The Impact of M-Commerce in Global Perspectives- A SWOT Analysis

FELICITTA J.
Dept. of MBA,
St.Joseph's College, Tiruchirappalli,
Tamilnadu, India-620 002.
pio03davis@hotmail.com

GNANA JAYANTHI J.
Dept. of MCA,
Holy Cross College, Tiruchirappalli,
Tamilnadu, India-620 002.
jgnanamtcy@yahoo.com

Abstract- *There has been tremendous growth in wireless technology in the last decade. This advancement has changed people do business in mobile environment (M-Business). This is where M-Commerce or Ubiquitous Commerce (U-Commerce) step in which promises to allow shoppers to purchase goods and have services using mobile phones, wearable PCs and handhelds and in the same way brings challenges for both individuals and society. This paper is intended to bring out the facts about the feasibility of m-commerce today; the strength and opportunities, the weaknesses and threats lying ahead. The highlight of this paper is the SWOT / TOWS matrix from which in future, the researchers may spell-out the ways to achieve the success of M-Commerce in the long-term.*

Keywords:- *M-Business; M-Commerce; U-Commerce; M-Commerce Strength; M-Commerce weakness; M-Commerce opportunities; M-Commerce Threats; M-Commerce SWOT Analysis;*

I. INTRODUCTION

Recent user-centric technology, mobile and wireless communications provide high global penetration. In recent days, different types of systems are being applied for different application areas. Further developments are expected to evolve from existing and emerging systems. In future, most of the systems and applications will be mainly designed from a user-centric perspective [1]. The rapid development in the internet and related technologies changes the ways we live. People are more attracted towards wireless devices (such as cell phones, laptops, notepads, PDAs and palmtops) and they like to buy theatre tickets 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) [2].

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]. 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.

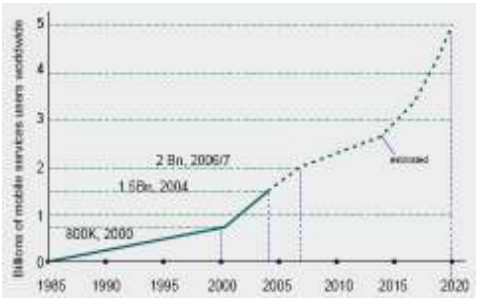

Figure (1): Worldwide M- commerce users – Gartner's forecast

Yang expected the growth of worldwide M-commerce users to be 1.67 billion by 2008 [7]. But, according to research by Gartner, the growth reached 2 billion in 2006 itself and by 2010 that will have passed 3 billion [8] as shown in figure(1). According to independent research findings, m-commerce, the conducting of business and services over portable, wireless devices, will soon be a dominant force in business and society. Realizing the usage and need of the m-commerce technology, and increasing growth rate of m-commerce users, this paper intends to brief its challenges and issues and examines an analysis of SWOT (Strength, Weakness, Opportunities and Threat) over M-commerce.

The paper is organized as follows. In Section II, the technical background related to mobile commerce is introduced; applications of m-commerce are presented in Section III. Section IV examines the strength, weakness, opportunities and threats related to m-commerce (SWOT analysis on M-Commerce).

II. TECHNICAL BACKGROUND

Known as next-generation e-commerce, m-commerce enables users to access the Internet without needing to find a place to plug in [9]. Mobile Commerce (also known as Ubiquitous Commerce [10] (U-Commerce), owing to the ubiquitous nature of its services) is the ability to conduct commerce, using a mobile device e.g. a mobile phone (or cell phone), a PDA, a smart-phone while on the move, and other emerging mobile equipment, like desktop mobile devices. Peter Keen and Ron Mackintosh [11] defined M-

commerce as the extension of e-commerce from wired to wireless computers and telecommunications, and from fixed locations to anytime, anywhere, and anyone device. Therefore, M-Commerce is any transaction with monitory value that is conducted via internetworking and involves the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access. It is a natural result of synthesizing two strongly emerging trends: e-commerce and pervasive computing. On the one hand, e-commerce is enabling new ways of doing business. Easy sharing of information, dissolution of distance, competitive costs, and improved efficiency are driving the phenomenal growth of both web-based consumer shopping B2C, online inter-enterprise transactions or *B2B*, and *B2E*. The emerging technology behind m-commerce is based on the Wireless Application Protocol (WAP) architecture which includes use of other technologies such as SMS services over a number of carriers (Global System for Mobile Communications (GSM), Interim Standard 95 (IS95), Code Division Multiple Access (CDMA), Wideband Code Division Multiple Access (W-CDMA)), Bluetooth applications, 2G, 2.5G, 3G,Wi-Fi, IRDA etc. (shown in the figure(2) and also the integration of low level digital carriers to IP based services through WAP or Compact HTML [12]. M-commerce covers terminals, standards, transaction models, middleware, or security; potential business models, methods; and design approaches to develop m-commerce applications.

Figure (2): Technologies supporting M-Commerce

III. APPLICATIONS

Six business applications have been identified are;

- Extended packaging: consumers access additional information about products through their mobile phone.
- Content purchase and delivery: digital products such as videos, games and music can be trialed and sold via mobile phones.
- Mobile coupons: mobile phones are used both to capture and redeem coupons and discounts
- Authentication: mobile phones are used to check whether or not a product is genuine.
- Re-ordering: Mobile phones are used to reorder products with orders sent to the supplier in a standard format.
- Mobile self-scanning: consumers in supermarkets use their mobile phone (rather than a device supplied by the supermarket) to scan products as they do their shopping.

The industries deploying m-commerce [13] shown in figure (3) include:

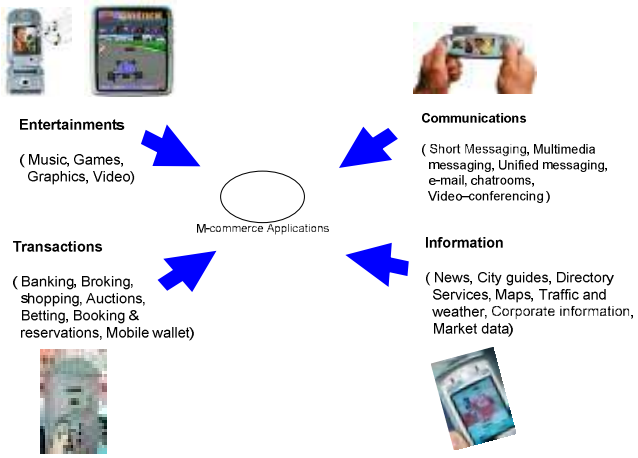

Figure (3): M-Commerce Applications

- Financial transactions services, which includes mobile banking as well as brokerage services
- Telecommunications, which includes service changes, bill payment and account reviews
- Service/retail, as consumers are given the ability to place and pay for orders on-the-fly
- Information services, which include the delivery of financial news, sports figures and traffic updates

These industrial m-commerce applications can be classified as B2B, B2C and B2E [14] as below.

A. Business-To-Business (B2B)

Business-To-Business was originally coined to describe the electronic communications between businesses or enterprises in order to distinguish it from the communications between businesses and consumers (B2C). It eventually came to be used in marketing as well, initially describing only industrial or capital goods marketing. It is widely used to describe all products and services used by enterprises.

B. Business-To-Consumer (B2C)

In B2C transactions, online transactions are made between businesses and individual consumers and there is no need for retailers. Businesses sell products and services through electronic channels directly to the consumer. The major activities involved are information sharing, ordering, payment, fulfillment, and Service and support.

a. Information Sharing:

A B2C M-Commerce model may use some or all of the following applications and technologies to share information with customers:

- Company Web site
- Online catalogs
- E-mail
- Online advertisements
- Message board system
- Newsgroups and discussion groups

b. Ordering:

A customer may use electronic forms similar to paper forms or e-mail to order a product or service.

c. Payment:

There are a variety of options. These include:

- Credit cards
- Electronic cheques
- Digital cash

d. Fulfillment:

The fulfillment function could be very complex depending upon the delivery of physical products (books, videos and CD's) or digital products (software, music, electronic documents). Fulfillment is responsible for physically delivering the product or service from the merchant to the customer.

Table (I): Details and Examples of M-Commerce Applications

Class of Applications	Details	Examples
Mobile Financial Applications (B2C, B2B)	Applications where mobile device becomes a powerful financial medium	Banking, Brokerage and payments for mobile users
Mobile Advertising (B2C)	Applications Turning the wireless infrastructure and devices into a powerful marketing medium	User specific and location sensitive advertisements
Mobile Inventory Management (B2C, B2B)	Applications attempting to reduce the amount of inventory needed by managing in-house and inventory-on-move	Location Tracking of goods, boxes, troops and people
Product Locating and Shopping (B2C, B2B)	Allocations helping to find the locations of product and services that are needed	Finding the location of a new / used cars of certain models and features
Mobile Entertainment services and games (B2C)	Applications providing entertainment services to users on per event or subscription basis	Video-on-demand / Audio-on-demand and interacting games
Mobile Distance Education (B2C)	Applications extending distance / virtual education support for mobile users everywhere	Taking a class using streaming audio and video
Mobile intra-business (B2E)	Applications provide products and/or services to their employees	Online insurance policy management / Corporate announcement dissemination / Online supply requests / Special employee offers / Employee benefits reporting / 401(k) Management

e. Service and Support:

Service and support is more important in M-Commerce than traditional business because M-Commerce companies lack a traditional physical presence and need other ways to maintain current customers. Examples include:

- E-mail confirmation
- Periodic news flash
- Online surveys
- Help desk
- Guaranteed secure transactions
- Guaranteed online auctions

These five activities all need to be used in conjunction with one another for a B2C business to be successful.

C. Business-to-Employee (B2E):

B2E M-commerce uses an intra-business network which allows companies to provide products and/or services to their employees. Typically, companies use B2E networks to automate employee-related corporate processes. There are potentially an unlimited number of m-commerce applications, and table (I) shows some important classes of applications and provides examples within each class.

Though M-commerce is applied many of the fields in day-to-day life, there comes a set of challenges and issues related to m-commerce.

IV. SWOT ANALYSIS

SWOT Analysis is a strategic planning method used to evaluate the **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats involved in a project or in a business venture. It identifies the internal and external factors that are favorable and unfavorable to achieving that objective. This SWOT analysis is being performed on M-commerce in order to identify its issues as weakness and threats so that more researches may be motivated and to direct the m-commerce in a more successful manner.

A. Strength

The strength of M-commerce is based on four factors: the anticipated ubiquity of devices, online access for a large portion of the world's population, location sensitivity of the devices, and authentication and authorization capabilities [15]. Varshney and Vetter argue that each of the levels in the framework which encompasses (i) Wireless (Network) Infrastructure, (ii) Mobile Middleware, (iii) Wireless User Infrastructure and (iv) Mobile Commerce Applications play a critical role in m-commerce success and deployment [16]. GPRS and 3G offer 'always-on' connections to the Internet. So a mobile device can provide with continuous links to the Internet, e-mail, interactive touch screen experiences which provides innovative service delivery [9]. High Quality-of-Service (QoS), Positioning services and location-aware services provide highly convenient and customized services [17]. For wireless carriers, to recoup the costs of building next-generation wireless data networks, m-commerce represent new revenue streams. Using Bluetooth technology, much of this communication could even be between devices rather than people and advertisers will be able to team with carriers to deliver their message.

B. Weakness

Lack of data security and digital identity are the major weakness for wireless communications [18]. Wireless Local Area Network (WLAN) present its own set of risks listed below:

- WLAN transmission can be 'listened to' up to a mile away using inexpensive receivers
- Many existing WLAN installations do not use WLAN built-in encryption capabilities
- Antivirus solutions are difficult to implement
- Privacy in data transmission is not maintained

Over the next decade, billions of people will gain access to mobile devices. Many of them will be functionally illiterate, and only a small percentage will be comfortable with English. A polyglot environment will place a large premium on language translation, clear interactions, and speech interfaces, but even after 30 years of research in these fields, sophisticated applications remain scarce [19]. Recent Mobile devices are not as fast as a fixed connection, or have anything like the graphics or processing power of a PC and they are limited with memory and computational power. The small screen size of mobile terminals is also a major deterrent to many applications [20]. Still, M-commerce relies on proprietary solutions and there are no standards for M-commerce.

C. Opportunities

Size and growth rate of the mobile market is the key driver of the mobile services market. “Third world” citizens will be able to communicate easily anywhere and engage in business without geographical limitations [19]. Moore says the 'payment gateways', are a company or organization that provides an interface between the merchant's point-of-sale system and the payment system [21]. The service may involve the purchaser's bank paying directly to the seller's bank, or through a credit card company, all facilitated by the payment gateway provider [22]. Tickets can be booked via the mobile; people have the flexibility of purchasing them on the go. Retailers can send coupons and loyalty cards that can be presented at the sales counter. The mobile platform can be used to deliver news alerts, stock market reports, sports schedule and results or traffic information [23]. Paper catalogues can be replaced by sending periodic alerts to the customers. Companies can reach consumers and select their target audience for a particular product or brand. These opportunities and what mobile commerce will look like in the future depend on the creation of an open and neutral infrastructure trusted by both businesses and consumers to enable a fast and easy adoption of the technology.

D. Threat

The threats involved in m-commerce [24] are;

- Mobile Commerce Security and Privacy Risks
- Wireless Infrastructure Security Risks
- Mobile Middleware Security Risks
- Wireless User Infrastructure Security Risks
- Mobile Application Security Risks

An obvious risk with remote networking is loss or theft of mobile devices. Although mobile telephone service can be cancelled and the problem of its loss reduced to the compromising of phone book entries, for large businesses a lost mobile computing device could also seriously compromise sensitive corporate information. In the wrong hands, it may cause untold financial losses, and could quickly cost the business its competitive edge.

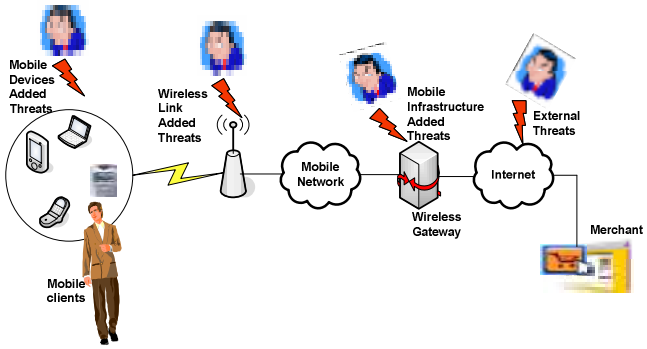

Figure () :M-commerce Extends Security Threats of E-commerce

Without safeguards, in a best-case scenario, when a device is stolen and/or sold, critical information stored on it is erased and lost. Mobile Viruses can spread attacks quickly through the network [25].Other important but seldom considered risks include: allowing employees to use their personal wireless devices or home computers for business purposes, or to use personal eMail services on a business computer at home. Both these practices, at a minimum, run the risk of virus infection.

Table (II): M-Commerce SWOT / TWOS Matrix

	Strengths	Weakness
Opportunities	• Innovative Business Models • Consumer adoption • High Speed Internet Connectivity and Always on Connection through GPRS, 3G, UMTS, Bluetooth • Third world citizens communicate easily without geographical limitations • Portability • Payment gateways • Ticketing, M vouchers, multimedia information, Shopping , Marketing and advertising	• In Long-term, lack of interoperability and higher operating costs • WLAN transmission can be captured by untrusted parties • No built-in encryption capabilities in WLAN • Limited Memory • Limited computational power • Antivirus solutions are difficult to implement
Threats	• M-Commerce Security and Privacy Risks • Wireless Infrastructure Security Risks • Mobile Middleware Security Risks • Wireless User Infrastructure Security Risks • Mobile Application Security Risks • Mobile Viruses can	• Risk related to theft of mobile device • Third world citizens uncomfortable with English • No Privacy of data • Small screen size of mobile terminals • Relies on

	spread attacks quickly through the network • Multiple means of infection	proprietary solutions • No standards for M-commerce

In the above table (II), M-commerce SWOT / TWOS matrix, we examined that,

- S-O strategies pursue opportunities that are good to the future
- W-O strategies overcome weakness to pursue opportunities
- S-T strategies identify ways that the M-commerce can use its strengths to vulnerability threats.
- W-T strategies establish a defensive plan to prevent the M-commerce's weakness from making it highly susceptible to threats

V. CONCLUSION

People live fuller, mobile lifestyles these days. They value convenience and have a lot of things that they want to do. They are comfortable with e-Commerce and willing to transact over the mobile to simplify their lives and optimize their time. M-commerce is such a technology which offers a new business opportunity to enterprises and consumers within reach, even as barriers to its development fall away. Applications and wireless devices promise to evolve together, each driving the introduction of innovative and powerful features in the other. The opportunity is much beyond mobile bill payments and can include all forms of transactions including merchant payments, utility bill payments, peer-to-peer money transfer and any other transaction scenario that the consumer faces today. The SWOT/TWOS matrix on m-commerce analyses and draws strategies to compete in an increasingly digital marketplace. The m-commerce need to develop synchronized value-added content, synthesized business models that go together with emerging technologies, which can create key mobile features and serve as drivers of the growing market demand.

REFERENCES

[1] Werner Mohr, "Vision for 2020?", SPRINGER Journal Wireless Personal Communications, ISSN 0929-6212 (Print) 1572-834X (Online), Issue Volume 44, Number 1, pp Pages 27-49, Jan'2008.

[2] 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.

[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] Samuel Pierre, "Mobile computing and ubiquitous networking: concepts, technologies and challenges", Science Direct Telematics and Informatics, Volume 18, Issues 2-3, pp: 109-131, May-Dec'2001.

[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] 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.

[7] Kurnia, S.; Heejin Lee; Song Yang, "Understanding Consumersapos; Expectations of Mobile Data Services in Australia", IEEE Proceedings of the International Conference on the Management of Mobile Business, ICMB 2007, pp: 14, 9-11 Jul'2007.

[8] Senn, J.A., "The emergence of m-commerce", IEEE Computer, Volume 33, Issue 12, pp: 148 – 150, Dec 2000.

[9] A GS1 Mobile Com White Paper,"Mobile Commerce: opportunities and challenges", Feb'2008.

[10] www.allbusiness.com/electronics/commercial-industrial-electronics-radio/11484012-1.html

[11] Keen, P.; Mackintosh, R.: The Freedom Economy: Gaining the m-Commerce Edge in the Era of the Wireless Internet. McGraw-Hill, 2001.

[12] Kalle Lyytinen, "M-commerce - Mobile Commerce: a New Frontier for E-business", IEEE Proceedings of the 34th Hawaii International Conference on System Sciences - 2001.

[13] Kalakota, R.; Robinson, M.: M-Business: The Race to Mobility. McGraw-Hill Companies, 2001.

[14] Paavilainen, J.: Mobile Business Strategies: Understanding the Technologies and Opportunities. Addison-Wesley, 2002.

[15] John Garofalakis, Flora Oikonomou, Vasilios Stefanis, "System's Design and Implementation for Easy Creation of Mobile Commerce Systems", IEEE Proceedings of the Third International Conference on Internet and Web Applications and Services, 978-0-7695-3163-2, 2008.

[16] Varshney, U., Vetter, R. and Kalakota, R. "Mobile commerce: A New Frontier", IEEE Computer: Special Issue on E-commerce, Oct' 2000.

[17] Nenad Jukic, Abhishek Sharma, Boris Jukic, Manoj Parameswaran, "M-commerce: a location-based value proposition", ACM transactions on Managing e-commerce and mobile computing technologies, ISBN:1-931777-46-2, pp: 19 - 27, 2003.

[18] David Phu, Rodger Jamieson, "Security Risks in Mobile Business", IEEE Proceedings of the International Conference on Mobile Business (ICMB'05), 0-7695-2367-6/05, 2005.

[19] Stuart Feldman, "Mobile Commerce for the Masses", IEEE Internet Computing, Nov-Dec'2000, http://computer.org/internet/

[20] MacCormac D, Deegan M, Mtenzi F, Brendan, "Implementation of a System to Support Mobile Computing Sessions", 2nd International Conference on Pervasive Computing and Applications, ICPCA 2007, pp: 521 - 526, 26-27 Jul'2007.

[21] Mobile Payments & MCommerce - The Future Opportunities & Challenges, www.WATBlog.com, Nov 10 2008.

[22] M. Litoiu1, D. Krishnamurthy, J. Rolia, "Performance stress vectors and capacity planning for e-commerce applications", Springer Berlin International Journal, ISSN 1432-5012, Volume 3, Number 4, pp 309-315, May 2002.

[23] Ziv N.D, "Toward a new paradigm of innovation on the mobile platform: redefining the roles of content providers, technology companies, and users", International Conference on Mobile Business, ICMB 2005, pp 152 - 158, 11-13 Jul'2005.

[24] Fourati A, Ayed H.K.B, Kamoun F, Benzekri A, "Security issues of m-commerce over hotspot networks", IEEE Wireless Communications and Networking Conference, WCNC'2004, Volume 2, Pp: 837 - 838, 21-25 Mar'2004.

[25] Thomas M. Chen, "Trends in Viruses and Worms", The Internet Protocol Journal, Volume 6, Number 3, Sep' 2003.