

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 2002 Proceedings

Americas Conference on Information Systems
(AMCIS)

December 2002

M-COMMERCE VERSUS INTERNET-BASED E-COMMERCE: THE KEY DIFFERENCES

Jason Zhang
McMaster University

Yufei Yuan
McMaster University

Follow this and additional works at: <http://aisel.aisnet.org/amcis2002>

Recommended Citation

Zhang, Jason and Yuan, Yufei, "M-COMMERCE VERSUS INTERNET-BASED E-COMMERCE: THE KEY DIFFERENCES" (2002). *AMCIS 2002 Proceedings*. 261.
<http://aisel.aisnet.org/amcis2002/261>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2002 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

M-COMMERCE VERSUS INTERNET-BASED E-COMMERCE: THE KEY DIFFERENCES

Jason J. Zhang and Yufei Yuan

Michael G. DeGroot School of Business

McMaster University

zhangj4@mcmaster.ca

yuanyuf@mcmaster.ca

Abstract

Is m-commerce just an extension or a subset of Internet-based e-commerce? Will it turn out to be just more hype? To answer these questions it is important for us to understand what are the fundamental differences between m-commerce and Internet-based e-commerce. In this paper we analyze the key differences between mobile commerce and Internet-based e-commerce along three important dimensions: the technologies, the nature of services, and the business models. Our findings could help businesses in developing their m-commerce strategies and turning the hype into real profits.

Introduction

M-commerce has been a very hot topic in recent years. Most often m-commerce is understood as mobile e-commerce (Donegan 2000; Liebmann 2000; Schwartz 2000), regarded as the continuation of e-commerce with the palm handheld, wireless laptops and a new generation of Web-enabled digital phones already on the market (Keen 2001). Internet access and Web browsing therefore are assumed to be the major selling point of m-commerce (Harter 2000). This is further encouraged by the flourishing wireless Internet facilitated by NTT DoCoMo's i-mode in Japan (Chidley 2002). In spite of industry watchers' saying that Japan is a unique market (a commuter culture of gadget-obsessed consumers, to whom other forms of Net access are costly), it was once believed that if you brought together mobile communications and the Internet, two of the biggest things in telecommunications, there would be an almighty explosion of growth in North America and other regions of the world as well. However, it has not happened yet. In many ways, m-commerce and the wireless Internet have been the victims of over-excited speculation (Darling 2001).

In fact, m-commerce is not simply a new distribution channel, a mobile Internet or a substitute for PCs. M-commerce applications have their own unique features: mobile communication, personal touch, location-related and time critical services. Even though wireless technology is sometimes regarded as an enhancement tool rather than a brand new medium (Ramakrishnan 2001), successful players in the m-commerce market space must take a much broader view of the technology, the market, and potential consumers. Obviously, people will not shop with their phones in the same way they shop with PCs. E-commerce applications that are successful on the desktop PC will not necessarily meet a similar accomplishment in m-commerce (Clarke III 2001). Unleashing the value of m-commerce calls for a radical shift in thinking (Nohria and Leestma 2001).

In this paper, we propose a theoretic framework to classify major aspects that distinguish m-commerce from Internet-based e-commerce into three dimensions: the technologies, the nature of services, and the business models. Through examining the differences in each of these categories, our findings could help m-commerce players to develop their business strategies and turn the hype into real profits.

A Theoretical Framework for Comparison

In order to understand the nature of m-commerce and explore its potentials, we will analyze the fundamental differences between m-commerce and Internet-based e-commerce along three important dimensions: 1) technologies, 2) nature of services and 3)

business models. The understanding of technology differences helps us to identify what can be done and what cannot be done in m-commerce. The understanding of nature of service differences helps us to identify what types of services are more suitable or not suitable in m-commerce. The understanding of business model differences helps us to identify the source of revenue and the cost structure of m-commerce. Our theoretical framework is illustrated in Table 1.

Table 1. A Theoretic Framework for Comparison

Dimensions for Comparison		
Technology	Nature of Services	Business Models
<p>Network Infrastructure</p> <ul style="list-style-type: none"> • Origin • Ownership • Connectivity • Bandwidth • Data transmission • Protocol • Geographic location System <p>Application Development</p> <ul style="list-style-type: none"> • Service delivery • Interaction facilitating • Application Development tools • Application Interoperability • Application integration • Payment system <p>Client Devices</p> <ul style="list-style-type: none"> • Types of devices • Interface • Processing capability • Mobility • Geographic locating • Device identity • Personal identity 	<p>Customer Base</p> <ul style="list-style-type: none"> • Population • Demographic • Leading region <p>Transaction</p> <ul style="list-style-type: none"> • Complexity • Product information • Range of product and services offered • Payment • Backend system connection <p>Mobility</p> <ul style="list-style-type: none"> • Service delivery • Moving target tracking <p>Location</p> <ul style="list-style-type: none"> • Location awareness • Service range <p>Timing</p> <ul style="list-style-type: none"> • Time sensitivity 	<p>Value Proposition</p> <ul style="list-style-type: none"> • Communication needs • Information needs • Convenience • Cost reduction • Emergency and Safety • Quality of service • Workforce support <p>Cost Structure</p> <ul style="list-style-type: none"> • Business entry cost • Contents creation cost • Content delivery cost • Logistic cost • Application development cost • Technology investment cost <p>Source of Revenue</p> <ul style="list-style-type: none"> • Infrastructure construction • Communication charge • Advertising • Business cost reduction • Online sales • Service charge

Technology

Technology determines what can be done. In this section, we present our discussion in three categories: network infrastructure, application platform, and client devices.

Network Infrastructure

The emergence and development of e-commerce was due to the rapid growth of the Internet, which originated from several U.S. government-sponsored programs (ARPANET, CSNET and NSFNET, etc) (Kalakota and Whinston 1996). In essence, nobody really owns the Internet. The Internet is supported by a well-established protocol, TCP/IP (Transmission Control Protocol/Internet Protocol), which solves the global internetworking problem and ensures that computers communicate with one another in a reliable fashion. In contrast, m-commerce services are originated from private mobile communication systems implemented by a variety of wireless media communication technologies ranging from global (Satellite), regional (3G, IEEE 802.11a/b, DoCoMo I-mode), to short distance (Bluetooth) (Shim and Rice 2001). Wireless companies particularly cellular phone carriers compete with each other with incompatible standards such as GSM (Global Service for Mobile), TDMA (Time Division Multiple Access), and CDMA (Code Division Multiple Access) (Leung and Antypas 2001; Holloway et al. 2002). This incompatibility leads to high cost of mobile communication and difficulty of globalization. Moreover, contrary to abundant bandwidth of the wired Internet,

wireless bandwidth is limited by signal frequency spectrum (Cooper 2001; McVicker 2000). However, in addition to mobility, wireless communication does have a unique capability: geographic locating. The ability to locate the position of a mobile device is facilitated by several geographic locating schemes including GPS (Global Positioning Systems), TDOA (Time Difference of Arrival), AOA (Angle of Arrival) and LPM (Location Pattern Matching) (Cousins and Varshney 2001). This geographic locating capability makes location based services a unique feature for m-commerce.

Application Platform

Over the past several years, the World Wide Web (WWW) has become dominating Internet traffic, and the vast majority of e-commerce applications are Web-based. The URL (Universal Resource Locator) was introduced to fulfill the need to locate a network resource. However, in a distributed and dynamic mobile environment, there is no unified service discovery infrastructure that is highly adaptive, interoperable, and autonomous (Chakraborty and Chen 2000). E-commerce web sites are very easy to connect to backend legacy system through the Internet. However, it will take many steps to overcome serious interoperability issue in order to connect different systems in a m-commerce application. This is the reason why most m-commerce applications are confined within regional networks and specific devices. In Internet-based e-commerce, interaction between clients and servers are facilitated by the request-response protocol HTTP (Hyper Text Transport Protocol). However, in a wireless communication environment, using HTTP requires constant connection, this makes it incapable to meet mobile users' demand for more effective and real-time interactive applications (Feng and Zhu 2001). The high cost of mobile communication and the limitations of handheld devices further compromise the success of this Web-based model. Thus against WAP (Wireless Application Protocol) derived from HTTP, J2ME (Java 2 Micro Edition) was proposed as another solution to facilitate massive interactions involved in m-commerce. To cope with the complexity of the mobile environment, agent-based infrastructure also was proposed to be a promising platform due to agents' autonomy, intelligence, modulated information and operations, and facilitating collaboration in distributed environment (Chakraborty and Chen 2000; Núñez-Suárez et al. 2000). It is clear that the application development platform in m-commerce is more complex than in Internet-based e-commerce.

Client Devices

In addition to the underlying network infrastructure and application platform, it is the client devices that actually determine what specific services can be delivered. The boom in e-commerce applications is actually due to the widespread use of PCs, which have a large screen, complete text input keyboard, substantial memory, and high processing power. Contrarily, m-commerce applications rely on the use of various handheld devices. These devices range from pagers, cell phones, and palmtops, to pocket PCs. Mobile devices such as cell phones have a tiny screen, some of which display only three lines of text at once (Lucas 2001). Moreover, software applications are relatively crude. There are no cookies or session controls, meaning that if the connection is lost, the application will restart rather than continue from previous screens (Leung and Antypas 2001). Even using WAP-based service, a visit to Barnes & Noble's WAP site to enter credit card number, address, and shipping information requires more than 100 keystrokes (Swartz 2001-2). If it takes too much time (e.g. more than 5 minutes) to conduct an m-commerce transaction, it might better be done with a PC. Simply converting e-commerce services to cell phones or PDAs will merely expose the limitations of wireless handheld devices and result in frustrating end-user experiences. For instance, the new Palm i705 is designed to include MultiMail email program, DataViz's Documents-to-Go for reading and editing Microsoft Office files, and a Web browser. But the small screen and the slow network make it a painful combination (Wildstrom 2002). However, in spite of their limitations in contrast to PCs, handheld devices (cell phones and PDAs) do have their own unique features: mobile, portable, and connected to a person rather than to home or an office.

The key differences between m-commerce and e-commerce in technology dimension are summarized in Table 2.

Nature of Service

Different technologies make m-commerce services different from e-commerce services. In this section we identify those differences in several categories: customer base, transaction, mobility and location.

Table 2. Key Differences in Technology Dimension

	Internet-based E-commerce	M-commerce
Network Infrastructure		
Origin	Government sponsored Internet project	Private cell phone communication services
Ownership	Publicly shared	Propriety
Connectivity	Universal global connection	Separate systems for short distance, regional, and global connection
Bandwidth	Unlimited	Limited by spectrum
Data transmission	Mainly for data communication	Mainly for voice communication
Protocol	Standard and dominated Internet protocol	Multiple competing mobile communication protocols
Geographic Location System	Not available	Enable several geographic locating technologies
Application Development Platform		
Service Discovery	URL-based domain name hyperlink Infrastructure	No uniform resource locator
Interaction Facilitating	Http/Web-based request-response system	Short message and simplified Web access, agent technology
Application development tools	General programming tools widely available	Specific and limited programming languages
Application interoperability	Open system, run on any PC	Device-specific
Application integration	Easy to integrate with legacy systems	Difficult to integrate with other information systems
Payment system	Third party payment mechanism	Built-in carrier payment mechanism
Client Devices		
Types of devices	Dominated by personal computers	Many types of handheld devices
Interface	PCs with big screen display and full text input keyboard. Voice and video communication is also possible,	Cell phones for voice and PDAs for data communication with a small screen and a small key pad
Processing capacity	Powerful CPU with large memory and disk space, unlimited power supply	Limited processing power with small memory chip, limited power supply
Mobility	Not mobile, fixed location	Mobile
Geographic locating	Cannot be geographically located	Can be geographically located
Device identity	May not be identified	Can always be identified
Personal identity	Not available	Biometric technology maybe used

Customer Base

Due to different origin, the customer bases of e-commerce and m-commerce are quite different. Most early Internet users are highly educated computer users, although the demographic of Internet population now is gradually close to general population in developed countries (Turban et al. 1999). In contrast, besides business mobile workers, most cell phone users are young or relatively less well-educated consumers. Over the next decade, billions of people will gain access to mobile devices, but many of them will be functionally illiterate and technologically unsophisticated (Feldman 2000; Barnett et al. 2000). Also because of the difference in origin, consumers have quite different expectations about m-commerce and e-commerce. For example, one reason for the low uptake of the wireless Internet in the U.S is that most Americans already are familiar with the wired Internet and expect to pay for wireless Internet access as they do for the wired one: unlimited access for a flat monthly fee (Fox 2000). Contrast to North America, in Asia and Europe mobile telephony adoption is more advanced (Herman 2000). In Japan, the number of cell-phone users has already reached 66 million (Kunii 2001); and 64% of the people in Finland have a mobile phone, while the rate in Sweden stands at 55.2% (Kruger 2000). The difference in customer base makes m-commerce players to be more precautionous in developing unique offerings for each market segment according to geographical location and demographics.

Transaction

The advance of Internet and Web technology enables rich information to be searched and delivered without geographic boundaries. It also enables sophisticated electronic transaction processes to be easily integrated with backend enterprise information systems. In contrast, m-commerce transactions are rather simple, usually available only in a specific region. Some simple transaction-based applications such as gambling and drawing lottery would be very valuable and profitable. Wireless users demand packets of hyper-personalized information, not scaled-down versions of general information (Clarke III 2001). Information overload and unnecessary communication in Internet-based e-commerce are often more tolerable. However, the relevance of service, support, and communication is critical for the success of m-commerce. Thus, m-commerce applications are more concentrated on the relevance and simplicity of information and transaction. With respect to simplicity, every additional click-through that a mobile user needs to make in navigating through a commercial online environment with a handheld device reduces the possibility of a transaction by 50% (Literature review of Clarke III 2001). Customers must be able to define on their own terms what is important, when they want to send and receive communications, and how support and service are delivered (Flack and Evans 2001). In Europe, where mobile users are not charged for incoming calls, there is a great deal of realities to keep mobile users informed of time critical information such as aircraft flight status, shipping status, seat reservations or stock prices, and other dynamically updated information (Leung and Antypas 2001; Schwartz 2000; Shaffer 2000).

Mobility

Due to wireless network connection and portable handheld devices, products/service can be delivered to people moving around anywhere and anytime. M-commerce opportunities for travelers and mobile workers can be very significant in comparison with e-commerce restricted by office or any fixed location. It is important to understand consumer groups intimately and develop ubiquitous solutions that recognize the role that mobility plays in consumers' lives (Nohria and Leestma 2001). In business services, simply not being forced to be hardwired enables a company's employees to remain connected while moving from office to office, or state to state; they can tap into the corporate network from airport lounges and hotel lobbies. Moving technicians can check inventory, get directions and ask for customer updates; in public safety market, Cops carrying PDAs can wireless access federal and state databases, and file reports; healthcare workers carrying PDAs can make medical calculations and access back-end databases (Holloway et al. 2002). For individual consumers, since a mobile handheld usually accompanies a person wherever he or she goes, mobile devices basically allow them to keep in touch with their friends and families anywhere and anytime. For instance, videophone users can take pictures wherever they go and send them attached with short notes to friends while shopping, traveling, or simply hanging out (Kunii 2001). While traveling, a user may use a mobile phone to control a home burglar or fire alarm system and to turn lights on or off as if at home (Fox 2000).

Location

In e-commerce, location is regarded as a limitation to overcome. Internet actually creates a virtual world or cyberspace, which enables customers to forget the distance boundaries of physical world, shopping in any virtual malls, working for any online companies, and receiving education and trainings from any universities/programs that they like. Contrarily, location awareness is much emphasized in the context of m-commerce and location is regarded as a new dimension for value creation. To date location-based services have been regarded as key enablers of m-commerce's future success (Swartz 2001-1). Portable geographic positioning systems (GPS) are becoming smaller and more affordable, at costs in the neighborhood of only about U.S. \$200. These systems can be used not only to identify locations, but also for business to deliver location-sensitive services to users. The ability to target relevant information to end-users provides great potential value in location-based applications. For instance, it would be quite useful to provide driving directions and local commercial services where users happen to be, such as nearby specific restaurants, movie shows, bus schedules, weather reports and guided tours in museums (Shaffer 2000; Taaffe 2001). Additionally, some location-based applications aim to track remote assets such as fleet vehicles and construction equipment (Secker 2001; Holloway et al. 2002).

Timing

Finally, time is also treated differently in e-commerce and m-commerce. In e-commerce, the objective is to overcome time limitations imposed by brick and mortar stores. However, time is critical for emergency and safety, in the case of specific m-

commerce application in health care and 911 calls. It was estimated that more than 50% of 911 emergency calls are initiated from mobile phones.

The key differences between m-commerce and e-commerce in the dimension of the nature of services are summarized in Table 3.

Table 3. Key Differences in Nature of Services

	Internet-based E-commerce	M-commerce
Customer Base		
Population	PC users with Internet connection	Cell phone and PDA users
Demographic	Most are highly educated	Business mobile workers and young, less educated people
Leading region	North America	Europe and Asia
Transaction		
Complexity	Complete and sophisticated transactions	Simple, often yes or no choices
Product information	Rich and easy to search	Simple, short, and critical messages
Range of product and services offered	Wide range of selections	Limited and specific
Payment	Mainly credit card	May use built-in payment mechanism
Backend System connection	Easy connection to EDI / EPR/ Intranet systems	Limited connection to backend system
Mobility		
Service delivery	Services deliver to home or office, reduce the need for travel	Services deliver to a moving person, facilitate a traveling person's needs
Moving target tracking	None	Tracking moving target in real time
Location		
Location awareness	As a limitation to overcome, location independent	As a new dimension for value creation, location-based services.
Service Range	Global market	Local / on spot
Timing		
Time sensitivity	Overcome time limitation, always available. (24 hours × 7 days)	Time-critical, emergency handling, impulsive purchasing on spot

Business Models

Business model is critical for commercial success. In this section we further investigate the business model differences between e-commerce and m-commerce in terms of value proposition, cost structure and source of revenue.

Value Proposition

Basically, the differences between m-commerce and e-commerce in value proposition are originated from their differences in mobility, location dependence, cost of communication, and capabilities of client devices. It is the very low cost and unlimited Internet access that attracts the customers to enter the e-commerce world. On the other hand, what is so inviting in m-commerce at beginning is mobile person-to-person communication. Beyond person-to-person mobile communication, Mobile consumers can access various services anytime and anywhere, presenting new marketing channels for businesses as well as creating more of a perception of enhanced intimacy with consumers.

Rich information exchange facilitated by Internet eliminates the information asymmetry between buyers and sellers and helps create a fair market. Both buyers and suppliers perceive the value arising out of reduced product/customer search cost, transaction costs, and reduced lead time/improved responsiveness (Mahadevan 2000). From other side, m-commerce has huge potentials in providing time-critical emergency/public safety support. Additionally, improving efficiency of logistics operation on moving targets is another potential value that m-commerce can provide. Contrary to cost reduction-centered benefits from Internet-based e-commerce, businesses in m-commerce would harvest improved productivity.

E-commerce advocates location independence without time limitation as discussed above. In e-commerce, products and services are delivered to home or office directly, thus reducing the need for travel. For instance, after September 11th terrorist attack in U.S., traveling is considered less safe and less desirable. Thus electronic conferencing over Internet became more attractive as an alternative of business travel (Sistanizadeh 2001). M-commerce on the other hand is not aimed to reduce traveling but facilitating traveling. Location awareness creates much value for m-commerce.

Cost structure

The term “e-commerce” was coined because of widely expanding networks and applications (Turban et al. 1999). The flourishing of e-commerce primarily is stimulated by uniform Internet standards and low Internet overhead cost, which points to the trend that has seen email, Internet site design and hosting, transaction charges, personal computers, and software move toward being free (Earle and Keen 2000). All of these significantly reduced e-commerce entry costs and helped fuel the rapid growth of e-commerce. Contrarily, m-commerce is rooted in paid-for service in the private mobile phone industry where business competition is stiff. To purchase entry licenses and actually build a mobile communication network requires heavy business investment with no government support (Ramakrishnan 2001). M-commerce carriers therefore must look for a great deal of business activity to generate revenues that justify the huge infrastructure investments (Lamont 2001). Competition for limited bandwidth resource makes wireless communication impossible to be free like Internet. Hence, compared to almost free global Internet access, high cost has been seen as a major characteristic of m-commerce (Shim and Rice 2001).

Moreover, both of e-commerce and m-commerce promise to sell two types of goods: tangible (physical goods) and intangible (information), but the related costs that they face are quite different. Information goods are characterized by high initial costs to produce the first copy and almost no cost to make additional copies (Mahadevan 2000). Most information (products, weather condition, and maps, etc) that m-commerce applications need is already there in e-commerce. This fact indicates that the cost of contents in e-commerce is much higher than in m-commerce, but the contents delivery cost in e-commerce is much lower than in m-commerce. On the other hand, for tangible goods, the cost of delivering from remote site in e-commerce is higher than that of offering locally in m-commerce. The reason is that e-commerce enables customers to place orders anywhere in the world, but m-commerce service is to meet on-spot needs such as looking for the nearest restaurant.

Source of Revenue

Internet-based end-to-end logistics solution (using web presence to provide an ordering point for customers, linking to suppliers' sites for procurement, and connecting the web site to UPS for coordination of pickup, shipping, and delivery of goods, etc) significantly reduces transaction cost and generates massive payoff for capital investment (Earle and Keen 2000). For instance, by using Internet-facilitated logistics, GE (General Electronic) cut \$500-\$700 million off its purchasing costs over a three-year period, labor costs by 30%, and materials costs by 5-20%. Contrarily, limited transaction processing capability and high cost of mobile communication prevents m-commerce from taking such advantages at present. But from another point of view, using wireless communication does help improving efficiency of mobile works and mobile logistics operation. Today, in the stock market, the only wireless companies earning money are those selling wireless to businesses as a tool for improving communications and supply chain logistics (Holloway et al. 2002). However, for those businesses adopting wireless solutions, the stream of revenue is still obscure at present.

Additionally, in Internet-based e-commerce, many organizations regard advertising as the main source of revenues (Mahadevan 2000). Portals (including the sophisticated searching engines) such as AOL and Yahoo play a significant role in funneling the customers into the target web sites, and receive huge revenue to support their operations by hosting banner ads (Dahlen 2001; Mahadevan 2000). In contrast, m-commerce customers particularly cell phone users are more impatient than Internet users and the paradigm here is not surfing (Clarke III 2001). Thus they would not possibly spend much time on surfing to locate a specific service/product through comparing plenty of choices provided by portals, or listening to voice or reading message-based

advertising by consuming limited power of mobile handhelds. In addition, location-specific advertising in m-commerce should be approached cautiously due to privacy concerns.

Heavy network traffic would not lead to additional profit for major players in e-commerce. In the Internet world, much is given away free or at a discount particularly for Internet access in the hope that a way will eventually be found to turn traffic into profits. Unfortunately, the sad truth is that although a Web site may receive millions of visitors, only about 3% actually buy anything (Betts 2001). However, for m-commerce, since mobile communication is paid by customers, any increased network traffic and paid service will generate extra revenue for network operators and products/service providers.

The networked economy can be divided into four layers: the infrastructure layer, the application layer, the intermediary layer, and the commerce layer. Overall, the growth of the intermediary and the commerce layer today, is significantly higher than that of the Internet infrastructure and applications layer (Mahadevan 2000). Contrarily, m-commerce is still in its infancy, which means that infrastructure construction (involving selling equipments, deploying backbone wireless network, and developing basic applications) and increasing subscription for mobile communication are the major sources of revenues for wireless business players particularly for operators. Intermediaries and real mobile commerce are still far from generating real profits.

The key differences between m-commerce and e-commerce in business models are summarized in Table 4.

Table 4. Key Differences in Business Models

	Internet-based E-commerce	M-commerce
Value Proposition		
Communication needs	Low cost, global communication	Mobile communication, personal reach
Information needs	Rich, free, and easy to search information	Time critical and location sensitive information
Convenience	Global market without geographic limitation. Reduce the need for travel. No time limitations	Navigation and local service guide, easy payment
Cost reduction	Lower transaction cost	Improve logistics operation
Emergency and Safety	No	Emergency service for life saving
Quality of service	Personalization, customer self-service	Location sensitive services
Workforce support	Support office workers	Support mobile workers
Cost structure		
Business entry cost	Low	High
Contents creation cost	High	Low
Content delivery cost	Low	High
Logistic cost	High for physical goods, low for information goods and services	Low for physical goods, high for information goods and services
Application development cost	Low	High
Technology investment cost	Low	High
Source of revenue		
Business cost reduction	Reduction of search cost, promotion cost, customer service cost, transaction cost	Improve efficiency and productivity of mobile workforce and logistics operation
Advertising	A major revenue source	Very limited
Communication charge	Flat and low rate for Internet connection, a cost rather than a revenue	Charge by time or volume, major revenue source
Infrastructure construction	Not significantly Increasing	Significantly Increasing
Online sales	Global market opportunity	Few items, small volume
Service charge	Free or limited service charge	Service is charged through subscription

Conclusions

The differences between Internet-based e-commerce and m-commerce identified above help us to form a better business strategy for m-commerce development. It is clear that m-commerce should not be regarded as mobile e-commerce or an extension of Internet-based e-commerce. We recommend that:

- (1) Technically, the complexity of underline mobile communication infrastructure makes m-commerce application development much more difficult than e-commerce. Mobile communication technology is still not mature yet. The standardization and interoperability is very critical for the success of any large-scale applications.
- (2) Due to technical limitations, services provided in mobile commerce are usually much less sophisticated than e-commerce. However, wireless technology does enable m-commerce to create special market niches that e-commerce is incapable to cover, such as mobile communication, mobile workforce support, location-based services and emergency handling in healthcare, military, and public safety, etc.
- (3) It is important to avoid the weakness of mobile communication technologies and not simply replicate the business models of e-commerce. The hype applications such as purchasing books over cell phones, scanning news, downloading free software, etc, would merely expose the technology limitations of m-commerce, let alone generate real profits.
- (4) Even some applications sound great, such as utilizing Go2 location-based direction services (including turn-by-turn directions and one-click calling) to steer mobile customers to stores that sell coke products (Jones 2000). It is questionable if such kind of application will be usable and could generate extra profit to pay off the \$30 million investment. The failure of overheated dot.coms teaches us that m-commerce players should not only think about the innovative benefit to their customers, but also the possibility of making a real profit.

To conclude, we believe that m-commerce does have great potential. But to realize this potential, we need to think about our business strategy carefully and not to be too optimistic without hard work to overcome many barriers.

References

- Barnett, N., Hodges, S., and Wilshire, M.J. "M-Commerce: An Operator's Manual", *The McKinsey Quarterly* (3), 2000, pp.162-173.
- Betts, M. "Turning Browsers Into Buyers", *MIT Sloan Management Review* (42:2), 2001, pp.8-9.
- Chakraborty, D., and Chen, H. "Service Discovery In The Future For Mobile Commerce", *ACM Crossroads* (7:2), 2000, pp.18-27.
- Chidley, J. "Smile, You're On The Phone", Editor's Note of *Canadian Business*, Feb 18, 2002, pp.6.
- Clarke III, I. "Emerging Value Propositions For M-Commerce", *Journal of Business Strategies* (18:2), 2001, pp.133-148.
- Cooper, M. "Bandwidth And The Creation Of Awareness", *Communications of the ACM* (44:3), 2001, pp. 55-57.
- Cousins, K., and Varshney, U. "A Product Location Framework For Mobile Commerce Environment", *Proceedings Of The First International Workshop On Mobile Commerce, Rome, Italy, 2001*.
- Dahlen, M. "Banner Advertisements Through A New Lens", *Journal of Advertising Research* (41:4), 2001, pp.23-30.
- Darling, A. "Waiting For The M-Commerce Explosion", *Telecommunications* (35:2), 2001, pp. 34-38.
- Donegan, M. "The M-Commerce Challenge", *Telecommunications* (34:1), 2000, pp. 58.
- Earle N., and Keen, P. *From.com to. Profit: Inventing Business Models that Deliver Value and Profit*, Jossey-Bass, San Francisco, 2000.
- Feldman, S. "Mobile Commerce for the Masses", *IEEE Internet Computing*, 2000, <http://computer.org/internet/>
- Feng, Y., and Zhu, J. *Wireless Java Programming with J2ME*, Sams Publishing, June 2001.
- Flack, D., and Evans, P. "Marketing On Customer Terms", *Marketing Management* (10:4), 2001, pp.18-28.
- Fox, J. "A River Of Money Will Flow Through The Wireless Web In Coming Years. All The Big Players Want Is A Piece Of The Action", *Fortune* (142:8), 2000, pp.140-146.
- Harter, B. "Motient's M-Commerce Movements", *Wireless Review* (17:19), 2000, pp.10-12.
- Herman, J. "The Coming Revolution In M-Commerce", *Business Communications Review* (30:10), 2000, pp.24-25.
- Holloway, A., Kirby, J., and Wahl, A. "Wireless That Works", *Canadian Business*, Feb 18, 2002, pp.25-30.
- Jones, J. "Vendors Walk Thin Line", *InfoWorld* (22:50), 2000, pp.1-27.
- Kalakota, R., and Whinston, A.B, *Frontier of Electronic Commerce*, Addison-Wesley Publishing Company, Inc., June 1996

- Keen, P.G.W. "Go Mobile-Now", *Computer World* (35:24), 2001, pp.36.
- Kruger, P. "Called To Amount", *Communications News* (38:7), 2001, pp.10
- Kunii, I.M. "Japan: A Wonderland For The Wireless Crowd", *Business Week* (3757), 2001, pp.73.
- Lamont, D. *Conquering The Wireless World, The Age of M-Commerce*, Capstone Publishing Limited, 2001.
- Leung, K., and Antypas, J. "Improving Returns On M-Commerce Investments", *Journal of Business Strategy* (22:5), 2001, pp.12-13.
- Liebmann, L. "Preparing For M-Commerce", *Communications News* (37:9), 2000, pp.132.
- Lucas, P. "M-Commerce Gets Personal", *Credit Card Management* (14:1), 2001, pp.24-30.
- Mahadevan, B. "Business Models For Internet-Based E-Commerce: An Anatomy", *California Management Review* (42:4), 2000, pp. 55-59.
- McVicker, D. "Not So FAST -- Wireless Bandwidth For The Net Is Way Too Narrow-And Real Improvements Are Still Years Away", *Special Issue of Internetweek* (828), 2000, pp. 47-48.
- Nohria, N., and Leestma, M. "A Moving Target: The Mobile-Commerce Customer", *MIT Sloan Management Review* (42:3), 2001, pp.104.
- Núñez-Suárez, J., O'Sullivan, D., Brouchoud, H., Cros, P., Moore, C., and Byrne, C. "Experiences In The Use Of FIPA Agent Technologies For The Development Of A Personal Travel Application", *Proceedings of the fourth international conference on Autonomous agents*, Barcelona Spain, 2000, pp.357-364
- Ramakrishnan, J. "WWWwireless Wonder", *Corporate Location*, 2001, pp.60-61.
- Schwartz, E. "Mobile Commerce Takes Off", *InfoWorld* (22:25), 2000, pp.1-32.
- Secker, M. "Does M-Commerce Know Where It's Going?", *Telecommunications* (35:4), 2001, pp.85-88.
- Shaffer, R.A. "M-Commerce: Online Selling's Wireless Future", *Fortune* (142:2), 2000, pp.262.
- Shim, R. and Rice, V. "How to Unwire Your Business", *Fortune* (Special Edition), 2001, pp.46-54.
- Sistanizadeh, K. "What's In Store For 2002?: Optical's Role Will Advance", *Communications News* (38:12), 2001, pp.10-19.
- Swartz, N. "Taking It To The Street", *Wireless Review* (18:5), 2001, pp.54-58.
- Swartz, N. "Hot & Cold: M-Commerce Opportunities", *Wireless Review* (18:6), 2001, pp.32-38.
- Taaffe, J. "Organization for Economic Cooperation and Development", *The OECD Observer* (224), 2001, pp.29-33.
- Turban, E., Lee, J., King, D., and Chung, H.M, *Electronic Commerce: A Managerial Perspective*, Prentice Hall, Inc. New Jersey, 1999
- Wildstrom, S.H. "The New Palm: No Wireless Wonder", *BusinessWeek Online*, February 18, 2002, <http://www.businessweek.com/print/magazine/>.