Every company started and tried to facilitate the process of development so that users can customize their devices (Future Market Insight, 2016) [6].

The mobile industry has continued to grow rapidly with a total of 3.6 billion unique mobile subscribers at the end of 2014 and an addition of 1 billion subscribers predicted by 2020 globally (GSMA intelligence, 2015) [7]. This global penetration rate is approximately 60% of the current users. It is important to know that mobile application usability differs from mobile device usability in that the latter term commonly refers to the extent to which the operating system such as iOS and Android, is user friendly (Adipat et al., 2011) [8]. Mobile application usability has been studied in a range of contexts. The researchers have used a variety of conceptualizations and measurement approaches to study the usability of mobile applications. Although there is a considerable amount of literature available on mobile application usability (Hess

et al. 2009) [9] (Hong et al. 2004b) [10] (Palmer 2003) [11] (Thong et al. 2002) [12] (Wells, Parboteeah, and Valacich 2011) [13]. The advent of mobile devices has presented new usability challenges that are difficult to model using traditional models of usability. Zhang and Adipat (2005) [14] highlighted several issues that have been introduced by the advent of mobile devices. First is the mobile context where, when using mobile applications, the user not tied to a single location. They may also be interacting with nearby people, objects, and environmental elements, which may distract their attention. Next, connectivity is often slow and unreliable on mobile devices. This will impact the performance of mobile applications that utilize these features.

The effectiveness of the user is referring to the experience that a person gets when they interact with a web system and mobile app in a condition. The user and the product interact in the context of use that social and cultural factors are influencing. Also, the product has influential factors, for example, mobility and adaptivity. All these factors influence the experience that user-product interaction evokes. (Dewey 1980 [15]; Forlizzi and Ford 2000 [16]; Hiltunen et al. 2002 [17]). Next, to study the user-product interaction, the researcher needs to determine the nature of a product. The type of product will affect the researcher methods and target such as user experience studies of web sites emphasize visual issues (Garrett,2002) [18]. Besides, the target of use group needs to be defined before developing or testing the prototypes for example, if the device needs to be put in public use and the user is not familiar with the web sites so that the interface needs to be simple and easy to understand (Bellotti et al,2002) [19].

Besides, user satisfaction may be defined as the extent to which users believe that the information system available to them to meets their information requirements (Ives et al.,1984) [20]. Further, Powers and Dickson argue that user satisfaction is the most important criterion in measuring information success and failure. Chismar et al. (1985) [21] also argue for the need for a more theoretical view of user attitude based on a tripartite (cognitive, affective, and behavioral) model of the user's attitude structure.

User satisfaction defined as the extent to which users believe the information system available to them meets their information requirements. In the IS literature, the user satisfaction construct has been referred to as "felt need", "system acceptance", "perceived usefulness", "feelings about the information system", "MIS appreciation", "perceptions", and "beliefs". User satisfaction provides a meaningful surrogate for the critical but

unmeasurable result of an information system, namely, changes in organizational effectiveness (Ives et al., 1984) [20]. The concept of user satisfaction based on Cyert and March's (1963) [22] suggestion that if an information system meets the requirements of the users, the users' satisfaction with the information system will increase. Thus, user satisfaction is a perceptual or subjective measure of IS effectiveness. It can also be an adequate substitute for objective measures of IS effectiveness.

Interaction process involved the components of user's group, tasks functions, and technology platform. The users use the technology which possesses on procedures and results in collaboration [23].Any application or software running in the web platform which the services can be access by permission for example web browser to sendthe data and receive the data. Meanwhile, suggested that software as application is hosted as aservice to the customer who can access via internet. The user has limited authority to set up the software,does not have to maintain and support the software [24].Facilitation can be done ubiquitously twenty-four hours a day and seven days a week, via computing devices with Internet connection [25,26].

III. METHOD

The data used for this study is primary data. This study involved all students from University Sultan Zainal Abidin (UniSZA), but since there are a lot of students, so this study only limits the scope of the study to 200 students from Faculty Informatics and Computing. The number of samples determined by Krejcie and Morgan 1970, sample size determination table. Based on Krejcie and Morgan, this study only takes 132 out of 200 students from Faculty Informatics and Computing as the sampling size. The result of this study computed by doing Statistical Package Social Science (SPSS). Pearson Correlation model is used to measure the relation between web-based system (X) and mobile application (Y).

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}} \quad (1)$$

Where :
- n : sample size
- x_i, y_i : arethe individual sample points indexed with i
- $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$ the sample mean

Table 1: Description of Each Variable in This Study

Variable Name	Variable	Description	Scale
About the effectiveness of end-user	Dependent		Ratio
Gender	**Independent**	1. **Male** 2. **Female**	**Nominal**
Age	Independent	1. 18-20 years old 2. 21-23 years old 3. 24 years and above 3.	Nominal
Educational qualification	Independent	1. Diploma 2. Degree 4.	Ordinal
like to use web system	Independent	1. Yes 3. No	Nominal
Often use internet	Independent	1. 1-3 hours per day 2. 4-6 hours per day 3. More than 6 hours 2.	Nominal
like to use mobile apps	Independent	1. Yes 4. No	Nominal
About Web System	Independent	2.	Ratio
About Mobile Application	Independent	3.	Ratio

Two objectives have to be achieved in this study. Table 2 summary the methodology used to answer the objectives of the study

Table 2: Summary of Data Analysis

Objective	Method of Data Analysis
To determine the relationship between the web system towards the effectiveness of the end-user. To determine the relationship between mobile applications towards the effectiveness of the end-user.	Pearson Correlations

IV. RESULTS AND DISCUSSION

The sample of 132 consisted of 78 students (59.1%) from diploma students and 54 students (40.9%) from degree students of Faculty Informatics And Computing. Based on Table 3, out of 132 respondents, 32 (24.2%) are male respondents while 100 (75.8%) are female respondents. There were 67 respondents (50.8%) between the ages of 18 to 20 years old, 38 respondents (28.8%) from 21 to 23 years old, and 27 respondents (20.5%) from above 24 years old. From Table 3 above, most of the respondents are like to use web systems which are 106 respondents (80.3%) and 26 respondents (19.7%) do not like to use the web system. Most of the respondents spend their time on the Internet more than 6 hours per day, which are 82 respondents (62.1%) and 13 respondents (9.8%) spend 1 to 3 hours per day on the Internet. Lastly, 122 respondents (92.4%) out of 132 respondents are like to use mobile apps than 10 respondents (7.6%) are dislike using mobile apps.

Table 3: Summary of Demographic Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	32	24.2
	Female	100	75.8
Age	18-20 years old	67	50.8
	21-23 years old	38	28.8
	24 years and above	27	20.5
Education Qualification	Diploma	78	59.1
	Degree	54	40.9

Like to use web system	Yes	106	80.3
	No	26	19.7
Often use Internet	1-3 hours per day	13	9.8
	4-6 hours per day	37	28.0
	More than 6 hours	82	62.1
Like to use mobile apps	Yes	122	92.4
	No	10	7.6

Table 4 shows the relationship between the effectiveness of the user. There is a weak relationship between the web system towards the effectiveness of the end-user (r = 0.633) and there is a strong relationship between mobile applications towards the effectiveness of the end-user (r = 0.973).

Table 4: Summary of Pearson Correlation

Pearson Correlation		
	About Web System	About Mobile Applications
The Effectiveness of User	0.633	0.973

V. CONCLUSION

This study examined the web system between mobile apps towards the effectiveness of end-users. The objectives of the study are to determine the relationship between web systems towards the effectiveness of the end-user and to determine the relationship between mobile applications towards the effectiveness of the end-user. This study collected by using primary data and the population is 200 students from Faculty Informatics and Computing. With the different objectives, this study has to use only one method of data analysis, which is a Pearson Correlation. Based on the outputs, there is a moderate relationship between the web system and the effectiveness of the end-user. Besides, there is a strong relationship between mobile applications towards the effectiveness of end-user. The result shows that mobile application is more effective towards the effectiveness of end-user than web systems.

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