

A Brief Study on Usability Principles of Mobile Commerce

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ABSTRACT :

The widespread use of mobile commerce is no longer a fiction. The future is for mobile technology and mobile commerce. These emerging technologies are getting wide acceptance throughout the world. Mobile commerce getting fast popularity since it allows the freedom of movement and ease of access virtually from anywhere. The future of mobile commerce heavily depends upon how easy and how friendly is this service to use. An effective user friendly interface design plays central role in the success of mobile commerce. Therefore, the main purpose of my research is to evaluate the usability principles of mobile commerce. In this research paper firstly I discussed about the M-Commerce in detail. Definitions of Mobile Commerce given by various authors are explained in brief. In problem discussion various barriers to M-Commerce are identified such as security, tangibility and physical experience. After this, usability of M-Commerce is explained as one of the biggest challenging issue in the adoption of M-Commerce. Essential factors of the M-Commerce acceptance are also outlined. After this a model of attributes of system acceptability is described. In last research questions are defined with the suitable answers. After research it can be concluded that if mobile usability could be improved above "satisfactory" level, it will have direct and positive impact of m-commerce usage and increase in m-commerce business volume.

KEYWORDS: WAP usability, Usability Principles, Mobile commerce, User Interface Design, Principles to support usability, Usability Heuristics, Amazon.com, CNN.com

I. MOBILE COMMERCE-

According to Will (2004) E-Commerce can be defined as a monetary transaction conducted using the combination of internet and a desktop or laptop computer. Likewise, M-commerce is generally known as an extension of e-commerce. M-commerce can be defined as a monetary transactions that take place using wireless internet-enabled technology like handheld computers, mobile phones, personal digital assistant and palmtop computers that allow the freedom of movement for the end user. The Wi-Fi- Wireless Fidelity which is the transmission of short-ranged radio signals between a fixed- based station and an end user's mobile device is the operating technology that facilitates mobile commerce. Condos et al. (2002) describe that m-commerce combines the advantages of mobile-communication with existing Electronic Commerce applications to permit customers to shop for goods and services virtually from anywhere. The rapid development in telecommunication and innovative thinking about user interface design has greatly facilitated mobile users to take the full advantage of m-commerce. WAP is one of the key enabling technologies of m-commerce that allows mobile users to access the internet from mobile. As a result, the future consumer adoption of m-commerce relies heavily on how easy it is to use WAP in order to access and utilize these services.

II. PROBLEM DISCUSSION

Although, WAP has sufficiently influenced the life style of common people, however the boost in the use of WAP users has not been as fast as the marketer's expectations (Brewin, 2001). For instance, a report by two large mobile phone carriers found that only 10 percent of 400,000 WAP enabled phones in Asia were used to connect to the Internet, the major reasons are identified as, the poor data quality, slow connections, small screens and poor enjoyment experience has been on the top (Associated Press, 2001; Bangkok Post, 2001). The problems of user interface, limited menu options and screen resolution should be taken into account by the

senders of the information but only to a point since WAP device display screens are presently too small to provide enough information to foster ease of use. Jakob Nielsen (1993) has identified these potential issues of navigation barriers; he figure out that it took 20 clicks to locate a stock quote and 12 clicks to get the location of a Starbucks coffee store. Zaret (2001) conducted a research by providing a sample of WAP enabled mobile phone to users for a week and information on the available content, as result, 70 per cent of the handset holders said they would not use a WAP phone within the next 12 months. Similarly, a research conducted in Japan in May 2001 produced same results that the participants in a large-scale trial of 3G handsets in complained about the short usage periods before battery discharge and the phones were very hot to use due to heavy voltage drains. A commercial research conducted by TNS Interactive (2001) shows consistent results that show that the greatest barriers to m-commerce were, in order of priority:

- Security
- Tangibility and
- Physical experience

The WAP adoption has not been achieved up-to its assumptions even in those countries where internet usage is at its highest growth where internet usage is at its highest growth, for instance, Norway as first in internet usage with (63 per cent) USA being fourth (57 per cent) and Australia seventh (48 per cent), however despite there being almost twice as many cellular phone subscribers as internet households in the USA in 2001, just 12 per cent of the mobile phone owners use WAP shopping. In addition, Phillips (2001) figure out that 39 per cent of cellular phone users were not ready for WAP or did not want to use WAP for shopping. Here a question arises, that, how the marketers will meet the profile needs of cellular phones users to stimulate the WAP usage?

According to Whitfield (2003) the wireless technology and mobile computing applications has been overestimated in marketing. It was estimated that in the mobile of 2003 a million new consumers could make video calls, they could watching live football and check e-mail using their WAP enabled phones. The 3G- third generation technology is believed to be accountable for this revolution and new market promotion. However, there are numerous questions about this technology, for instance, what new marketing opportunities will emerge from this technology? What are the limitations of this new promising wireless mobile market? However, it has been noticed that the value creation to the user and to the customer is not always delivered using those emerging technologies

III. M-COMMERCE USABILITY

M-Commerce usability is one of the biggest challenging issues in adopting m-commerce (Ghinea and Angelides, 2004). Since, m-commerce has been deflated in the last few years therefore some doubts and concerns arose about its future (Jarvenpaa et al., 2000). In contrast to e-commerce, research shows new challenges in usability design in mobile commerce that are not limited to, the small screen size, limited screen resolution, limited processing capabilities, inadequate battery power of mobile devices, and bulky input mechanisms (Ghinea and Angelides, 2004).

Similar to Sears and Arora (2002) and Nielsen et al. (2001), Ozok and Wei (2004) has also identified additional usability difficulties with the use of mobile phones including one of the hands being occupied holding mobile phone while data entry is conducted with the other hand using a stylus pen or the keypad. In addition, more difficulties involve information retrieval such as graphics being too small to read and take long time to download. In online sales, the user interface features including web page and content designs are key factors to enhance sales (Cao et al., 2005). In order to satisfy internet commerce usability expectations, the websites needs to be customized according to user interface principles to satisfy both their sensory and functional needs (Bellman et al., 1999). According to Venkatesh et al. (2003) with the aim to establish a successful mobile commerce environment there are certain prerequisites to pursue. A simple conversion of a successful e-commerce business into mobile commerce is not a way of success. Therefore, a step-by-step content translation from e-commerce to m-commerce is not a best solution. There are numerous fundamental challenges needed for transferring websites from e-commerce to mobile commerce such as

- The first factor is related to the human issue connected with the small keypads and limited display interfaces of mobile phones; therefore, mobile commerce website designers should offer shrunk web pages with a limited number of features on the mobile interfaces rather than offering variety of features on e-commerce websites.
- Second factor is that the goal is different in mobile commerce, since the key in mobile commerce success is the ability to present content to users in a customized fashion, therefore, the goals mobile commerce customers wants to achieve are different than their goals in the e-commerce environment. Since, in mobile commerce environment goals are often associated with a limited time (Sadeh, 2002). Mobile commerce tends to provide services to support time-critical activities therefore designers have to leverage the desires for specific usability aspects of mobile commerce.
- The third factor is associated with cultural differences, Chau et al. (2002) has identified that while designing mobile commerce solution the designers should consider the cultural differences since people have been found as culturally sensitive.
- The fourth important factor in mobile commerce is security and privacy. Palen and Salzman (2002) has figure out security as part of the advancement of usability in m-commerce. The issue of information privacy is a growing concern from a customer perspective as in m-commerce the world is a global village.
- The fifth vital factor in mobile commerce is user trust. Ozok and Wei (2004) has identified that user trust in secure data transmission using mobile device is considerably high, as compare to e-commerce.

IV. ESSENTIAL FACTORS OF M-COMMERCE ACCEPTANCE

Choi et al.; (2008) has list down the essential factors of m-commerce acceptance in their study of m-commerce in Korea. They figure out that these factors have significant impact on customer satisfaction while using m-commerce. The factors such as ease of navigation ease of use, content quality, perceived usefulness, and mobile portal reliability strongly affect to decide whether the customer should revisit that mobile portal or not. If these factors are considered in mobile portal development it will increase m-commerce usability. Following Figure shows the detailed contents of these essential factors of m-commerce acceptance.

Factors	Description	Researchers
Convenience	Perceived ease of use Ease of Navigation	Cheong and Park (2005), Wu and Wang (2005), Kim et al, (2005)
Transaction Process	Transaction Time Transaction Process	Ghinea and Angelides (2004), Kim et al, (2005)
Mobile portal and Reliability	Systems Perceived risk Perceived system quality Compatibility Product Perceived content quality Degree of content up-to-date Variety of content	Cheong and Park (2005), Wu and Wang (2005), Kim et 1, (2005)
Information	Categorization of information Naming of information	Kim et al, (2005)
Price	Cost Perceived level of price	Ghinea and Angelides (2004), Cheong and Park (2005), Wu and Wang (2005)
Security/Privacy Usefulness	Perceived usefulness Usefulness of content	Cheong and Park (2005), Wu and Wang (2005), Kim et al, (2005)
Experience	Internet experience	Cheong and Park (2005)
User behavior	Attitude to m-internet Intention to use	Cheong and Park (2005), Wu and Wang (2005)
Representation	Size of image/text Readability of information Convenience of navigation	Kim et al, (2005)

Figure 1.1 Essential factors of m-commerce acceptance in the previous studies

Source: Choi et al.; (2008)

The above figure illustrates the essential factors of m-commerce acceptance such as “transaction process” and “customization” which lead customer satisfaction when connecting an m-commerce site. However it has unique aspects of “content reliability”, “availability”, and “perceived price level” of mobile Internet which build customers intention to use m-commerce site.

V. USABILITY AND SYSTEM ACCEPTABILITY

According to (Nielsen, 1993) system usability is relatively a minor concern as compared to the larger issues of system acceptability, which is the main question of whether the system is good enough to satisfy user needs and requirements and other potential stakeholders e.g. users, clients and managers. In general, acceptability of a computer system is again a combination of its social acceptability and practical acceptability; for instance, consider a system which investigates whether people applying for unemployment benefits are currently employed or unemployed to prevent fraudulent claims. This can easily be done by verifying information with other systems. Some people might appreciate this fraud-preventing system whereas some people might assume that it un-necessarily delays the benefits to deserving people. In this example, the system is not socially acceptable by peoples of later category; even though the system is practically acceptable since it prevent fraudulent claims.

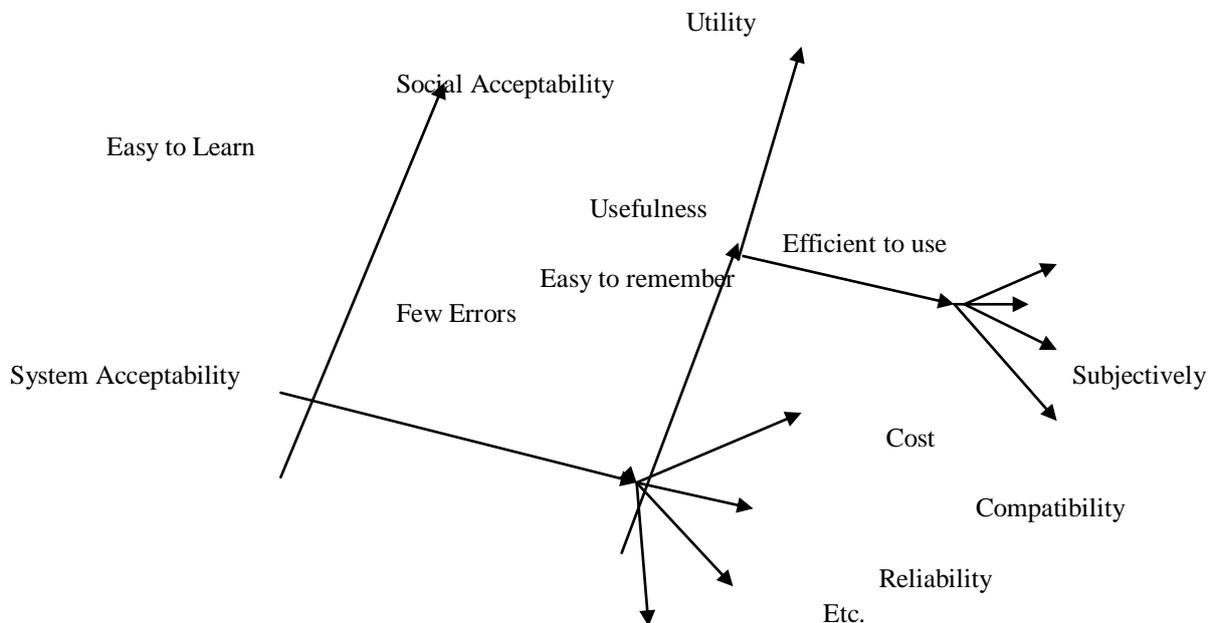


Figure 2.2 A model of attributes of system acceptability

Source: (Nielsen, 1993) page 25

In this figure, A model of attributes of system acceptability is given which illustrates the different elements of system acceptability. The model is based on four key attributes, included social acceptability, practical acceptability, usefulness, utility and usability, these elements are critical for the successful interface design. The main features of system acceptability also include sub-elements that describe the details against each key segment.

VI. RESEARCH QUESTIONS

Based on problem discussions, I have formulated two research questions which are as follows:

RQ1. Does the design of WAP services contain major usability flaws?

Research conducted by Ramsay 2001, Condos et al, 2002 and Nielsen 1993 is very much useful to answer our first research question to workout does the design of current WAP services contain major usability flaws?

Usability Principles for WAP Services defined by Condos et al., (2002)

- Avoid unnecessary use of graphics
- Avoid long lists and indicate the length of the list
- Make important options visible to the user
- Provide clear, helpful and meaningful error messages
- Avoid dead ends
- Format and present content appropriately
- Offer consistency in navigation and naming of menu options
- Provide the user with sufficient prompting
- Minimize user input
- Structure tasks to aid the user's interaction with the system

Usability Principles for WAP Services defined by Ramsay (2001)

- E-Navigation and Labeling
- Unnecessary browse time
- Minimize input
- Help Facility

RQ2. How the m-commerce interface design can be made user-friendly?

User centered interface design principles and usability principles plays key role to improve interface design. Since, my research is intended to first figure-out any existing flaws in WAP services and in second research question, I will attempt to propose solutions to improve the interface design with the help of valuable research conducted by Nielsen, 1990, Dix et al., 1993, and Preece et al., 1995.

Usability heuristics for User Interface Design: Jakob Nielsen (1990)

- Visibility of system status
- Use user's own language
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition versus Recall
- Flexibility of use
- Aesthetic and minimalist design
- Sensible error messages
- Help and documentation

VII. CONCLUSION

Mobile commerce is one of the fastest and emerging fields of research. The importance of mobile commerce is an open reality; however a few studies are found on "usability of mobile commerce". Therefore, this field of research required immediate attention of passionate and enthusiastic researchers. Since, the mobile devices and technology itself changing very quickly, as a result, it open doors for the constant need for the improvement of mobile usability and mobile interface design principles. I would recommend that a future study should be conducted by taking different WAP Portals. Since, we believe that if mobile usability could be improved above "satisfactory" level, it will have direct and positive impact of m-commerce usage and increase in m-commerce business volume.

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