The Effects of User Interface on Decision Making in Mobile and Traditional Environments: A Comparative Model

Hua Dai, The University of North Carolina – Greensboro, USA; E-mail: h_dai@uncg.edu

Muhammad Naveed Baqir, The University of North Carolina – Greensboro, USA; E-mail: mnbaqir@uncg.edu

Hamid Nemati, The University of North Carolina – Greensboro, USA; E-mail: nemati@uncg.edu

ABSTRACT
Mobile communication technologies have penetrated consumer markets throughout the world. Traditionally, mobile services mainly facilitate voice communication. Recently, new forms of mobile services have made possible text messaging, web surfing, digital imaging, payments, banking, financial instrument trading, and shopping. These new functions of the mobile services require powerful interface features. These interface features must be easily customizable to fit the taste of an individual user's decision making. Besides, it was predicted that mobile tools, mobile e-services, and wireless Internet protocols will mark the next major sets of development in DSS, thereby expanding the accessibility of the tools to decision-makers wherever they may be. Thus the research studies and compares the user interface features in both the mobile and traditional decision making in order to find the advantages and challenges in user interface deisgn in the two environments. It also dighlights the distinct interface features of mobile device and applications that encourage users' decision to adopt mobile commerce. The study on mobile user interfaces features and their effects on decision making will have singnificant influence on the mobile commerce activities, consumer behaviors, mobile communication markets and also the decision science research.

INTRODUCTION
Mobile communication technologies have penetrated consumer markets throughout the world. According to Universal Mobile Telecommunications System (UMTS) Forum, the global mobile market has grown rapidly to about 1.2 billion subscribers in 2003, with an approximate increase of 20% since 2001. It is also anticipated that there will be more than 2 billion mobile users between 2007 and 2010.

Mobile services have primarily facilitated voice communication. However, recently new forms of mobile services have made text messaging, web surfing, digital imaging, payments, banking, financial instrument trading, and shopping possible. (Mao et. al., 2004) The mobile technology should be low cost with minimal difficulty for implementation. (Zucker et al, 2005). All these requirements of user interface features will have the influence on the individual user's decision making for mobile commerce. According to Daft (1991), a decision is "a choice made from among available alternatives" (p. 180). Choosing from among alternative courses of action lies at the heart of decision making (Payne, 1982). Decision quality is a measure of the goodness of this choice. A user interface supports both the mechanics of the interaction and facilitates the broader notion of a dialogue between human and computer. As used here, a user interface is an "observable two-way exchange of symbols and actions between human and computer".

LITERATURE REVIEW
The rapid growth of mobile telephony has fueled the expansion of the mobile Internet as a foundation for mobile commerce (Lee and Benbasat, 2004). Mobile Commerce or M-commerce is defined as buying and selling of goods and services through wireless handheld devices such as mobile telephones and personal digital assistants (PDA) (Bhuyan, 2005). Mobile Commerce represents the convergence of two technologies – the web and wireless technology. While the former hasradically changed the way business is conducted, the later has added a mobile dimension

to e-commerce and mobile computing through mobile devices such as cell phone, PDA, or pager (Coyle 2001). The adoption of electronic commerce has made the significant impact on the organizational formation, decision making, business strategy and other business related issues.

Despite the sanguine expectations of many observers and the enhanced capabilities of mobile systems, few researchers on information systems (IS) have empirically studied interface designs for m-commerce. Human-computer interaction (HCI) researchers have explored interface designs for mobile devices through which users experience a very different environment than with personal computers (Lee and Benbasat, 2004). For many decades, there are large numbers of studies in decision making and decision support systems. Gorry and Morton(1971) developed a framework to help the decision makers to understand the evolution of MIS activities within the organization.

Sauter (1999) defined four types of decision making style: left-brain, right-brain, accommodating and integrated. Todd and Benbasat (1992) presented the importance of cognitive effort in Strategy selection and decision making and pointed out that the cognitive cost perspective is helpful in understanding the influence of DSS on decision making. Decision makers utilize the tools provided in such a way as to limit their overall expenditures of effort. In regard to the cognitive support for decision making, Lerch and Harter (2001) examined how decision makers manage their attentional resources when making a series of interdependent decisions in a real-time environment and indicated that decision strategies for real-time dynamic tasks consist of two main overlapping cognitive activities: monitoring and control.

The proposed model is an extension of Lee and Benbasat (2004) 7C model for mobile commerce interface design and traditional interface design. It compares the user interface features in both the mobile and traditional decision making in order to find the advantages and challenges in user interface deisgn in traditional and mobile environment.

Synthesizing the past literature leads to the following general research model emerges. Description of the individual boxes is given in the following sections. It is clear from the past literature that a pattern of evolution in the user interface can be observed. In 1960s, Scott Morton and others started demonstrating befits of using computer based decision support systems. Decision support concepts and technologies were developed in 1970s. With the introduction of personal computers in 1980s, we can observe a rise in the group decision support systems.

PROPOSED RESEARCH MODEL
On the basis of Lee and Benbasat 7C model for mobile commerce interface design, decision making theory as well as the cognition and intuition characteristics of problem understanding, we propsed following research model. The model shows that the both the mobile decision making and traditional decision making process will lead a better problem understanding which has the influence on the individual user's decision making efficiency and quality.

According to lee and Benbasat (2004), the mobile commerce interface framework is composed of: context, content, community, customization, communication,

Figure 1. Areas of study for comparing user interface features on decision making in traditional and mobile environment
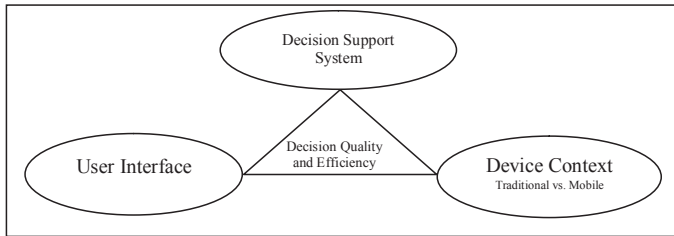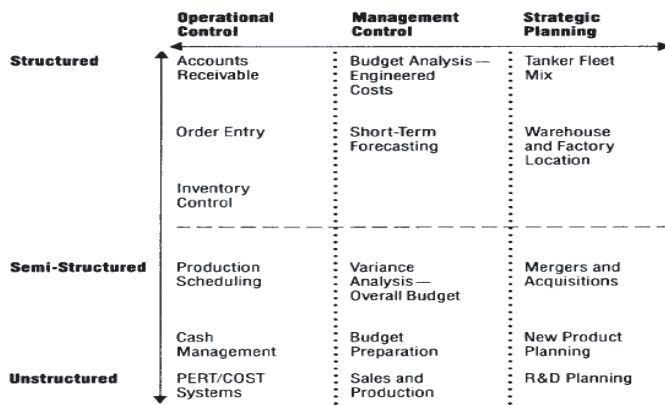

Figure 2. Framework for Information Systems (Gorry and Morton,1971)

connection, and commerce. Context captures how Web sites are developed, consisting of functionality and aesthetics; Content focuses on what a site presents, comprising the offering, appeal, multimedia mix, and content type; Community concerns interaction between users, including interactive and non-interactive communication; Customization refers to a site's ability to tailor itself (tailoring) or to be tailored by users (personalization); Communication is defined as dialogue between sites and users: broadcast, interactive, and hybrid; Connection refers to the extent of formal linkages between sites, consisting of outsourced content, percentage of home site content, and pathways of connections. Commerce is concerned with interfaces related to sales of goods and product services, such as a shopping cart and order tracking.

Several researches have been conducted to study the powerful interface features to meet the users sepcific needs. Albers and Kim (2000) asserted that the small screen would interfere with navigation because information is too fragmented on separate pages to develop an integrated mental model given the user's limited short-term memory. Jones et al.(1999) compared users' navigation activities on small and big screens (640 × 480, 1,074 × 768), and found that navigation activity—the number of scroll up/down and left/right actions.

According to Gallivan and Shen (2005), the introduction of mobile technologies in organizations requires mobile users to have certain new skills, or to increase the level of certain skills they already have. First, mobile workers need to manage distributed objects. Second, mobile users need to maintain a high level self-discipline. Third, mobile users have to deal with high cognitive load. Fourth, employees using mobile technologies face the challenge of balancing work and personal life. Those challenges in user technology interaction in mobile commerce ask for powerful interface design in order to fit the taste of an individual user to faclitate their decision making.

Traditional decision making encompasses three main elements (1) user interface, (2) human computer interaction and (3) decision support systems. This decision making also relies on the development of problem understanding which in turn is developed by intuition and cognition. Decision making is traditionally measured in terms of quality and the efficiency of the decision.

CONCLUSION

Our study has compared the user interface features in both the mobile and traditional decision making in order to find the advantages and challenges in user interface deisgn in traditional and mobile environment and to indicated the distinct interface features of mobile device and applications, hence encouraging users' decision to adopt mobile commerce. Besides, the study on mobile user interfaces features and their effects on decision making will have the singnificant influence on the mobile commerce activities, consumer behaviors, mobile communication markets and also the decision science research.

This research has implications for research on not only mobile device interface design and decision support system but information systems interfaces as well as it addressed the issues of user interfaces in mobile and ubiquitous devices. For practitioners who develop mobile decision support interfaces and applications, this study will serve as a means of understanding user needs effectively.

All research studies have limitations and this one is no exception. The study does not study impact of other features of mobile experience such as connection speed, technologies (2G, 3G), rich diversity of power and specific functionality of devices

REFERENCES

1. Albers, M. & Kim, L. (2000). User Web browsing characteristics using palm handheld for information retrieval. In Proceedings of IEEE Professional Communication Society International Communication Conference and ACM Special Interest Group on Documentation Conference. Cambridge: IEEE Educational Activities Department, 125–135.
2. Bhuyan, A.(2005). The Why and Hows of M-Commerce, Financial Times Information.
3. Coyle, F. P.(2001). Wireless Web: A Manager's Guide, Addison Wesley, NJ.
4. Daft, R. L. (1991). Management (2nd ed.). New York: The Dryden Press.
5. Gallivan, M. & Shen Y. (2005). Examining User-Technology Interaction: Toward a Sociotechnical Theory for Understanding User Adjustment to Mobile Technologies. In Proceedings of the Eleventh Americas Conference on Information Systems, Omaha, NE, USA.
6. Gorry, G. A. , Morton, M.S.S. (1971). A Framework for Management Information Systems, Sloan Management Review, 30(3), 49-62.
7. Jones, M., Marsden, G., Mohd-Nasir, N., Boone, K., & Buchanan, G. (1999). Improving Web interaction on small displays, In Proceedings of the Eighth International Conference on World Wide Web, Amsterdam: Elsevier North-Holland, 1129–1137.
8. Lee Y. E. & Benbasat, I. (2004). A Framework for the Study of Customer Interface Design for Mobile Commerce, International Journal of Electronic Commerce, 8(3), 79–102.
9. Lerch, F. J. & Harter, D. E. (2001). Cognitive Support for Real-time Dynamic Decision Making, Information Systems Research, 12(1).
10. Mao, E., Site, M., Thatcher, J. B., & Yaprak, O. (2004). A Research Model for Mobile Phone Service Behaviors: Empirical Validation in the US and Turkey. Journal of Global Information Technology Management, 8(4).
11. Payne, J. W. (1982). Contingent decision behavior. Psychological Bulletin, 92(2), 382-402.
12. Sauter, V.L. (1999). Intuitive Decision Making Association for Computing Machinery. Communications of the ACM, 42(6), 109.
13. Todd, P. & Benbasat, I. (1992). The use of information in decision making: An experimental investigatio n of the impact of computer-based decision aids, MIS Quarterly, 16(3), 373-393.
14. Zucker, D., Uematsu, M., & Kamada, T. (2005). Marup-based SmartPhone User Interface using the Web Browser Engine, XTech Conference , ACCESS Co., Ltd.

Related Content

The Internet of Things
Nigel McKelvey, Kevin Curranand Nadarajah Subaginy (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 5777-5783).*
www.irma-international.org/chapter/internet-things/113032

General Perspectives on Electromyography Signal Features and Classifiers Used for Control of Human Arm Prosthetics
Faruk Ortes, Derya Karabulutand Yunus Ziya Arslan (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 492-504).*
www.irma-international.org/chapter/general-perspectives-on-electromyography-signal-features-and-classifiers-used-for-control-of-human-arm-prosthetics/183764

Design and Implementation of Smart Classroom Based on Internet of Things and Cloud Computing
Kai Zhang (2021). *International Journal of Information Technologies and Systems Approach (pp. 38-51).*
www.irma-international.org/article/design-and-implementation-of-smart-classroom-based-on-internet-of-things-and-cloud-computing/278709

Personalized Education Resource Recommendation Method Based on Deep Learning in Intelligent Educational Robot Environments
Sisi Liand Bo Yang (2023). *International Journal of Information Technologies and Systems Approach (pp. 1-15).*
www.irma-international.org/article/personalized-education-resource-recommendation-method-based-on-deep-learning-in-intelligent-educational-robot-environments/321133

Using Serious Games for Training and Development of Human Resources
Paulo Correiaand Paulo Carrasco (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 3703-3710).*
www.irma-international.org/chapter/using-serious-games-for-training-and-development-of-human-resources/112805