

# Mobile Commerce Applications and Adoption

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## INTRODUCTION

The potential advantages of mobile commerce applications have been discussed extensively in the recent literature, with many industries offering mobile services. Examples from the financial sector include instant funds transfer (mobile banking) and share trading (mobile brokerage). Commuter services such as sending schedule change alerts or using a mobile phone to pay for parking have become widespread. Applications based on the location of the user (e.g., offering mobile coupons to customers in the vicinity of a shop or a restaurant) are also being trialled (Barnes, 2002; Siau, Lim, & Shen, 2001; Varshney, Vetter, & Kalakota, 2000).

Despite the potential benefits (for example, improved customer service) mobile commerce applications have not been widely adopted across business sectors. Mobile banking illustrates the point: initially, seen as the “killer application” of mobile commerce (Kannan, Chang, & Whinston, 2001), it has now been termed a “dead end” (Semrau & Kraiss, 2001). It has also been classified as an application which has not yet matured (Mallat, Rooi, & Tuunainen, 2004). However, innovative applications continue to emerge, for example, breaking news alerts (CNN, n.d.), and a mobile tutoring service (Butte, 2004). It has become important therefore to identify the determinants of mobile commerce adoption and the emerging adoption patterns.

A significant number of results in this area have been reported in the literature. Recent examples include studies of mobile services adoption in areas characterized by relatively high penetration of mobile devices—such as Denmark (Constantiou, Damsgaard, & Knutsen, 2004), Singapore (Samtani, Leow, Lim, & Goh, 2004), and Finland (Carlsson, Hyvonen, Repo, & Walden, 2005). The identified drivers and inhibitors of mobile commerce adoption can be broadly classified as factors related to mobile infrastructure access, and factors relating to perceived consumer value. This article proposes a mobile commerce reference model which incorporates both infrastructure access and customer value and can be used to formulate research questions related to mobile commerce adoption.

The remainder of the article is organized as follows: first, mobile commerce is defined and compared to elec-

tronic commerce. The next section introduces a mobile commerce reference model and discusses mobile commerce adoption. The article continues with a review of future trends and a brief conclusion.

## BACKGROUND

The definitions of mobile commerce (m-commerce) found in the literature such as the one suggested in Varshney et al. (2000), emphasize the use of mobile telephony and a handheld device to execute transactions with monetary value (i.e., exchange of funds for goods and services). M-commerce services are offered to subscribers only.

Turban, Lee, and Viehland (2004, p. 399) classify m-commerce as a subset of electronic commerce (e-commerce). However several features of m-commerce are either not found, or are not strongly manifested in e-commerce. These include “ubiquity”—which allows the user to interact with a mobile application anywhere, even when travelling or moving (Schneiderman, 2000, p. 1); “localization”—the ability of an application to offer a service specific to the location of the customer (Köhne, Totz, & Wehmeyer, 2005) and “personalization”—the ability to tailor an m-commerce activity according to a customer profile, and use the subscriber’s account for payment (Siau et al., 2001).

The m-commerce characteristics described above (ubiquity, localization, and personalization) and the profile of the potential m-commerce user as a paid mobile network subscriber provide the grounds on which to differentiate between e-commerce and m-commerce. In this article, m-commerce is defined as a value-added service that enables mobile users to conduct reliable and secure transactions through specifically-designed mobile applications. The definition implies that a company or an organization offering a mobile service needs to develop and implement an appropriate business model which will incorporate the value proposition of the service, the revenue model, and the interactions of the company with business partners, suppliers and customers (Veijalainen, Terziyan, & Tirri, 2003).

## MODELLING M-COMMERCE ADOPTION

Even the most innovative and creative mobile application or service will only be commercially successful if brought to customers through a business model that clearly focuses on the added value generated and offered by the application or service. Furthermore, the adoption of the application will depend on additional factors such as whether it is accessible from all locations, or whether it depends on the specific features of the handheld device—(e.g., WAP functionality or a small screen). General factors such as security awareness, privacy, and trust concerns might also play a role (Giaglis, 2005; Lin, 2004). To be viable, an m-commerce business model needs to:

1. Take full advantage of user mobility.
2. Offer services which would be either unavailable or prohibitively expensive if offered by means of e-commerce or brick-and-mortar commerce.
3. Offer services overcoming drawbacks caused by security and privacy related issues.

The degree to which the requirements above are met will influence the adoption of a particular m-commerce application and will act as a viability determinant of the associated business model. The investigation of the process of value creation and subsequent adoption needs to consider both technological and social factors (Carlsson et al., 2005; Pedersen, Methlie, & Thorbjornsen, 2002) and needs to include the different players involved: network providers and operators, content contributors and aggregators, portal hosts and application developers. One of the approaches is to consider the interactions among the players and their roles in the value chain model of m-commerce (Barnes, 2002, 2003).

## A REFERENCE MODEL FOR M-COMMERCE

The value chain approach breaks down m-commerce into a structured chain of entities with associated “actors” and allows the researcher to identify easily and conveniently the companies and organizations involved in creating mobility-related value (Barnes, 2002; Buellingen & Woerter, 2004; Olsson & Nilsson, 2002; Siau et al., 2001).

The reference model (Figure 1) places together the players involved in the value chain, and captures the features of technologies, applications and services related to m-commerce. It incorporates three basic layers: an infrastructure layer (devices and networks), an interface

layer (mobile middleware and platforms), and a business layer (services, content, application-based business models). Direct interactions with subscribers/customers occur mostly at the infrastructure and business layers where the value chain players act as enablers and direct providers, respectively. At the interface layer, the actors perform the role of intermediaries. The layered structure complies with the m-commerce definition in the previous section and enables the systematic investigation of the processes of value-creation across the m-commerce value chain. The model can be used to develop evaluation criteria and study m-commerce applications and their adoption within an industry segment, at national or at a regional level.

Other proposed approaches towards conceptual modelling of m-commerce include the bundled value proposition (Anckar & D’Incau, 2002), the open-plane framework (Varshney & Vetter, 2002), the reference model for m-commerce applications (Stanoevska-Slabeva, 2003), and extended three-dimensional models (Chen, Lee, & Cheung, 2001; Tarasewich, Nickerson, & Varkentin, 2002). The reference model introduced above is somewhat similar to Stanoevska-Slabeva’s and Varshney and Vetter’s models but is more comprehensive.

Figure 1. A reference model for m-commerce

<b>Business layers</b>		
Companies and organizations interact indirectly with customers (consumers of mobile services and end-users of mobile applications)		
7	Business Model	Companies/organizations offering an m-commerce application to customers (direct providers)
6	Mobile Content	Companies/organizations providing or developing content for the application (intermediaries)
5	Mobile Service	Companies/organizations offering the application to the customer, or providing a related service (intermediaries)
<b>Interface layers</b>		
Companies and organizations mostly interact indirectly with users (consumers of mobile services and applications)		
4	Application Platform	Developers of portals, integrators, and/or network providers (enablers)
3	Mobile Middleware	Developers of general purpose middleware or specialized consortia (include network providers and device manufacturers).
<b>Infrastructure layers</b>		
Companies and organizations interact directly or indirectly with subscribers		
2	Mobile Device	Manufacturers and vendors
1	Mobile Network	Providers and vendors (enablers)

Layers                      Players in the value chain (enablers, direct providers, intermediaries)

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