

M COMMERCE analysis



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I. Introduction

Similar to the first wave of electronic commerce in the late 90s, mobile commerce (*the exchange of commodities, services, or information on the wireless network through the use of mobile devices*) has revolutionized commerce in many parts of the world. In just a few years, mobile commerce has emerged from nowhere to become the hottest trend in the business world. A number of mobile commerce applications have been developed and are already in use, covering a wide range of business functions from advertising to banking. Given the already high mobile phone penetration (a penetration rate of over 60% in Europe and over 40% in the USA according to most sources), the rapid growth of mobile commerce seems assured. With such knowledge in mind, this document will set out to conduct an investigative study of the various aspects of m-commerce and how mobile commerce systems can change the way organizations conducts business. We will look at its implementation in Japan and Europe, and discuss the conditions for the forthcoming successful implementation of the technology in Canada.



III. Situational Analysis

1. Definition:

By definition, the term m-commerce refers to the mobile nature of the wireless environment that enables radio-based wireless devices, such as mobile phones and PDAs, to conduct business-to-business and business-to-consumer transactions over a wired, web-based e-commerce systems (Lau 167). Eventhough it is a natural extension of e-commerce, shares similar fundamental business principles, m-commerce does behave differently. It generally acts as another channel through which value can be added to e-commerce processes. In fact, the mobility and flexibility m-commerce offers to consumers provides many outstanding opportunities that meet evolving customer needs (Please refer to Appendix A for the differences between e-commerce and m-commerce).

Another interesting definition is the evolving conversion of the term “cellular phone” to “mobile phone”. Originally, the term “cellular phone” was accepted during the 80s and 90s due to the geometric structure of the antenna grid that linked these devices into terrestrial telephone systems. However, the mass diffusion of mobile telephones in industrialized nations during the second half of the 90s has coincided with a decisive shift away from that designation towards the use of the term “mobile phone” (Townsend 90). This has indicated a broad shift in cultural perceptions from a view where the technological innovation was seen to be in the supporting

infrastructure (cellular) to one where the intelligence is embodied in the device itself (mobile). Indeed, the emergence of mobile devices and mobile commerce has signified more than just some complex technovation of the century. People look up to mobile commerce as the persona of the future solution for meeting evolving personalized customer needs.

2. Description of the technology:

As a congregated technology of many technologies, the mobile commerce system requires a variety of constituents from different disciplines. In general, the system has five components (Shi 35):

a. Mobile Commerce Applications:

M commerce application is most prominent in commerce areas (Yuan 40), although applications in other areas are developing rapidly (please refer to Appendix B for the list of options):

i. M-banking:

Piloted by NTT DoCoMo, Japan's largest cell phone system operator, Japanese mobile phone users now can make payments and withdraw cash via mobile phone handset. The technology allows people to withdraw and deposit money at cash points in convenience stores, supermarkets, and vending machines using mobile phones instead of cash cards. Furthermore, the latest edition of Osai-Keitai, or mobile wallet, can be used to act as boarding pass on certain domestic air flights; can authorize entry through corporate security doors with the wave of the handset (Boyd 14).

ii. M-payment:

The most common m-payment service allows users to initiate a payment by sending a text message with their password, the amount they want to send, and the recipient's mobile phone number. The users can also include a short message. As long as the person is on the GSM network, the service will transfer the funds and the recipient is notified via SMS ("New M-Commerce"). Another popular payment option is called the WAP (Wireless Application Protocol) service. A payment system that lets users make payments, check their balance, and view past transactions from a web-enabled phone. Alternatively, consumers can also make payments using IVR service (Interactive Voice Response): they call a designated telephone number, key in their six-digit pass code, the amount they wish to send, and the recipient's mobile number ("New M-Commerce"). The transaction is completed once the recipient gets notified about the transaction via an automatic SMS message. There have been talks within the industry about the prosperous application expansion of this technology into ticket reservation and restaurant businesses ("New M-Commerce").

iii. E-vending:

Many vending machine technology providers are helping companies cash in on new "smart appliance" trends, including the option of allowing machine operators to monitor kiosks, and consumers to make payments wirelessly with mobile devices. Among others, Cellenium (a mobile commerce technology provider) and Coca-Cola Beverages (CCB) AG in Switzerland are launching a wireless intelligent vending solution that communicates real-time data allowing merchants to remotely monitor machine functions and inventory. Based on this proprietary messaging technology,

vending operators have a convenient means to optimize the control their vending operations. These vending machines will also be able to accept m-payments from consumers using their cell phones to purchase drinks (“Cellenium & Coke”).

b. Mobile Stations:

Mobile stations are mobile handheld devices such as a PDA (personal digital assistant) or a web-enabled mobile phone. These embrace the feature convergence of many devices such as computers, telephone/fax, e-mails, PIM (personal information managers), calendars, address books, and networking features. Although many developers are fiercely fighting to make the latest and best mobile station model, the most ardent battles occur among the operating system developers. There are three types of OS available in the market:

i. Palm OS:

The most popular system is the Palm OS. The plain design of the Palm OS has resulted in a long battery life, approximately twice that of its rivals. It supports many important wireless standards, including Bluetooth and 802.11b local wireless and GSM, Mobitex, and CDMA wide-area wireless networks. To offset the increasing challenge from Pocket PC 2002, Palm introduced Palm OS 5, which runs an ARM processor (TI OMAP1510) and has a high-resolution (320×320) color screen, 16 MB of memory, built-in voice recorder, directional pad, Bluetooth, media playback capability (MP3/OGG/WAV), and a speaker/headphone jack (Shi).

ii. Pocket PC:

On the other hand, Microsoft recently introduced the Pocket PC. With mobile users in mind, it was designed to optimize service and deliver more computing power than Windows CE. Moreover, the latest version introduces support for Bluetooth, IEEE 802.11b, and mobile phone technologies, such as CDPD, CDMA, and GSM, and allows access to corporate information via a number of connectivity options, including VPN, WAN, LAN, and PAN ("Windows Mobile Software for Pocket PC"). Since its introduction in 2000, the Pocket PC platform has presented a serious challenge to Palm OS, which for the time being still enjoys a slight lead in the market share.

iii. Symbian OS:

The latest rival is the Symbian OS: a joint venture product from Psion, Ericsson, Nokia, and Motorola. Unlike Windows CE, from its inception Symbian was planned to be a full operating system for mobile stations. It includes the following key features: integrated multimode mobile telephony, an open application environment, multitasking, multimedia features, and data synchronization ("Symbian OS Technology"). Although the system is comparatively in its infantile stage of improvement, the endorsement of these mobile technology developers and the close network they have with most telecommunication giants gives Symbian OS great market staying power potential.

c. Mobile Middleware:

The third component of a m-commerce system is the mobile middleware layer: the software layer between the operating system and the distributed applications that interact via the networks. The primary mission of a middleware layer is to hide the underlying networked environment's complexity by insulating applications from explicit protocol handling, disjoint memories, data replication, network faults, and parallelism (Geihs 24). Mobile middleware translates requests from mobile stations to a host computer and adapts content from the host to the mobile station (Saha 55). Although WAP and i-mode are the two specifications utilized specifically for the wireless network environment, the stable and universal standard for enabling technologies as of this moment have not yet been developed (Please refer to Appendix A for more information).

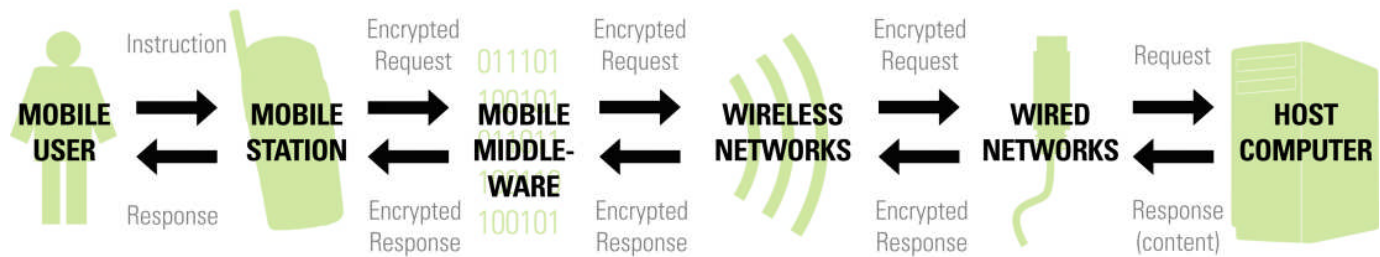
d. Wireless Networks:

Nowadays wireless networking technologies are advancing at a tremendous pace. Each advancement represents a solution for a certain phase (such as 1G, 2G, and 3G) in a particular geographical area (United States, Europe, or Japan). The wireless nature of this mobile networking allows wireless nodes to roam around from one location to another, as long as they are within certain range of their AP. Nodes are no longer bound to fixed locations as with a wire-bound LAN. Furthermore, WLANs also run over the same protocols and operating systems required by a wire-bound LAN (Dean 131). This compatibility ensures that wireless and wire-bound transmission methods can be integrated on the same network.

e. Host Computers:

Just like any host computer in the network, the host computer on the mobile commerce system administers, produces, and stores information for applications. Therefore, this component is similar to that used in an electronic commerce system because the host computers are usually not aware of differences among the targets, browsers, or microbrowsers they serve (Shi 67). It is the application programs that are responsible for apprehending their clients and responding to them accordingly. Most of the mobile commerce application programs resemble typical networking components such as applications for Web servers, database servers, and support software.

Example of the above described system (for an additional example please refer to Appendix C)





III. Market Situation

1. Canadian Market:

Growth in the cellular technology market has increased exponentially over the past ten years. Advancements in technology have allowed better service and improved features for cell phone users. The Canadian market has not been as profitable as the market in the Asia-Pacific corridor or the European market, but its potential is promising. Canada has adopted cellular technology to a high degree, but has yet to show true interest in the increasing cellular features that have been introduced in the past few years. This is a result of the critical nature of our North American culture regarding technology. We need to see new technologies implemented in other countries, and if they work, we begin adopting them here. This was the case with many video game consoles, computers and various other digital technologies.

The giant telecommunication corporations of Canada have taken notice of the success of m-commerce in Japan and Europe, and have decided to begin its implementation here. While on a per-capita basis there are less cell phone users in Canada (40%) than there are in Japan (68%), these corporations believe that the thirteen million cell phone users in Canada will undoubtedly turn a profit ("The World Factbook"). Cellular phone penetration became high enough for m-commerce in Canada four years later than it did in Hong Kong. A lesson learned from Hong Kong

is that cellular phone penetration rose to 85% by 2005, so we should expect an increase in cellular technology sales in Canada after the implementation of m-commerce (Chou). In fact, since 2004, cell phone subscribers have increased 12% to 15.5 million users in this nation (Whenham). Ideally, and as observed from similar markets, the Canadian cellular market will increase even further with the inception of m-commerce. M-commerce is not about expanding socialization, promoting culture or making our society more democratic; m-commerce is about making money.

In an attempt to make money, it is important for MIS specialists to devise a way to make the technology work, and an effective way to bring it to the market. M-commerce brings forth a myriad of critical marketing points to be taken very seriously when devising how to bring the technology to market. Cell phones are used “by poorly educated and even illiterate people, a segment [that is] significantly different from the well-educated white-collar workers who are often the subjects of concern” (Lehner 3). M-commerce must be marketed to all of Canadian society and not just the technological elite in order to be successful. As well, the user interface will have to be completely revamped in order to encourage people to both purchase new cell phones and participate in mobile commerce. For years companies have thought that cellular technology was to be regarded only by its visual presence, when in fact, “cell phones have an aural, tactile, and visual interface” (Lehner 3). For m-commerce to be truly successful and adopted as quickly as possible by North America, the aural, tactile and visual interfaces will have to be altered. In addition, the lessons learned from the e-commerce boom and subsequent bust must be considered when delving into m-commerce. For all intents and purposes, m-commerce is a mere extension of e-

commerce and it is subject to the same rules of economics that every form of business should follow. The marketing lessons, and economic lessons, learned from e-commerce must be given priority when bringing mobile commerce to Canadian society.

2. Diffusion Pattern:

a. Literature in the field:

The diffusion of mobile commerce is greatly dependent on its usability and its ability to change the way our society operates. M-commerce affords compatibility with our current ways of doing things. This means that e-commerce, cellular communication and proper advertising are all already happening. Such compatibility is critical to the success of m-commerce because people don't need to make massive lifestyle changes to adopt new technology. This technology is not difficult to operate; any new features are easy to learn because of existing tacit mobile technology and electronic commerce knowledge possessed by individuals in this day and age. Currently, the Canadian public can observe people in other countries using the technology successful via strategic marketing campaigns. Experts agree that, "with the high penetration of mobile phones and the aggressive marketing tactics of mobile carriers, exposure to mobile commerce technology is increasingly high" (Khalifa, 6). The new technology will spread virally, that is to say there will be few people who adopt to it early, but will pick up speed when more and more people see the obvious advantages. For example, "the exposure of an individual to mobile commerce enhances his/her belief in his/her capability to engage in mobile commerce, which in

turn influences positively the individual's intention to adopt mobile commerce" (Khalifa, 6). Canadian cell phone providers must allow users to try the new service for a minimal cost in order to teach them about the advantages of the technology. This is imperative for the cellular companies because it will also affect increase profits in other sectors. People will not only use mobile commerce but they will also desire cellular phones with specific m-commerce usability options; which will increase sales of physical units and the bottom line of the cellular companies. The diffusion of mobile commerce in Canada will most likely be a slow process that will ultimately increase the overall cellular penetration in the country.

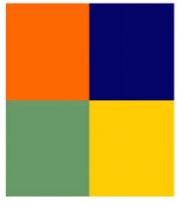
b. Our research findings:

In order to better understand people's awareness of m-commerce and their opinions of the emerging technology, we decided to setup an online survey. Demographically speaking, our survey participants were mainly third year university students aged 21-25. Additionally the majority of our students are studying Communications, Culture and Information Technology; hence it is safe to say that a number of our participants may be familiar with m-commerce due to class materials.

Of our participants, 92% of them already have cell phones, and of these owners, 60% of them have owned their phones for and even distribution of 1-5 years. Since m-commerce deals with making payments over your cell phone, we asked our participants which of them already purchase items such as ring tones on their cell phones. There was an even split between those who frequently and infrequently made

purchases over their cell phones with 7.7% of our respondents never making purchases over their cell phones.

Before the administrations of our survey, 70% of our respondents had heard of m-commerce but they were divided almost evenly concerning if they were interested in using the technology or not (please refer to Appendix D). We asked our respondents their concerns regarding the use of m-commerce and the top two concerns were security and privacy, respectively (please refer to Appendix E). Such results were not unexpected and did not surprise us. One of the biggest issues with m-commerce is the “how safe is it” factor. This factor alone is one of the main hurdles m-commerce will have to overcome. We firmly believe that if the right safety precautions are taken and the reliance of the system is clearly demonstrated, there should be no problem in successful implementation of m-commerce.



IV. SWOT

SWOT

1. Strengths:

Implementation of m-commerce in Canada is a great step forward for consumers and businesses. There are numerous strengths that can be associated with the execution of m-commerce technology in Canada. The first one to be discussed is the strength of mobility. When engaging in electronic commerce, consumers must be in close proximity of their Internet connection. Owning a desktop computer with a hard-wired Internet connection is a common form of engaging in e-commerce. The next step up from e-commerce is w-commerce (Wireless-commerce) in which users can complete transactions from almost anywhere, but are still subject to a cumbersome laptop. M-commerce is completely mobile by means of cellular telecommunications as well as friendly interfaces. It is imperative to redesign the aural, tactile and visual interfaces of cellular technology to make m-commerce as strong as possible.

There are specific fields of commerce in which m-commerce will undoubtedly flourish. P.K. Kannan, an associate professor of marketing at the University of Maryland's business school says that, "m-commerce will only become essential for companies whose products or services are time-constrained " (Schultz). These specific fields include, but are not limited to, "financial firms offering online trading, payment and portfolio management services, and travel (airline, hotel, rental car) and

entertainment firms offering online booking ” (Schultz). This is a seemingly obvious conclusion to draw, as e-commerce didn’t engage the customer in impulse purchase behaviour. But m-commerce has more opportunity to provide consumers with more useful marketing information than e-commerce. There is even an opportunity for m-commerce to provide more information than television, radio or print advertising could even dream of providing. The implication is that television, radio and print advertising do not have the same personalization capabilities as m-commerce advertising.

2. Weaknesses:

Cellular technology in and of itself has many weaknesses. The weaknesses stem from the nature of the technology. For example, cellular technologies have, “clumsy user interfaces, cumbersome applications, low speeds, flaky connections and expensive services ” (Schultz). For m-commerce to be truly viable, the user interface must be redesigned and reintroduced to the market with improved interfaces. It is certainly true that Internet applications used via cell phone are difficult to use because of the poor user interface, low bandwidth connection and the expensive nature of cellular services. If m-commerce is to thrive and survive in Canada, the companies governing the infrastructure must expand the network to allow more connectivity and bandwidth while at the same time making it cheaper to use the cell phone. If they don’t do this, which they will certainly be reluctant to do, m-commerce will not be as profitable as it should in Canada.

E-commerce, or at least business to consumer e-commerce, did not fare as well as perceived because of the difficulties with security, privacy and encryption. These are all weaknesses that must be addressed in the implementation of the new technology. First of all, some people might find it to be an invasion of privacy to walk in front of a brick and mortar company and receive a message that there is a sale on MP3 players fifty yards away. There would certainly have to be an option to cancel this sort of marketing. Second, and more important, is the unease with releasing banking information through a cellular phone over the m-commerce infrastructure and to the bank. There is a point on the WAP network in which wireless information is decrypted and made wired. Mitch Bishop, the vice president of marketing at e-commerce software infrastructure Mobileum says, "for a financial services application or other situation requiring ironclad security, those gateways should reside behind your firewall" (Schultz). There is an obvious requirement for ironclad security when dealing with transactions and this is a relatively shaky aspect of WAP technologies and m-commerce itself.

What happens if a user loses their cell phone? Will it be as easy to cancel as a credit card, or will there be a fraudulent person emptying an account while the user looks aimlessly for the cell phone? M-commerce would obviously have to take advantage of user IDs and passwords as well as implementing a digital certificate to ensure security. All a thief has to do is attain the user ID and password to make a purchase. And there are few digital certificate services in place at this moment that would ensure that the person making transactions is the person using the phone (Schultz).

3. Opportunities:

Opportunity afforded by m-commerce appears to be infinite. Consumers and suppliers alike can benefit from the many opportunities afforded by this technology. The first opportunity to be addressed is the notion of a 'virtual mall'. Within a specific zone, area, or cell, users of m-commerce will be able to receive instantaneous updates of pricing and marketing strategies directly from the manufacturer. The consumer could hold merchandise at a particular store, pay for it, and then pick it up at a time that suits them best. This opportunity has very far-reaching consequences, and will certainly be an option to streamline retail sales. For example, if a consumer has pricing information for all competitors in a zone they will have an advantage because, "a seller who is aware of the fact that the customer is equipped with the information on the best options for purchase, might be forced to come up with the best price to attract the customers for its general commodities " (Jukic 4). It is fair to assume that prices would remain relatively consistent throughout a zone, but this would promote fierce competition between different zones. The consumer gets the best pricing for a product available, and suppliers will be able to strategically increase sales at specific stores in specific zones.

The second opportunity to be discussed for m-commerce is the element of personalization. Suppliers will have the ability to target specific demographics in ways that they have never been able to before. For example, a clothing store would be able to propagate the latest bargain to every male between the ages of eighteen and twenty-five who are within a five hundred meter radius of the store. This means that

consumers receive current pricing strategies from the seller who is promoting a one-to-one advertising basis with the customer. The customer feels that they have a good relationship with the seller and will venture into the store to take advantage of this personalized bargain. The benefit for the seller is quite obvious; they get consumers into the store and they will not only buy what was advertised, but will hopefully purchase goods that they had no intention to buy.

Personalized marketing is made possible by a tracking technology that will be included for m-commerce customers. This technology, "implies a robust platform that allows triangulation between different network base stations, which in turn allows the network/engine, and mobile devices users to track the location of other users within the range of the zone " (Jukic 5). The tracking ability affords the exact coordinates of a consumer and suggests commodities within their area that would be pleasing to that user.

Another opportunity for m-commerce is in regards to promotional effectiveness. The ability of personalization and tracking would make for a competitive advantage in a marketplace. Let's assume a very probable example of a restaurant, which changes its menu daily, being able to send their menu with specific items highlighted to everyone within a three hundred meter radius. The consumers will be able to be guided to the store by the same technology that allows cell-users to be tracked. In effect, "M-Commerce promotions can guide the target customer to the doorstep of the store, an attribute absent in traditional promotional efforts " (Jukic 6).

M-commerce has the opportunity to do many things for stakeholders. That is, organizations, consumers and investors will be able to, "increase profitability, gain

market share, improve customer service, and deliver products faster " (Lehner 4). Retail sales will increase as a result of the personalized marketing initiatives. Cell phone sales will increase with the added usability of the aural, tactile and visual user interfaces. Television, radio and print advertising could go down with the new feasibility of personalized advertising.

Finally, there are massive opportunities for database management companies to act as intermediaries to store consumer information. If there is well-organized information about each individual customer, business intelligence will shoot through the roof. The opportunity in this facet of m-commerce will be explained and exemplified in the recommendations section of this paper.

4. Threats:

Although m-commerce has a multitude of opportunities, there are just as many threats to its inception in Canada. The biggest threat to the implementation of m-commerce in Canada is the current financial infrastructure. M-commerce is a component that will lead to the demise of using tangible currency, cash, in everyday transactions. Credit cards and debit cards are already putting an end to the use of cash for everyday transactions; and no one can say if consumers will use their cell phones to make everyday purchases. Credit cards and debit cards are together the biggest threat to the implementation of m-commerce in Canada.

It is often thought that m-commerce will be a byproduct of owning a cellular phone. Some believe that it is a byproduct while others contest this point vehemently. For instance, "Just because someone owns a TV doesn't mean he patronizes a

shopping channel. Just because someone owns an Internet-capable wireless device doesn't mean the person will ever shop with it " (Schultz). Experts also say that the marketing campaign to make m-commerce known to the public will be a truly massive undertaking. The public will need to know how they can use the technology, when they can use the technology, and that the technology is secure. M-commerce will seem like a digital utopian fantasy to the techno-nerds of our society, but what about everyone else? This form of technology will be subject to the rules of technological adoption to which all other digital devices are subject. However, will this appease the unquenchable thirst for market growth for which shareholders clamor? If the technology flops it would be probable that shareholders would try and vote the technology off the market. Although m-commerce seems like a great idea off the bat, it is apparent that there are organizational, economical, cultural and technological threats to the potential for the true market growth in Canada.



V. Recommendations

Canadian cellular companies exhibit astute marketing in their attempt to actualize m-commerce in Canada. My recommendations fall in line heavily with their implementation proposal, but expand on the limited information released at this point.

As mentioned in the description of the market, cellular phone manufacturers must be vigilant in their attempt to redesign and reinvent the cell phone. They must make the cell phone user friendly from an aural, tactile and visual user interface standpoint. This includes a variety of developments that have been emerging in the past few years including digital certificate, fingerprint biometrics and data-basing.

To help speed up the network there will have to be an implementation of extremely high bandwidth infrastructures and uses of intermediaries to cache important information. There must be an intermediary, in our case let's call it a broker, that "stores a copy of the information that it receives" (Hu 221). This will allow information to be reused by other institutions thus decreasing the amount of information put out over the network. This cache will aid with Customer Relationship Management (CRM) because businesses will have, "the knowledge of the user profile to manage the user's needs for information, and deliver information in a predictive fashion and dynamic tracking of clusters of data " (Muñoz 281). Business must have the ability to search and retrieve this information to allow for, "tasks such as searching, advising, contacting, comparing, filtering and facilitating access to databases " (Muñoz 281).

The ability of business to retrieve this myriad of information depends on massive databases with functional and economical methods of retrieving, organizing and analyzing consumer information.” There are massive opportunities for intermediaries to provide essential business intelligence and CRM information. Again, these cache methods must be in place to increase the bandwidth on a seemingly sluggish cellular network.

Regarding security, digital certificates must be developed to ensure that the person who is using the phone is the person who owns the phone. Transferring money directly from the consumer’s cellular phone to the financial institution of the supplier will present some very important security issues. There must be a security intermediary developed to control certificate management. Digital certificate management utilizes a Public Key Infrastructure, “to provide the m-commerce transactions with the security services such as integrity, privacy, non-repudiation, authentication and access control” (Muñoz 281). In this case the intermediary will, “store and manage digital certificates, and combine with OCSP (Online Certificate Status Protocol) timely information about the status of certificates” (Muñoz 283). Digital certificate management deals with the identification of the user on the m-commerce network and node-to-node security on the mobile infrastructure. Essentially, the user makes a signature on an electric pad and an application authenticates its origin. A certificate is, “a digital document signed by a Trusted Third Party (TTP) called ‘issuer’; certificates are tamper-evident, in other words, they can be easily read but they cannot be modified without making the signature invalid (Muñoz 282). The certificate in widest use is the Identity Certificate (IC). Canadian cellular

service providers engaging in m-commerce must make use of this technology for proper end-to-end security. Basically, IC differentiates between the user's Distinguished Name (DN) and the public key; the transaction will only take place if the user possess and replicate a DN. One way to validate a DN is by using OSCP, which Canadian cellular providers must carry. These online certificates must be validated by a server, which is timely process. Once again, the broker must store all certificate information to reduce the sluggish use of the network. Developers should also take advantage of two other security technologies to ensure protection on the m-commerce network: Secure Socket Layers (SSL) and Secure Electronic Transactions (SET). SSL can do three things for the m-commerce network, "(1) create a secure and private connection between a Web client computer and a Web server computer, (2) encrypts the information, and (3) then sends the information over the Internet" (Haag, 261). A SET is reminiscent of SSL technology because it encrypts the information but it also, "enables... a merchant to verify a customer's identity by securely transmitting credit card information to the business that issued the credit card for verification" (Haag, 261). All identity certificate information, CRM information, distinguished name information must be stored behind an immensely capable firewall. This information must be non-accessible to everyone without a public or private key. With all these factors in place, Canadian M-commerce will be as secure as modern technology allows. However, it is imperative to note that there are always methods to subvert modern security techniques. Encryption codes must be continually updated and changed to fend off hackers. As well, taking advantage of intelligence agents, much the same as modern credit card companies, will allow for security to occur after the

actual transaction is processed. With these security methods in place, consumers will have more confidence in the m-commerce networks.

Comprehensive biometric security infrastructures are emerging in our present technological sphere. When cell phone manufacturers develop the new interfaces for the phones they should include a standard fingerprint analysis application/infrastructure that will make it quick and easy to validate that the person using the phone is the person who owns the phone. Atura, a company backed by such giants as Intel and Nokia, released their first touchpad biometrics phone in February of 2004. This touchpad not only confirms the identity of the cellular user, but can be used much the same as a laptop touchpad in which you can scroll through menus and select important items. Obviously this will be a part of the tactile and visual refinements to our contemporary cellular phone ("Cell Phone").

Rogers, Telus and Bell have decided to release m-commerce in Canada on a two-phase basis. The first phase will be narrow and allow for wireless phone payments to be paid over the network. The second phase is a wide version that will include making payments over the network. This is all the information released at this point, but there is potential for a third phase. The third phase would include a number of other options available through this technology (Please refer to Appendix B for the lists of potential applications). The big three telecommunication companies should get together and think about the future prospects for implementing these components of a truly wide m-commerce environment.



VI. Conclusion

The implementation of m-commerce in Canada is a very exciting and promising endeavor by the nation's communication giants. As we have seen from the rampant success of m-commerce in Japan, the technology should make our lives easier. The potential barriers which currently exist such as security issues, privacy issues, government regulations, and others must be strongly considered as indicated by the majority of our survey respondents. The diffusion of m-commerce will be highly dependent on the adherence to our recommendations. Obviously, at this time the Canadian telecommunication corporations have deemed that the strengths and opportunities of m-commerce in Canada greatly outweigh the weaknesses and threats. We look forward to participating in a fully mobile marketplace in the very near future. We believe the m-commerce initiative that Telus, Rogers and Bell are spearheading is long overdue and will lead to a prosperous and more connected marketplace.

Appendix A

Distinctions between E-Commerce and M-Commerce

	E-Commerce	M-Commerce
Communication Mode	Wired connection to a LAN	Wireless network → A bonus because the wireless environment enables consumers to engage in m-commerce activities anytime/anywhere.
Internet Access Devices	Transactions are conducted mainly through desktop and laptop computers.	- Transactions are conducted through wireless, personal devices (mobile phones, wireless-enabled laptops). → Personal devices offer high potential for personalized products and services.
Development Languages	Hypertext Markup Language (HTML)	- Wireless Markup Language (WML): used in most parts of the world - Compact HTML (cHTML): used only by DoCoMo, a Japanese pioneer company in m-commerce.
Communication Protocols	Hypertext Transfer Protocol (HTTP)	- Wireless Application Protocol (WAP) - DoCoMo's proprietary protocol i-Mode → The existence of different standards is common because the industry in the international realm is still in its infancy stage. Unnecessary ones will be eliminated once the dominant design emerges.
Enabling Technologies	Cookies, JAVA, active server pages, etc.	Enabling technologies in e-commerce standards so far are not compatible with WAP. New standards are being developed (e.g. WAP 2.0) but so far a stable system is still absent.

Appendix B

Major M-Commerce Applications

Mobile Category	Major Applications
Commerce	Mobile transactions and payments e.g. m-banking, m-payment, e-vending
Education	Mobile classrooms and labs E.g. Wireless LANs can be used to hook PCs or mobile handheld devices to the Internet and other systems.
Enterprise Resource Planning	Resource management E.g. tracking the location of goods and services, locating specific items, and transmitting warnings about aging components.
Entertainment	Games/images/music/video downloads and online gaming at anytime, anywhere
Health Care	Assessing and updating patient records immediately
Inventory Tracking and Dispatching	Product monitoring
Traffic	Global positioning, directions, traffic advisories
Travel Ticketing	Travel management e.g. Customers can use mobile channels to locate a desired hotel nearby, purchase tickets, make transportation arrangements, and so on. It also extends the reach of relationship-oriented companies beyond their current channels and helps the mobile users to identify, attract, serve, and retain valuable customers.

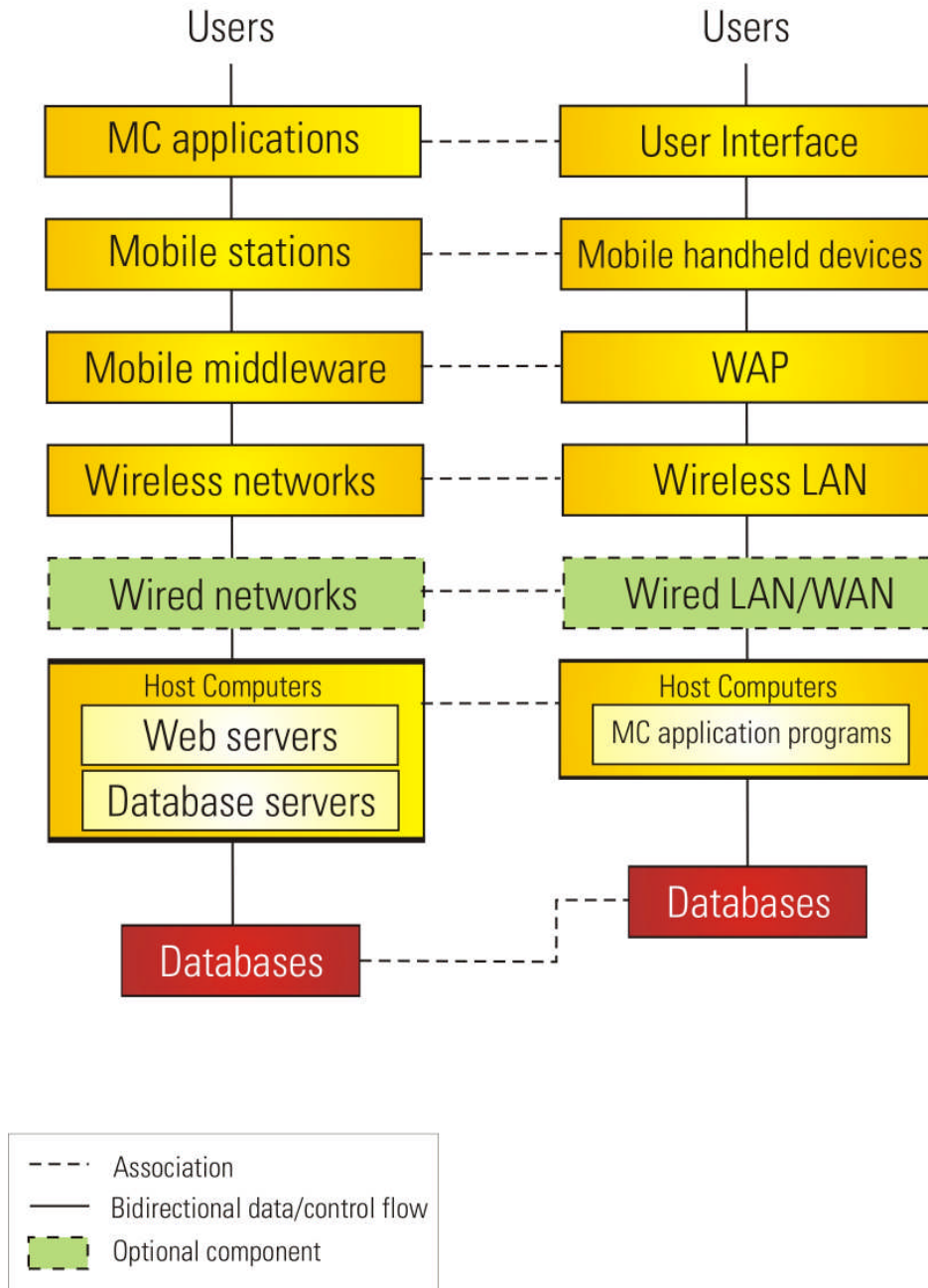
* Data obtained from Nansi Shi's "Mobile Commerce Applications" (please refer to the Bibliography page for the complete citation)."

Appendix C

M-Commerce System

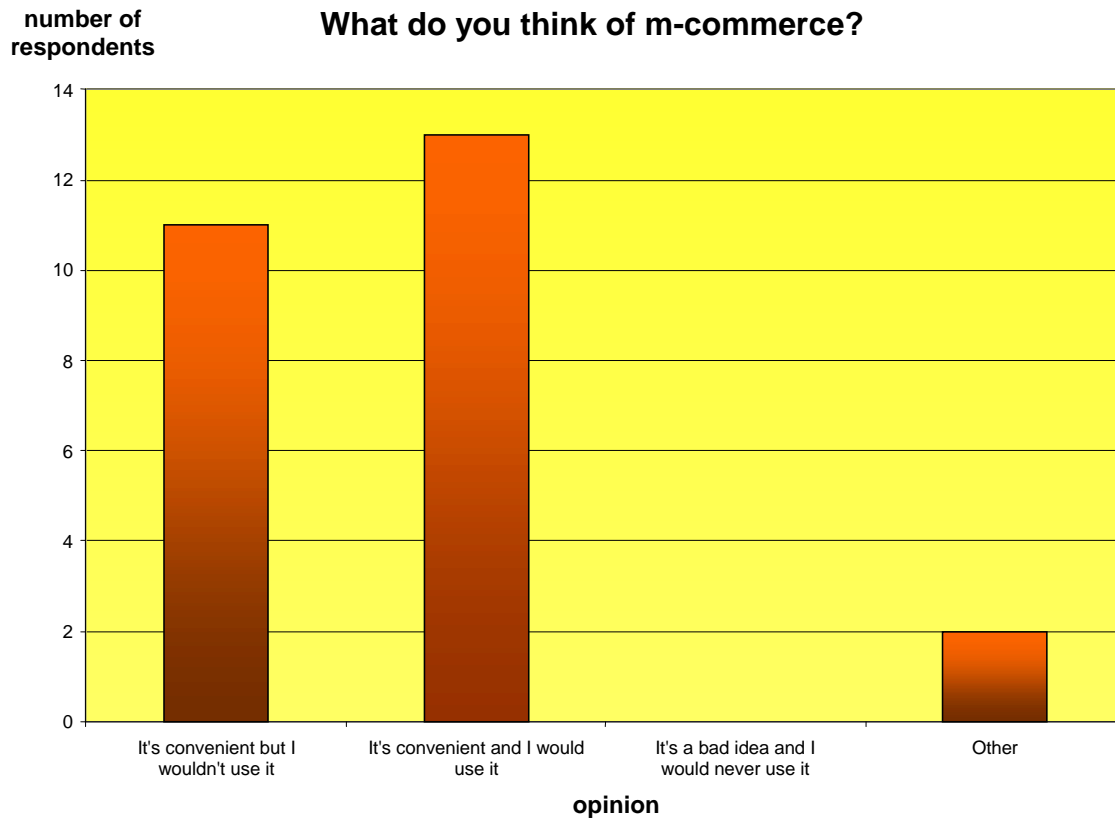
A MC System Structure

A Typical Implementation



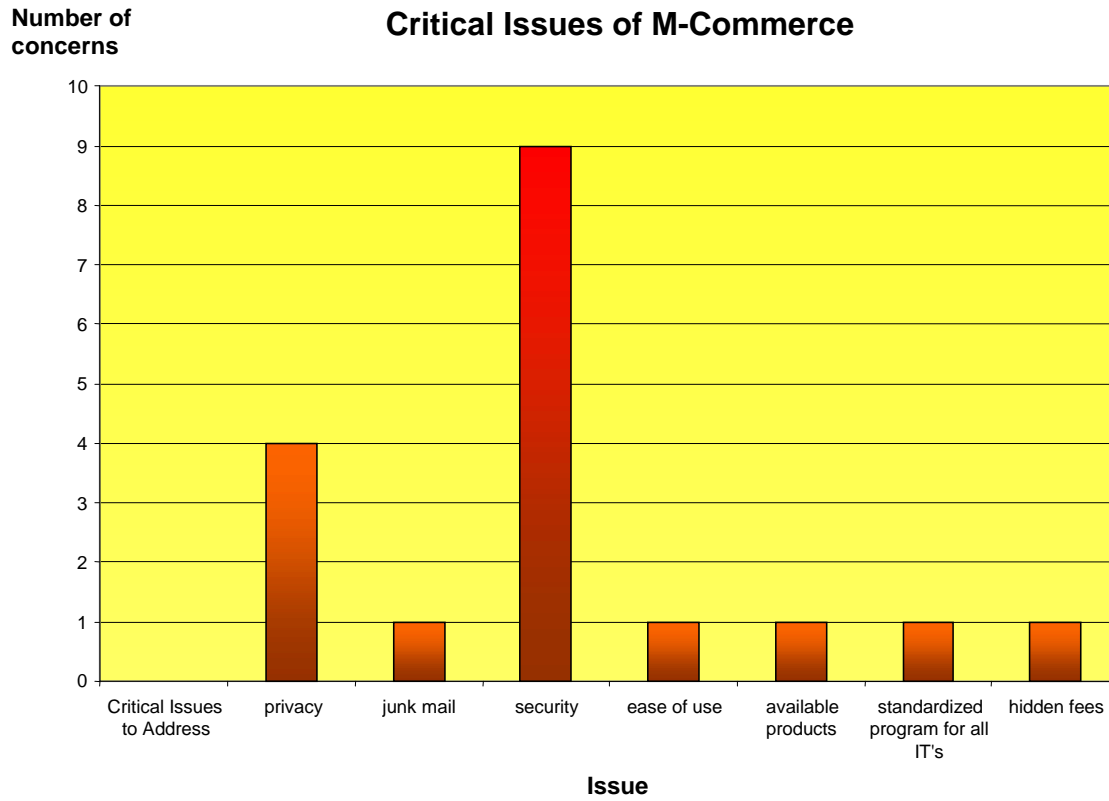
Appendix D

Consumer Opinions



Appendix E

Critical Issues



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Comments