Mobile Commerce

Maria Cristina Enache
mpodoleanu@ugal.ro
"Dunarea de Jos" University of Galati, Romania

Mobile commerce, or m-commerce, refers to the use of wireless digital devices to enable transactions on the Web. Described more fully in Chapter 3, m-commerce involves the use of wireless networks to connect cell phones, handheld devices such Blackberries, and personal computers to the Web. Once connected, mobile consumers can conduct transactions, including stock trades, in-store price comparisons, banking, travel reservations, and more.

Keywords: Social Business, IT, marketing, social media, models

I. Introduction

Our focus in this paper is m -commerce—the use of the Internet and the Web to transact business using a mobile technologies. More formally, we focus on digitally enabled commercial transactions between and among organizations and individuals. Each of these components of our working definition of m-commerce is important. Digitally enabled transactions include all transactions mediated by digital technology.

For the most part, this means transactions that occur over the Internet and the Web. Commercial transactions involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products and services. Exchange of value is important for understanding the limits of e-commerce. Without an exchange of value, no commerce occurs.

M-commerce have been considered as being either one of these concepts – a technology, product or service – or as combination of the three. Defining m-commerce or M-commerce is sometimes referred to as "mobile e-commerce", because its transactions are basically electronic transactions, conducted using a mobile terminal and a wireless network. Mobile terminals include all portable devices such as mobile telephones and PDAs, as well as devices "mounted in the vehicles that are capable of accessing wireless networks" and perform m-commerce transactions. One definition of m-commerce describes it as "any transaction with a monetary value that is conducted via a mobile telecommunications network". [4]

Some definitions tend to ignore telematics, an important feature of m-commerce. These definitions concentrate on the appliance. For instance, "m-commerce is the buying and selling of goods and services, using wireless hand-held devices such as mobile telephones or personal data assistants (PDAs)".

2. The role of mobile operators

To ensure long term focus, mobile operators need to begin by drawing up strategic plans supplemented by tactical plans for near term engagement with vertical industries. The GSMA believes the primary opportunities for mobile operators in the retail sector are[8]:

- Create an end-to-end secure business-to-business proposition for tier 1 retailers, either individually or as a framework developed with other mobile operators.
- Work with other mobile operators to develop a framework infrastructure that tier 1, 2 and 3 retailers can use to provide mobile commerce services.
- Provide a toolkit to enable retailers and service providers in other industry sectors to easily integrate payment, coupons and loyalty services into their applications.
- Provide a flexible wallet application that consumers can use to access a wide range of services, encompassing retail, transport, entertainment and community and government services, supported by a mechanism that will enable consumers to download information and vouchers into the wallet.
- Use the SIM card to authenticate consumers and increase the security and privacy of mobile commerce services.
- Provide a web/mobile browser plug-in that will enable consumers to download information and vouchers into their wallet.

Mobile commerce is growing like a weed [8].

- Mobile is 29% of e-commerce transactions in the US and 34% globally. By the end of 2016, mobile share is forecast to reach 33% in the US, and 40% globally.
- Women devote more time to their mobile devices than man. Smartphone owners are dominated by Women with 62.5% (figure 1)
- Mobile transactions grew 10% in the last 3 months: Growth continues across all retail categories, especially with top quartile retailers.
- It's all about smartphones: In most countries, including the US, smartphones are now the majority of mobile transactions.
- There is no limit: For the first time Japan and South Korea had over 50% of their e-commerce transactions on mobile.
- Consumers view the same number of products on smartphone and desktop sites: Lower mobile conversion rates in the US are due to weaknesses in turning this browsing into completed purchases.

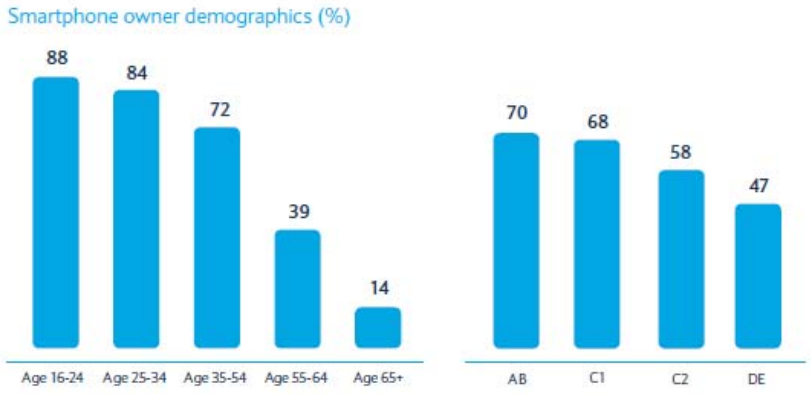

Figure 1 – Smartphone owners by age [8]

Figure 2 – Smartphone owners in 2015 [8]

Young people between 16-24 years have in proportion of 88 % a mobile phone.

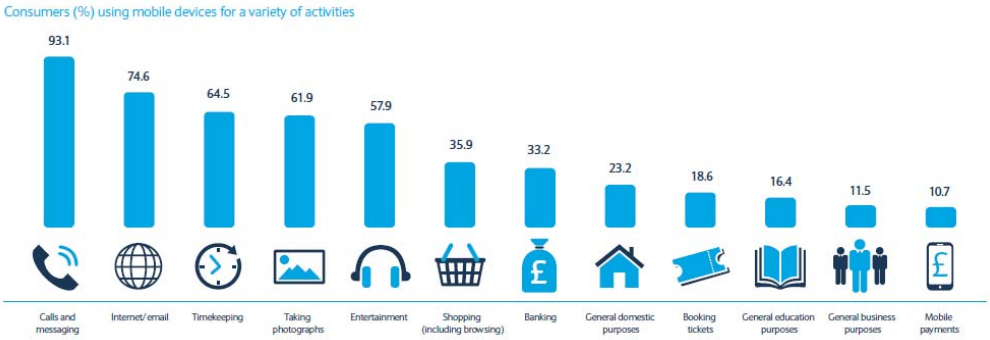

Figure 3 – Smartphone owners activities [8]

Shopping via a mobile device peaks 35%. Despite being the least popular activity, 1 mobile in 10 users are making mobile payments. (figure 3)

3. Characteristics of m-commerce

The primary criterion of mobility is the method of access. Not all mobile devices provide a mobile access to telecommunication networks. For instance, a laptop, even though a mobile device, generally uses stationary access to networks. Even when a laptop connects to a wireless network, its usage, while on the move, is limited by factors such as size and weight. On the other hand, telematics devices mounted in vehicles are capable of providing mobile access to telecommunication networks. The computer-mediated networks may be partially or even fully wired, as long as they are able to receive and handle requests sent by mobile electronic devices.

Some parts of a transaction may be processed in a stationary sector. For example, ordering clothes using a mobile phone is an m-commerce transaction, even when the transaction is processed by stationary computers, the ordered goods are sent by snail mail and paid against an invoice. What is important is that at least the initiation or the completion is carried out using mobile access via an electronic device. The completed transaction need not have a monetary character if the transaction is carried out as a marketing measure or as an after-sales service.

M-commerce is characterized by some unique features that equip it with certain advantages against conventional forms of commercial transactions, including e-commerce.

- users can avail services and carry out transactions largely independent of his current geographic location (the "anywhere" feature). This feature can be useful in many situations, e.g. to cross-check prices while standing in a supermarket or while on the move.
- Closely related to ubiquity is the "anytime" feature. This feature is particularly attractive for services that are time-critical and demand a fast reaction, e.g. stock market information for a broker. Additionally, the consumer can buy goods and services as and when he feels the need. The immediacy of transaction helps to capture consumers at the moment of intention so that sales are not lost in the hiatus between the point of intention and that of actual purchase.
- Localization. Positioning technologies, such as the Global Positioning System (GPS), allow companies to offer goods and services to the user specific to his current location. Location-based services can thus be offered to meet consumer needs and wishes for localized content and services.
- Instant connectivity. Ever since the introduction of the General Packet Radio Service (GPRS) mobile devices are constantly "online", i.e. in touch with the network. This feature brings convenience to the user, as time consuming dial-up or boot processes are not necessary.
- M-commerce opens new avenues for push-marketing, such as content and product offers. Services like "Opt-in advertising" can be offered, so that a user may choose those products, services and companies that he wants to be kept informed about. The Short Message Service (SMS) can be used to send brief text messages to consumers, informing them of relevant local offerings that best suit their needs. This feature ensures that the "right" (relevant) information can be provided to the user at the "right" place, at the "right" time. The user too does not have to fear missing some potentially crucial information or getting it too late.
- Authentication procedure. Mobile telecommunication devices function with an electronic chip called Subscriber Identity Module (SIM). The SIM is registered with the network operator and the owner is thus unambiguously identifiable. The clear identification of the user in combination with an individual Personal Identification Number (PIN) makes any further time-consuming, complicated and potentially inefficient authentication process redundant.

M-commerce is not just a transaction, but it extends to provide services and information. • For example m-commerce is seen to possess some mobile applications which are used to provide a number of services. These services include mobile banking, payment, information and marketing services.

M-business is the use of mobiles or wireless devices in the conduct of all business activities of a firm both internally or externally in relation with its customers, suppliers, partners and other stakeholders. M-business covers the application of mobiles to finance and accounting, marketing, human resources, procurement, manufacturing, transport & logistics et cetera.

4. M-commerce Adopters

Technology users tend to be drawn to the technological features of the technologies they adopt. M-commerce adopters as technology users tend to be influenced by technology characteristics of m-commerce services or products.

- Perceived usefulness/Functional performance refers to the degree to which an m-commerce adopter believes the m-commerce would provides expected benefits or expected functional performance.
- Perceived ease-of-use is refers to the adopter's perception of the minimum effort required for the use of the m-commerce service.
- Acquisition cost is the cost of an m-commerce service or product that adopters have to pay in order to possess or own the service or product. For example, cost of mobile phone or cost of a mobile banking application.
- Operating cost is the cost that occurs when a user utilize the m-commerce service. For example, cost of airtime to make use of mobile voice services.
- Reliability relates to how free an m-commerce service or product is from mal functionality, including the useful lifetime of it.
- Compatibility is the way that the new technology fits with other existing devices or business requirements.
- Serviceability refers to how long it takes and how expensive it is to repair or reinstate an m-commerce product or service if it goes wrong.
- Security refers to the state in which an m-commerce service or product is free from unauthorized use, misuse and disturbance during usage by an m-commerce adopter.

5. M-commerce architecture

Industry is faced with challenges of providing the necessary capacity for both backbone transmission infrastructure and the access network. Support is needed for Mobile Apps which depends on how extensively the applications use the underlying network.

To be successful, M-Commerce systems typically need to run on a variety of mobile device platforms. Over the years we have work endlessly towards integrating various protocols, application compatibility to yield a robust application architecture.[3]

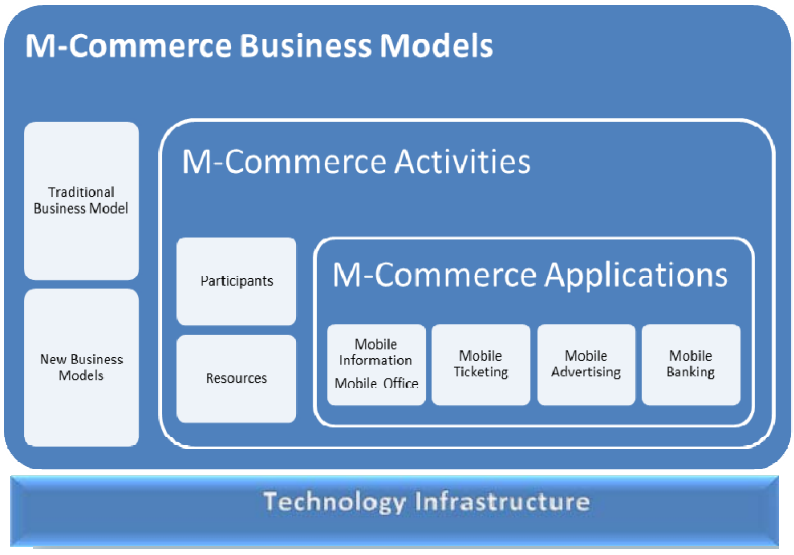

Figure 4 - Mobile architecture

Figure 4 shows an architecture framework for m-commerce relating to business models.

The core elements of the m-commerce include mobile commerce participants, mobile commerce resources and mobile commerce activities.

A classic platform that will bring an online store to mobile devices like the website was built for that specific device is presented in figure 5.

The benefits of having an mobile platform are

- Provide the ultimate shopping experience. With specific tailoring for each device, customers enjoy a devoted design and service. Right from the landing page to the checkout, customers find shopping, payment and notifications handy.

- Harness the power of the social media. With the best-in-the-market SEO, Analytics, Social Media marketing and deep-linking to certain items, customers will be able to browse the online store using different platforms and experience adapted views.
- Increase ROI. Customers love to feel special, and by making every page a device-specific catalogue, customers enjoy shopping on their desktops, and even more on their smartphones and tablets. Each device is unique, and so is our customization.
- Gain brand equity. Because people are using their mobile devices all the more, the mobile becomes an essential part of brands – a platform where customers show up every day (or even all the time).
- Study customer behavior. How customers move about a store, their favorite items, colors, item views and time per item, touch gesture tracking and visitor flow – every little detail is important.

On level of framework a m-commerce may be the mobile commerce applications. Because an organization uses mobile applications to support and deliver its business models through the supply chain, mobile applications are seen as the tangible end-user vehicles that mechanize and enable the m-commerce transaction. M-commerce applications can be broadly categorized as communication applications, information applications, entertainment applications and commerce applications. Five main application types were identified:

- mobile ticketing,
- mobile advertising,
- mobile information,
- mobile banking
- mobile office applications.

These were found to support the key business models and imperatives (revenue generation or cost reduction) and were constructed using the supply chain to deliver an aggregated service. The constantly developing landscape of mobile technologies, and more specifically application capability, raises a proposition of re-aligning business models and supply chains to fully leverage the potential of that change - thus suggesting a commercially synergistic relationship.

Figure 5 – Mobile commerce platform

6. Responsive Web Design

Responsive Web Design means that a site is implemented in such a way that it adjusts automatically to provide an optimized web experience to the viewer on any device and any screen size. This is especially important in e-Commerce and m-Commerce, as customers nowadays are expecting ease of use and a compelling web experience across all devices. Responsive design adjusts automatically, making it almost a must for all those who regularly provide changing content, like e-Commerce retailers. It uses CSS3 media queries to ensure that the layout adapts to the screen size using fluid proportion-based grids and flexible images. The page uses different CSS style rules

automatically based on characteristics of the device the site is being displayed on. Flexible images are also sized automatically to make sure they fit the screen size.

Before Responsive Design, marketers had to create several sets of content, if they wanted to cater to multiple screens, which meant more costs and a lot more work, with a mobile experience that was still not necessarily the best. Not to mention that it was almost impossible to make your layout fit all screen sizes, from tiny smartphone screens to 27"desktop flat screens. Responsive Design, however, really takes the content only once and makes it adapt to every screen, to every platform, to every operating system, every browser and is fully compatible with all devices on the market today. This is the best thing that could have happened to marketers in e-Commerce, who have to update their offerings very frequently.

Responsive design might cost more work in setting up and implementing, but administration will be much less in the long run. When designing responsive layouts, the first important rule is „mobile first". You should start with the smallest screen. You will pick out the most important crucial information, which needs to be displayed. It is much easier to add details for larger screens, than to remove them. Also avoid specifying the font size, this too needs to be able to adapt according to the device it is displayed on. You can either define percentages or use JavaScript plug-ins which will scale headlines and text according to screen size.

When taking care of all these technical aspects of implementing responsive design, there are some things of special importance for e-Commerce and m-Commerce:

- Pay special attention to the placement of the search box, as people often access mobile sites in search of something specific, so make sure they can easily get there.
- The shopping cart icon should be clearly visible and touch friendly on all product pages.
- Navigation throughout the buying cycle should also be designed to be touch-friendly.
- The consumer should be invited to opt-in to receive your newsletter across all channels, be it via QR code, on the mobile landing page or when placing a product in the shopping cart. You might also want to consider offering incentives for opting in, for example by offering 10% rebate on the next order.
- Also don't forget to include a CTC (click to call) button for those m-Commerce users who want a question answered, or need further information to your products. Many customers will be surfing your site via mobile, so making it easy to call you shouldn't be forgotten.

The goal of marketers has to be creating web content which adjusts to multiple screens while still delivering compelling shopping experiences. A good mobile experience will always combine minimalism, e.g. single column layout and great navigation, social media integration, and will load fast.

According to eMarketing's survey, 59% of US retailers have declared that implementing a mobile-responsive design for their websites is a high priority this year. Further down the list of retailer priorities is creating apps for iOS devices at 28% and for Android at 22%.

Mobile devices generally do a pretty decent job of displaying websites these days. Sometimes they could use a little assistance though, particularly around identifying the viewport size, scale, and resolution of a website. To remedy this, Apple invented the viewport meta tag.

Using the viewport meta tag with either the height or width values will define the height or width of the viewport respectively. Each value accepts either a positive integer or keyword. For the height property the keyword device-height value is accepted, and for the width property the keyword device-width is accepted. Using these keywords will inherit the device's default height and width value.

For the best results, and the best looking website, it is recommend that you use the device defaults by applying the device-height and device-width values.

<meta name="viewport" content="width=device-width">

To control how a website is scaled on a mobile device, and how users can continue to scale a website, use the minimum-scale, maximum-scale, initial-scale, and user-scalable properties.

The initial-scale of a website should be set to 1 as this defines the ratio between the device height, while in a portrait orientation, and the viewport size. Should a device be in landscape mode this would be the ratio between the device width and the viewport size. Values for initial-scale should always be a positive integer between 0 and 10.

<meta name="viewport" content="initial-scale=2">

The minimum-scale and maximum-scale values determine how small and how large a viewport may be scaled. When using minimum-scale the value should be a positive integer lower than or equal

to the initial-scale. Using the same reasoning, the maximum-scale value should be a positive integer greater than or equal to the initial-scale. Values for both of these must also be between 0 and 10.

```
<meta name="viewport" content="minimum-scale=0">
```

Generally speaking, these values should not be set to the same value as the initial-scale. This would disable any zooming, which can be accomplished instead by using the user-scalable value. Setting the user-scalable value to no will disable any zooming. Alternatively, setting the user-scalable value to yes will turn on zooming.

Turning off the ability to scale a website is a bad idea. It harms accessibility and usability, preventing those with disabilities from viewing a website as desired.

```
<meta name="viewport" content="user-scalable=yes">
```

Viewport Resolution **-** Letting the browser decide how to scale a website based off any viewport scale values usually does the trick. When more control is needed, specifically over the resolution of a device, the target-density dpi value may be used. The target-density dpi viewport accepts a handful of values including device-dpi, high-dpi, medium-dpi, low-dpi, or an actual DPI number. Using the target-density dpi viewport value is rare, but extremely helpful when pixel by pixel control is needed.

```
<meta name="viewport" content="target-density dpi=device-dpi">
```

Combining Viewport Values **-** The viewport meta tag will accept individual values as well as multiple values, allowing multiple viewport properties to be set at once. Setting multiple values requires comma separating them within the content attribute value. One of the recommended viewport values is outlined below, using both the width and initial-scale properties.

```
<meta name="viewport" content="width=device-width, initial-scale=1">
```

Since the viewport meta tag revolves so heavily around setting the styles of how a website should be rendered it has been recommend to move the viewport from a meta tag with HTML to an @ rule within CSS. This helps keep the style separated from content, providing a more semantic approach.

Currently some browsers have already implemented the @viewport rule, however support isn't great across the board. The previously recommended viewport meta tag would look like the following @viewport rule in CSS.

```
@viewport {
  width: device-width;
  zoom: 1;
}
```

An important aspect to responsive web design involves flexible media. As viewports begin to change size media doesn't always follow suit. Images, videos, and other media types need to be scalable, changing their size as the size of the viewport changes.

One quick way to make media scalable is by using the max-width property with a value of 100%. Doing so ensures that as the viewport gets smaller any media will scale down according to its containers width.

```
img, video, canvas {
  max-width: 100%;
}
```

5. Conclusions

Applications specially designed for shopping on the smartphone or the parcel shelf are not yet very popular. Research has shown that the main purpose of the more consumers is to find the most advantageous commercial offer using the search engines. No thought of wanting in particular to become loyal to a brand or an online stores through the use of dedicated applications only for them.

In conclusion, mobile e-commerce can be one of the most intelligent strategic move which can be made in online to increase conversions and of business!

Technology infrastructure for m-commerce includes wireless communication technology, wireless middleware technology, information exchange technology, wireless network & application protocols and mobile security technology. Essentially, these are the core technological components and infrastructures that enable mobile users in their environments.

Most mobile commerce services to date have focused just on an individual retailer or the actual shopping/ transactional experience. Such an approach is too narrow; consumers are much more likely to adopt holistic mobile commerce propositions that help them travel to and from the retailer and undertake many other activities during an outing to a town or destination retailer. Mobile commerce services should support the preparations, the outward journey, in store interactions, transactions, post transactions and return travel and set the stage for the next journey. That implies that a mobile commerce proposition needs to support a wide array of different services, potentially using a range of capabilities and technologies. Furthermore, mobile operators, retailers, banks, commercial organizations and industry associations need to work together to define a consistent transactional journey, so that consumers and retail staff don't have to adapt to multiple processes to make payments, redeem vouchers and accumulate loyalty points in merchant outlets. That implies they should use standards wherever possible and work with appropriate organizations to identify where new standards are required. The provision of a core set of capabilities will stimulate innovation.

References

1. *Deepu Saini and Dr. Vijay Singh Rathore "Study & Analysis of Secured E-Commerce Transactions Information ProtocolsPurchasing Order". IJCSMS- Vol. 12, Issue 03, September 2012 ISSN (Online): 2231 –5268*
2. *Niranjanamurthy M, Kavyashree N, Mr S.Jagannath "MCOMMERCE: SECURITY CHALLENGES ISSUES AND RECOMMENDED SECURE PAYMENT*
3. *http://www.cs.ccsu.edu/~stan/research/mcommerce/mcommercetechnologies-web.pdf*
4. *Okazaki, S., "Mobile advertising adoption by multinationals: Senior executives' initial responses," Internet Research: Electronic Networking and Applications, Vol. 15, No 2: 160-180, 2005.*
5. *Petty, R. D., "Wireless Advertising Messaging: Legal. Analysis and Public Policy Issues," Journal of Public. Policy and Marketing, Vol. 22, No. 1: 71–82, 2003.*
6. *https://www.barclayscorporate.com/content/dam/corppublic/corporate/Documents/research/Future-of-m-commerce.pdf*
7. *Brynjolfsson, Erik, Yu Jeffrey Hu, and Mohammad S. Rahman. 2013. "Competing in the Age of Omnichannel Retailing." MIT Sloan Management Review 54 (4).*
8. *International Journal of Electronic Commerce, Vol. 8, No. 3: 65-78, Spring 2004.*