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Analysis of the Usability of M-Commerce Applications

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Abstract

In this paper significant studies will be reviewed about the usability issues, requirements and methods for Mobile E-Commerce. In the beginning we will support the research problem with a larger observation of the mobile applications usability, followed up by the different authors' definitions. After that we will focus on the usability issues for M-Commerce applications, including the mobile usability issues, E-Commerce usability issues and Mobile Commerce usability issues. Then, relevant studies about the usability requirements and methods will be presented narrowing down the research problem. Finally, summary will be given for this paper creating a base for our conceptual framework.

Keywords: *mobile applications, m-commerce, e-commerce, mobile usability*

1. Introduction

Mobile devices already have turn out to be very trendy means in everyday activities of people whenever they are. Tendencies in the Communication and Information Technologies (CIT) and in the buying strategies point out that the users exploit their individual phones for work. Commerce with the mobility has developed into mainstream, so it is expected that there is going to be above 1.3 billion movable employees [1]. As a result of this, mobile applications have appeared as commercial IT proposals that are necessary to assist the managerial functions. Mobile applications caused a lot of advantages with its usability in different areas like tourism, logistics, transportation, disaster, management activities and project monitoring [2-8]. Hence, the mobile applications are assisting different type of users, business or technical, and are very usable and beneficial.

Usability as a term is identified as the potential of some product to be comprehended, studied and desirable to users when exploited in order to accomplish specified aims with efficiency and effectiveness in particular environments [9]. There are a lot of guidelines and standards for usability in order the quality of the software outcomes to be guaranteed. But, although there are a lot of common regulations to lead the implementation of the desktop and web applications, usability standards and guidelines for mobile applications are yet in deficiency and quite undiscovered [10]. This subject is serious because the accessible guidelines for usability are not enough for designing efficient mobile interfaces for the applications as a result of the unusual characteristics and the dynamic context of the mobile applications [11].

Usability of the mobile applications has improved significantly in the past few years enabling the users to carry out more jobs in the mobile context. Progress that has been made in the field of the mobile technologies has caused developing an extensive variety of applications that could be utilized by the users which are very dynamic and movable. But, at times the developers of the mobile applications are neglecting the fact that

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modern users are very dynamic and they like to interact while they are on the move with the devices. That is why a lot of issues arise during the developing for portable and small devices like high power consumption rates, small screen sizes, limited input modalities, limited connectivity etc.

2. Literature Review

Different kind of definitions for the mobile applications usability can be found in the existing literature. If we observe the usability from a larger point of view, it is envisaged as fine and functional user interface, positioning all probable usability issues [12]. Nielsen in [12] suggested a number of guidelines for usability, as learn ability, user friendliness, well integration of functions, ease of navigation, simplicity and consistency of the design as assistance for the designers. As we observe the usability from engineering viewpoint, it can be defined having in mind two features, and they are hardware (physical) and software (system). The physical feature is related to the physical attributes of the outcome like the indicator, screen display and button. It is also related to the accomplished presentations in order to satisfy the user requirements.

Qualitative analysis of forty five usability researches which were issued between 2000 and 2006 is presented in [13]. In this review four elements are exposed, the examination of peripheral dimension, the related factors, the main findings, and the explanations and calculations of the main dimensions. The main dimensions include technology, user, task/activity and environment.

Usability problems are recognized in the researches from [14] using hybrid method. Authors of this work stated that the usability assessment ought to meet the problems of the usage which are founded on human and application errors. Scenarios are conducted in order interaction abilities to be determined where mobile manipulation performances utilized the persona and the user profile. A number of methods were employed like processing investigation scenarios in order to detect the rightful scenarios that express the usability constraints and relations; defining the key relations and evident usability challenges; and the use case methods to assess the interface, components and design models. This study suggested a number of aspects like error, study capability, comprehensible, useful, contentment and intuitiveness.

Experience of the users regarding mobile applications for tourists is researched in [15]. Researches in this work are conducted in the real environment using mobile adhoc networks and Bluetooth and in the laboratory. Assignment is given to the users to download from Internet or from infokiosk tourist information into the mobile devices. The number of users that participate in the researches is twenty and they are from twenty to fifty three years old. There are also 2 usability specialists in this work who are conducting heuristic assessment. From the results of the work it can be concluded that usability measurements that correspond this kind of applications are comprehensibility, effectiveness, user satisfaction, efficiency, simplicity, learn capability, system adaptability and perceived usefulness.

In the existing literature there is also study about the usability models for systems of mobile cancer utilizing iPad and iPhone [16]. In this research UCD (User Centered Design) method is used in order to detect four essential requirements of the users: relocating into the mail application from the questionnaire, enough function of controlling data to reduce error, simple manual and user manipulation for the patient. According this study a few procedures are defined which are functionality, simple manual, security, effectiveness, satisfaction, usable, efficiency, ease of use, enjoyable, useful, safety, aesthetic, simplicity, learn ability and minimalist.

Very attractive viewpoint of the usability assessment is presented in the work of Raita and Oulasvirta [17]. In this research the authors point out that user anticipation sharply effects on the usability ranking and this can surpass the satisfactory performances. This means that assessment of the usability is encountering not only usability challenges, but also disclosing the way of perceiving and experiencing the product in the every day life of the future users. So, the usability measurement that is emphasized with this research is attractiveness.

So far mentioned researches pointed out great relationship between the usability and the simplicity weighted against other measurements. Per instance, Hye-Jin and Choi in [18] researched the influence of the simplicity regarding the satisfaction of the users. Three measurements are included in the simplicity, assignment difficulty, aesthetics, and information architecture. In order to confirm the association, assignments based on scenarios that included 205 users were carried out. The results of this work prove that the design of simple interface gives affirmative user satisfaction.

The relation between the usability and the aesthetic is also examined in the existing literature. Aesthetic is defined as classical expressive, beauty and hedoaestheticsty [19]. From the presented results in this work it is stated that hedonic doesn't has influence to the usability. In addition, just in the case when aesthetic improves the sensitivity of usability, beauty is utilizable. Aesthetic is also researched to calculate the significant outcomes towards pleasure and satisfaction [20].

The significance of the mobile devices is rising on a daily basis in communication as well as computational direction. As the users of the mobile phones are exponentially increasing, the usability of the mobile applications is turning into significant factor. Mobile applications employ interfaces that are interactive, but in fact complex and regularly confronted with usability challenges like screen clutter, restricted interaction instruments, shortage of assignment support and information overload [21, 22]. This kind of complication is easily observable from the characteristics of the mobile devices. Mobile devices consist of superior tiny sensor with extremely expanded interaction styles and they are linked with network of high bandwidth [21]. In spite of the mentioned benefits, constraints of the mobile devices are in the relatively small size of the screen, small keypad, various input methods, low battery life and small memory [7]. Because of this, the accessible rules and procedures for the interface design needs customizations prior they could be accepted to mobile applications [23].

Hence, several usability measurements are established by the accessible researches in order to determine the usability of the mobile applications. Every type determines various features of the usability and highlights on various priority levels.

3. Usability Issues for M-Commerce Applications

Mobile Commerce is likely to be the consequently gigantic signal of business. The remoteness between customer and purchaser is considerably reduced using the mobile commerce, or m-commerce. M-commerce usability is one of the greatest demanding issues during the implementation of the m-commerce [24]. Essential usability issues for m-commerce applications include device limitations, location, time pressure, convenience, relevancy, customization, structure, industry-specific design rules and lack of industry standards [25].

M-Commerce varies to a certain extend from electronic commerce (e-commerce) as a result of the particular characteristics and limitations that wireless networks and mobile devices have. Hence, e-commerce is defined as selling and buying of products, services and information by the use of internet and computer networks. Nowadays, WAP and

wireless telecommunications has turned out to be the main subject of the research studies.

Before commencing with the business activities, customers choose whether to use traditional commerce, m-commerce or e-commerce. Every one of these strategies of business contains advantages and disadvantages. Because of the high growth of the cellular phones usage in the developed countries, as well as in the developing countries, acquisition of the mobile services and products also enlarged. Rapid growth of mobile usability has provided great bounce to the term m-commerce as application of the wireless communications [26]. In the following subsections, usability issues of mobile, e-commerce and mobile commerce will be given in more details.

3.1. Mobile Usability Issues

Mobile devices are not just end user devices in the context of m-commerce. There are different types of mobile terminals as: mobile phones, personal digital assistant (PDA), blackberry, smart phones (per example IPhone), tablet PC's (Samsung Galaxy Tab, Apple I Pad, Blackberry Playbook), laptop, and each of them has definite features that have effect on its usability. Some of these features are: input device, accessibility of mouse or keyboard, network connectivity, bandwidth capacity, size and colour of the display, memory and CPU (central processing unit) processing power, accessibility of internal smart card reader (per example memory card, SIM card), supported operating systems (Blackberry operating system, Microsoft pocket PC, Android, Symbian, Palm Operating System). According to these features, mobile users can receive different kind of services. Different bandwidth capacity that is related to the type of the network technology utilized for transmission also has influence on the type of the service that is received from the mobile user. Because all modern mobile devices have internet connection, either using the cellular network by the SIM card or through the WLAN interface, mobility and internet connectivity are the most fundamental elements of the Mobile Commerce. Hence, each mobile device with internet connection could be utilized for Mobile Commerce.

Utilization of the mobile devices is rising in the latest years and because their features are dissimilar comparing to computers, it is crucial to particularly research the usability of mobile devices. Expansion of the mobile devices has renovated the method of designing digital content, including here not only web pages, but every other content that can be enabled on these devices [27]. If the focus is put on the web content from the aspect of usability, a number of attempts have been made in order recommendations and guidelines to be established for generating the content in a usable manner [28].

Because of the limitations of the mobile devices, creating hyperlinks as one of the crucial aspects of the web is great challenge. Authors in [29] demonstrate from a usability point of view solution for the challenge of the hyperlinks at mobile devices. For this purpose, a group of experiments are conducted with real users and various types of hyperlinks are used to figure out the appropriate size for them when using in mobile devices.

Usability for the mobile devices, mainly touchphones and smartphones, as well as usability comparisons, design for the small screens, development of the mobile strategy and some aspects about the future are well explained in [28].

3.2. E-Commerce Usability Issues

E-commerce is used as universal expression for every kind of business or commercial transaction that includes information transmission via Internet. The establishment of websites with e-commerce allowed clients to purchase online through the Internet. The expansion of the e-commerce web sites caused the assessment of the usability web site experience to be relevant. Significant component of the experience obtained with online shopping is when clients can purchase easily the products and services. That's why it is very important user interface to be easy to use and simplified. Another important issue during the usability of e-commerce is the security. If there is a deficiency of security, the clients are discoursed to carry out online payments during their online shopping. Izabela in her studies [30] states that according Nielsen the most crucial main part for the development of e-commerce is usability. It is confirmed that the breakdown of a lot of sites of e-commerce in catching the attention of the clients is occurred because of the lack of the usability component. That's why development of the e-commerce and its web sites with attractive interface design is very significant for ensuring affirmative shopping practices by the clients.

E-commerce in the recent years has risen significantly in the countries of Africa, although it is yet far from the level in the developed countries [31]. Although internet utilization in Africa is developing faster than other world regions, e-commerce hasn't accomplished its full capability [32]. Hence, it is very important companies permanently to develop the usability of the e-commerce in order to generate affirmative user practice.

According the first law of e-commerce, if the clients of the e-commerce cannot find the product that they are searching for, they cannot purchase it [12]. So, usable website is not extravagance, but it is important precondition for continued existence of the website itself. If there is incompetent testing of the usability of the sites, challenges appear in the e-commerce web site usability. There are a lot of guidelines and procedures that could be employed to the e-commerce web site usability, like user evaluation, heuristic evaluation, satisfaction questionnaires and guideline check lists. Even though there is a great amount of guidelines for web design, according the researches a lot of web sites are yet unexploited or inadequately modeled. Additionally, several guidelines are still not authorized by empirical prove, so they are inappropriate in a number of contexts. In Africa most of the designers are following particular guidelines, even though they don't essentially supply adequate degrees of website usability. The usability of UIs (user interfaces) of e-commerce applications is very essential for continued existence of successful business. Only e-commerce applications that have quick response, content with high quality, frequent updates and ease of use can catch the attention of the users and clients. Nevertheless, research studies present that greater part of the user interfaces of e-commerce applications experience problems with the usability [33].

3.3. M-Commerce Usability Issues

M-Commerce usability presents one of the greatest demanding issues in accepting m-commerce. Comparing to e-commerce, studies demonstrate novel demands in the usability modeling of mobile commerce that don't exist in e-commerce. Some of these demands are related to the limited processing capabilities, small screen size, inadequate battery power, limited screen resolution and large input mechanisms of the mobile devices. Furthermore, another usability challenge is that while using the mobile phone

one hand is occupied with holding the mobile, while the other hand is used for data entry. The most significant user-related challenges are the restricted data entrance and data recovery facilities.

There are a lot of research studies that have explored different issues that are correlated to m-commerce. Different issues and challenges related to m-commerce are discovered to help practitioners in recognizing these issues and challenges. Mobile devices and other wireless terminals with small screens could generate hitches for clients. Having in mind this detail, usable front end – interface is needed in order usability level to be improved. One of the methods for upgrading the bounded display area is translucency [34]. In this particular study implementation of the translucency was at 50% alpha with two menu levels. Subjective and objective features of the usability and acceptance were gathered. According to the focus of the study, fascinating findings were produced, completely relaying transparency to the usability.

4. Conclusion

The conducted research study in this paper gives detailed analysis of the usability of the mobile commerce applications and contributions in both theoretical and practical aspects. So far, there is no available material or resource in the area of usability issues and their solutions that is targeted to M-Commerce in the developing nations. In this context, this research study aims to produce a huge contribution in this field of studies by theoretical and experimental means. Through a detailed review of the main researches done in the field of usability of M-Commerce applications this paper enables readers and experts in this field to find the main issues in one place.

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