

M-Commerce, Emergent Platform For Training & Educating

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1. Abstract

Mobile commerce is now acquiring momentum after a slow start. Mobile and handheld devices are gaining popularity among customers and more companies are working towards providing commercial services to this segment of mobilized customers. This paper discusses the key players in the m-commerce value chain along with the challenges these implementers and service providers face in extending their services. Until the recent past, these limitations and challenges have served as the outline for mobile applications. The telecommunication and technological advancements are adding a new facet to the already existing mobile paradigms. This paper focuses on the current scenario of mobile applications and discusses the various aspects of present day applications such as mobile banking, directory services, gaming, mobile e-tailing, portals and distance learning (and eLearning). This paper further evaluates the expected future trend as m-commerce integrates into the business and education mainstream.

2. Introduction

Mobile devices, with their revolutionary impact on voice communication, are set to transform the world of data and commerce. With the proliferation of mobile devices and advances in technology, more consumers are accessing the Internet through mobile phones, PDA's, smart phones, and other potable devices. Mobile commerce, popularly known as m-commerce, is the process of buying and selling of goods and services through mobile devices (Sadeh, 2002). In the recent past, there has been a change in the viewpoint of companies. Many companies incorporated m-commerce as an additional channel for extending their services. However, the widespread acceptance of m-commerce faces hurdles like physical challenges of mobile devices and the restrictions posed by the existing mobile infrastructure. The mobile industry has awakened to this call and is endeavoring to fill the gap between the existing mobile system and the desired one. Present day applications meet these challenges, as they lay a foundation for a more comprehensive and user-centric mobile applications. The growth and increased revenue of m-commerce proves that as a technology it has secured its place in business world. This paper highlights the role of industrial players in the m-commerce value chain, and explores the challenges faced in implementing commerce through mobile devices. This paper also discusses about

present day mobile applications and next generation of trends and services that users can expect as m-commerce is incorporated in the business mainstream.

3. Going from “e” to “m”

Emergence of m-commerce can be attributed to the convergence of various factors like proliferation of mobile equipment, desire of mobile operators to search for newer sources of revenue, advancements in telecommunication technologies and customer acceptance to more mobile services (Sadeh, 2002). According to Lim and Siau (2003), mobile commerce is a new conduit of doing electronic commerce and cannot be completely portrayed as a logical extension of e-commerce. Like the early days of e-commerce, m-commerce too is experiencing a combat of various players to grab the most profitable market share. Though m-commerce emerged from the already established e-business paradigm, its success lies in its distinguishing features such as mobility, ubiquity, and constancy, which are not easily available through the wired interface. These distinguishing features add new opportunities but simultaneously expose m-commerce to new set of challenges. M-commerce in its present form can best be described as a conglomeration of emerging technologies, where mobile service providers and implementers are testing the already existent business models and some new contestants. Their aim is to create the next range of killer applications over handheld device. For instance, the advertising model of e-commerce is being changed to suit the privacy and personalization requirements of mobile users. The idea is to provide only those advertisements that users opt to receive or are relevant to their present physical locations and requirements. A close observation show that this transition from “e” to “m” is not literal; instead, it is a sequence of evolutionary steps.

4. What lies ahead?

Some of the trends that will be seen in the future m-commerce applications are *Completion of the transition from 2G to 3G*: The migration from 2G to 3G is in progress, and most of the mobile operators are using the intermediary 2.5G technologies. The shift from 2G to 3G is not yet complete, but mobile industry is already buzzing with excitement and perspectives of 4G technologies and advanced addressing method called the Mobile IPV6. The 4G paradigm promises a much higher data rates of 100 Mbps or more (Andersson, 2001). With these faster data rate technologies, mobile service providers are ready to enter into a new age of wireless applications. *Rise in personalized applications*: With the completion of 2G to 3G migration there will be an increase in more personalized, location based and context aware services. It is far simpler to determine the exact location of mobile users than that of wired users. Using the user’s current location to provide the location of a Coke vending machine on a hot and sunny day, or the address of a nearest gift shop on their spouse’s birthday will be an added value proposition to the customers, many of whom will be willing to pay a small additional charge. Bloch-Morhange and Fontela (2003) proposed in their study the three dimensions — data rate, cost for the users and value addition to the social and economical system— as the determining factors for the success of m-commerce. The high data rates of 3G technology will form the base for more personalized services, but the success will depend on customer acceptance and their willingness to pay for these services. *Rise in customer segment specific applications*: Many

mobile service providers are targeting customers with “all-in- one and all- you- need” solutions (www.blackberry.com). This will continue for some years to come, until most of the vital and professional fields have at least one such service provider. An example for such an effort is, Research In Motion’s (RIM) Blackberry wireless solutions. Blackberry caters to the needs of individuals, business corporations, and government enterprises. It enables users to access emails, office memos, share files, and contact colleagues even when they are traveling or away from their offices (www.blackberry.com). Other areas that can take advantage of such application include healthcare, medicine, education, and entertainment. As in the case of Apple’s ipod, its services can be extended to the next generation of mobile entertainment. At present, users can download music and videos through the Internet and synchronize them to their ipods. This is known as podcasting (www.apple.com). In the future, more flexible and enriched source of entertainment can be provided to the users by enabling them to their ipods directly to the Internet. Another aspect to these advancements will be the integration of mobile devices with the already existent LANs and Bluetooth infrastructure. The corporate sector will have more interest in this integration because it will lead to evolution of a more efficient mobile workforce. While for individuals, it will provide uninterrupted connectivity to their personal LANs and other Bluetooth enabled devices even when they are away for work or on vacation.

Increase in “Push” services: With the growing needs of customization, mobile service providers are progressively moving towards “push” technology. In this technology, contents are delivered to the users based on their predefined preferences and not by “pull” i.e. explicitly polling the servers for services. (www.wikipedia.com). This concept was developed in 1990s but the failure of PointCast, a desktop-based Internet application, decelerated the adoption of push technology on wired interfaces. Without proper configuration, push services can bring about overwhelming of the hard disks. This has led the companies to decide on the option of moving towards a balance of pull and push technologies. Examples of such combinations are Microsoft’s webcasting and Netscape netcasting (Gerwing, 1997). Push applications, however, are more suited for mobile users. In 2002, Openwave, an IP-based communication infrastructure application and software provider, Brazilian leading telecommunication company Telesp Celular and the content provider Folha entered into a joint venture. Using the push technology, they provided users with updated information about World Cup proceedings and eventually reported a 40% increase in mobile subscriptions for Telesp Celular (Openwave world cup, 2002). Device manufactures are also incorporating this technology in their products, like RIM’s Blackberry, comes with push features for email access (www.blackberry.com). Use push technology can be luring but it needs understanding at the part of the implementers, so that they do not offend customers with their services and also at the part of users, so that they comprehend the intricacies of such technology and opt for them appropriately.

Development in device independent applications: Dependence of applications on mobile devices is one of the major hurdles in the interoperability and globalization of mobile services. In the future, companies will move towards device independent applications. In February 2005, Volantis, a UK based firm, launched the first device independent mobile content player called “XDIME player”. (Volantis launches worlds, 2005). Likewise, IBM also has the WebSphere Everyplace Mobile Portals solution, which enables deployment of content independent of underlying mobile device. The idea behind such pervasive application is the strength of “write once, render may” feature, which leads to quick deployment, reduction of cost, and decrease in complexity of integration (WebSphere everyday mobile, n.d.). At present, the progress towards device independent solutions is

segmented and company specific, but as more companies join in and decide to collaborate, we can expect development of more standardized applications. *Leap in mobile gaming:* Mobile gaming industry is surging to new heights with developments for the next generation of mobile games like Real Tournament. This multiplayer game has aspects of mobile networking, context-aware and sensor-based computing (Wu, Mitchell, McCaffery, Finney & Friday, 2004). Real world implementation of such augmented reality games will focus on users within the age group of 11 -15 years. This age group of smart and creative users expects ever increasing variety and challenges in their games. Development and deployment of such diverse games will entail extra cost for game providers. Moreover, to remain profitable, companies will also have to invest on security and gaming infrastructures (Loo & Choi, 2004). *Development of robust payment systems:* Companies involved in mobile commerce are working towards combating the challenges in mobile payment systems. Financial leaders like MasterCard, American Express, Visa; mobile infrastructure providers like Orange, Sprint, T-Mobile, TIM, Vodafone and Nokia and third party provider like First Date have jointly formed the Mobile Payment Forum (www.mobilepaymentforum.org). Reinforcement of the traditional SIM card based security with additional level of secure algorithms and digital signing methods, (Herzberg, 2003) or the use of wireless identity module (WIM) card as second identification module (Sadeh,2002), are some of the proposed solutions for security of mobile payment. With the ongoing research and development, the future of mobile commerce will experience an increase in customer satisfaction and loyalty due to secure transaction procedures. Moreover, advancement in e-wallet technology will also increase user adoption of mobile applications. Implementers of mobile payment systems are considering the use of short-range wireless technologies as an alternative to the present day solutions. Near Field communication, developed by Royal Philips Electronics and Sony, is one such short-range wireless standard. It uses magnetic induction and enables transfer of information between two devices by touching or placing them in close proximity. The standard can be used to develop a new generation of mobile payment system where payment can be done by merely placing the mobile phone next to the item (Chen & Adams, 2004). *Rise in security threats:* As m-commerce enters the next generation, there will be rise in security threats. The impact of these threats will be more profound in case of mobile devices than that for PCs, as many mobile applications aim at turning hand held devices to e-wallets or virtual smartcards. As companies tighten their PC and Web security, mobile devices will be the next target of malware and viruses. The increase in virus attacks on some of the most popular mobile operating systems like SymbianOS has already set out an alarm for mobile application developers (Nystedt, 2005). With these alerts already gaining attention, the next major development in the field of mobile application will be the rise in security software like antivirus, firewalls, and spywares. Accommodation of this extra software into the limited memory framework of present day mobile devices is the main challenge for the application developers.

5. Conclusion

Mobile commerce is a new concept, which is still emerging in context of a technology and business. Most present day applications and services over mobile channels have their roots in existing e-commerce paradigms. The uniqueness of m-commerce, however, is attributed to the features such as mobility and ubiquity provided by these handheld devices. The challenges faced by m-commerce are different from those faced

during the implementation of e-commerce. These challenges range from limitation of physical mobile devices to technological inadequacies such as lack of desirable bandwidth, low security features, and lack of universal standards. Companies have incorporated m-commerce into their existing business models, but they use mobile devices only as additional channels to strengthen their positions. Current mobile services such as mobile gaming, portals, directory services, banking, mobile e-tailing are clear indicators of such an integration. As technology advances, m-commerce will see more success with the next wave of trends such as the transition from 2G to 3G , personalization of applications, robust payment systems, new entertainment methods, device independent applications, and rise in security levels. These changes shall bring about development of personalized, location based and context aware services, which will provide excellent value propositions to the customers. Different entities of the mobile value chain are investing resources on infrastructure, research, and development. Nevertheless, complete success of m-commerce requires development of new business models, where mobile devices are the primary sources of relationships with the customers. It will be the innovativeness of the implementer, which will drive m-commerce to a new level.

6. References

- Amazon launches mobile-phone store (2000, December) [Electronic version]. *RCR wireless news*, 19 (49), 41-41. Retrieved October 14, 2005 from Business Source Premier database.
- Andersson, C. (2001). *GPRS and 3G Wireless Applications: Professional Developer's Guide*. NY: John Wiley & Sons, Inc.
- Bekiaries, M. (2005, June). Everyday money. [Electronic version]. *Money (Australia)* 5, 14- 14. Retrieved on October 13, 2005 from Business Source Premier database.
- Bloch-Morhange, G. & Fontela, E. (2003, April). Mobile communication from voice to data: A morphological analysis [Electronic version]. *Info*, 5(2), 24-33. Retrieved October 13, 2005 from Business Source Premier database.
- Chen, J. J. & Adam, C. (2004). Short-range wireless technologies with mobile payments systems. *ACM International Conference Proceeding Series, Proceedings of the 6th international conference on Electronic commerce*, 60,649- 656. Retrieved October 1, 2005 from ACM digital library.
- Forum Nokia (2004). *Multiplayer mobile games: Business Challenges and opportunity*. Retrieved October 11, 2005 form http://sw.nokia.com/id/65b06331-c2ea-4038-9cb7-b3b63588140f/business_multiplayer_v_1_0_en.pdf
- Gerwig, K. (1997 July/August). The push technology rage...so what's next? [Electronic version] *.netWorker*, 1(2), 13-17. Retrieved October 17, 2005 from ACM digital library.
- Herzberg, A. (2003, May). Payments and banking with mobile personal devices. [Electronic version]. *Communications of the ACM*, 46(5), 53-58. Retrieved October 4, 2005 from ACM digital library.
- Iappli: imode with java* (2005, October). Retrieved October 22, 2005 from <http://www.nttdocomo.com/corebiz/services/imode/iappli.html>
- Kalakota, R. & Robinson, M. (2002). *M-business: The Race to Mobility*. NY: McGraw- Hill Professional.
- Krudel, T. & Goldman, C. (2000, July). Dial-A- Coke [Electronic version] *.Wireless Review*; 17(13), 10-10. Retrieved October 14, 2005 from Business Source Premier database.
- Lim, E. & Siau, K. (2003). *Advances in Mobile Commerce Technologies*. Hershey PA : Idea Group Publishing.

- Lindmark S., Bohlin E. & Andersson E. (2004, January). Japan's mobile internet success story – facts, myths, lessons and implications [Electronic Version]. *Info*. 6 (6), 348 – 358. Retrieved October 5, 2005, from Emerald (Electronic management research library database).
- Loo, A. & Choi, C. (2004). Infrastructure for games on wireless Internet. [Electronic version] *The Electronic Library*, 22(1), 8 – 15. Retrieved October 2, 2005 from Emerald (Electronic management research library database).
- Malhotra, A. & Segars, A. H. (2005, October). Investigating wireless web adoption patterns in the U.S. [Electronic version]. *Communications of the ACM*, 48(10), 105-111. Retrieved October 1, 2005, from the ACM Digital Library.
- Mobilocity.net (2000). *Understanding the fundamentals of M-commerce- A Mobile Internet 101*. Retrieved September 27, 2005 from <http://www.itpapers.com/whitepaper.aspx?kw=Mobilocity.net&docid=10321>
- New Media Age (2005, September). *O2 launches i-mode in UK with top brands*, 3-3. Retrieved October 13, 2005 from Business Source Premier database.
- Nutt, C. (2005, September). Sony's PSP [Electronic version]. *Computer gaming world*, 254, 24-24. Retrieved October 14, 2005, from Business Source Premier database.
- Nystedt., D.(2005). *Mobile Viruses Could Get Nasty Fast*. Retrieved October 19, 2005 from <http://www.pcworld.com/resource/article/0,aid,122773,pg,1,RSS,RSS,00.asp>
- Openwave world cup interactive push application drives 40% increase in wireless data usage for Telesp Celular* (2000). Retrieved October 13, 2005 from http://www.openwave.com/us/news_room/press_releases/2002/20020625_opwv_t elesp_0625.htm
- Paulson, L.D. (2005, August). Search technology goes mobile [Electronic version]. *Computer*, 38, 19-22. Retrieved October 4, 2005, from IEEE computer society digital library.
- Sadeh, N. (2002). *M-Commerce: technologies, services, and business models*. NY: John Wiley & Sons, Inc.
- Strategy analysis (2001). *Strategy analytics forecasts \$230 billion mobile commerce market by 2006*. Retrieved September 21, 2005 from <http://www.strategyanalytics.com/press/PRNP002.htm>
- Sybase Press release. (2000, July). *Sybase's iAnywhere solutions and Ericsson form global alliance to deliver mobile banking solutions*. Retrieved on October 13, 2005 from <http://www.symbian.com/news/cn/2000/pr000710b.html>
- Velocity goes mobile (2000, October) [Electronic version] *Travel Weekly*, 59 (84), 15- 15. Retrieved on October 15, 2005 from Business Source Premier database.
- Venketash, V., Ramesh, V. & Massey, A.P. (2003, December). Understanding usability in mobile commerce [Electronic version]. *Communications of the ACM*, 46(12), 53 – 56. Retrieved October 1, 2005, from the ACM Digital Library.
- Volantis Launches world's first device-independent mobile content "Player" server-optimized, zero programming XDIME Player™ re-invents "Java portals"* (2005). Retrieved October 4, 2005 from <http://www.volantis.com/story.jsp?story=volpressrel20050222&tnav=news>.
- WebSphere Everyplace Mobile Portal* (n.d). Retrieved October 2, 2005 http://www-306.ibm.com/software/pervasive/ws_everyplace_mobile_portal/
- Weill, P. & Vitale, M.R.(2001). Portals, agents, auctions, aggregators, and other intermediaries. *Place to space: Migrating to e-business models*, 168-169. Harvard Business School Publication Corporation.
- What Hooks M-Commerce Customers? [Electronic version](2003, spring). *MIT Sloan management review*. 44, 9. Retrieved October 3, 2005 from <http://sloanreview.mit.edu/smr/issue/2003/spring/1c/>
- Wu, M., Mitchell, K., McCaffery, D., Finney, D., & Friday A.(2004, February) *Real Tournament – mobile context-aware gaming for the next generation*. [Electronic

version].*The Electronic Library* , 22(1),55-64.Retrieved October 2, 2005 from Emerald
(Electronic management research library database).