

M-Commerce: Revolution + Inertia = Evolution

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Abstract: Mcommerce has led to expectations of revolutionary changes in business and markets. Similar to developments in the past, however, the radical impacts will probably be limited, while many times Mcommerce will lead to more gradual changes. Furthermore, significant stumbling blocks will slow the rate of radical or limited change.

Key words: M-Commerce, wireless, Bluetooth, cellular phone, wireless LAN, PDA, wireless commerce

Introduction

The use of mobile technologies in organizations has received much attention in recent years. In many cases, expectations are being expressed that Mcommerce will lead to revolutionary changes in business and industries.

"The wireless revolution isn't about staring at your cell-phone screen... this new world will extend to every strata of the enterprise, " says Mark F. Bregman, the head of a new IBM-Division for "pervasive computing."

In this context MCommerce is defined as Ecommerce business processes and models carried out on a mobile terminal (1).

Consultants, venture capitalists, journalists, and, of course, vendors, citing the enormous number of mobile devices, expect multiple billions of dollars in mobile shopping in the U.S. by just 2003 and significantly more in European markets thriving on early adopters of wireless technology. The conclusion that Mcommerce will transform the global economy is the same thing said about Ecommerce before the bubble burst.

In this context we have to ask, how well can the "e" be translated to "m." When Ecommerce first moved from hype to reality, business learned—often the hard way—that certain kinds of commerce work well on the desktop, while other kinds failed miserably. The same will be true for Mcommerce (2).

Mcommerce, like the Internet, will lead to mixed results. While it will lead to radical changes in some areas and take over business or create new businesses, other areas will see more gradual or minimal changes. Like the Internet, Mcommerce will lead to over enthusiasm and a bubble that will inevitably burst, to lots of pain due to technology implementations and business disruptions. Finally, similar to the implementation of other new technologies in the past, significant stumbling blocks have to be overcome in the context of Mcommerce, and many times, adoption processes will be disruptive.

In this contribution, we discuss how much we can actually call Mcommerce changes "revolutionary," what changes will simply be the adoption of Mcommerce to enhance existing business processes, and what hurdles exist to the success of Mcommerce, as a revolution or as an enhancement. The first thing we need to do is understand how to recognize a "revolution;" too often, a revolution is declared without a clear definition of what a business revolution actually is.

Defining A Revolution

Thomas Kuhn said that scientific revolutions result from the failure to solve a small problem that appears on the fringes of accepted theory, or from results that don't match expectations. The scientific revolutions that occur from these anomalies "lead the profession at last to... a new basis for the practice of science. (3)" It does not seem possible to define Mcommerce, or the Internet for that matter, as a "business revolution" because it has not led, and does not seem that it will lead, to a "new basis for the practice of business." If we look around, we see that "Old Economy" businesses are still there. They may have added the Internet and Mcommerce to their business practices, but they aren't practicing business in a fundamentally new way. And, with few exceptions, the "pure play" online businesses are still standard businesses, with such old-fashioned things as inventories, staff, and accounting, even if they are all outsourced to someone else.

There have been business revolutions.

"In the 1800s, there used to be an ice harvesting industry.... The ice harvesters were put out of business by the ice factories.... Then the ice factories were put out of business by the refrigerator companies.... No company went from ice harvester to ice factory to refrigerator company (4)."

“When the Erie Canal... opened in 1825, shipping costs between New York and Chicago immediately fell by 85% (5).”

"At the turn of the 20th century, a Missouri farmer named D. Ward King invented the King Road Drag. Pulled along a muddy road, it smoothed it out and molded the dirt into a slight curve, so that the next time it rained, the rain would drain to the sides. At this time, fewer than 150,000 of the 2 million miles of road were not dirt. Economists estimated that it cost more to haul a bushel of wheat along 10 miles of US dirt road than to ship it from New York to Liverpool, England (6)."

The improvement in rural dirt roads allowed the Post Office to deliver not only mail but also packages, causing a boom in the mail-order catalog industry. "Smaller companies, with limited resources, had a way to bypass the middlemen and reach customers all over the country. You no longer needed to sell to the consumer through actual stores made of bricks and mortar. You could build a virtual store! (6)"

At the beginning of 1846 there was one telegraph line in the US, running 40 miles between Washington, D.C. and Baltimore. By 1850 there were over 12,000 miles operated by 20 companies. By 1852 there were 23,000 miles, with another 10,000 miles under construction, a 600-fold growth from 1846 (7).

These examples and others describe developments that can indeed be termed revolutionary. As a result of innovative technologies business is being practiced in a new way (shipping by water rather than road), completely new businesses are replacing old (refrigerators), and entirely new businesses are developing (telegraph, mail-order catalogs).

Similar examples can be found in the context of Mcommerce, as we will show in the next section. However, the examples also show that Mcommerce is not triggering a revolution in all aspects of business, or in every industry. In the section following that we show that much of the effects of Mcommerce will be

changes caused by adoption of the technology to enhance existing business processes. This is a common pattern: a declaration that a new technology is a "revolution," followed by a burst of entrepreneurial zeal and overenthusiastic investment which ignores issues that hinder adoption of the technology, ending with a "burst bubble" when the revolution doesn't produce the predicted widespread benefits, and, in retrospect, a realization that the technology has actually revolutionized some aspects of business and society, while enhancing many others.

Mcommerce Revolution

In this chapter we examine some examples that demonstrate how Mcommerce can indeed have radical consequences leading to business being practiced in a new way, completely new businesses replacing old, and entirely new businesses developing.

FedEx was a pioneer of Mcommerce well before the Internet arrived. In the 1980s they created and rolled out their wireless Digital Assisted Dispatch System coupled with SuperTracker, a handheld device used by drivers (8). The system, among many benefits, eliminated calls from drivers to dispatchers and the need to write down a million addresses every day. It also turned FedEx into a wireless carrier since they bought spectrum across the US to insure coverage for their drivers and dispatch centers. This wireless technology and infrastructure has enabled FedEx to migrate from a package delivery company to a supply chain partner/outsourcer to any business interested in controlling the flow of items from suppliers and to customers, including, of course, pure play ebusinesses.

Savi Technology has developed wireless technology based on radio frequency identification (RFID). RFID chips can be imprinted with the contents of a package, attached using standard printing technology, and read wirelessly from up to several hundred feet away (9). The Department of Defense is using Savi's technology to track 200,000 containers globally.

Singapore Airlines is using RFID technology to track many thousands of air cargo containers every day at its Singapore Airport distribution center. RFID chips have the potential to replace bar codes for tracking objects and at Point of Sale (POS) stations. They also make it possible to track and identify things, such as pipes and wiring, which were difficult, if not impossible, to label, or had to be dug up before they could be identified.

Wireless LANs using the 802.11 (Ethernet) standard have been installed in airports, hotels, companies, and schools (10). McKessonHBOC spent \$52 million to install wireless LANs in 1,300 warehouses around the US and to equip warehouse personnel with wearable wireless computers from Symbol Technologies (11). The computers deliver pick lists including locations, read bar codes to verify picked items, and ask pickers to enter remaining inventory. McKesson says that they have seen an 80% drop in incorrect items shipped and a 50% reduction in product shortages; in addition, they no longer do a physical inventory. In theory, wireless LANs combined with RFID technology could be used to create "lights out" warehouses and package sorting and distribution centers. Wireless LANs, running at speeds of up to 11Mbps, and capable of transmitting up to 1000 feet, provide ubiquitous wireless Internet access for laptops, PCs, and PDAs. It is possible that wireless LANs could be, at least in metropolitan areas, the choice for wireless Internet access because of speed, coverage, and ease of installation.

NTT DoCoMo's i-mode service has about 17 million subscribers, and is signing up new ones at the rate of 50,000/day (12). It provides access to about 32,000 specially formatted Web sites via cell phones. i-mode offers an always on connection at reasonable speed, graphics (including color), and lots of content. It is mostly used for sending instant messages, email, news and entertainment, a usage profile similar to that of the wired Internet elsewhere. It has provided Internet access for millions of Japanese who would otherwise not be able to afford a PC and dialup access, and made NTT DoCoMo the fastest-growing Internet Service Provider (ISP) in history. Projecting from its current growth rate, it could be bigger than AOL by 2002.

AirClic Connect, a joint venture of Motorola, Symbol Technologies, AirClic, and Connect Things, an Ericsson affiliate, will sell unique numbers to businesses that can be printed as bar codes (13). Cell phones or PDAs equipped with Symbol bar code scanners can read the codes and automatically transfer to a customized wireless Web site with streamlined choices. If the person has Web access through their TV, they can even scan the bar code with a TV remote. Payment options being considered include credit card information stored on the phone, added to the phone bill, or deducted from a bank account. Purchased items will be delivered with another unique bar code; scanning the code with a cell phone triggers a return request. If many things that could be purchased had a unique bar code, then there might be stores without cashiers, and vending machines for many items not normally sold that way. Safeway PLC in England has already set up a PDA-based ordering system that includes the ability to scan bar codes (14). While the shopping list is now transmitted by phone, it could also be sent wirelessly. Safeway gives away the PDAs to help attract customers; AirClic intends to give away scanner-equipped cell phones for the same reason.

These selected examples show that the innovative use of mobile technologies can lead to radical changes, and can therefore be considered "revolutionary." However, many Mcommerce related developments and consequences are more modest, enhancing existing businesses and business processes, as we will show with a number of examples in the next section.

Gradual Changes

There are many applications of Mcommerce which, while they are not causing a revolution, are still providing benefits to businesses such as cost reductions, more efficient business processes, and better customer service. In this chapter we will cite some examples.

The Simon Property Group, one the biggest mall managers in the US, is testing wireless scanners for teenagers (15). They can scan bar codes in mall

stores, creating personalized Web pages showing favorite products that can then be used as emailed “wish lists.”

Wyndham International Inc. is rolling out a wireless reservation and personalization system (16). Besides making reservations, customers can change their profiles at any time from a number of wireless devices and their rooms will be prepared accordingly. The hotel chain’s housekeeping personnel already use handheld devices to signal when a room has been cleaned.

In June 2000 UPS announced that it would let customers track shipments via wireless devices, including cell phones and pagers, and do things such as find the nearest drop box (17). All the major delivery firms are making big investments in wireless services and processes (18).

Many schools and colleges are using wireless LANs to hook PCs to the Internet and other systems (19).

A woman in Bangladesh bought a cell phone with a loan from a nonprofit program and turned it into a thriving service business by becoming a local “phone company” (20).

United Airlines is providing booking services for Palm handhelds and Web-enabled phones. It also provides flight status information on Palms and a paging service to notify people of flight and gate changes (21).

The Improv, a comedy club, lets customers order and pay for tickets on the Web, and then print out bar-coded receipts. When they arrive, the Web customers bypass the box office and are seated by personnel who scan the bar codes with Symbol pocket PCs, connected wirelessly to a LAN (22). By the end of 2001, this technology should be in widespread use in the US, including “tickets” sent wirelessly to PDAs and cell phones (23).

You can buy a soda from a vending machine in Finland using your cell phone; the cost is deducted from your bank account. Coca-Cola is testing a similar system at 100 machines in Europe. In Frankfurt, you can find a parking spot via cell phone and then have the meter fee added to your phone bill. (24).

“Since October 2000, E-Trade customers have been able to transfer funds between E-Trade Bank and E-Trade Securities accounts, check account balances, and pay bills using their Web-enabled phones or PDAs. A customer can also use a Web-enabled device to locate one of E-Trade's 9,600 participating ATMs by entering a ZIP code. “(25)

Services like these illustrate innovative approaches to the lack of credit cards in many countries outside the US, and to the "small cash amount" problem which has hampered Ecommerce everywhere. These services also introduce security issues in case the transaction is tapped or the phone is stolen.

We have to admit that the border between a revolutionary use of Mcommerce and its use to enhance business processes is not always very clear. The distinction, however, is still important, as it shows that business changes related to Mcommerce follow a similar adoption pattern as other technologies considered "revolutionary." And as with other technologies introduced in the past, the success of Mcommerce cannot be assumed as given but is based on a number of factors that affect adoption and implementation. We will examine some of those factors in the next section.

Success Factors for Mcommerce

When evaluating the consequences of current developments, it is important to be clear on how real they are. Although helpful in some ways, enthusiasm, optimism, and self-interest cannot be a substitute for a careful identification of success factors and their management based on the realities.

For example, many times, simple things are being ignored, such as what kinds of people are behind the billions of mobile devices, and in what ways, if

any, are they different from the people behind PCs. Other issues that are affecting the adoption of Mcommerce include lack of infrastructure (wireless and business), competing standards, poor input and display capabilities in cell phones, and consumer indifference. In this chapter we will examine some relevant data concerning these issues.

Accenture points out that, for the 2000 Christmas season, only 12 of the top 100 etailers had set up the necessary wireless infrastructure to take orders (26). Even worse, it proved extremely difficult to find out which 12 were wireless-enabled. Their research also showed how difficult it was to use a PDA or cell phone to actually buy something on the Web; on a Palm device it could take 20% more keystrokes, while on a Wap-enabled cell phone it could take more than twice as many. Finally, Accenture found through surveys that the typical wireless user went online only when they could not get to a computer, and got weather, news, sports, email (mostly reading it), and maps; not a single person mentioned buying anything.

A review of wireless statistics (27) showed much the same thing; 66% of US wireless users were not interested in Internet access and 63% did not want wireless email. Of those who were interested in wireless Internet access, only 30% said they wanted it to buy things. About 66% of US households have no interest in wireless purchases.

The data on wireless users simply reflects the general Internet consumer population, who use it for entertainment, communication, and news. A survey by the Pew Internet Project during the 2000 Christmas season found that only 24% purchased gifts, while 53% sent email greetings and 32% sent ecards (28). In fact, for the first eight months of 2000, total online retail revenue in the US, at \$27 billion, was only 1% of all retail revenue (29). That hardly seems like a revolution in retailing, especially when you consider how many online retailers had to split up the \$27 billion: 1,000 had \$500,000 or more in revenue (30).

One other possibility for resistance to using wireless services is the very human fear of having to learn new things. An anthropological study of 180 people in the US, Asia, and Europe by the Context-Based Research Group showed that most people's expectations of cell phone Internet access were not being met, and many people feared having to learn new systems (31). This may help explain the costly failure of WAP, once touted as the technology that would make Mcommerce real, which reached only 20% of the expected users by late 2000 (32).

Another problem for wireless is privacy fears due to location services that combine GPS and wireless devices (33). The US government, for example, has mandated that, by the end of 2001, either cell phones or cell phone networks will have to be able to locate a caller to within 300 feet. Many people are concerned that this will lead to advertising spam as well as invasion of privacy and spying on individuals.

Spotty coverage and dropped connections are commonplace with cell phones. According to Barton Goldenberg, president of consultancy ISM, latency in wireless networks can cause 40% of the data in any given transfer to be lost (34). The CTO of a software company cautions Java developers: "...the biggest challenge [of wireless Java development] was to [cope with]...varying bandwidth, intermittent connectivity, and packet loss (35).

Competing wireless standards, especially in the US, make it difficult, if not impossible, for any one company to provide uniform services (36). This is less of a problem in Europe and Asia, although different approaches to second and third generation wireless services may cause incompatibilities worldwide. Even some attendees at the 3GSM World Congress in Feb. 2001, including the CEO of Palm, said that there had been way too much hype about 3G (37).

Payment has been a problem for ecommerce and will continue to be a problem for Mcommerce. For example, in Argentina very few people have credit cards. A number of companies have compensated for this situation by

letting online customers pay at a store or on delivery (38). This is not a situation that will be remedied by Mcommerce. The same problem exists in Japan where many people don't have credit cards because they are too expensive; they order on the Internet and then take delivery and pay at a neighborhood store, such as 7-11 (39). NTT DoCoMo has sidestepped this problem with i-mode by adding Web charges to the cell phone bill, an innovative solution that so far hasn't been widely adopted.

Simply getting the 3G infrastructure in place will be a slow and expensive proposition. Banks appear to be reluctant to lend European carriers the estimated \$100 billion-plus required, especially after so many of them have taken on crippling debt, paying almost \$200 billion just to buy spectrum. Other issues will impact the European build out, including restrictive environmental laws and old cities with crowded streets. In the US, 3G licenses may not even be available until 2004. (40).

Summary

There is no doubt that mobile technologies have the potential to bring changes to businesses and industries. Whether this will lead to the predicted revolution, however, remains doubtful. We expect a somewhat limited revolution, with many more gradual changes. The success of Mcommerce in either case will depend on the careful identification of critical success factors, as well as the adequate consideration of the realities. The analysis of technology adoption processes of the past can be of much help to understand current developments: "Those who cannot remember the past are condemned to repeat it." -- George Santayana

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