Mobile Commerce for Online Investors

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ABSTRACT

E-commerce continues to grow however it will not mature until it becomes truly mobile with information available anywhere, anytime and to anybody. Applying mobile access to computing creates both tremendous commercial opportunities and complexity, which will make computing globally pervasive and ubiquitous. In developing countries wireless technology is overtaking fixed line telephony. Hence, in many parts of the developing world people's first glimpse of the internet will be via a mobile phone rather than a PC.

Despite the economic downturn, online investment continued to grow in the US market, simply because online investors want greater control of their investments and the direction of their retirement plans with their money available anytime they want to check and update.

General Terms

Economics, Theory, Human Factors

Keywords

Mobile Commerce, mobile economy, technology innovation, WLAN, Wi-Fi

INTRODUCTION

Electronic commerce continues to see phenomenal growth, but most development of e-commerce involves wired infrastructures. Emerging wireless and mobile networks will provide new avenues for growth and new opportunities in mobile commerce [18].

The growth of mobile applications will change the way people live, play and do business. The following evolutionary steps clarify how this could happen [9]:

>Step 1: the user going to the computer's location (computer-centric)
>Step 2: the computer is wherever the user is (person-centric)

Mobile commerce is the buying and selling of goods and services through wireless hand-held devices such as mobile phones, personal digital assistants (PDAs), mp3 players, digital cameras, handheld gaming devices and computers [11]. M-commerce is facilitated by the convergence of the Internet, e-commerce and the wireless world where people can go online anytime, anywhere and using any device (Kalakota and Robinson 2001). Some of examples of the wireless or mobile networks are GSM (Global Systems for Mobile Telecommunication), GPRS (General Packet Radio Services), CDMA (Code Division Multiple Access), Mobitex, Reflex and UMTS (Universal Mobile Telecommunication Systems) [13].

Research Rationale

This research originated as an attempt to understand how online investment has impacted in the global economy. The approach is to acquire in-depth knowledge of wireless innovation along with security issues in the investment market while a global economy is converting to a mobile economy. The theory and method adopted in the study is as follows:

Methodology

The literature review is the primary sources of research data including the World Wide Web, online newspaper articles, Journal articles, newspapers through Factiva (Reuters and DowJones) and books such as 'M-Commerce The race to Mobility' [9] and 'mCommerce Security: a beginner's guide' [13].
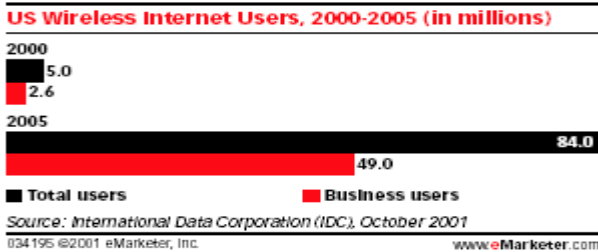
This research started by investigating the development and attempted adoption of m-commerce across the financial market. In this sector, most of the review is done at this stage in the US market. This approach is seeking to address 'how' and 'why' questions associated with this research. In the future, the researcher will undertake structured interviews with big players and prepare some questionnaires for a survey in the market to develop a support system to clarify doubts of potential users. This will be reported on in a later paper.

Also for future work, the methodology will also emphasize the importance of subjective meanings in the processes through which users react to online investing. This requires the use of field studies of humans in their settings so as to describe, interpret, analyze, and understand the social world from the participant's perspective. That is, the process will be viewed as a social one, and the research will aim to capture the complex, dynamic nature of the social phenomena. The research will seek to understand the process in practice from the participants' perspectives, with a primary focus being the meaning of the technology to the individuals as well as their expectations around its use [12], particularly with respect to their social, cultural, and work contexts.

OVERVIEW OF M-COMMERCE

The dream of reaching out great distances without wires was ignited in the late 1930s, when Al Gross invented the walkie-talkie. This dream to communicate without constraints of cables is fueled by the emergence of the internet and PDAs in the twentieth century. With the current complex and multi-featured mobile phones and PDAs, people are truly in the verge of anytime, anywhere computing [3]. Wireless applications are another way to increase productivity for some businesses. International Data Corporation (IDC) predicts there will be 84 million wireless internet users in the US by 2005. Business users will make up 49 million of this total, or 58% [5] which is

shown in the graph below. Implementation of wireless LAN (WLAN) has doubled over the year 2001 in the USA according to Yankee Group. WLAN access points are becoming more common in malls, restaurants, and other high traffic locations [2].

US Wireless Internet Users, 2000-2005 (in millions)

2000
5.0
2.6

2005
84.0
49.0

■ Total users   ■ Business users

Source: International Data Corporation (IDC), October 2001
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Computing will become globally pervasive and ubiquitous once it is possible to add wireless connectivity. In developing countries wireless technology is overtaking fixed line telephony. Hence, in many parts of the developing world people's first glimpse of the internet will be via a mobile phone rather than a PC [1].

M-Commerce covers a multitude of industry sectors. Mobile phones and PDAs are frequently being used for conducting trades and logging on to wireless brokerage services in the USA [10]. Mobile banking is rapidly becoming a significant market for mobile consumers. Even most current news sites: CNN, Reuters, and BBC have started offering services whereby users can configure their mobile device to receive news and information content [13].

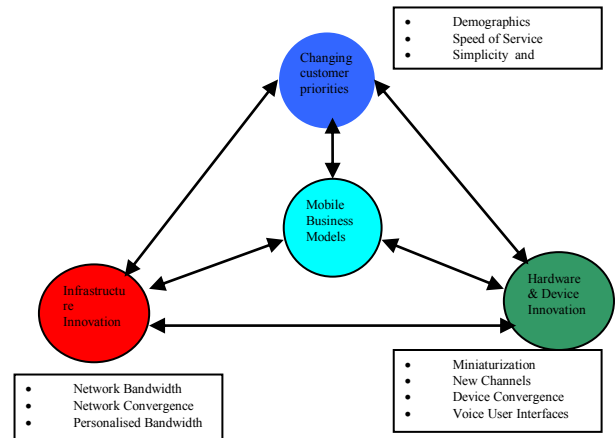M-commerce using mobile phone or handheld devices like PDAs are outlined in the table below:

Table 1: M-commerce Examples [13]

Paying for parking tickets
Buying a drink from a vending machine and charging it to the mobile phone bill.
Buying an airline ticket and being invoiced by a travel agent.
Paying for an MP3 file download
Buying stocks and initiating a request to have the money transferred from a preconfigured bank account.
Browsing through books from an online bookstore on the PDA and buying
Placing a purchase order over a wireless network linked to a supplier's intranet
Using voice recognition on a phone to buy a movie ticket.

MOBILE ECONOMY

Within three decades, the PC became an integral part of life as a word processing tool, accounting tool, messaging device and entertainment and education centre. One of main reasons is the

steadily improving price to performance ratio [9]. According to an Apax Partners and Economist Intelligence Unit report 'The impact of Innovation' computing costs will continue to decrease and overall efficiency will increase until computing becomes a utility much like electricity [1]. Similarly mobile devices will follow a similar path. When the prices of mobile devices and services drop, reliability improves, applications that they support get better and demand will explode as we can see in the market. Gradually the Internet will be accessible from anywhere just like electrical power, which would also be defined as mobile economy [9].


Figure 1 labels:

Changing customer priorities
- Demographics
- Speed of Service
- Simplicity and

Mobile Business Models

Infrastructure Innovation
- Network Bandwidth
- Network Convergence
- Personalised Bandwidth

Hardware & Device Innovation
- Miniaturization
- New Channels
- Device Convergence
- Voice User Interfaces

Figure 1. The Innovation Circle (Source [9])

The mobile economy is both inevitable and imminent, which is facilitated by convergence of the Internet, e-business and the wireless applications. Obviously the nature of customer interaction and speed of business will change due to the availability of next generation of multi-network and multi-content Internet. On the other hand, businesses will have to deliver existing and next-generation services and applications with greater speed, interactivity and intelligence [9]. This is also summarised in figure 1. This figure groups the trends and directions emerging in the mobile economy. In the transition of the global economy to mobile economy, existing business processes will be further streamlined. I consider below how, in this type of environment, the investment market is contributing to the global economy.

Mobile Commerce in the Investment market

Because of economic downturn many experts were expecting people to abandon online, but in the U.S. online investing market is continuing to expand at a rapid pace. According to the eMarketer, the number of U.S. internet user investing online is projected to rise from 14.3 million in 2000 to 32.4 million in 2004, a 126.9% increase over a five-year period which is shown below in the graph [4]:

US Internet Users Investing Online, 2000-2004 (in millions)

Year	Value
2000	14.3
2001	17.4
2002	20.6
2003	24.8
2004	32.4
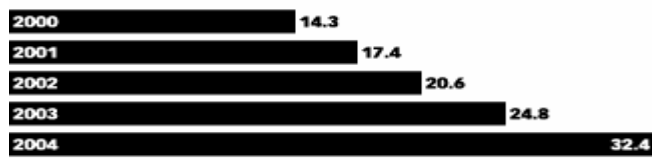
Source: eMarketer, May 2002

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One of the main reasons for the increasing number of online investors is that once people use online investment and become satisfied with it they keep using it no matter what; for the simple reason that they want greater control of their investments and the direction of their retirement plans with their money available anytime they want to check and update. In addition, they are more comfortable with all forms of internet commerce. These factors will contribute to increased stability and continued growth in the online investing sector [4]. A study by the Boston-based Yankee Group reinforced this matter. The report estimated that over 20 percent of today's 20 million wireless Internet users already tap into online brokerage accounts or keep up with the latest movements of their favourite stocks. The report also suggested that another 13 million stock traders are interested in wireless stock information if only they had the right tools. This is an untapped market just waiting to be captured by wireless service providers and carriers [17].

Therefore, a study by Jupiter Media Metrix reveals that wireless stock trading will change the entire way investments are bought and sold. Responsive trading focuses more on building relationships through making recommendations and receiving trade instructions via cell phone or PDA rather than user-initiated trades. According to Mr Robert Sterling, senior analyst at Jupiter Media Metrix, "The most important role of wireless data services in broker transactions will be driving responsive trading, rather than user-initiated trades, which make up the majority of online brokerage trades today" [15].

Beside these predictions, financial organisations are struggling to find a balance between innovation and security. The innovation circle in the figure 1 shows how social, technological and economic forces are shaping the business landscape. Wireless adds another layer of complexity and risk to safeguarding information because the infrastructure for m-commerce is much less mature, less reliable, and more vulnerable to a security breach by the very nature of how a wireless transaction is made [6]. Security issue in wireless technologies introduces WLAN standards. The development of WLAN industry standards is a very important component for the deployment of wireless networks and the continuing evolution of wireless devices. There are too many WLAN standards competing with each other for market acceptance. For example, a problem such as an 802.11b card will not be able to join 80.211g networks due to incompatible data rates [16].

The different standards are listed in the following table.

Table 2: M-commerce Examples [9]

WLAN Standards	Desscription	Backed by
802.11a	Increases the data throughput to 54Mbps (from 11Mbps) and moves to the less congested 5-GHz radio band.	3Com, Apple, Cisco, Intel, Nortel
802.11b (Wi-Fi)	Operates on the 2.4-GHz frequency and moves data at speeds up to 11Mbps.	
802.11g	An extension of 802.11b, it moves data at speeds of at least 20Mbps and perhaps as high as 54Mbps. Compatible with existing 802.11b	
802.11e	Improves streaming media performance for every flavor of 802.11	AT&T, Cisco, Intel

According to IntelliQuest research study, certain conditions must be met before American consumers will use wireless devices to conduct financial transactions.

- **80%** of wireless device users in the study indicated they would not use wireless for financial transactions if not provided with a completely secure network through which the transaction is processed.
- **75%** of respondents indicated they would be less likely to use wireless to connect to the Internet if personalized services were not available [17].

However, a research by TowerGroup reported that the flexibility of Wi-Fi in not only sending data interoffice but also to customers which makes this technology more popular to the financial institutions. It is predicted that WLAN in finance will be adequate with the current level of throughput for uses like back-office connectivity and simple roaming in a branch office. This report also shows that 14% of North American financial institutions have a WLAN in at least one facility, and that number is expected to grow 50% by 2006 [8].

The WLAN community has recognized the need for a multi-faceted security model to overcome both perceived and real threats to the data integrity. In fact it has reacted by both focusing on a long-term solution centered around the 802.11i work and by innovative and timely delivered techniques, such as Rapid Re-keying, to deliver a broader and more effective tool set to the user community [14].

Since it is still in early phase of mobile economy, some issues are not dealt perfectly however there are many developments taking place. Wireless LAN technology is poised to deliver measurable benefits when deployed in financial organisations. For example, The Enterasys Wireless Network solution provides seamless, wireless data communications to financial organizations, making access to information possible despite distributed geography, temporary offices, and roaming users. Wireless network accommodates multi-geographic banks with ubiquitous access that is the same for both indoor and outdoor

use. Moreover, it affords such cost-saving capabilities as the ability to forge immediately productive, temporary networked areas and the ability to enable communication and automation in areas where the wired network is overloaded [7].
Based on requirements, there are three global services are available [7]. They are

• Indoor Solution
The Indoor Solution is made up of Access Points and Radio Cards that allow wireless-enabled laptops (and compatible products) to seamlessly integrate into a network. Such a solution is ideal for a small or large office space, as well as a conference room, cafeteria and corporate campus area coverage for mobile users.

• Outdoor Point-to-Point Solution
The Outdoor Point-to-Point Solution is made up of Access Points connected to a line-of-sight antenna that signals to the same configuration at the end-point location. The antenna serves the need for redundancy, and eliminates the need for costly aerial cable or fiber optics for a corporate backbone.

• Outdoor Point-to-Multipoint Solution
The Outdoor Point-to-Multipoint Solution is made up of Access Points connected to one omni-directional (360º) antenna and at least one line-of-sight antenna. The line-of-sight antenna on each location points to the omni-directional antenna, providing network access for all buildings.

CONCLUSION

Mobile commerce is complementary to e-commerce. To extract value from e-commerce applications, new mobile application are needed that enable unprecedented ease and speed of information access. When the prices of mobile devices and services drop, reliability improves, applications that they support get better and demand will explode as we can see in the market. Gradually the Internet will be accessible from anywhere just like electrical power.
Despite the economic downturn, online investing continued to grow in the US market, simply because people want greater control of their investments and the direction of their retirement plans with their money available anytime they want to check and update. However, financial organisations are struggling to find a balance between innovation and security. In the innovation part, nature of customer interaction and speed of business will change due to the availability of next generation of multi-network and multi-content Internet. But wireless adds another layer of complexity and risk to safeguarding information because the infrastructure for m-commerce is much less mature, less reliable. However many standards are available in the market competing each other for acceptance. Besides these issues there are companies in the market which provides seamless, wireless data communications to financial organisations.

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