

Utilizing WAMMI Components to Evaluate the Usability of E-commerce Website

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Abstract—With the advance and the spread of communication devices, users are increasingly interacting with the applications on the Internet. This modern technology has been widespread and many industries are utilizing it, such as e-commerce. The literature stated that, any technology/products that are developed, it should be first accepted by its users. Broadly, user's positive or negative attitude will affect the acceptance of new technology/products. Usability of the website is a strong predictor of the user satisfaction and intention to use. However, in recent years, the number of online stores has grown exponentially and it creates a strong rivalry between those stores. Therefore, poor website design can drive away potential customers. This study undertakes the ABC (not real name) commercial website as a case study. Unfortunately, until recently, the number of visitors who are visiting the ABC website has been a steep declined compared to other marketing websites. Consequently, the current empirical study strives to assess the usability of the ABC website based on the WAMMI components and the participants viewpoint. The results indicate that, attractiveness is satisfactory for the visitors of the website. In turn, each of controllability, efficiency, helpfulness and learnability are not satisfactory for the visitors.

Index Terms—E-commerce; Electronic Shopping; WAMMI; Website's Evaluation.

I. INTRODUCTION

Online shopping is one of the applications over the Internet deemed as a relatively recent phenomenon. The power of the modern technologies (such as Internet and web 2.0) has been clearly demonstrated in business, as evidenced by the tremendous success of e-commerce worldwide [1]. However, Nielsen [2] referred that, the first law of online shopping is that, if customers are having difficulty in finding a product, they cannot buy it. On top of that, Jach and Kuliński [3] pointed that, one of the main barriers faced in online marketing is poor usability of electronic shopping web pages. Furthermore, Aydogan, Delice and Papajorgji [4] referred that, the people increasingly expect more from the functionality of a Web site, therefore the usability of sites as an important topic, for the time being, has emerged.

Indeed, usability is a concept used on a very widely in the system design. Fundamentally, it is concerned with the design of software that people find comfortable and practical applications for use [5] and is often defined as a measure related to how usable or user-friendly the service, product, or system is [6]. Regarding web usability, Lee and Kozar [7]

stated that usability of the website refers to "a qualitative appraisal of the relative user-friendliness of a website, as well as ease of use". In the same context, Najjar [8] defined the usability as "a measure of how easy the interface is to use" Stewart [9] also defined usability as a quality attribute that describes how easy it is for a user to navigate through the website. In fact, there are a variety of definitions of the usability of the Website, because the researchers interpret different ways to measure the usability. However, there are many evaluation methods that can be exploited to assess the usability of the electronic shopping. In this project, the WAMMI (Website Analysis and Measurement Inventory) components are used.

II. MOTIVATION OF STUDY

Exploit of modern technologies (such as Internet, Web 2.0) has been widespread and many industries apply the various forms of these technologies. Indeed, for any technology to be adopted, it should be first accepted by its users. Broadly, user's positive or negative attitude will affect the acceptance of a new technology. Meanwhile, Senol, Gecili and Onay Durdu [10] asserted that, evaluating the usability of websites are essential since usability problems will affect the acceptance of the users. According to Yuen et al. [11] in the development of any application or website, it is important to take appropriate decisions regarding the design of website based on the specific audience (for instance younger audiences) and to evaluate user reactions carefully. In the same vein, Venkatesh, Hoehle and Aljafari [12] discovered that usability of the website is a strong predictor of the user satisfaction and intention to use.

With regard to marketing, the online environment is now generally deemed as a most efficient and effective marketing channel [13]. In recent years, the number of online stores has grown exponentially and has become a strong rivalry between them. Thus, their own website design must attract customers and at the same time keeping the customers to the website as long as possible. Therefore, unusable shopping website will lead shoppers to abandon it, resulting in a loss of sales. According to Leung [14], bad web design can drive away potential customers. Unfortunately, recently the number of visitors who are visiting the ABC website has been a steep declined compared to other marketing websites [15]. Moreover, based on the latest survey from Alexa organization in 2016, the ABC's website did not occupy any position

among the top ten sites in Malaysia [16]. Building on this discussion, it becomes more useful to measure the usability of the website of ABC, because the usability evaluation is one approach that can help to reduce the barriers that prevent people from using the particular website [17]. Therefore, based on these arguments, the current empirical study strives to measure the usability of ABC website based on the WAMMI components and students' viewpoint.

III. THEORETICAL BACKGROUND

A. Electronic Shopping

With the rapid growth in online marketing, businesses are seeking to gain a competitive advantage by using online commerce to interact with customers [19]. Electronic commerce, or also called e-commerce, refers to a wide range of digital activities for services and products (such as online shopping). E-commerce also pertains to any forms of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact.

In a similar context, electronic shopping (aka internet shopping/buying and online buying) refers to the procedures of buying services or products by using modern technologies [20]. Therefore, to attain strategic sustainability in a rapidly changing competitive environment and to improve profits, many websites have repackaged themselves by targeting new markets, expanding into the online world, forming alliances, licensing software and adjusting their core offering to focus on the most profitable products and customers. However, businesses with the most experience and success in using electronic shopping are beginning to realize that the key determinants of success or failure are not merely the website presence and low price but also include the e-service quality. In addition, Al-Jabari [21] stated that, as the competition in e-commerce is intensified, it becomes more important for online retailers to understand the predictors of consumer acceptance of online shopping.

In online shopping website, for companies and customers alike, usability has become a crucial concept these days [22]. These arguments also supported by Sheikh, Fields and Duncker-Gassen [23], Bashir and Éthier, Hadaya, Talbot and Cadieux [24]. They stated that usable websites are crucial for e-business realization, to promote an encouraging approach towards online stores, to increase adhesiveness and to arouse users for more online purchases. In fact, online shopping websites that encompass a high level of usability are considered as a smart-business. In a similar vein, Sheikh et al. [22] asserted that usability could increase the satisfaction of the customer and productivity, leads to customer loyalty and trust and inevitably results in tangible cost savings and profitability.

B. Usability Assessment Method

Panda, Swain and Mall [28] affirmed that, in order to be successful, the websites must have good usability. Regarding of usability, the literature described the overall assessment of how easy the user interface is [2][29]. In addition, Nielsen referred usability of a website mean the ease of use. For instance, navigation of the website is considered as one of the important elements of web pages that support the user in browsing through the site's content and in finding information. Practically, when the web interfaces are not attractive, it will affect the site's overall quality [30].

Therefore, Ebenezer [31] pointed out that, even if the web pages can be produced easily, there is an urgent need to assess whether the pages are meeting the users' needs. On top of that, Hasan, Morris and Proberts [32] asserted that digital shopping companies need to assess and enhance their electronic commerce websites in a way that will boost their success.

According to Noyes [33], usability evaluation is defined as "systematical process of collecting data, in order to have a better understanding of users and how user groups use the product to perform a specific task under specified conditions". A lot of useful information can be acquired through evaluation of usability whereby the information can assist designers and companies to enhance their websites on the basis of users' needs [46]. However, a diversity of usability evaluation approaches or methods have been developed to determine usability issues of websites. These techniques can be categorized into three methods [34], as shown in Figure 1.

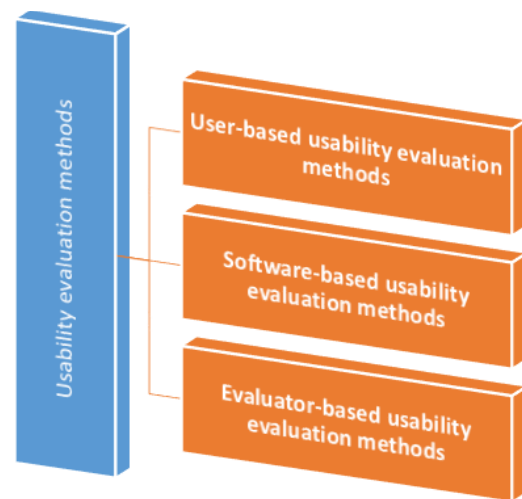


Figure 1: Kinds of usability evaluation methods

User-based usability evaluation methods: in this type of method, there are a number of predefined functions that are performed by users to identify usability problems [35].

Evaluator-based usability evaluation methods: This category involves a number of experts, who evaluate the interface of website to judge whether it conforms to a set of usability principles [36].

Software-based usability evaluation methods this category is automated methods, this means to use the tools automatically for identifying usability problems [37].

Nevertheless, few empirical studies have employed user testing methods in the evaluation of e-commerce, especially in the evaluation of online shopping. Normally, in the usability evaluation part, the user is trying to observe some websites and identifying problems on the basis of specific tasks beforehand [35]. However, user's perceptions have been frequently used to evaluate the usability of e-commerce website (for instance in [38][39]). In the study conducted by McKinney et. al, [39], they developed, constructs and corresponding measurement scales with users for measuring web's customer satisfaction. In the same context, Tilson, Dong, Martin and Kieke [40] asked sixteen users to complete tasks on four e-commerce sites and report what they liked and disliked. In addition, Freeman, Hyland and Soar [41] used a similar technique to evaluate and compare the usability of e-commerce sites.

The discussion stated here proved the usefulness of user-based evaluation in identifying major design problems which prevented users from interacting with the sites effortlessly. Apart from the literature outlined, there has been little research evaluating the usability of e-commerce websites employing user-based [32]. Therefore, this study based on the user's viewpoint and this will become another contribution provided by the present empirical study.

C. WAMMI Components

This experimental study aims to measure the usability of the ABC web site via five assumed factors of usability defined by WAMMI (Website Analysis and Measurement Inventory): attractiveness, controllability, helpfulness, efficiency and learnability [42]. In fact, there are numerous tests for evaluating the website usability for instances QUIS, SUMI and NIST Web Metrics. More useful questionnaires to measure the user satisfaction of web sites are MUMMS (Measuring the Usability of Multi-Media) for assessing multimedia software and WAMMI to assess the web sites [43].

Furthermore, according to Mentés and Turan [42], WAMMI is one of the most popular evaluation tools for websites. It was developed by Human Factors Research Group (HFRG) in 1999. WAMMI is based on a questionnaire filled by visitors of a website and gives a measure of how useful and easy it is to use the site [44]. As mentioned earlier WAMMI proposes five factors to assess the usability of websites; attractiveness, controllability, efficiency, helpfulness and learnability.

III. METHODOLOGY

As stated earlier, the usability is a fundamental principle of the effectiveness, efficiency and degree of comfort of the users in the interaction with the interfaces [45]. Therefore, the usability study seeks to measure the usability of the ABC website through the five factors of usability defined by Website Analysis and Measurement Inventory (WAMMI): attractiveness, controllability, efficiency helpfulness and learnability. Six students (under/postgraduate students) participated in this study. Figure 2 depicted the research process for this study.

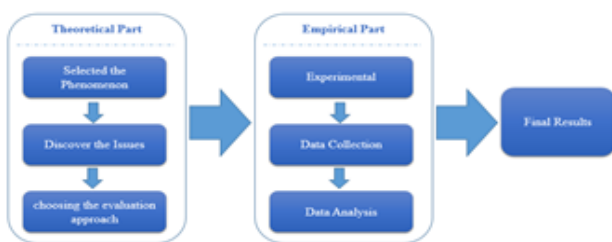


Figure 2: Research process

IV. EXPERIMENT

In general, the experiment is a test done in order to learn something or to find out whether something works or not. In this section of this empirical study, the researchers explained the experimental procedures according to WAMMI elements and a user's performance.

The first step of the experiment is surfing the websites based on several tasks that will be conducted by the students. Afterward, students will measure the functionalities of the

website according to the four elements of WAMMI questionnaire. Figure 3 illustrates the experimental procedures for the present study.



Figure 3: Experimental procedures

A. User's Performance

After selecting the students randomly from the UUM Library, the researchers asked each student to carry out six tasks related to the shopping process. These six tasks include:

- Finding the particular product (Samsung Tablet 2);
- Finding second-hand product (iPhone 4);
- Finding new product (Camera Song);
- Finding particular product (TV) based on the categories;
- Finding particular product (Fan) based on the location;
- Contacting the seller of such product (Camera).

During these tasks, the researchers observed the students' performance and recorded the time taken to complete each task. Actually, the researchers sought to design the tasks to become pertinent to the questionnaire that will be posted later. Table 1 shows the student performance result based on five tasks. The list of tasks given are not complicated. In addition, due to time constraints, it is not possible to test every feature provided by this website. Therefore, the tasks focused only for the most important functionalities. The completion times of each task by the students are presented in Table 1.

Table 1
Participants Performance Results

Participants	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
P 1	8:23	6:23	4:58	7:24	3:48	4:02
P 2	6:01	10:30	5:10	8:00	5:11	3:30
P 3	10:10	5:13	5:00	4:10	5:00	2:00
P 4	3:33	3:23	4:58	3:24	3:00	6:00
P 5	10:30	7:10	13:00	9:00	7:23	8:10
P 6	11:11	8:11	12:01	7:56	5:13	6:32

Student 1 faces difficulties to know how to search the products (in our task is a search for PlayStation 3). In contrast, student 2 searches the new product by writing in the search textbox. At the same time, student 3 could not complete all the tasks without assistance from the researchers. Student 4 completed five tasks, but he lost the way on the final task, and do not know how to contact the seller. Student 5 and 6 looking for a specific product (such as Mobile, battery) in a different category, and they unable to find this product.

B. Website's Evaluation (ABC Website)

After finishing the first step from this empirical study, the WAMMI questionnaire is employed for the second step. The questionnaire measured the visitor satisfaction level of usability of the ABC's interface website. This process used a five-point Likert scale ranging from "strongly agree=1" to "strongly disagree= 5." And the data were analyzed with the statistical package program for social science (SPSS 21 for Windows) and MS Excel. The questionnaire is divided into

two parts, the first is the general information about the students and the second part is about the WAMMI elements.

With regard to student’s information, the age of the students is varied between 18 to 43 years. About gender, 33% of the students were males and 67% were females. As for to the rate of use the internet, all the students’ answers were daily. They used the internet for browsing news or write comments through social media platform such as Facebook.



Figure 4: Online shopping percentage

According to value in Figure 4, 50% of the students uses the internet for shopping monthly. In turn, 33% and 17% used online shopping yearly and weekly respectively.

In the second part of the questionnaire, this study used the one-sample t-test statistic to indicate the level of the satisfaction among the students about the usability of ABC website. In one-sample t-test, the test value is defined as 3, because the present study utilized 5-Likert point scale. Table 2 displays the one sample t-test and related five measurements.

Table 2
Result on Five Usability Factors

Constructs	N	Mean	Std. Deviation	Std. Error Mean
Attractiveness	6	2.5000	.22361	.09129
Controllability	6	1.9167	.66458	.27131
Efficiency	6	3.6250	.49371	.20156
Helpfulness	6	2.0833	.76920	.31402
Learnability	6	2.5417	.74861	.30562

According to Table 2, only Efficiency measurement’s mean value is greater than test value (which is 3). In contrast, Attractiveness, Controllability, Learnability and Helpfulness measurements’ mean values are lower to test value.

Table 3
Result on Five Usability Factors (second table)

Constructs	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Attractiveness	-5.477	5	.003	-.50000	-.7347	-.2653
Controllability	-3.993	5	.010	-1.08333	-1.7808	-.3859
Efficiency	3.101	5	.027	.62500	.1069	1.1431
Helpfulness	-2.919	5	.033	-.91667	-1.7239	-.1094
Learnability	-1.500	5	.194	-.45833	-1.2440	.3273

In Table 3, significant values of Controllability, Efficiency, Helpfulness and Learnability are greater than 0.05 but significant of Attractiveness is less than 0.05. Based on this outcome, Attractiveness is satisfactory for the website visitors. In turn, each of Controllability, Efficiency, Helpfulness and Learnability are not satisfactory for the website visitors.

IV. CONCLUSION

Usability evaluation of online shopping websites becomes paramount because it can provide concrete prescriptions for developing user-centred electronic shops that might be expected to increase user uptake and the volume of sales can be achieved by aligning to users’ needs. The key aim of the current study is to assess the ABC website from the usability perspective. In fact, there is a clear lack of empirical studies that apply WAMMI to evaluate online shopping websites, and this is where this study seeks to make a contribution.

This study divided into two-fold: First, the selected students carried out a number of tasks to discover the ABC website functions. After that, the researchers requested these students to fill the questionnaire on the usability of the ABC Website. Attractiveness, controllability, efficiency, helpfulness and learnability were the usability factors employed to measure the usability of ABC Website. The results indicate that Attractiveness is satisfactory for the visitors of the ABC Website. In turn, each of Controllability, Efficiency, Helpfulness and Learnability are not satisfactory for the visitors.

Therefore, the commercial websites, such as ABC, must enable the user to learn how to use it by showing the guidelines for searching the certain product and contact with the seller and the way to buy product or services. With regard to controllability, the webmaster of such website must aware that, poor controllability of a website means a poorly organized the website. Therefore, the webmaster must make a streamline navigation among the system functions. Moreover, disorientation or the tendency to lose one’s sense of location in a website, can cause users to become frustrated. Thus, any commercial website must attempt to re-design and improve the conventional design into a proper website to enable the user to quickly locate a certain product. Finally, helpfulness is deemed as the main factor to the website’s success. In fact, the webmaster of the commercial websites must explore the ways to help users for every step of their visit in such websites.

Furthermore, this study is important because the results are expected to provide guidance for developing better and more usable web sites, (e.g. explore the weakness of the ABC website) not only for ABC but for other online shopping website as well. In the future, the researchers recommend conducting more empirical studies to measure the usability of the e-commerce websites, such as Amazon and eBay, because the interface design of the website or application will have great influence on the potential users.

ACKNOWLEDGMENT

This study was funded by Ministry of Higher Education Malaysia under ERGS Research Grant (SO Code: 12462).

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