
Retrieval Methods in M-Commerce Applications – Challenges and Prospects

T. Esther Ratna

Assistant Professor

St. Joseph's Degree and PG College

ABSTRACT

The rapid growth of wireless technology, mobile devices and mobile Internet around the globe has influenced people to do business in mobile environment (M-Business). This promises customers to purchase goods and have services using mobile phones which bring challenges for both individuals and society. This paper gives insight into the technical framework adopted for conducting m-commerce, context based results generated that bring out the facts about the viability of m-commerce today and elucidate the ways to achieve the success in the long-term.

Keywords: *M-Commerce; Mobile Commerce; M-Business; Context based results, voice output*

INTRODUCTION

The development and usage of Internet and related technologies changes the way we live. People are more attracted towards wireless devices (such as cell phones, laptops, notepads, PDAs and palmtops) and they like to buy movie/event ticket while waiting to board a plane, or monitor financial markets and scan e-mail between meetings, play games, surf internet wherever they may be. These facilities are provided by the advent of electronic commerce (e-commerce) [1]. The convergence of mobile communications and distributed networked computing has provided the foundation for the development of a new channel of electronic business: Mobile Business / Mobile Commerce. The increasing usage of mobile and telecommunication devices acted as another precursor to change, and that change led to the rise of **mobile commerce**, also known as M-Commerce which is a global phenomenon and is part of a multichannel purchase experience from 'showrooming' to 'webrooming'. Mobile devices serve not only as a direct purchase channel, but also aid consumers' purchase journey across other channels, online and offline [2].

DEFINITIONS

Mobile e-commerce (also called mobile commerce or m-commerce) is defined as all activities related to a (potential) commercial transaction conducted through communications networks that interface with wireless (or mobile) devices

Mobile Devices are those devices that are used to connect the to mobile services. Current wireless devices include

-) Wireless phones
-) Wireless-enabled handheld computers (so-called pocket, palmtop, and tablet computers)
-) Laptop computers
-) Personal Digital Assistants (PDAs)

While e-commerce continues to impact the global business environment profoundly, technologies and applications are beginning to focus more on mobile computing and the wireless web. Mobile technology is the most pervasive communications technology in the world [3]. Electronic commerce and mobile commerce are not only frontier for doing global business and trade but also offers multiple benefits to the business,

government and consumers on massive scale. Many companies, organizations, and communities are doing business using E-commerce and also are adopting M-commerce.

The Mobile Internet is accessible from anywhere [4] and at any time, and this is the advantage that the carriers are trying to exploit in a variety of services. This advanced mobile and internet technologies coined together, enable people to be connected any time, any place, without being tied to a wired infrastructure. This feature allows mobile users to have mobile business transactions termed as Mobile Commerce [5], allowing Business-to-Employees (B2E), Business-to-Business (B2B) and Business-to-Consumer (B2C) applications [6]. These applications move processes, information, products and services closer to clients, partners and consumers. Meanwhile, “Anywhere/ anytime” access and its potential for B2E, B2B and B2C via wireless technology accounts for m-Commerce's tremendous demand.

NEED FOR THE STUDY

Mobile Commerce has given a new dimension for business today. Business organizations have been restlessly evaluating the revenue potential of the M-commerce market and developing business models to exploit the huge profit potential of this new market. The main purpose of this paper is to provide a description about the technology infrastructure for conducting m-commerce and evaluate existing methods of information retrieval and its challenges.

OBJECTIVES OF THE STUDY

1. To understand the technological framework of M-Commerce
2. To understand the mobile usage penetration globally and its impact on mobile shoppers
3. To study the context based retrieval/output methods and its challenges
4. To propose a business model for enhanced retrieval mechanism to improve m-commerce

REVIEW OF LITERATURE

) Zaifulasraf Ahmad¹ , Roslina Ibrahim (2017)

The article entitled “Mobile Commerce (M-Commerce) Interface Design: A Review of Literature”. This paper discusses several interface design principles that m-commerce apps must follow in order to be a good apps. There are seven elements of m-commerce interface design proposed such as context, content, community, customization, communication, connection and commerce elements found in this review.

) Susy S. Chan, Xiaowen Fang (2009)

The article entitled “Interface Design Issues for Mobile Commerce”. This paper summarizes that Poor usability of mobile Internet sites and wireless applications for commerce activities stands out as a major obstacle for the adoption of mobile solutions.

) Cyra, Headb, & Ivanovc, 2006

confirmed that the design aesthetics in m-commerce positively influence to perceived usefulness, perceived of use and perceived enjoyment[12]. All these factors are significantly impact to m-loyalty which is how user willingness to re-visit the m-commerce application. Aesthetics is referring to how our brain interprets with something good or bad in their first appearance. In context of m-commerce, the interface design can be expressed via colors, shape, font type, music or animation. All this elements will influence the sensory experience of m-commerce and will attract more customers[12].

) Ting-Peng Liang and Chih-Ping Wei (2004)

The article entitled “Introduction to the Special Issue: Mobile Commerce Applications”. This paper proposes a fit-viability framework for assessing the likely success or failure of m-commerce applications. For fit, criteria

for measurement are identified based on task-technology fit theory. For viability, financial and managerial criteria are identified. The papers in this Special Issue address factors related to the framework, and m-commerce applications in procurement and travel agencies, to demonstrate its value.

) Tarasewich, 2002

Believe that the well-designed of user interface and perceived usability are important aspect for user to perform smooth activities in m-commerce[13]. Those factors will influence user to stay longer and invite them to return back. He categorized the interaction between user and wireless devices (mobile) by two types, input interaction (the capabilities of users using mobile application to enter any data or commands) and output interaction (how users receive the outcome from application). All this capabilities and limitations should be analyzed first and then the usability of those interface can be identified and tested. He found that, there are several methods to evaluate the usability including empirical testing, heuristic evaluations, cognitive walkthroughs and analytics method[13].

) Peter Tarasewich, Robert C. Nickerson, Merrill Warkentin (2002)

The article entitled “ISSUES IN MOBILE E-COMMERCE”. This paper identifies and categorizes some of these issues so that researchers, developers, and managers have a starting point for focusing their activities within the emerging m-commerce domain. Our examination finds categories that include technological (both client and infrastructure) issues, application issues, and areas for future research.

) Keng Siau, Zixing (2001)

The article entitled “Mobile Commerce: Promises, Challenges and Research Agenda”. This paper presents an overview of mobile commerce development by examining the enabling technologies, the impact of mobile commerce on the business world and the implications of the mobile commerce providers. The study found the future research area m-commerce where applications can be developed in simple user interface.

METHODOLOGY

Secondary sources of data would be used for the study. Secondary sources of data would involve the use of Books, Journals, Websites and Magazines etc.

TECHNOLOGY INFRASTRUCTURE FOR MOBILE COMMERCE

Siau et al. from the University of Nebraska-Lincoln in the USA found that the function of a mobile commerce infrastructure level is to enable integration and connection to the organisation’s businesses and network operators [8]. They introduce two core components at m-commerce infrastructure level – these are mobile communication technology, and information exchange technology

Mobile Communication Technology

According to their research, Siau et al., point out that mobile communication technology is designed to transport data and information in coded digital form between various computers that support storage, retrieval, updates and processing for mobile end-users [12]. They introduce the three major mobile communication network infrastructures: GSM infrastructure, GPRS infrastructure and UMTS infrastructure. Each of these network infrastructures has impact upon the mobile end—user capability in terms of application capability, and associated information access (for example, the association of higher bandwidth mobile communications with rich media information access and transactions.) All infrastructures can offer support for mobile commerce in varying degrees – including mobile advertising, coupon or ticketing services, and paid-for entertainment services

Information Exchange Technology

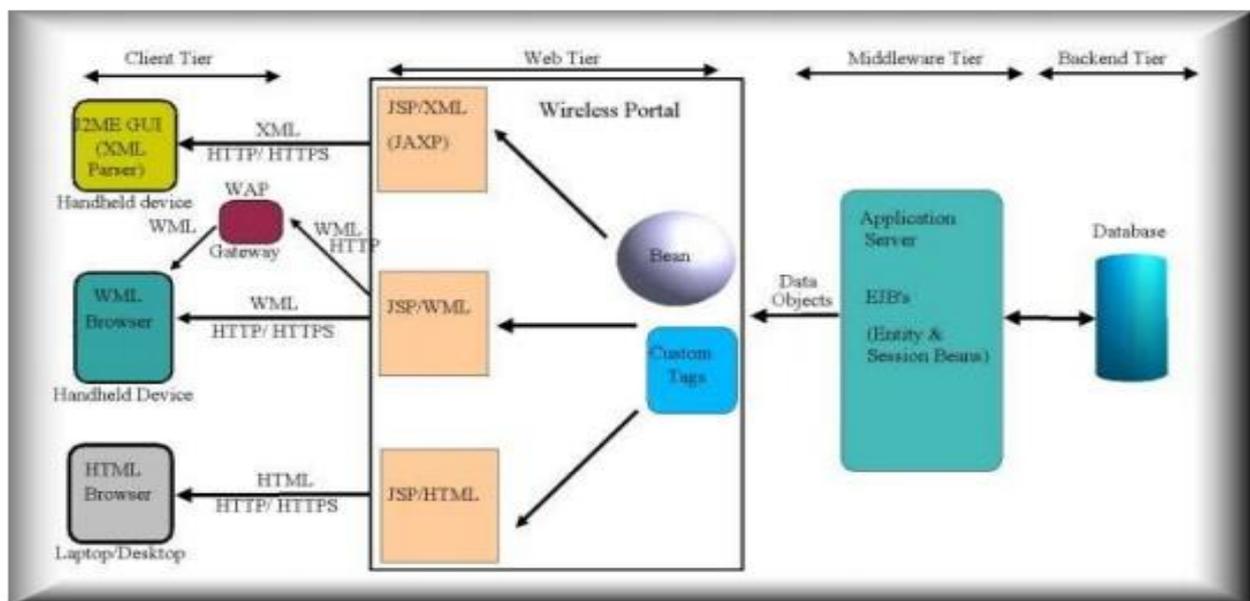
Siau et al. state that fundamental information exchange technologies mainly include Extensible Markup Language (XML), Wireless Markup Language (WML) and Short Message Service (SMS). WML is considered as a derivation from XML having been developed especially for WAP [12]. SMS, albeit being different in nature from XML and WML still features and reference to it is no surprise given its penetration rate and capability as a core and effective vehicle to support messages as part of mobile commerce transactions.

Wireless Application Protocol

Constantiou & Polyzos from the Athens University of Economics and Business state that WAP is an open, global specification that empowers mobile users with wireless devices to access and interact with information services [13]. They also point out that WAP can be adopted in most mobile devices and different mobile communication systems. In addition, they refer to the WTLS specification found in WAP which implements options for authentication and encryption optimized for use in the mobile environment [13]. This potentially provides a basis for developing secure end-to-end mobile commerce transactions.

Wireless Middleware

Lam and Yazdani from the University of Cape Town point out the proliferation of wireless networks as being a key driver for the development of wireless middleware as a specialized subset of middleware [14]. They classify wireless middleware into ‘traditional middleware’ and ‘more recent middleware.’ Traditional middleware includes messaging middleware and distributed transaction-processing monitors. More recent middleware includes component-based middleware, and component technology XML middleware. Moreover, Lam and Yazdani found that wireless middleware is presented with many challenges due to the potentially complex nature and characteristics of wireless environments [14].



Figure(1) illustrates m-commerce system architecture

www.brainkart.com/article/Structure-of-M-Commerce_9908

According to the figure (2) the recent survey reports show that there is rise in the number of mobile internet users, faster mobile connection speeds, and the increased use of smartphones have all combined to deliver a 50% year-on-year increase in data traffic volumes. Total data traffic around the world now exceeds 7 billion gigabytes each month, with the average smartphone accessing nearly 2GB of data every month.

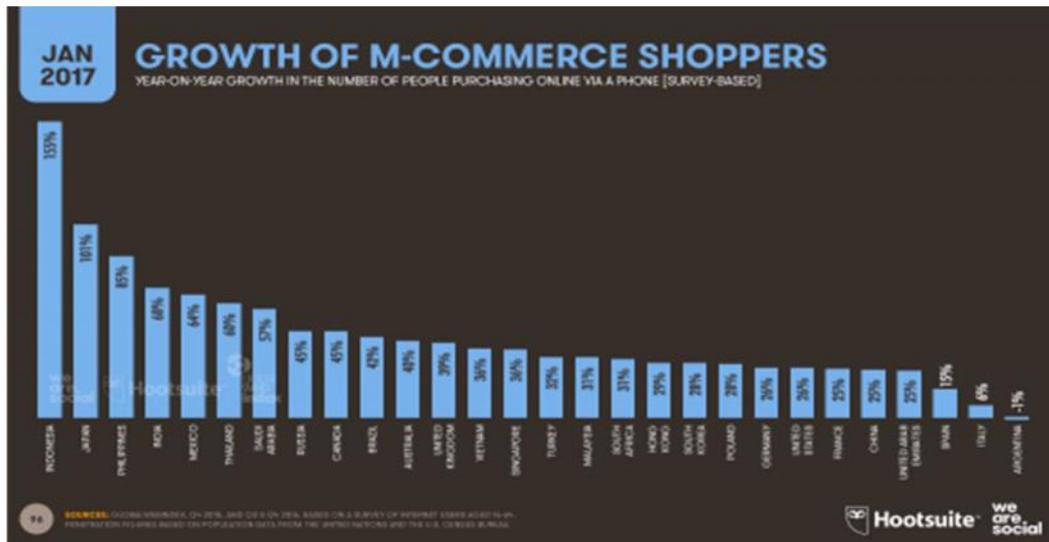


Figure (2) – Source: Global WebIndex - <https://wearesocial.com/special-reports/digital-in-2017-global-overview>

Issues in User Interface

Five issues are essential to the interface design for mobile commerce applications, including: (a) technology issues (b) user goals and tasks (c) content preparation (d) application development and (e) the relationship between m- and e-commerce.

Technology Issues

Limitation of Bandwidth

Most mobile communication standards only support data rates that are less than 28.8 kbps. Connections to the wireless service base stations are unstable because signal strength changes from place to place, especially on the move. These constraints limit the amount of information exchanged between device and base station. Indication of the download progress and friendly recovery from broken connections are necessary to help users gain a better sense of control.

Form Factor

Mobile commerce services are accessible through four common platforms: wireless PDA devices using Palm OS, Pocket PCs running Microsoft Windows CE/Pocket PC OS, WAP phone, and two-way pagers. Within the same platform, different form factors may offer different functionalities. A developer should consider the form factor's unique characteristics when developing m-commerce applications.

User Goals and Tasks

Mobile users can spare only limited time and cognitive resources in performing a task. Services that emphasize mobile values, and time-critical and spontaneous needs, add more value for m-commerce users. These mobile services may include the ability to check flight schedules, check stock prices, and submit bids for auction (Anckar & D'Incau, 2002). In addition, mobile tasks that demonstrate a high level of perceived usefulness, playfulness, and security are the ones most likely to be adopted by users (Fang, Chan, Brzezinski & Xu, 2003).

Content preparation

Constraints in bandwidth and small screen size demand different design guidelines. Most design guidelines for e-commerce (e.g., Nielsen, Farrell, Snyder & Molich, 2000) support the development of rich product information sets and a complete shopping process. In contrast, wireless Web sites have to simplify their content presentation.

) Amount of Information

Content adaptation is necessary to convert information for the mobile Web (Zhou & Chan, 2003). However, users should have sufficient, if not rich, information to accomplish the goals for the application.

) Navigation

Navigation systems vary from one form factor to another because the design of handheld devices differs. Currently, there is no consensus on which functions or features should be provided by the application, or built into the device itself.

) Depth of Site Structure

Since mobile users have limited time for browsing wireless applications, the organization of information is critical. A flatter structure with fewer steps for wireless applications would allow users to review more options in the same step, and to locate the desired information more quickly.

) Graphics or Text

Text is a better choice for displaying information on small screen browsers. However, better technology may improve the screen quality of handheld devices to display more complicated graphics. When determining the format of information to present, it is important to consider the form factor, because it may pose additional constraints on the format.

Development Environment

Mobile computing alters the assumption of “fixed” context of use for interface design and usability testing (Johnson, 1998). Traditional means of user interviews or usability testing in a laboratory environment cannot reveal insights into users’ activities and mobility in real life. Contextual consideration is critical for gathering information about user requirements. For example, when developing and testing a mobile application for grocery shoppers, user requirement gathering and prototype evaluation should be conducted in a grocery store (Newcomb, Pashley & Stasko, 2003). The method of contextual inquiry can augment user interface design by exploring the versatility of usage patterns and usage context (Vaananen-Vainio-Mattila & Ruuska, 1998). While contextual inquiry may help developers gain a realistic understanding of contextual factors affecting user behaviors in motion, it is difficult to conduct non-obtrusive observations and inquiries. Developers for mobile applications need to consider the application context surrounding the relationship between the mobile device and user goals and tasks.

Relationship Between M-commerce and E-commerce

The wireless channel for e-commerce has raised many new questions regarding coordination between interactions with users across multiple channels. Some researchers suggest that because of the “transaction aware” and “location aware” characteristics of the wireless technology, mobile consumers may increase impulse purchases, especially in low-value, low-involvement product categories, such as topics and CDs (Kannan et al., 2001). At present, many Web sites have extended the wireless channel to leverage relationships with exiting customers (Chan et al., 2002). The current state of technology and poor usability of mobile Web sites makes it difficult to expand m-commerce as an independent channel. Many analysts believe that the wireless channel is promising for customer relationship management (CRM) because of its ability to: (1) personalize content and services; (2) track consumers or users across media and over time; (3) provide content and service at the point of need; and (4) provide content with highly engaging characteristics (Kannan et al., 2001). The challenge is how to coordinate interface and content across multiple channels so that experienced users and repeat customers can handle multiple media and platforms with satisfaction.

Findings

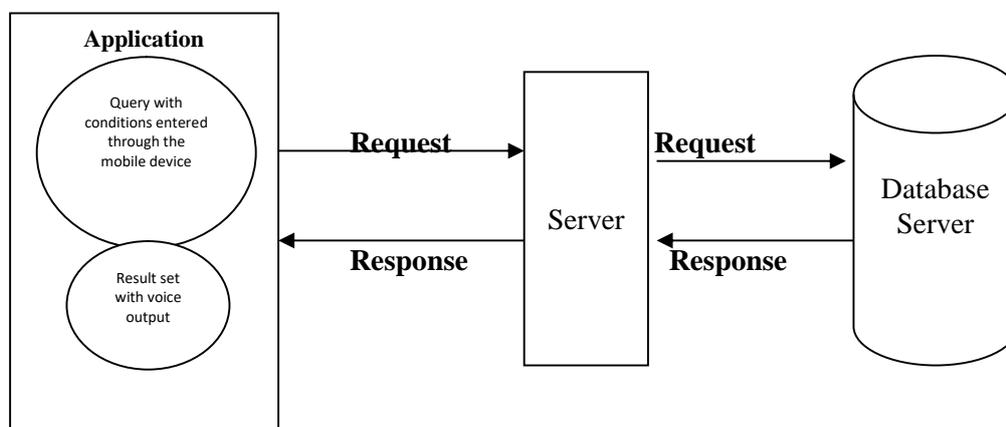
1. Since the mobile screen is small, the users do not spend considerable time for m-commerce

2. Various data types such as text, forms, images, pictures, videos, audio are presented/displayed as content in m-commerce applications.
3. User interface should be easy and compatible to various platforms
4. Navigation method should not be complex. Input and Output tech
5. Depth of the site structure hinders novice users to get to the appropriate link

Recommendations

1. To develop applications for mobile devices that accept voice input as query and process the request to give the relevant results back to the user
2. The consolidated information of the top 5-10 result set produced to be converted as voice output giving information which provides recommendations and suggestions to the users

Proposed Business Model



Mobile Device

Conclusion

The mobile applications should be developed with simple and easy to access interface design. The applications should make use of all the possible input and output mechanisms for search and retrieval to use all the functionalities incorporated in the device. The voice output with recommendations and suggestions from top result set helps and guides various users viz. beginners or advanced to take full advantage of the application. It helps to reduce pressure on the user to view the results in small screen, improves the usage of time as it is hands-free and enhances the conduction of m-commerce in the long run. The future work is to develop the code to incorporate this feature into the application

References

- [1] Little, M.C. Shrivastava, S.K., "Integrating the Object Transaction Service with the Web", Proceedings of the Second International IEEE Conference on Enterprise Distributed Object Computing Workshop, EDOC '98, La Jolla, CA, USA, ISBN: 0-7803-5158-4, pp: 194-205, 3-5 Nov 1998.
- [2] www.iab.com/wp-content/uploads/2016/09/2016-IAB-Global-Mobile-Commerce-Report-FINAL-092216.pdf
- [3] Baladron, C.; Aguiar, J.; Carro, B., Sanchez-Esguevillas, A., "Integrating User-Generated Content and Pervasive Communications", IEEE Pervasive Computing, Volume: 7, Issue: 4, ISSN: 1536-1268, pp: 58-61, Oct.-Dec. 2008
- [4] Sujata P. Deshmukh1 , Prashant Deshmukh2 , G.T. Thampi, "Transformation from E-commerce to M-commerce in Indian Context", IJCSI International Journal of Computer Science Issues, Vol. 10, Issue 4, No 2, July 2013

-
- [5] Rajnish Tiwari, Stephan Buse, Cornelius Herstatt, "From Electronic to Mobile Commerce Opportunities through technology convergence for business services", CACCI Journal, Vol. 1, 2008.
- [6] Reinhard Riedl Department of Information Technology, University of Zurich, "A Functional Model for Mobile Commerce", https://link.springer.com/content/pdf/10.1007%2F0-306-47009-8_45.pdf
- [7] D. Cyra, M. Headb and A. Ivanovc, "Design aesthetics leading to m-loyalty in mobile commerce," Information & Management, vol. 43, pp. 950-963, 2006.
- [8] Introduction to the Special Issue: Mobile Commerce Applications Ting-Peng Liang and Chih-Ping Wei
- [9] P. Tarasewich, "Wireless Devices for Mobile Commerce: User Interface Design and Usability," in Mobile Commerce: Technology, Theory, and Applications, Idea Group Inc (IGI), 2002, pp. 26-50
- [10] Keng Siau, Ee-Peng Lim, Zixing Shen, 2006, Mobile Commerce: Current States and Future Trends, University of NebraskaLincoln, USA
- [11] Ms.Sayali S. Nandan, "MOBILE COMMERCE APPLICATIONS AND SERVICES" International Journal Of Engineering And Computer Science ISSN:2319-7242
- [12] Loanna D.Constantiou & George C.Polyzos, 2006, The Impact of Technology Advances on Strategy Formulation in Mobile Communications Networks, Athens University of Economics and Business.
- [13] Bonnie Lam & Nadim Yazdani, 2006, Wireless Middleware, University of Cape Town.
- [14] Christer Carlsson, Pirkko Walden and Jari Veijalainen, "MOBILE COMMERCE: Decision Technologies for Management Track", IEEE Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS'03), 0- 7695-1874-5. IEEE Computer Society, 2003
- [15] <https://blog.hubspot.com/marketing/mobile-commerce-growth-global>
- [16] Chandan Gupta, Anil Chandhok and Manu Gupta "Hardship of M-commerce in India: Problems, Issues and challenges" IOSR Journal of Business and Management (IOSR JBM), January, 2016
- [17] <http://what-when-how.com/information-science-and-technology/interface-design-issues-for-mobile-commerce-information-science/>