

# Building Trust of Mobile Users and their Adoption of M-Commerce

Shafiq Ur Rehman and Jane-Lisa Coughlan

**Abstract**—One challenging direction of mobile commerce (m-commerce) that is getting a great deal of attention globally is mobile financing. The smart-phone and PDA users all around the world are facing difficulties to become accustomed and trust in m-commerce. The main rationale can be the slow variation and lack of trust in mobile payment systems. Mobile payment systems that are in use need to be more effective and efficient. This paper proposes: the interface design is not the only factor affecting the m-commerce adoption and lack of trust; in fact it is the combined effect of interface usability and trustworthy mobile payment systems, because it's the money that the user has to spend at the end of the day, which the user requires to get transferred securely. The purpose of this research is to identify the problems regarding the trust and adaption of m-commerce applications by mobile users and to provide the best possible solution with respect to human computer interaction (HCI) principles.

**Keywords**—m-commerce, usability, mobile payment method, interface design.

## I. INTRODUCTION

M-commerce mainly intend to commercial transactions performed through a range of mobile devices in excess of a wireless telecommunication network environment. At present, these mobile devices contain personal digital assistants (PDA), wireless application protocol (WAP), cellular phones and wireless network devices [1]. Cheong and Tan [2] have identified the challenges that facing the customer on mobile payments method, that are usability, cost, and security. Li and Yeh [3] determined the customer satisfaction is a key factor of having trust in m-commerce. The scope of this research is to provide a design of m-commerce application that is easy to adapt and trustworthy. These qualities would be achieved through an interface which is designed keeping in mind the usability perspective and a mobile payment system that is efficient, effective and easy to understand. Design aesthetics considerably impact the website characteristics factor such as customization and user friendly. The application should be designed according to Human Computer Interaction (HCI) principles to set free the targeted promotions to the consumers of mobile devices. It also provides a new mobile payment system that is of high scalability, cost effective, security and technical requirements. The system plays the role of a mediator between content information, mobile operators and financial service providers.

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## A. Target Market

The target market of the m-commerce application consists of all the mobile-vendors that are selling their products to mobile users through m-commerce. The slow adaption and lack of trust of smart-phone and PDA users affect the m-vendors who are selling their products on mobile internet and getting no revenues back.

## B. Intended Users

The intended users of the m-commerce application are all the mobile users that have smart-phones and PDAs. These customers of the m-vendors buy different products on mobile internet and want all this to be done with ease, effectively and efficiently.

## II. RELATED WORK

According to Min et al [1] the adoption of m-commerce from mobile users is influenced by usability and usability is in-turn influenced by three factors that are Wireless Application Protocol (WAP) web, mobile devices and mobile communication networks. According to Technology Acceptance Model (TAM), the main antecedents of IT adoption are Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) but these are more subjective than a usability perspective which is a practical and objective concept. Usability refers that the system should be used perfectly. There are many attributes of usability but the most important are learnability, efficiency, memorability, errors avoid, and satisfaction. The goals of usability evaluation are, to improve present products and to confirm evaluation index according to the usability criteria. Usability can be evaluated through usability test which is a technique to ensure that the users of a system complete their tasks efficiently and satisfactorily. Lee and Benbasat [4] states, the mobile setting comprises of spatiality, temporality and contextuality. Spatiality refers to the capability of mobile users to ramble anywhere with the mobile device. Temporality refers to accessing the internet at any place. Contextuality is the environment in which the users carry out their tasks such as interaction with friends who have used the product or service before. Mobile device constraints are a part of mobile setting and it includes small screen and fewer resources of the mobile phones than a desktop PC. In [4] Lee and Benbasat lists seven elements known as seven C's that are effective for m-commerce design. These include *context*, *content*, *community*, *customization*, *communication*, *connection* and *commerce*. Context refers to the layered sequential process or links to other tasks provided as sub-menu which the user has a higher probability to move to. Content refers to the product information and promotional messages that are adapted according to the mobile setting of the user. It also includes the multimedia mix which overcomes the mobile device constraint by converting content into non-

speech sounds and other multimedia. Community refers to the shared information of mobile setting that enhances interactive communication between users and non-interactive communication. Customization refers to the personalization of the site by the user or the tailoring of the site itself which filters unnecessary information. Communication refers to the exchange of ideas between sites and users: broadcast, interactive, and hybrid. Connection is the formal linkages between sites which means that in m-commerce the website is linked to the website of the nearby stores. Commerce refers to the mutual authentication process of the money by consumers, financial service providers and m-commerce retailers, used to buy the product. Work by Li and Yeh [5] have shown in their paper that the design aesthetics had a very important impact on the website characteristics components, particularly customization, effectiveness and user-friendly environment, all of which had a huge impact on customer trust. Kurkovsky and Harihar in [6] proposed SSMART (System for Mobile Marketing: Adaptive, PeRsonalized and Targeted), a context aware, adaptive and personalized e-commerce applications are designed to the customer of mobile devices. Mobile marketing and advertising applications provide the sufficient information to users, base on their favorite and area while guarding and protecting user's identity. It also performs clever matching with the interest of user's shopping. The range of unique features of a wireless mobile device like ubiquity (affordability and portability), personalization (a person can be identified through his PDA) and area consciousness (a connection build can determine the location of mobile device) contribute a lot in m-commerce. There are a number of emerging applications following anytime at anyplace model of ubiquitous computing. Kurovksy and Harihar are with the opinion that location-based mobile marketing means to bring the marketing information to customers that are present next to the vendor. A problem with these applications is that reporting location relies on the exactness for the user area is resolute by network technology, a type of sensors. There is a need to cover a small geographic location to keep away from obstruction of a wireless network and careful selection of promotional information and that of their planned beneficiaries. There are two types of passing information, the push technology in which the promotional message is automatically sent to the user whereas in the pull technology these are delivering to the demand of consumer's. A lot of technologies and methods are used the consumer like wireless radio frequency, GPS sensors, Bluetooth technology and Wi-Fi but client/server architectures and peer-to-peer architectures can be utilized when the provider and consumer, or two or more peers are near each other. Shopper's interest can be determined by the facts that product should be related to the user's interest and the way the information about the product is offered should grab the user's interest. This can be done by presenting highly related and essential data, which are the product price and name. Li and Yeh in [7] applied Technology Acceptance Model (TAM) and Service Quality Model (SERVQUAL) with proposed quality attributes which control the trust of customer in m-commerce. The results showed that customization and trade name had a direct impact on belief formation. Interactivity and responsiveness were indirectly impacting trust through satisfaction.

### III. MOBILE PAYMENT METHOD

This system would be implemented keeping in mind all the usability attributes that will enhance customer trust and customer satisfaction. Mobile payment method for m-commerce is an efficient system, which is more reliable. The system proposes some more enhancements to the current m-commerce process.

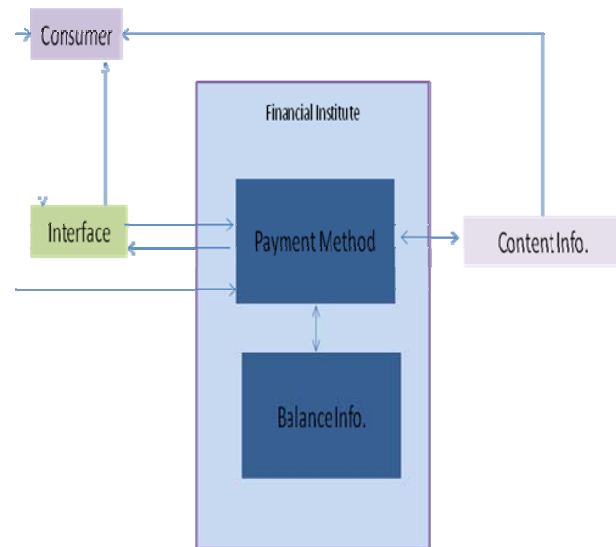


Fig. 1 Mobile Payment Method

The above process is carried out in the following way:

- Consumer registers into the Payment Method (PM).
- Consumer tells PM via Interface about his/her intent to purchase a certain product that is available for sale at a certain store.
- PM detects the Interface through a service number.
- PM, which is placed inside a Financial Institution, obtains the Balance Information of the Mobile Consumer.
- PM obtains the Content Information whether the product is available and other information regarding the price of product and matches the price with the balance present of the Mobile Consumer.
- PM then sends the information of approval or denial to the Interface of a certain service number.
- Interface Platform provides this information to Mobile Consumer.
- If the response is positive then the Content Info sends the merchandise to the Mobile Consumer otherwise, it doesn't.

The development of trust on m-commerce consists of combination of two factors, usability of interface design and the security of mobile payment system. Characteristics of Wireless Application Protocol (WAP) web, mobile devices and wireless communication networks affect the usability of the system. Usability attributes that contribute to the m-commerce trust by the mobile users are learnability,

efficiency, memorability, errors avoid, and satisfaction. Skillful and attractive design aesthetics result in the ease of use, usefulness and customization which in turn builds the mobile trust (m-trust). A context aware, adaptive and tailored m-commerce application with a very secure mobile payment system which is quick, interactive and yet does most of the work itself is also very fruitful for the development of m-trust and fast adoption of m-commerce application.

#### A. Interface for Mobile Payment Method

The advancement in the mobile communication and the rapid increase number of the user is forcing the authorities and compose a perfect model to bring the modified information to mobile users and provide the right step in the development of m-commerce. This advancement of technology leads to the possibility of using web service on the mobile. It also makes it possible to offer services on the exact location.

#### B. Needs of Interface Design

Interface design is very important and it should be considered since the start of designing the product. It helps in increasing number of user adoption to the product. Universal interface design for mobile handheld devices facilitated user adoption for mobile commerce. It can be adopted by anyone regardless of the demographic difference or any other fact. Presently wireless technology poses many constraints for effective interface design. These constraints include limited connectivity and bandwidth, diverse yet simplistic devices, the dominance of proprietary tools and languages, and the absence of common standards for application development.

#### C. Advantages of Designing Interface

Prototypes are extremely important and useful for any product. It is important to make it clear and tested that the purpose of the product is completed or not.

Here is a list of some advantages is:-

##### *Helps to Develop Ideas*

Overcome the limitation of our cognitive abilities to develop complex ideas. We can test design alternatives and gradually refine them into final designs

##### *Legalizes experimentations and revision*

Allows us to try out ideas in a reality environment with affordable cost and flexible time.

##### *Makes the intangible tangible*

Allows the client to understand how the product works from technical specifications because the prototype shows and stimulates what the product can do.

##### *Takes the client for a test drive*

Provides early demonstration on how the product works to the client and give them the interactivity experience.

##### *Makes early usability tests possible*

During prototyping phase to test the early usability tests, we have studied what works and what doesn't work and where the effort of improvement is irrelevant.

##### *Improves team collaboration*

Allows the members of the team to provide imminent and evaluate in the design before finalization. For instance, makes clear in mind that the design is technically possible.

##### *Serves as master plan for implementation*

Demonstrates functionality and flow thus prevent the confusion over maintenance and let the team members to fully focus on doing their task.

##### *Improves cost-efficiency*

Avoids major overheads down the line and the inevitable high cost of making changes by adding a phase.

## IV. CONCLUSION

The Easy Payment Method proposed the solution in the current mobile payment system to facilitate the customer. There are a lot of solutions given to the above problems. Some researchers are of the opinion that the interface should be changed with respect to usability heuristics, while others are of the opinion that the mobile payment systems need to be redesigned in order for the m-commerce applications to be more useful for the mobile user. Currently there are some issues in mobile payment method, main of the security features that would be provide further usability and as a result customer acceptance.

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