



Investigating the Determinants of Usability in Web-Based Transactional Systems Context

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Abstract: The primary purpose of this article was to empirically examine the usability determinants model. The data was gathered from 208 students through an experimental procedure followed by the questionnaire. The model was tested using structural equation modelling technique with AMOS software. Results suggested that navigability, response time, accessibility, interactivity, content, design credibility, and terminology clarity were found significant determinants of usability in web-based transactional systems context. These results will be very helpful for both designers and developers.

Keywords: Usability dimensions, Web-based transactional systems, Structural equation Modelling

1. INTRODUCTION

Since the inception of computers, interaction between human and computer has always been a center of attention among academicians and researcher in designing a variety of computer software applications. For this reason usability has been considered as the most widely studied theme in human computer interaction (HCI) literature. (Rosson and Carrol 2002) suggests that HCI discipline is concerned with the study and practice of usability. Further emphasizing HCI (ibid) they suggests that HCI is about understanding and developing software systems and/or technology that individuals will want to use, able to use, and find such systems effective when use them. Studies in HCI has long emphasized that human factors are pivotal for the successful design and development of technological systems or devices. This concept is summarized as “HCI is the study of how people interact with computing technology” (Olson and Olson 2003).

Despite the popularity and widespread usage of usability (Sahi and madan, 2015), researchers are still unable to develop a consensus on the definition of usability. The use of usability term in many different ways has made its conceptualization very confusing. This is the reason that existing literature provides plethora of definitions regarding usability. For example, Mayhew (1999) defines usability as a measurable component of a product’s user interface that exists to some degree. Seffah and Metzker (2004) while describing usability pointed out that “both set of independent quality attributes such as user performance, satisfaction, and learn ability, or all at once, makes it a very difficult to precisely measure usability” Several

studies have identified and proposed usability dimensions. For example, (McKnight *et al.* 2002) proposed interactivity and navigability. While, (Devaraj *et al.* 2002) suggested supportability as a usability dimension. (Gehrke and Turban 1999) on the other hand suggested, page loading, smooth navigation, download (response) time, search efficiency, error rates, job completion time, and rate of cursor movement, as valid usability dimensions. Nielsen’s (2000) work suggested that content, response time, navigation, and credibility are important aspects (dimensions) of usability. (Agarwal and Venkatesh 2002) proposed yet another set of dimensions of usability, such as content, promotion, ease-of-use, emotion, and made-for-medium.

Keeping in a view the overabundant availability of usability dimensions, Lee and Kozar, (2004) strongly recommended that past efforts be integrated to propose common usability dimensions. Following Lee and Kozar’s (2004) recommendations, this article, empirically examines the level of significance of each of these dimensions, using a systematic usability determinants model (**Fig.1**), in web-based transactional systems context.

2. USABILITY DIMENSIONS MODEL AND HYPOTHESES

The in-depth review of literature identified several dimensions of web usability. However, literature revealed that many of the dimensions discussed in prior work had somehow similar properties, but were labelled with different names by different researchers. Such dimensions are, promotion (PR), design credibility (DC), interactivity (INT), made-for-the-medium (MM),

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navigation (NAV), responsiveness (RES), supportability (SUP), response time (RT), content (CT), maintainability (MAIN), terminology clarity (TC), accessibility (ACC). In order to determine which specific dimensions contribute to the web-based transactional systems' usability, author proposes a model of the determinants of usability (see figure 1), based on dimensions identified in the literature. Following sections discussed the procedure and design used in this study for achieving this objective.

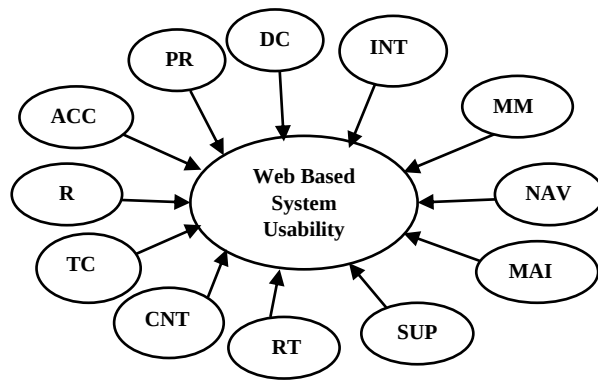


Fig.1 Usability Dimensions Model

The proposed model postulations are given as under:

H1: Promotion is a significant determinant of WTS usability.

H2: Interactivity is a significant determinant of WTS usability.

H3: Made-for-the-medium is a significant determinant of WTS usability.

H4: Navigation is a significant determinant of WTS usability.

H5: Maintainability is a significant determinant of WTS usability.

H6: Supportability is a significant determinant of WTS usability.

H7: Response time is a significant determinant of WTS usability.

H8: Content is a significant determinant of WTS usability.

H9: Terminology Clarity is a significant determinant of WTS usability.

H10: Design Credibility is a significant determinant of WTS usability.

H11: Responsiveness is a significant determinant of WTS usability.

H12: Accessibility is a significant determinant of WTS usability.

4.

PROCEDURE

In order to test this model with a sufficient number of participants, author, publicized a letter at various places in university, inviting students to voluntarily participate in the study. 215 students voluntarily agreed to participate in this study. However, 7 students did not complete the task. The remaining 208 finished the task and filled the questionnaire in the end. Selection of students as a study population is consistent with prior work (Palmer, 2002; Agrawal and Venkatesh, 2002; Green and Pearson, 2010).

Each student was asked to go to a specific transactional website (www.Amazon.com) and perform the following simple tasks:

- 1) Using a web browser, visit an online shop. Concentrate at the content of the homepage for a couple of minutes, and take a look at the homepage for three minutes. Read the content, and navigate the website using menus or hyperlinks. Please make sure you are familiar with the structure, features, and design of the online shop's website.
- 2) Go through the privacy policy of website.
- 3) Look for our favorite Novel using search option. Add that to the cart, but do not check out;
- 4) Add another item such as CD of your choice, but do not check out;
- 5) Remove both items from the shopping cart;
- 6) Spend again few more minutes on the site to figure out if features (such as, hyperlinks, color scheme, buttons, content, structure etc.) of this website are consistent, readable, easy-to-learn, and concise.
- 7) Exit the website.

After finishing the tasks, participants were asked to fill a paper based questionnaire. The questionnaire was used to examine their perceptions of the web based transactional system's usability and to determine which specific dimensions (factors) contribute to usability.

5.

RESULTS

Reliability

Although questionnaire was developed based on already validated items and scales, however, author checked its reliability before hypotheses testing. Results of reliability test are presented in (Table-1).

Table-1. Reliability test are presented

S. No.	Dimensions	No. of Items	Reliability (Cronbach's α)
1	Promotion	4	0.94
2	Responsiveness	4	0.86
3	Made-for-the-medium	4	0.90
4	Supportability	4	0.92
5	Design Credibility	4	0.75
6	Contents	4	0.78
7	Response Time	3	0.93
8	Interactively	3	0.88
9	Navigability	4	0.93
10	Terminology Clarity	2	0.91
11	Accessibility	2	0.84
12	Maintainability	3	0.80

The results obtained from reliability test suggests that all the measurement items used in questionnaire were above recommended value, i.e. $p \geq 0.7$ (Nunally, 1978; Hair *et al.*, 2006). This confirmed that the questionnaire was reliable.

Hypotheses Testing

The hypotheses proposed in the given usability dimensions model were tested using structural equation modeling technique, with AMOS software tool. The purpose of examining path coefficients (hypotheses testing) was to check the influence and level of significance of each of these dimensions on usability.

Table-2 Report of Hypotheses Testing

Construct	Code Name	Hypotheses	Standardised regression weights (β)	Supported
Navigability	NV	H1	0.397	YES***
Promotion	PR	H2	0.093	NO
Response Time	RT	H3	0.288	YES***
Accessibility	ACC	H4	0.453	YES***
Interactivity	INT	H5	0.279	YES***
Contents	CN	H6	0.194	YES**
Design Credibility	DC	H7	0.373	YES***
Terminology Clarity	TC	H8	0.243	YES***
Made-for-the-medium	MM	H9	0.082	NO
Responsiveness	RES	H10	0.077	NO
Maintainability	MAI	H11	0.098	NO
Supportability	SUP	H12	0.028	NO

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The results suggested that navigability, response time, accessibility, interactivity, contents, design credibility, and terminology clarity were found significant determinants of usability. Whereas, supportability, maintainability, promotion, made-for-the-medium, and responsiveness did not significantly contributed to usability.

6. CONCLUSION

From usability's point of view, the findings obtained from this article offer very useful information to the business owners, designers and developer of the web-based transactional systems. This is so because the level of significant of each usability dimension will guide the designer and developers as to which specific dimension needs to be kept on priority while designing such systems. By doing so they may be able to enhance the user experience of system's usability.

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