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**Title**

**M-COMMERCE CHALLENGE MODEL FOR QUALITY  
CONTROL**

**Author(s)**

**AMIT YADAV**

**(MCA, M.Phil, Ph.D)**

*Research Scholar,*

*Singhania University,*

*(R.A.J.)*

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**SANJEEV PANWAR**

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**Abstract:**

The initial hype created by the emergence of mobile computing technologies has slowly given way to a large amount of skepticism. Even though some m-commerce applications have already made their way to the marketplace, experts now predict that it will still be some time before the potential of M-commerce can finally be realized. This pessimism is largely due to the fact that the technologies involved are still not mature enough, and it will cost a great deal in terms of resources and effort to install the required infrastructure. M-commerce faces many challenges today. Various solutions have been suggested, some realizable with today's technology, some not. In the end, however, only the users of the applications will determine the level of success of m-commerce. Unless it becomes easier and cheaper to transact business using m-commerce applications than by using conventional methods, applications will not become popular, either with users or providers. Companies involved in providing m-commerce services must also be convinced that they will receive a return on the large investments they are making in setting up the necessary infrastructure. In this paper, we present a challenge model for mobile commerce. We analyze the impediments and their inter-relationships, and also discuss the benefits and disadvantages of mobile commerce.

**Keywords** – M-commerce, goods, services, information, quality control.

**INTRODUCTION:**

The term m-commerce was coined by Kevin Duffy, the director of Group Telecom of Logica, in February 1997. Several definitions have been suggested for m-commerce. The Durlacher Mobile Commerce Report [1] defines m-commerce as .any transaction with monetary value that is conducted via a mobile telecommunications network.. This definition is fairly rigid, and makes a very clear-cut distinction between M-commerce applications and other mobile applications. This same Report predicted that the European m-commerce market would grow from Euro 323M in 1998, to Euro 23B by 2003.

According to Aphrodite Tsalgatidou of the University of Athens [5], Greece, a mobile e-commerce transaction is any type of transaction of an economic value that is conducted through a mobile terminal that uses a wireless telecommunications network for communication with the ecommerce infrastructure. *Mobile electronic commerce* refers to e-commerce activities relying solely or partially on mobile e-commerce transactions.

The various applications of mobile commerce can be classified into a few broad categories, including infrastructure based applications, service discovery based applications, and ad hoc network based applications. Most applications offered today are infrastructure based, i.e. the user uses the infrastructure provided by the service provider. For example, the user could use a printer in an Internet kiosk to produce a printout of a document, and be charged for that service. Other sample applications include making purchases from vending machines, paying tolls, paying for public transport, and downloading data of all kinds such as music, movies, software, etc.

There are many potential ad hoc network based applications of mobile commerce. One of these is the notion of an ad hoc auction, where a particular user advertises the availability of a particular commodity, and invites bids. Mobile devices could also be used for one-to-one trading in anything from stocks, currency, and precious metals, to fruits and vegetables.

### **CHALLENGES:**

No one can deny that m-commerce is an economic activity of enormous potential [12, 13, 14, 15]. However, despite widespread initial optimism, m-commerce has not taken off, i.e. it has not achieved the economy of scale and the ubiquity that was initially expected. The reason behind this is that M-commerce must still overcome a large number of hurdles before it can reach its potential of widespread use [3].

Mobile handsets currently have small screens and small multifunction keypads that allow the mobile user to easily carry them around. Such small screens severely limit the interface to the mobile handset, forcing the development of various special interfaces for mobile handsets. This discourages many e-commerce websites from making the transition into m-commerce. For



example, to enter textual information on a mobile phone via its keypad, users must go through a laborious procedure to specify whether they mean .2., .A., .B., or .C. on the .2. Button [2].

One of the main obstacles to the ubiquity of m-commerce is slow wireless networks, most of which currently run at 14.4 kbps. It is generally accepted that this speed is too low for most m-commerce applications [6].

Certain aspects of m-commerce require the service provider to know the location of the user via his/her mobile handset. Consider, for example, an m-commerce application that informs you about a sale on leather shoes when you pass by the Payless Shoe Source store. To achieve this, the service provider must be allowed access to the user's location, and even pass it on to third parties. This raises many security, legal and privacy issues [7].

Portable devices have fewer resources than desktop devices, including memory, disk capacity and computational power. While it is possible to have more memory and processor speed in portable devices, there is still a problem. The more speed a processor has, the more energy it tends to consume and hence can decrease battery life. Moreover, due to lack of memory and disk capacity, wireless traffic handling techniques such as caching can only be minimally implemented, and a very limited amount of data can be stored on the device. Hence, fancy graphical interfaces are severely limited on portable and handheld devices, which significantly diminish the web experience.

The challenges to the emergence of m-commerce do not end with limited resources. The bandwidth currently available is not ideal. The effective bandwidth, as quoted by M-commerce world. Com, is somewhere around 9kbps [4]. This further hinders the advent of sites containing graphics and user-friendlier interfaces, in turn discouraging users from opting for m-commerce.

Devices using different protocols cannot talk to each other. This poses a big problem for m-commerce. The interface on a Palm device looks different from what is displayed on a cell phone. When it came to the Internet (and e-commerce), HTTP provided a level playing field. Such a convention in format and Communication does not yet exist for the mobile environment. The current disparity of protocols and formats constitute, in fact, a headache for the user, and has slowed down the growth of wireless services and data [8].

The mobility factor, the use of a mobile handset, also raises many issues. For example, bandwidth can change with the hand-over in certain areas. The signal type sometimes switches from analog to digital and vice-versa with area hand-over as well, causing many security and authentication issues [11]. As the area changes with the device's mobility, the infrastructure must raise questions about whether the device really is what it claims to be, and whether the user really is who he/she claims to be. Such issues have slowed the evolution of m-commerce to a considerable extent [9].

Even though m-commerce is considered to be the next .big thing. After the Internet, most companies are taking the .wait and see. Attitude. Only about one in five IT managers say that m-commerce will make a major contribution to their company's revenue stream this year [10].

### **M-COMMERCE CHALLENGE MODEL:**

Several challenges may combine together and contribute to a much larger problem. We propose a model describing the relationship between the various challenges, so that it can serve as an aid to solving the various problems involved. The model presented here is very general, looking at m-commerce as a whole, but it may be applied to specific applications and services. The challenges stem from the limitations of the mobile devices, the limitations of the environment, lack of standardization, and immature technology. These combine in various ways to present new challenges.

The major limiting factor that is responsible for the lukewarm response from customers to m-Commerce applications is the cost. There are various factors that are responsible for making m-commerce a costly affair for the consumer, one of them being the per-minute pricing for access to the mobile network. If an application needs to frequently access the network, it will be very costly for the user. The per-minute rates by themselves are currently high, because it is expensive for a service provider to currently provide the service. Because of per minute pricing, the customer will also tend to limit the time he/she uses to access the network to a bare minimum. If the device is not connected to the network, he will miss out on some push-based services he may have subscribed to, prompting him to decide that they are not worth paying for. This, along with the cost factor, directly contributes to the low customer demand.



The other factors contributing to low customer demand are the not so user-friendly interfaces that are currently available on today's mobile devices, and the low bandwidth that severely affects the response time obtained by the user. This Factor also causes the user to be connected to the network for longer periods of time, increasing the cost. The lack of user friendliness arises from the physical limitations on the capabilities of the mobile devices themselves.

Limits on the resources available on a mobile device also place restrictions on the functionality of the applications (clients) that run on them. Lack of functionality means that the user will not find an application as useful as he wants (or worth what he will be paying) and will further contribute to low customer demand. One severe restriction on mobile devices is that they are powered by batteries, which have a very low life. This forces the user to ration his time, i.e. he will tend to keep his device on only when absolutely necessary. This is also one of the reasons why the customer is not always online. Other reasons for this may be the risk of damage to/theft of the mobile device.

The strategy for formulating a plan to overcome the challenges facing a particular application (or m-commerce in general) could be to start from the rightmost end, and examine the various issues as you move to the left. The key here is to be able to identify the areas where less time and effort is expected to be required to solve a particular issue. As a result of the many transitive relations in the model, the solutions will propagate forward, enabling the formulation of a plan of action.

Currently, there are no concrete solutions to the low bandwidth problem facing mobile networks. The problem could be alleviated by filtering, i.e. limiting the content that flows to and from the user's handset so that only information that is wanted by the user, or that his handset is capable of presenting, is sent to his device. There is no point in wasting bandwidth sending all components of a web page that has lot of graphics or sound if the device is not capable of displaying them.

There is also a real-world problem with mobile devices; a device can be lost, stolen or damaged. One major issue that needs to be resolved is the representation of the user's identity using the device. Is it possible for a person to



Impersonate a valid user by simply gaining access to that user's handset? Can the valid user establish his identity when his own device is not available? Is it possible for a user (if he is paranoid) to do or buy something without disclosing his identity?

One approach to dealing with this class of problems is to provide some form of authentication either for the device or for an application. One would suggest that passwords are the solution, but this would defeat the ease of use of a particular technology. The key here would be to enable some form of biometrics to be used for authentication. The most obvious would be voice recognition. Voice recognition system has several well known limitations. The voice-recognition system needs to be trained, and it must be versatile enough to be able to recognize a user's voice even when it changes because of a cold or throat infection. At the same time, the system must be able to detect if someone else is impersonating the user.

Currently the most practical way to validate a user seems to be using some kind of smart card or other similar card that stores the user's profile. Smart cards could also be used to deal with various other issues, which we will discuss later. Unfortunately, anyone in possession of the card could also easily assume the user's identity. This is very much possible, and appropriate policies must be put in place to prevent this problem. It is naïve to assume that such a plug in card will not be stolen, or can be prevented from being stolen. Therefore, policies and technologies are needed so that the card can very easily and quickly be invalidated. This is the case with credit cards, where one can call one's credit card company to report that one's card has been stolen or misplaced. One way to do this would be to require the user to register the card with the service provider, and to associate that card with that particular device, so that the card can only be used on another device if it has been registered on that device.

This technique is not very useful if the device is stolen with the card inside, but this is where a sound policy and the user's discretion become important. Having a different card to pay for transportation and utilities, another one for banking transactions, and yet another for authenticating yourself on your company's server, would all be sensible practices. It would be reasonable to keep the first type of card in your mobile device most of the time, while using the other two types only when required.

A completely different scenario is that of an individual using a malicious device to commit fraud. This could range from getting the device to mimic a valid user, to using forged certificates (to conduct bogus transactions) and other crimes.

There have been different schemes suggested for the user to be able to feel comfortable making online purchases, as he may be apprehensive divulging his credit card information on a network whose security still has something to be desired. The first scheme is one in which the user makes purchases, and he is billed by his service provider. Approaches that protect the user's privacy are the Mobile Wallet (already introduced by Wells Fargo Bank) or the concept of tokens (electronic cash), which can be used to buy commodities.

Sadly, at this moment the solution to this problem is not entirely in place. Though it is not straightforward to fabricate a device that bypasses built-in authentication measures, it can still be done. Today, there is not much confidence in the existing mobile security infrastructure. Currently, in many mobile telecommunication networks, there is no encryption between handsets and base stations.

The problem with the user interface must also be overcome. Currently, the user must choose between size (portability) and user-friendliness. A small mobile phone is only going to have a small LCD screen and numerical pad. If the user wants more, he will have to go in for a larger device.

The only solution to the problem that there are too many different protocols in mobile networking today, and no universally established and accepted standards, is that in the near future all major players, both academic and commercial, should establish a universal standard so that it becomes easier to set up the infrastructure, to extend an existing service and incorporate it with another, etc.

As discussed earlier, the setting up of an m-commerce service requires the collaboration of a number of entities, each with possibly conflicting interests. This problem will be partially solved with standardization, as well as strategic planning and alliances between the players.

**APPLICATION OF M-COMMERCE:**

According to Ovum’s research, there is a lot of uncertainty about which mobile commerce application will be successful and make money. The research firm classified M-commerce application into three categories.

	<b>Goods</b>	<b>Services</b>	<b>Information</b>
<i>Business to Consumer</i>	Shopping Vending Trading	Gaming & Gambling	Paid-for Information
<i>Business to Business</i>	Procurement Trading	Ticketing  E-cash Banking Discount & Loyalty Schemes	Advertising

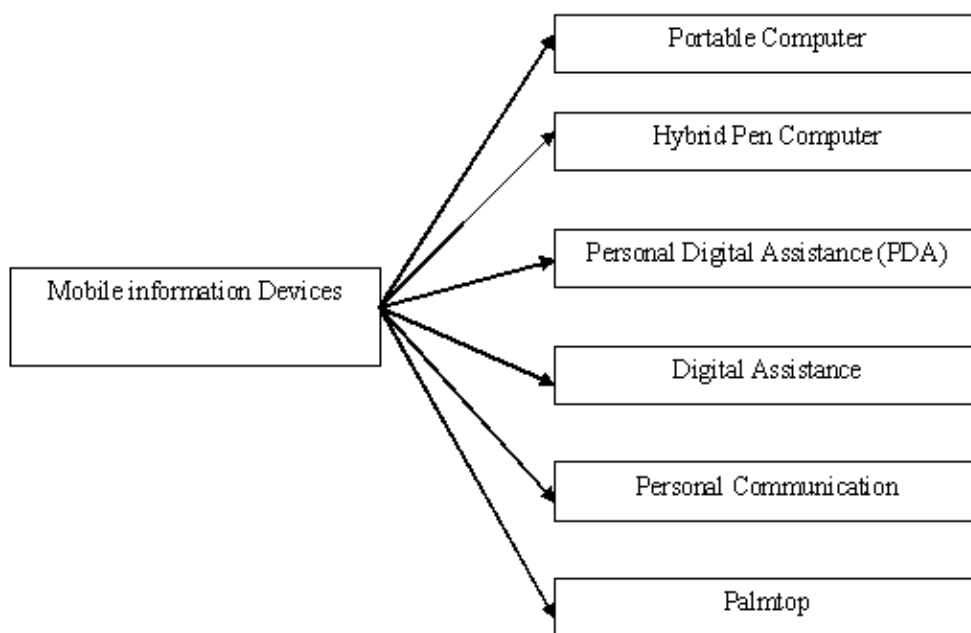
- 1. Goods:** There can be two type of domain like **business-to-business and business-to-customer**. Like a vender can sail to customer or to another vender.
- 2. Service:** Again service can be **business-to-business or customer-to-business**. Like a company can provide service to directly customers or to another company.
- 3. Information:** Information service can be paid to customers or to other companies and the second aspect is advertising.



The M-commerce application in business-to-consumer and business-to-business can be easily understood. M-commerce can provide business comfort to organizations and also can be very help full to consumers.

### MOBILE INFORMATION DEVICES:

A special kind of devices needed to perform the M-commerce. Some of these devices:



By using these devices we can perform the M-commerce. By using the wire less network we can connect our devices with Internet to perform the M-commerce.

- 1. Portable Computers:** Basically Laptops, note books and handhelds comes under portable computers. Laptops are needed to run some heavy applications. Notebooks have the capacity to run word data and manipulate spread sheets. Handhelds like mobile

phones has limited processing powers. But now a days mobile phones also become very advance and can work like small computers.

2. **Hybrid Pen Computers:** A pen-based interface is clearly more appropriate in many situations. Pen computers are often equipped with wireless communications. Basically in hybrid pen computers a pen is provided which works as mouse.
3. **PDA's (Personal Digital Assistance):** PDA means a computer which can be adjusted in pocket also. Basically it is a smallest possible computer and still companies are working to reduce the size.
4. **Digital Assistance:** Digital assistant combine personal information management with wireless voice, data and fax communication. Digital assistants provide a wide array of information-management tools, Notepad and Sketch pad functionality.
5. **Personal Communicators:** Basically it is a PDA which is a combination of cellular telephone with a pen computer's user interface. Personal communicators offers many services like fax transmission and reception, personal information management, email without attachments etc.
6. **Palmtops:** Palmtops computers provide higher functionality and more closely resemble what is available in desktop computers. In palmtop software is built into the ROM. Palmtops have combined functionality of a personal organizer and communication terminal to provide access to email.

### Advantages of M-commerce:

☑ **Ubiquity.** A mobile handset can fulfill the need both for real-time information and for communication anywhere, independently of the user's location.

☑ **Convenience.** A mobile handset with all the capabilities of the Internet can assist anybody immensely in their day-to-day life. Users can check their email, stock quotes; obtain weather information, driving directions, and shop for items such as airline and movie tickets while driving using their mobile handsets

**3. Competition.** The hype behind m-commerce has raised interest from many firms currently competing in the wireless arena. This will force those companies to innovate, and in the process develop new technologies that can shape the future of e-commerce and the future of business as a whole.

□ **Revenue** M-commerce gives businesses a new frontier to market their products. With the current large number of mobile subscribers worldwide, and further developments in the m-commerce arena, there is no doubt businesses can profit immensely from m-commerce.

### **Disadvantages of M-commerce:**

The challenges faced by m-commerce can also be considered to be the disadvantages of m-commerce. With the emergence of m-commerce, the user will have to go through the cumbersome task of entering, say, his/her credit-card information via the small keypads of mobile handsets. In addition, the monitoring of usage habits by service providers can become a big security issue. Spamming can become a huge disadvantage if service providers are allowed to send uncontrolled amounts of advertisements on the mobile handsets.

### **CONCLUSIONS:**

It is true that the m-commerce phenomenon has not lived up to the hype that had initially been created for it. But it is not merely a pipe dream either. The m-commerce age will come; only later than it was initially anticipated. Before the m-commerce dream can be realized, much work must be done in the areas of wireless network security, standardization of protocols, and user interface design. A few legal and ethical issues also need to be resolved. In this paper we have systematically laid out the challenges facing m-commerce, and shown how the various impediments to widespread use of m-commerce affect and interact with each other. It seems evident that m-commerce will not boom overnight. Instead, it appears it will gather momentum slowly but surely.



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