

From Electronic to Mobile Commerce

Opportunities through technology convergence for business services

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Mobile commerce is gaining increasing acceptance. The need for mobility is a primary driving force behind mobile banking, mobile entertainment and mobile marketing, and is supported by an ever increasing convergence of computers and mobile telecommunication devices. This article examines the conceptual background and existing regulatory framework of this relatively new business field, in order to provide a systematic and comprehensive understanding of m-commerce, including its utility for both consumers and service-providers, so as to make them aware of the new business opportunities arising out of this convergence.

Introduction

Mobile commerce (m-commerce) has staged a remarkable comeback. Rising from the ruins of a failed first stint, it has surprised many pundits busy writing its obituaries. Mobile services have registered impressive growth in preceding years and m-commerce is slowly but surely showing signs of a healthy recovery.

According to the European Information Technology Observatory (EITO), the total amount of revenues generated by Mobile Internet and Mobile Content services together, were reported to be less than • 9 million in the whole of Western Europe in 2001.¹ Just two years later, revenues in Germany alone had registered an impressive growth to reach • 280 million.² In the same year m-commerce turnover in Great Britain was reported to be • 212 million and in France • 127 million.² These revenues were generated primarily by paid-for services sold to subscribers of mobile phones. Demand for certain mobile financial services in Germany jumped up to 92 per cent of bank customers with some 75 per cent of them willing to pay for them.³

The reasons for these developments can be traced back mainly to technology innovations, like faster data transmission technologies and better mobile devices equipped with improved computing capacity, enhanced data storage and better user-interface. Some other factors, like the increasing penetration of society by mobile phones and the integration of world economies have also increased the need for mobility.³ The high availability of mobile Introduction phones, which is greater than that of computers in most countries, is leading to concepts of new, innovative mobile services, collectively described as m-commerce.

M-commerce is a by-product of the technology convergence of information technology (IT) with telecommunication technologies (TCT). Together they are referred to as information and M-commerce may be thus regarded as an extension of electronic commerce (ecommerce) to wireless media. This convergence, however, enables some unique, location-based services, hitherto not possible in e-commerce. These innovative services are made possible by the convergence of these two technologies.

Today, the scope of m-commerce encompasses almost every walk of life. Mobile services are reported in the fields of content, entertainment, travel, banking and marketing. The second section of this article undertakes a comprehensive examination of the conceptual background to clarify the connection between m-commerce and related fields.

The third section provides an overview of different mobile services and m-commerce applications. The fourth section presents a case study of an innovative approach to deal with technology convergence by adapting web-based applications to mobile platforms. The fifth section deals briefly with regulatory issues and the sixth contains a short summary.

Understanding m-commerce

In order to understand the convergence of e-commerce and m-commerce it is imperative to understand the conceptual background of these and other related terms such as electronic business (e-business) and mobile business (m-business). It is therefore useful to establish working definitions of the terms “commerce” and “business”, for they seem to have transcended their dictionary meanings and acquired new significance since the advent of the Internet economy. We further differentiate between the terms “electronic” and “mobile”, to clarify the respective concepts by showing their similarities and highlighting their differences.

“Business” versus “commerce”

The term “commerce” in this article refers to the sale and purchase of goods and services in both business and consumer segments and to activities directly related to such transactions. Examples of such activities are marketing measures and after-sales services. The related activities are included so as to take into account that not each and every transfer of ownership or rights to use a good or service may necessarily trigger a monetary transaction.

The term “business” in this article refers to all activities undertaken by a firm in order to produce and sell goods and services. These activities are, thus, not exclusively of a “commercial” nature, because they include other processes such as procurement, production, customer relationship management (CRM) and human resources management (HRM).

The term “commerce” is hence seen as an integral subset of the broader term “business”. In accordance with this approach, m-commerce is regarded as a subset of m-business.^{4,5} E-commerce is correspondingly seen as an integral subset of e-business.

“Electronic” versus “mobile”

The adjective “electronic”, used within the specific contexts of “e-business” or “e-commerce”, signifies an “anytime access” to business processes. The access to computer networks is in this case stationary. The services are therefore not completely independent of the current geographic location of the user.⁶

The adjective “mobile”, used within the specific contexts of “m-commerce” or “m-business”, signifies an “anytime and anywhere access” to business processes. The access takes place using mobile communication networks, making the availability of these services independent of the geographic location of the user.⁶

At this point it would be also helpful to differentiate between the terms “mobile” and “wireless”. As opposed to the term “mobile” that signifies an “anytime and anywhere” access to computer-mediated networks, “wireless” is just a method of communication between electronic devices, e.g. with the help of infrared interfaces. Whereas a mobile device is *per se* wireless, not every wireless device may be suitable for feasible mobile applications.⁷ For example, wireless local area networks (WLAN), with their limited maximum range of 300 metres, cannot support feasible mobile applications.

Defining e-Commerce

A simple definition of e-commerce describes it as “the buying and selling of products and services over the Web”.⁸ However, there are several definitions of e-commerce in circulation, emphasizing different aspects. Prevailing definitions may be divided into two primary categories. The first category works with a narrow, restrictive definition, requiring the whole transaction to take place in electronic form and having a monetary character. For example, the German Federal Statistical Office is reported to use the following definition: “Transactions are regarded as e-commerce, when the offer as well as purchase or the actual availing of a product or service is carried out in electronic form, using a computer-mediated network against monetary payment”.⁹

This definition, however, seems to be too restrictive as it does not recognize the fact that just some parts of a transaction might be carried out electronically without having to process all the steps of a value-chain in that form. Further, the emphasis on the monetary character ignores the commercial nature of marketing measures (e.g. transactions carried out with the intention of selling a product or service) and after-sales services (e.g. transactions carried out in continuation of a preceding monetary transaction).

The second category works with a broader definition of e-commerce, as can be seen in the definition used by the US Bureau of the Census, which defines e-commerce as “any transaction completed over a computer-mediated network that involves the transfer of ownership or rights to use goods or services... Completed transactions may have a zero price (e.g. a free software download)”.¹⁰ Also according to the Organization for Economic Cooperation and Development (OECD), it is the method used to place or receive an order, not the mode of payment or the channel of the delivery that determines whether a transaction is considered as an e-Commerce transaction.¹¹

Thus the primary criteria for e-commerce are:

- The at least partially electronic form of a transaction; and
- The transfer of ownership or rights to use a good or service, whether against monetary payment or otherwise.

Defining m-commerce

M-commerce is sometimes referred to as “mobile e-commerce”¹², 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.¹³ One definition of m-commerce describes it as “any transaction with a monetary value that is conducted via a mobile telecommunications network”.¹⁴ 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)”.¹⁵

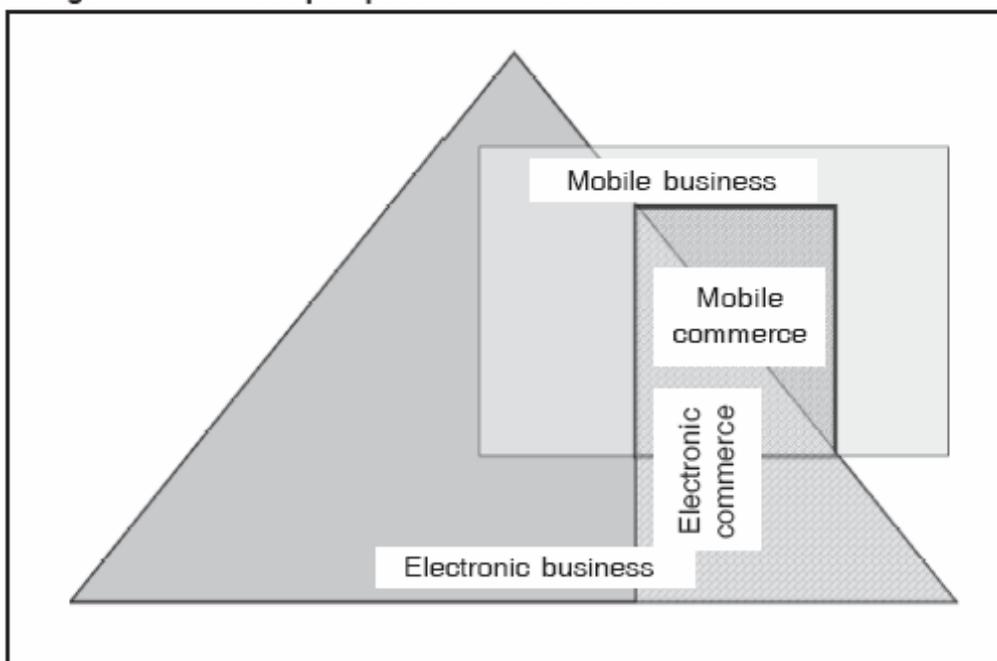
These definitions, formulated in the initial phase of m-commerce, do not seem to be appropriate today, even when they provide useful insights for understanding m-commerce. It is therefore essential to formulate a new definition of m-commerce that takes all of the above-discussed factors into account. This article accordingly defines m-commerce as “any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access to computer-mediated networks with the help of an electronic device.”

As shown above, m-commerce is closely related to e-commerce, since the services offered in both variations are handled electronically by computer-mediated networks and accessible via telecommunication networks. The only difference is that in m-commerce the telecommunication networks are accessed through mobile electronic devices. There exist two different paradigms covering the relationship of m-commerce to e-commerce. The first paradigm classifies m-commerce simply as an extension of e-commerce; the second paradigm regards m-commerce as an independent business field and consequently as an alternative mechanism to e-commerce. That each of these approaches is principally right and yet too one-sided, can be derived from the following facts:

- Many of the services offered by m-commerce may as well be availed of using “immobile” (stationary) Internet, e.g. purchasing tickets to a football match.
- M-commerce opens new business opportunities by enabling innovative, location-based services (LBS) that the “immobile” Internet cannot offer. For instance the location of the nearest Automatic Teller Machine (ATM) in real time can only be provided by determining the current geographic position of the user.

An exclusivist approach is therefore erroneous and what we rather need is an integrative, holistic approach, as shown in Figure 1.

Figure 1: A holistic perspective of m-commerce



Characteristics of m-commerce

1. 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.

Features of m-commerce

M-commerce is characterized by some unique features that equip it with certain advantages against conventional forms of commercial transactions, including e-commerce.^{14, 4}

- **Ubiquity.** Ubiquity means that the user 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.
- **Immediacy.** Closely related to ubiquity is the possibility of real-time availment of services (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 (the “always-on” feature). This feature brings convenience to the user, as time-consuming dial-up or boot processes are not necessary.

- **Pro-active functionality.** By virtue of its ability to be immediate, local and personal, 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.
- **Simple 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.

Mobile applications and methods of payment

Individual mobile services of similar nature can be bundled into an application, e.g. mobile ticketing or mobile banking. In the following we present a brief overview of diverse m-commerce applications (Table 1).

Mobile banking. This application makes it possible to complete bank-related transactions, e.g. checking account status, transferring money and selling stocks, via mobile devices, independent of the current user location.

Mobile entertainment. This application contains services that provide the user digital data with entertainment value on mobile devices, e.g. ring-tones, music and videos, on the one hand. On the other hand, it opens an array of interactive services, e.g. betting, gaming, dating and chatting.

Table 1: M-commerce services and applications

M-commerce applications	
Application	Examples of services offered
Mobile banking	<ul style="list-style-type: none"> • Mobile accounting • Mobile brokerage • Mobile financial information
Mobile entertainment	<ul style="list-style-type: none"> • Mobile gaming • Download of music and ring tones • Download of videos and digital images • Location-based entertainment services
Mobile information services	<ul style="list-style-type: none"> • Current affairs (financial, sport and other news) • Travel information • Tracking services (persons and objects) • Mobile search engines and directories Mobile office
Mobile marketing	<ul style="list-style-type: none"> • Mobile couponing • Direct (context-sensitive) marketing • Organization of mobile events • Mobile newsletters
Mobile shopping	<ul style="list-style-type: none"> • Mobile purchasing of goods and services
Mobile ticketing	<ul style="list-style-type: none"> • Public transport • Sports and cultural events • Air and rail traffic • Mobile parking
Telematics services	<ul style="list-style-type: none"> • Remote diagnosis and maintenance of vehicles • Navigation services • Vehicle tracking and theft protection • Emergency services

Mobile information services. This term refers to mobile services that provide subscribers with content of an informational character. Examples of such services are news updates of any nature (finance, politics, sports, etc.), travel information, access to search engines and mobile office (e-mails, appointments, etc.).

Mobile marketing. This term refers to services based on mobile communication technologies that provide firms with new, innovative instruments, e.g. to increase sales, win and retain customers, improve after-sales services, build and sustain a positive and modern image/brand and carry out market research. Mobile devices serve thereby as simple and relatively inexpensive channels of interaction.

Mobile shopping. This application bundles services that allow for mobile processing of transactions involving purchase of goods of daily use. The user can purchase (mostly standardized) products by choosing them from a catalogue accessible from a mobile device.

Mobile ticketing. All services that must be paid for before a lawful utilization can take place are suitable for mobile ticketing, e.g. travel by public transport, and entry to a cultural event or cinema. This application ensures that the user can purchase a right to utilization / entry (ticket) via a mobile device, replacing the conventional paper ticket. The ticket is sent in digital form to the mobile device.

Telematics services. Telematics is an artificial term that refers to innovative technologies that link telecommunication technologies with informatics. The transport segment has been the primary area of this application, which is also known as an Intelligent Transport System (ITS). The main services are navigation systems, remote diagnosis and access to other mobile applications, such as mobile entertainment, mobile content/office, mobile banking and mobile shopping.

Payment mechanisms for utilizing mobile services

Having described various m-commerce applications, we now look at the payment mechanisms required for availment of these applications. There are a number of such mechanisms:

Payment by credit card: In this method, the charges for services are billed against the credit card of the subscriber. The subscriber can inform the service provider about his credit card number, e.g. via WAP interface.

Payment against invoice: The subscriber may register himself with the provider and get an invoice for the services that he or she utilizes. The subscriber may pay the invoice either manually or entrust the provider with a standing order for direct debit against the subscriber's bank account.

Payment by prepaid card. The subscriber may buy a prepaid card sold by the provider. Any utilization of offered services is billed against the prepaid card until the amount on the card is exhausted.

Payment by premium SMS. The subscriber may send a SMS to a certain number. This SMS costs a fixed, pre-determined amount that is collected by the network carrier on behalf of the service provider.

Payment via telephone bill. A comfortable way of paying for mobile services is payment via the monthly telephone bill that the network carrier sends to each subscriber. The carrier may collect the amount on behalf of the provider against a certain service charge.

Mobile payment: This term refers to payments that are made via mobile hand-held devices in order to purchase goods and services. Mobile payment services usually act as an intermediary between consumer and vendor. Prominent examples of such services are “Mobile Wallet”, a service by T-Mobile, and the “m-pay” of Vodafone. It is a hybrid form of payment that combines elements from other methods of payment, e.g. credit cards, prepaid cards, invoicing and telephone bills.

Both, the customer and the vendor get themselves registered with the payment service. Each subscriber gets an individual PIN to authenticate himself via WAP or SMS, in order to make payments for his purchases. The advantage to the subscriber lies in the fact that he does not need to get himself registered with each individual vendor. The vendor, on the other hand, does not need to worry about the creditworthiness of the individual customer. He may also hope to attract customers who would have liked to pay by mobile means but who were not willing to register themselves with him.

There have been extensive studies about the viability of mobile payments, which have generally confirmed the acceptability of such methods amongst consumers. In the following, we introduce the findings of a representative study¹⁶ carried out at the University of Augsburg in Germany, and involving about 4,400 participants. Over 80 per cent of survey participants were willing to accept mobile payment. An overwhelming majority (96 per cent) of the willing participants gave privacy of personal data as one of the reasons for their decision. Other cited reasons were the simplicity of the method (93 per cent) and lower or nil transaction costs (92 per cent). The transaction costs seem to be an important criterion for the acceptability, as over 37 per cent of the surveyed persons were willing to use mobile payment only if it had no transaction costs, another 19 per cent were willing to pay a fee of up to • 2.50 a year for utilizing such services, and a further 36 per cent up to • 5.

The study found that mobile payment is preferred primarily for smaller amounts (micro payments). There is no clear-cut definition of the term “micro payments”; opinions range from • 2.50 to • 0. Nonetheless, over 71 per cent of the participants of the Augsburg study were willing to make use of mobile payment for amounts between • 2.50 and • 50. It may be therefore contended that the mobile payment methods have come to enjoy acceptability, paving way for m-commerce applications. The limitation of micro payments must, however, be kept in mind while designing an application.

Case study: Business opportunities in technology convergence

This section describes how technology convergence may be utilized to find new business opportunities. We present a case study of *Sevenval AG*, a Cologne-based software firm providing innovative (browser-based) solutions for e-business and m-business. Its product “Sevenval FIT Mobile”, (FIT = Filtering Integration Technology), which converts web-based applications into mobile solutions, is reportedly in use at *Deutsche Postbank AG* and several others. The following data are based on information provided by *Sevenval AG* as well as our own research.

This firm, with its 40-member team, provides an innovative middleware solution for mobile business. The “Sevenval FIT Mobile” converts “an existing Internet presence into an application for mobile devices”. The main advantage of such a solution is that the customer does not need to undertake any technical modifications on existing software. According to information provided by *Sevenval*, existing websites can be thus converted into suitable formats for mobile devices within a few man days.

The idea behind FIT Mobile is as simple as it is ingenious. On receiving a request from a mobile device, the FIT middleware interprets the request, retrieves the data, including complex processes and security mechanisms, from the existing Internet applications and transforms it into a suitable mobile format. “Processes, graphics and images are thereby automatically adapted to the respective capabilities of the display and browser in use.” FIT Mobile can work with all popular mark-up languages, mobile formats and web technologies, e.g. HTML or WML. It recognizes the mobile device and automatically renders the content in an optimized format. For this purpose, *Sevenval* claims that it maintains and regularly updates a database containing technical specifications of over 7,000 mobile phone models from across the world. This feature of the *Sevenval* solution has been the serious constraint of finding suitable mobile phones. This ensures that mobile banking software does not have to be updated each time a new mobile phone model comes out; an entry of technical specifications in the database would suffice.

This solution seems to be gaining fast popularity. *Sevenval* can meanwhile boast of several top clients in various sectors. Prominent clients in the field of mobile banking include *Postbank*, *comdirect bank*, *Norisbank* and *VR-Networld*.

Regulatory framework of m-commerce

M-commerce, like e-commerce, requires transparent and clear regulations as the contracting parties do not necessarily know each other and there is hardly, if any, face-to-face contact while negotiating an agreement.¹⁷ This anonymity makes many potential customers suspicious of electronic transactions. Their worry about the privacy and safety of personal data (e.g. credit card information) and its potential misuse is well-known. The contracting parties should therefore be able to count upon the law, where required, to enforce the provisions of contracts concluded using mobile electronic devices. Further, the customer should be able to trust that his personal privacy is always maintained.

A clearly defined regulatory framework is hence indispensable to boost consumer confidence and to increase acceptance amongst broad sections of the society as well as to ensure smooth functioning of m-commerce. Being a relatively new phenomenon, however, it has not yet attracted the attention of lawmakers in most countries as an independent business field. Its transactions are usually governed by e-commerce regulations, supplemented by telecommunication laws.¹⁸ Many of these regulations have their origins in multilateral treaties, such as those of the European Union (EU) or the United Nations Organisation (UNO). Also other international organizations, such as the OECD, the World Trade Organisation (WTO) and the World Intellectual Property Organisation (WIPO) have been involved in formulating regulatory frameworks. It may, hence, be reasonably assumed that the regulatory concepts in principle have an international character, even if the degree of regulations might differ across nations.

Law regime in EU

The EU has provided a guideline on regulatory framework for e-commerce by the virtue of its Directive 2000/31/EC. It has issued 12 directives stipulating the regulatory framework for legally-binding electronic contracts, determination of jurisdiction, consumer- and data protection, protection of intellectual property rights (IPR), dispute resolution, cyber crimes and taxation regimes among others, to ensure legal certainty. Its directives lay down the regulatory framework for member countries while ensuring compliance to international treaties such as the “Model Law on Electronic Commerce” passed by the United Nations Commission on International Trade Law (UNCITRAL).

The legal regulations imposed by the lawmaker intend to safeguard and balance both consumer and business interests by setting rules and regulating the usage of existing and emerging technologies. Regulations applicable to m-commerce are generally guided by five principles:

1. Legal enforceability of contracts;
2. Consumer protection;
3. Privacy of data (no unnecessary or unauthorized data collection);
4. Confidentiality of data (protecting authorized data from misuse); and
5. Right of self-determination (to carry out or reject a communication).

Legal enforceability of contracts

A contract is legally binding when both the contracting parties make legally admissible, mutual and corresponding declarations of intent, i.e. the quotation by a prospective customer for acquiring a good or service and the acceptance thereof by the vendor. In addition, for electronic and m-commerce the following specifications apply:

- The declaration of intent by the customer via electronic means is legally admissible, provided it is carried out by an unambiguous and deliberate act, e.g. reconfirmation of an order by sending an affirmation code via SMS to the vendor.
- Electronic contracts may be revoked, and the purchased good returned, by the customer within 14 days of the agreement without specifying any reason. This regulation however does not apply for nondurable goods (e.g. food items) or mediums of data storage that might be copied (e.g. unsealed copies of audios, videos or software).
- The vendor must inform the customer about the final price of a good or service including all taxes and other costs. Exceptions are allowed only while dealing with business customers.
- In case of violation (e.g. failure to inform the customer of his right to return the good within 14 days) the contract is deemed null and void and the good may be returned at any time.
- International transactions are governed by two different principles. All the commercial transactions taking place in the business-to-business (B2B) segment are governed by the “country of origin” principle, i.e. the transactions are subject to the regulations of the country in which the vendor is located. Commercial transactions in the business-to-consumer (B2C) segment, on the other hand, are governed by the “country of destination” principle, i.e. the transactions are subject to the law of the country in which the consumer is residing.

Consumer and data protection

The protection of the private sphere of the consumer and the prevention of unauthorized use of personal data have been of primary concern for the lawmaker in order to safeguard public interest on the one hand and to increase the consumer confidence in the electronic form of commerce, on the other. For this purpose several stringent regulatory norms have been put in force, as, for example:

- Personal data may be collected, processed or used only with the explicit consent of the user.
- If the user is offered the choice to give his consent electronically, the vendor must guarantee that such consent can only be given by an unambiguous and deliberate act and the text of such consent can be accessed at any time by the user.
- The consent may be withdrawn by the user at any time.
- Personal data cannot be processed for any purpose other than for which it has been explicitly collected.

Categories excluded

Some of the very few categories for which EU member states are authorized by the virtue of the EU directive on Electronic Commerce (2000/31/EC Article 9 § 2) to prohibit conclusion of contracts by electronic means are:

- Contracts that create or transfer rights in real estate, except for rental rights.
- Contracts requiring, by law, the involvement of courts, public authorities or professions exercising public authority, e.g. notaries.
- Contracts governed by family law or by the law of succession.

This discussion shows the legal framework governing e- and m-commerce in Germany. The framework principles, however, are as discussed earlier of international character and relevant not only within the geographic boundaries of the Federal Republic of Germany.

Summary

The discussion above has shown that m-commerce, resulting from the convergence of IT and TCT, provides many value-added services to a customer on the move and therefore possesses significant business opportunities for the providers of such services. Conceptualizing and developing “anytime, anywhere” mobile services presents, simultaneously, a challenge and an opportunity for vendors from diverse industries. For instance, services such as those of mobile entertainment are branch-independent and may also be offered by small and medium-sized enterprises (SMEs). Other services such as mobile banking are more interesting for specialized firms such as banks and other financial enterprises.

More specifically, a vast field of business opportunities is about to be created for technology providers who could offer mobile solutions to service providers. SMEs from related technology fields may be ideally positioned as they possess competitive advantage by virtue of flexibility and specialization.

References

1. EITO, 2002. *European Information Technology Observatory 2002*, Edition 10, World Wide Web: <http://www.eito.com>, Last retrieved 17.04.2006.
2. EITO, 2004. *European Information Technology Observatory 2004*, Eurobit, Frankfurt am Main.
3. Tiwari, R., Buse, S. and Herstatt, C., 2006. *Customer on the Move – Strategic Implications of Mobile Banking for Banks and Financial Enterprises* in, “CEC/EEE 2006, Proceedings of The 8th IEEE International Conference on E-Commerce Technology (CEC/EEE’06)”, San Francisco, pp. 522-529.
4. Buse, S., 2002. Der Mobile Erfolg – Ergebnisse einer empirischen Untersuchung in ausgewählten Branchen, in Keuper, F. (Eds.): *Electronic Business und Mobile Business*, pp. 91-117, Gabler, Wiesbaden.
5. UNCTAD, 2004. *E-Commerce and Development Report 2004*, United Nations Conference on Trade and Development, New York, NY (a.o.).
6. Hohenberg, H.E. and Rufera, S., 2004. Das Mobiltelefon als Geldbörse der Zukunft - Chancen und Potentiale des Mobile Payment (M-Payment), in *der markt: Zeitschrift für Absatzwirtschaft und Marketing*, Vol. 43, No. 168, 2004/1, pp. 33-40, Vienna.
7. Anckar, B. and D’Incau D., 2002, *Value-Added Services in Mobile Commerce: An Analytical Framework and Empirical Findings from a National Consumer Survey*, World Wide Web: <http://csdl.computer.org/comp/proceedings/hicss/2002/1435/03/14350086b.pdf>, last retrieved, 17.04.2006.
8. Kalakota, R. and Robinson, M., 2002, *M-business: The Race to Mobility*, McGraw-Hill, New York.
9. Fischer, I. 2003, Zur Beobachtung der Entwicklung des E-Commerce, in *Wirtschaft und Statistik*, No. 4, 2003, pp. 318-318, Wiesbaden.
10. Mesenbourg, T. L., 2001, *Measuring Electronic Business*. World Wide Web: <http://www.census.gov/econ/estats/papers/msrebus.pdf>, last retrieved, 17.04.2006.
11. OECD (2002): *Measuring the Internet Economy 2002*. Organisation for Economic Co-operation and Development, Web: <http://www.oecd.org/dataoecd/16/14/1835738.pdf>, last retrieved, 17.04.2006.
12. Zhang, J.J. et al., 2004, Driving Forces for m-commerce Success, in Shaw, M.J. (Ed.): *E-Business Management: Integration of Web Technologies with Business Models*. pp. 51-76, Kluwer, Norwell - Massachusetts.
13. Veijalainen, J. et al., 2003, *On Requirements for Mobile Commerce*, Web: <http://www.esan.edu.pe/paginas/PDF/15veijalamenyotros.pdf>, last retrieved, 17.04.2006.
14. Müller-Veerse, F., 2000, *Mobile Commerce Report*, World Wide Web: <http://www.dad.be/library/pdf/durlacher1.pdf>, last retrieved 17.04.2006.
15. UNCTAD, 2002, *E-Commerce and Development Report 2002*, United Nations Conference on Trade and Development, New York, NY (a.o.).
16. Khodawandi, D., Pousttchi, K. and Wiedemann, D.G., 2003, Akzeptanz mobiler Bezahlverfahren in Deutschland, in Pousttchi, K. and Turowski, K. (Eds.): *Mobile Commerce - Anwendungen und Perspektiven*, Augsburg 2003, pp. 42-57.
17. Wirtz, B.W., 2001, *Electronic Business*. 2. Edition, Gabler, Wiesbaden.
18. Heinemann, A. et al., 2004, *Zur rechtsverträglichen Technikgestaltung anhand einer m-commerce-Anwendung*. World Wide Web: <http://nibbler.tk.informatik.tu-darmstadt.de/publications/2004/mc4.pdf>, last retrieved 11.01.2005.