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**THE POTENTIALS OF MOBILE COMMERCE –
AN ECONOMICS PERSPECTIVE**

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ABSTRACT

The scientific community largely regards mobile commerce as a special case of electronic commerce and thus refrains from treating its economic implications in more detail. However, mobile commerce has a lot of particularities having specific consequences for markets. The article at hand addresses this issue by investigating mobile commerce and its implications from an economics point of view. Hypotheses on how different market actors may be affected are developed based on economic theory.

Keywords: Mobile Commerce, Mobile Telecommunications Market, New Institutional Economics, Network Effect Theory, Attention Economics.

1 Introduction

Since the advent of the New Economy, research in economics developed a vast body of literature analyzing the various specificities of electronic commerce, i.e. of markets where supplier and consumer interact via the internet as an electronic media (e.g. Ng 2003, Zerdick et al. 2001, or Shapiro and Varian 1999). Major phenomena under study were network effects, lock-in, market failure, standardization, disintegration and dis- and reintermediation, revenue models and pricing strategies (e.g. “follow-the-free”), strategic implications (e.g. “co-competition”), or the implications of information goods. Although most of these phenomena had not been completely new, they had lacked broad research focus until then.

While the economic consequences of electronic commerce have been investigated in detail, its mobile descendant has not got similar attention, yet. Instead, current mobile commerce literature mainly focuses on technological concepts (e.g. UMTS Forum 2001) or specific services (e.g. Muntermann 2004) as well as high level business model analysis (e.g. Bouwman 2003 or Faber et al. 2003). At the same time, new questions and problems arise. In recent years the introduction of third generation mobile networks (3G) has been regarded as a major milestone for mobile electronic markets. Now that these networks and services are operational the question that research should aid answering is which opportunities in terms of adequate business models, market strategy or efficiency improvements this infrastructure is offering. In order to support this objective, first and foremost, a deeper understanding concerning the economic underpinnings of mobile communications based commerce should be present.

The article at hand contributes to this issue by systematically analyzing what is different about mobile communications and mobile commerce in comparison with other communications, transaction, and distribution channels. More precisely, the implications of mobile communications for consumer behavior and utility as well as marketing will be investigated. We restrict our analysis to transactions with consumer markets and deliberately omit issues of business process support within or between organizations (e.g. firms or public authorities), i.e. we focus on mobile commerce instead of mobile business. In methodological terms, we conduct a systematic analysis of phenomena and derive hypotheses from that, drawing largely on appropriate economic theory like new institutional economics, among others. Ultimately, this article is to motivate empirical research challenging or validating our hypotheses.

The rest of the paper is organized as follows. First, we define the scope of mobile commerce and mark it off from electronic commerce. Then, we outline the unique characteristics of mobile communications and introduce

three generic market actors who are relevant in our examinations. Following this, each mobile feature is illuminated by means of certain economic theories. Here, approaches like new institutional economics, information economics and network effect theory are sensible owing to the behavioral focus of our study. As a result, we develop a system of theory based hypotheses which are to help better understand consumer behavior as well as offer new business potentials.

2 Investigating Mobile Commerce

Mobile commerce markets are constituted by suppliers of data transfer services as well as content and application services on the one hand and consumers on the other hand. Below, generic roles for these actors are defined which will guide, among others, our later examinations. Subsequently, the particularities of mobile communications systems as well as the existing industry structure are analyzed. Based on these investigations a definition of mobile commerce is developed.

2.1 Market Actors and Roles

Communication between a sender and a receiver is bound to media allowing the exchange of information of various kinds. There are different industries providing these media services, such as print media, television, mobile radio networks or the internet. These channels differ in the purposes which they may be used for, e.g. communication, delivery, or transaction. Different media industries developed specific value chains which coordinate and align market actors to accomplish a specific communication purpose¹.

The term “market actors” relates to a generic role as a set of functions rather than a real market entity. For mobile commerce, being closely related to the mobile telecommunications market, many potential market actors have been identified. For instance, Camponovo and Pigneur (2002) identify *Content Provider*, *Payment Agent*, *Government*, *Network Operator*, *Device Maker* and *User* as relevant market actors while, for instance, Bohlin et al. (2003a) differentiate *Content Provider*, *Operator*, *Customer*, *Retail Store* and *Terminal Manufacturer*. Since our aim is neither the analysis or design of business models nor a supplier focused industry analysis (which may require accounting for regulatory authorities or hardware suppliers) but rather marketing related issues we may restrict our considerations to the following three generic market actors:

¹ For an overview of value chain concepts confer e.g. Zerdick et al. (2001) or Sabat (2002).

- The *service provider (SP)* role comprises a wide range of value chain activities, such as application service provision (i.e. application hosting), or content provision (i.e. development and sale of contents). A more detailed differentiation is not necessary for the context of this examination. Of major importance is, however, the difference to the mobile network operator which will be presented next.
- The *mobile network operator (MNO)* owns and operates the technical infrastructure and is hence the actual enabler for mobile communications. MNOs possess a property right for utilizing radio frequency bands. They act as intermediaries between consumer and service provider while in this context offering mobile service portals (i.e. service aggregation).
- Mobile *consumer* is the role finally utilizing mobile applications and data services with the help of a personal mobile device. The term consumer subsumes the actual customer (the one who will or has conducted an economic transaction) as well as the potential customer (the one who is likely to conduct an economic transaction) relating to a certain service offering.

In order to increase traffic load on its network cooperation with an SP is desirable for the MNO. An SP's products may be conditioned on data provided by the MNO's mobile network (e.g. network based localization or identification of the user). As a consequence of these interdependencies SP and MNO roles are often embodied by a single company or at least strong ties between these actors do exist.

The mobile commerce value chain is competing against other media channels for the monetary budget of the communication partners (SPs and consumers) as well as the attention of consumers. Technological convergence additionally intensifies competition among formerly clearly separated industries. For instance, Digital Video Broadcasting (DVB) allows the mobile distribution of multimedia content and services, thus intruding a domain that has also been chosen as a future market by the mobile telecommunications industry (Figge and Rannenberg 2004). In such media competition the identification of unique characteristics and unique selling propositions that can be offered to potential customers is a serious question which shall be addressed in the next section.

2.2 Unique Characteristics of Mobile Communications

In order to mark off mobile commerce from electronic commerce it is necessary to identify its key characteristics ultimately leading us to a definition as accurate as possible. In the past six years some researchers have

already approached this objective, e.g. Müller-Veerse (1999), Gerpott (2001), Reichwald et al. (2002), Campo-
novo and Pigneur (2003) or Nysveen et al. (2005). Table 1 summarizes their findings revealing a steady percep-
tion of these particularities with only varying applied taxonomies. It also presents our own taxonomy and or-
ganization in the right column.

Table 1 – Characteristics of mobile commerce

	Müller-Veerse (1999)	Gerpott (2001)	Reichwald et al. (2002)	Camponovo and Pigneur (2003)	Nysveen et al. (2005)	Our Organization
Characteristics relating to Communications	Instant Connectivity	Mobility without time delay	Permanent Connectivity	Mobility	Information Accessibility	<i>Place and Time Independence</i>
	Ubiquity		Location Flexibility			
	Reachability		Context Sensitivity		Information Personalization	
	Personalization	Personalization				
	Localization	Localization	--		Information Dissemination	<i>Interaction Capabilities</i>
	--	Multimedia	--			<i>Personal Relatedness</i>
	Security	--	Personal Sphere		--	
Market	--	--	--	Exclusive control over important assets	--	<i>Strong Intermediaries</i>
	--	--	--	Network Effects	--	

As can be seen, the different authors apply different levels of detail. For instance, Camponovo and Pigneur (2003) argue that “mobility may be the most important characteristic of mobile business, because it represents its only distinctive advantage upon which mobile services can build their value proposition”. Their connotation of mobility comprises freedom of movement, ubiquity, reachability, convenience as well as localization and thus can be mapped to the more detailed analyses provided for instance by Müller-Veerse (1999).

All authors identify permanent network access in connection with freedom of movement as a major characteristic which will be adopted by us with the term “place and time independence”. All authors also agree that the availability of context data is a further important aspect of mobile commerce. We refer to this concept by “identity and context detection”. Gerpott (2001) additionally identifies presentation issues (mobile multimedia) which our analysis adopts as “interaction capabilities”. The less technical issue of a one-to-one relationship between

mobile consumers and their mobile device is merely declared by Müller-Veese (1999) and Reichwald et. al (2002). We also consider this aspect as significant and hence include it under the term “personal relatedness”.

In addition to mobile communications related aspects there are also characteristics pertaining to the market. Camponovo and Pigneur (2003) are discussing network effects and exclusive control over important assets in this context. We follow their argumentation but subsume both phenomena under the term “strong intermediaries”. In the following subsections, we elaborate on the five constructs which were just introduced.

2.2.1 Place and Time Independence

Generally, the mobile device offers the possibility of accessing a voice or data network when within a radio cell. Since most MNOs aim at covering a wide area (e.g. a country), this results in a ubiquitous access opportunity. Location independence is therefore a consequence of certain hardware allocation and configuration. Software applicable to such hardware configurations determines the set of applications or services being available to the user irrespective of location. This represents an extension in comparison with non-mobile electronic commerce in which automation and digitization already facilitated the provision of services (usually) at any time but only at places with a physical network access point. Although this was a great improvement as regards flexibility compared to non-electronic commerce, it still had the limitation of a physical location dependent network access point. Since mobile communications offers ubiquitous network access, there are no restrictions as to the location and time of service consumption. Hence, *location and time independence* are usually summarized in one term.

2.2.2 Personal Relatedness

Location independence also implies another important characteristic of mobile commerce. With fixed line telecommunications, the termination point is fixed either (apart from short range cordless telephones, e.g. according to the DECT standard) leading to a logical separation of person and network termination point. With mobile telecommunications, on the other hand, the termination point is portable which allows that the mobile network member is *permanently directly available* to other network members. Since many users regard their cellular phone as a very personal device, like a wallet or a handbag, the device is carried continuously and personal data is entered for personal information management purposes (e.g. contacts or calendar). The strong tie between consumer and device additionally allows gathering personal and contextual data on the consumer (cf.

section 2.2.3). This implies a high amount of personal information on the mobile device and on the MNO's network that in turn allows offering relevant and personal related communications.

The strong relationship between device and user allows a unique implementation of pull and push communications. Mobile push communications can reach consumers at any time and results in the consumer being triggered (e.g. when receiving an SMS for notification purposes) rather than triggering. Simultaneously a marketing related push message bears the risk of being perceived as intrusive and disturbing (Sacharin 2000, pp. 27), as it inherently interrupts the user's activities forcing him to pay attention. Pull communication on the other hand (e.g. when the consumer is starting a mobile portal) sets the consumer in charge, allowing him to schedule marketing communications at times when the consumer is willing to pay attention. These two communications paradigms together with personal information allows to design marketing communications that is highly personal related and therefore assumed as being relevant.

2.2.3 Identity and Context Detection

As already mentioned within the context of personal relatedness mobile communications systems resolve the separation of individuals and network termination points, i.e. each network termination point relates to a real *personal identity*. The possibility of direct *identification* of network termination nodes represents a source of information for SPs, who can now recognize network members. This facilitates new kinds of marketing like one-to-one marketing, mass customization and personalized offerings. In non-mobile electronic commerce, on the other hand, consumer identification is just possible by former manual cooperation of the consumer (e.g. the consumer has to register with an internet portal).

Another unique feature of mobile communications networks is the possibility of *localizing* each network member continuously, provided his device is ready for operation. Identification together with localization allows entailing information that can, up to a certain degree, detect the context of the user. This very specific and time-dependent knowledge about the consumer may be used to anticipate his current preferences and adopt offerings accordingly. The contained information in such context descriptions is only limited by the amount of data available for the specific user. This data can be obtained either by prior transactions with the consumer or by information explicitly revealed by the consumer. However, these profiles require the consumers' cooperation and agreement (Murthi and Sarkar 2003).

Note that context specific offerings may relate to physical goods (e.g. a restaurant offering one's favorite meal), services (e.g. a nearby coiffeur's special offers) or information goods (e.g. an offering for one's favorite music download). As can be seen from the three examples, all kinds of offerings may be location independent or location dependent. In case of location independence context sensitivity relies on other factors (e.g. time of day or personal preferences).

2.2.4 Interaction Capabilities

As is always the case with non-dominant alternatives, there is a trade-off among features. In this case, the aforementioned superiorities have to be purchased with less processing and storage capacity. Similarly, wireless connection data rates are usually lower than with wired connections. Furthermore, because of the necessity to retain a small device, mobile phones lag behind personal computers in terms of presentation as well as input possibilities. This may lower user acceptance or render some internet services inappropriate for smart phones. Finally, owing to portability and size restrictions power supply represents another technological constraint.

These limitations, however, may be partly mitigated by software adaptations (e.g. lightweight software components, format converters, task-centric user interfaces, etc.). Moreover, it has to be stated that mobile phones catch up with traditional personal computers in terms of storage capacity, processing power, and data rates.

Put shortly, the environment affects the set of feasible and sensible use cases. For example, executing banking transactions in a crowded train car may be less sensible for most people owing to the lack of confidentiality. On the other hand, querying a route may be useful in this setting. Another example close to the mobile commerce domain would be voice communications which is superior in some settings (e.g. when speaking is possible) but inferior in others (e.g. in a meeting, messages may be the better mode of communications).

2.2.5 Strong Intermediaries

One of the scarce resources in mobile communications industries is the available capacity within the naturally limited radio frequency spectrum. Radio frequencies are usually allocated exclusively in order to avoid interference, that is only one party has the right to use a certain part of the spectrum. The allocation including us-

age conditions (e.g. license terms, coverage) of these property rights is assumed by regulatory authorities in most countries.

As a consequence, there are few market actors that have an guaranteed property right for offering mobile communications. Applying the market roles defined in chapter 2.1, the number of MNOs is fixed for a certain time period implying a highly concentrated market structure. As, at the same time, the penetration rate of mobile communications in most developed countries is currently around 80% (German Association for Information Technology, Telecommunications and New Media 2004), many MNOs maintain customer relationships with a significant portion of the population.

Since the advent of mobile data communications in the late nineties MNOs are trying to obtain revenues from their ability to transfer data through mobile networks. Mobile service portals were introduced in Europe offering services and applications designed, developed and controlled by the MNOs. As this approach did not result in significant workload and accepted services, the business model underlying the successful i-mode service in Japan was transferred to Europe (Bohlin et al. 2003b). Consequently, the early portals were replaced by a new portal concept associated with the *walled garden* metaphor. The idea is to open mobile service portals to third party service offerings by mainly obtaining revenues from data transfer and leaving the major part of service revenues to the SPs in order to generate network effects. Even though the economic and technical conditions of mobile service provisioning are still controlled by the MNO in principal any party is able to engage in the mobile market.

This situation implies that the MNO is the owner of the customer contact, offers the communication channel, and controls the conditions of mobile service provisioning. This indicates a powerful intermediate role in the mobile commerce setting, as no party is able to communicate with the mobile consumer without the MNO being involved. This leads to the ability to establish technology standards leading to less diffusion inertia (owing to incompatible networks or consumer uncertainty) provided that MNOs coordinate correspondingly.

2.3 Definition of Mobile Commerce

Relying on the foregoing analyses we propose the following definition of mobile commerce:

Mobile commerce comprises (1) all economic transactions along the customer buying process conducted over a (2) portable and personally-related (3) radio network device (4) based on the user's ac-

tive (e.g. transaction inputs) and passive (e.g. context information processing) information provisioning.

In part (1) of the definition we emphasize that mobile commerce may refer to one, several or even all phases of the buying process being conducted over mobile communications systems. The second part (2) expresses the characteristics place and time independence as well as personal-relatedness and (3) describes the medium, i.e., a portable device which is connected to a radio network. Finally part (4) expresses the fact that it is an interactive medium which allows gaining information on the consumer's context with his immediate cooperation.

3 Theoretical Foundation

Neoclassical economics assumes away consumers' as well as suppliers' limited information processing capacities as well as the possibility of irrational behavior. These assumptions rendered economics theory quite impractical for researchers in disciplines like marketing. A comparatively new branch called "new institutional economics" pursues a more realistic approach relaxing both of these assumptions. As our aim is the analysis of the consumer impact of mobile commerce, which requires a realistic picture of human beings, we draw mainly on this theoretical framework. In the following sections we summarize its most important aspects.

3.1 Property Rights Theory and Principal Agent Theory

Property rights theory deals with the allocation of property rights and the resulting economic implications (Coase 1960). An economic transaction thereby represents the process of transferring property rights from one market actor to another. Principal agent theory, on the other hand, analyses situations in which agents are commissioned by principals to execute economic transactions (Jensen and Meckling 1976). Both theories are strongly connected and rely on the assumption that market information is distributed asymmetrically among actors so that no complete contracts may be formed in the case of property rights transfers and no complete information on the agent's actual behavior may be available to the principal (allowing the former to act opportunistically).

As mobile commerce may include the transfer and processing of property rights (e.g. contextual or personal information) both theories can contribute to an economic analysis.

3.2 Transaction Cost Theory

Transaction costs incur while business transactions are executed (e.g. search costs, bargaining costs, contract costs, or control costs) (Williamson 1975 and 1985). These costs are due to limited information processing capacities as well as irrational behavior and may be summarized as costs of institutions like markets, organizations or private consumers. Transaction cost theory explicitly examines these costs as well as the efficiency differences of various institutional arrangements.

In this paper we ask how transaction costs change within the context of mobile commerce. This may include, among others, data transmission costs, search costs, as well as marketing costs.

3.3 Information Economics

In the context of information economics we do not explicitly account for the specificities of information as a good, its implications for markets (e.g. pricing) and its transport, though this is of major relevance in the area of electronic commerce. Instead, we concentrate on information as a factor in consumers' product assessments. If several potential products are at hand for choice people may allow for quality information (including experience), its origin or channel, as well as uncertainties, risks and expectations in their decision calculus². Nelson (1970) and Darby and Karni (1973) were the first to classify products according to the available information on product characteristics before and after purchase. They differentiate three classes of product characteristics: (1) search characteristics are product attributes which may be readily examined prior to purchase, (2) experience characteristics are attributes which are difficult to find out before purchase but only through usage of and experience with the product, and finally (3) the quality of credence characteristics is difficult to observe both before and after purchase.

Information goods are experience goods or credence goods by nature since they cannot be evaluated before purchase or rather before consumption (e.g. reading a book at a bookstore before buying it means consumption before purchase) and sometimes not even after consumption. This generally implies higher uncertainty and possibly higher risks. It is mostly in this context that we ask how mobile commerce goods fall into these categories and how consumers will be affected.

² Of course, there are purchase situations with different consumer evaluation processes, like impulse purchases, in which these rules might be not applicable (Weiber and Adler, 1995, p. 62).

3.4 Network Effect Theory

Network effects usually emerge with system goods, i.e. goods which have a kind of complementary relationship to other goods of the same or another category. Traditionally, literature discriminates direct and indirect network effects (e.g. Katz and Shapiro 1985, Liebowitz and Margolis 1995). With direct network effects consumers' utilities from a network good rises the larger the network. Indirect network effects, on the other hand, relate to complementary goods. Here, the virtual network (i.e. the installed base) of complementary goods is all the more valuable the larger the network.

Network effects are quite important in mobile communications markets owing to a strongly componentized product architecture. For example, a mobile web application requires a mobile phone, a software browser, a mobile radio network, and among other things, the provided content. All these partial products are in a complementary relationship.

3.5 Attention Economics and Attention Economy

Attention economics is not an established economic theory as the previously mentioned concepts. Instead, the works of Becker (1976), Franck (1998) or Davenport and Beck (2001) may be regarded as first steps in analyzing the construct of human attention from an economic perspective. One of the authors' major arguments is that the change from information scarcity to information overload renders human attention as a scarce resource.

The attention concept is applicable for analyzing certain phenomena in nearly all current markets. In times of fierce competition with a high number of brands and products, attention of consumers is crucial and highly valuable from a supplier's point of view. Similar concepts are one-to-one marketing or permission marketing (Godin 1999) yet they presuppose the consumer's given attention.

Construing attention as a scarce measurable and tradable resource, which different actors are interested in differently, leads to the question of reallocation and corresponding markets, i.e. attention markets, such as the advertising market. However, currently these markets just trade consumer contacts which do not guarantee consumer awareness. For mobile commerce this means that owing to the theoretical possibility of addressing the consumer always and everywhere new awareness potentials may be accessible.

4 Economic Implications of Mobile Characteristics

In the following subsections the implications of mobile communications systems characteristics for the aforementioned three market actors shall be worked out based on theoretical principles ending up in a list of hypotheses.

4.1 Place and Time Independence

As elaborated in section 2.2.1 place and time independence is the crucial characteristic of channels based on mobile communications systems. This allows the consumer to immediately engage in a business transaction to fulfill an emerging need or to utilize time. From a transaction costs theory perspective, ubiquitously offering services and products decreases efforts necessary for the consumer to accommodate her or his demand. As transactions can be performed at the most suitable time and place (e.g. while using public transport) the consumer is able to better allocate the available time implying a decreasing effect on opportunity costs of his current activities (Becker 1976, pp. 97).

Another effect may be an increased effectiveness of the SP's marketing instruments owing to their capability of "absorbing" a higher fraction of the consumer's attention. Applying the AIDA-model (Kotler and Bliemel 2001, pp. 891) as an organizing concept for marketing communications reveals the potential. It proclaims the sequence of attention, interest, desire and finally action as the characteristic mental states of the consumer accompanying marketing activities. In case that attention, interest and desire of the consumer have been achieved (regardless whether this happened in a traditional or mobile way) a mobile commerce application allows immediate (re)activity by the consumer. Place and time discontinuities between desire and the final consumer activity, as it frequently occurs in traditional markets, do not mean a hindrance anymore. Proclaiming that these discontinuities normally owe to a certain amount of lost business, the interaction possibilities of mobile commerce directly lead to a higher marketing effectiveness.

In the light of attention economics, the ubiquity of mobile commerce markets is an attention-getting technology (Davenport and Beck 2001, pp. 73). To circumvent effects of decreasing attention caused by increasing information load (as Herbert Simon put it: "A wealth of information creates a poverty of attention") the ubiquity of market information has to be accompanied by compensating attention-structuring and attention-protecting mechanisms.

From this we derive the following hypotheses:

H1.1: Place and time independence decreases transaction costs for consumers compared to other transaction channels. This is due to the ability to perform transactions at the most suitable time and place when spare attention is available and therefore opportunity costs of time spent is minimal.

H1.2: Place and time independence decreases transaction costs for the SPs leading to a higher marketing effectiveness compared to other transaction channels. This is due to the lack of place and time discontinuities between the mental states of the consumer leading from attention to (buying) actions.

4.2 Personal Relatedness

The last section emphasized the relevance of the “availability” property. Availability requires the mobile phone to be considered as a personal device by the consumer. For this attitude the phone has to be portable, adaptable (to the personal preferences and attitudes), and trustworthy, among others. For instance, storing telephone book entries, preferred services, personal internet shortcut lists, as well as authentication data (e.g. credit card numbers) provides extra utility but also bears additional risks (e.g. privacy violation, data abuse). To sum up, the mobile phone is more beneficial for consumers as well as suppliers if it is regarded as a personal device. This, however, requires a certain trust relationship between the consumer and the various suppliers (i.e. SP, hardware supplier, network operator).

Research in technology acceptance and e-commerce support this argument. Extant literature found a strong relationship between perceived trust and acceptance (e.g. Eggs 2001; Pavlou 2003; Gefen et al. 2003; Suh and Han 2003) as well as between personalization and acceptance (Murthi and Sarkar 2003). As the value propositions of mobile commerce largely rely on personal data and context data trust appears all the more relevant. Yet, personal data is not only stored on the mobile phone but also within the MNO’s or the SP’s infrastructure. Not only does this include personal characteristics and preferences but also actual usage data, such as service requests or the consumer’s situation and context (cf. section 4.3). The aspect of personal information processing and trust can be economically modeled with the help of information economics and principal agent theory.

In the terminology of the previous, the consumer reveals personal information which bears the risk of “moral hazard” or “hidden characteristics” by the counterparty, i.e. the data may be used in an unexpected and unwanted way. Note the difference between the quality of the actual service and the quality of information proc-

essing and data protection. The former may be perceived after purchase or consumption (i.e. it is most likely an experience good) the latter may possibly never be found out (i.e. it may be a credence good). This is a general information deficiency of services which always belong to the category of experience or credence goods according to information economics theory. Hence, data handling quality is a matter of credence from a consumer's perspective. Among the set of means of signaling trust (Riley 1979; Eggs 2001) it may be hypothesized that the supplier's size and track record may represent major positive indicators from a consumer's viewpoint. For instance, the current mobile telecommunications industry structure is rather concentrated in many countries making consumers think they are quite trustworthy. The MNOs' property rights with the networks may represent another trust signal since operators may "close" the network, i.e. they have control over who is allowed to offer goods on the network (e.g. by prescribing a common platform). Such a select walled garden strategy is different from the unrestricted internet where many hazards do exist.

In the light of principal-agent theory MNOs and SPs collect a lot of customer data which is subject to data protection rules. This relationship may be modeled according to the principal-agent metaphor. The consumer acts as principal who commissions the operator or SP (the agent) to provide services on condition that privacy and data security requirements are kept. The principal allows the agent to process his individual data in a certain way, i.e. he transfers property rights on his personal data to the agent (Laudon 1996). Costs for signaling trust incur at the part of the agent. Thus, the consumer's utility function as well as the SP's profit maximization calculus has to be extended by signals and signaling costs, respectively.

Altogether, this leads us to the following propositions:

H2.1 Personal relatedness leads to higher consumer marketing acceptance compared to other transaction channels owing to higher perceived trust and higher utility.

H2.2: The positive implications of personal relatedness face costs of trust uncertainty for the consumer owing to the principal-agent relationship with the MNO and SPs resulting from transferred property rights of personal information.

4.3 Identity and Context Detection

Identity and location information originating from the mobile network linked with personal information (explicitly revealed by the consumer) allows the generation of situational profiles describing the current context

of the consumer. Based on these profiles products and services can be tailored to the consumer's context. For the consumer this means that information received through the mobile device may relate to his current situation. Consequently, appointed attention is allocated more efficiently compared to other transaction channel with missing context specificity, i.e. contained irrelevant information (Sacharin 2000). From another perspective this can be expressed by a better ratio of utility and usage time resulting from less necessary mental efforts owing to the selection and assessment of information when using portals and applications (Bucklin and Sismeiro 2003). In terms of transaction costs for the consumer (TC^C) (Zerdick et al. 2001, pp. 40) individualization based on identity and context detection, allows the approximation of preference structures which *possibly leads to a reduction of transaction costs* (Δtc^C).

A similar explanation applies to the SP: acquiring consumer contacts is related with transaction costs (TC^{SP}). In terms of information economics these contacts are experience goods with risk and uncertainty about their quality. Mass media provides no or only highly aggregated information about its recipients leading to actual communication with recipients that are not within the intended target consumer group. With context information the SP is able to minimize the risk of obtaining unwanted customer contacts by pre-selecting them. This leads to decreasing transaction costs for the SP (Δtc^{SP}) and a higher marketing efficiency as for a given marketing budget the ratio of conducted business and user contacts should increase.

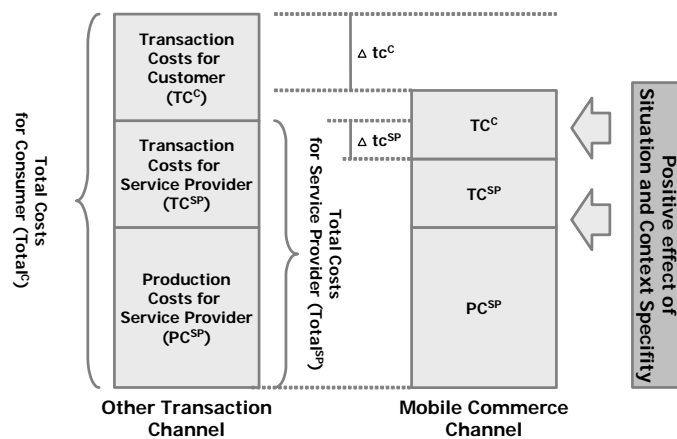


Figure 1 – Transaction cost comparison between mobile and other channels

From this we may hypothesize:

H3.1: Identity and context detection decreases transaction costs for consumers compared to other transaction channels. This is due to the higher need-fit of the interaction.

H3.2: Identity and context detection decreases transaction costs for the SPs leading to higher marketing efficiency compared to other transaction channels. This is due to less spreading losses and a higher accurateness of the targeted customer profile.

4.4 Interaction Capabilities

In section 4.2 the quality uncertainty regarding mobile services including data handling was outlined. Besides information goods mobile commerce may purely act as a channel for, say, the purchase of physical goods. In this case, the major problem is not data protection uncertainty but rather a quality uncertainty from incomplete inspection and evaluation possibilities. Here, the focal good is a search good but the channel turns it into an experience good. For instance, if a consumer wants to purchase a durable, e.g. a dishwasher, by mobile phone he cannot inspect product attributes in detail owing to limited interaction capabilities of the medium. These hypotheses are supported by technology acceptance research which emphasizes the relevance of “ease of use” (Davis 1989, Taylor and Todd 1995). However, this is not a sole problem of mobile devices since mediated information is most often inferior in comparison with direct information. Still, as explained above mobile phones show extraordinary strong interaction limitations.

These drawbacks may be mitigated by MNOs and SPs by credence signals like branding, guarantees, personalization, or “walled gardens”, among others. Moreover, currently introduced broadband networks and multimedia-enabled devices may facilitate superior presentation and interaction modes.

H4.1 Consumer’s acceptance of mobile commerce will be limited to special kinds of goods which may be inspected thoroughly via the mobile medium.

H4.2 The introduction of multimedia networks and devices as well as personalization techniques broadens the range of goods likely to be purchased via the mobile medium.

4.5 Strong Intermediary

Typical auxiliary functions relating to intermediaries in market transactions are (Picot et al. 2001, pp. 377):

- provisioning market actors with market information (e.g. price and service descriptions),

- composing and structuring offerings (e.g. by defining service categories or by offering search capabilities),
- strengthening and enabling trust among the market actors (e.g. quality assurance), as well as
- providing supplementary services such as billing or risk coverage.

The coincidence of technical and economical intermediary in mobile commerce assumed by the MNO plus the oligopoly-like conditions in mobile telecommunications industry allows the aggregation of these tasks at one market player. The resulting high number of transactions leads to economies of scale concerning the processing. Owing to those economies of scale a reduction of information costs is possible, on condition that the benefit is transferred to market participants.

A second effect is due to the reduction of the number of consumer-supplier relationships and the transactions costs incurring in order to maintain one of these relations. This effect, also known as the Baligh-Richartz effect (Baligh and Richartz 1967), states a reduced complexity in intermediated consumer-supplier relationships. Instead of $n \times m$ relationships without an intermediary, only $n+m$ relationships have to be maintained. With a high number of market participants, as it is the case with the commonly large mobile subscriber base in the mobile ecosystem, the reduction of complexity goes hand in hand with significant relationship cost reductions.

The two effects, the delegation of necessary market functions and the reduction of the number of market relationships may lead to a reduction of information costs for market participants. Another positive effect can be deduced from the fact that the MNO with its mobile subscribers and SPs shape a homogenous interoperable system, i.e. a network. Network effect theory states that a high number of network participants offer direct and indirect network effects that in turn generate extra utility. Direct network effects account for the enabled interoperability among all market actors, so that consumers are able to communicate with SPs and vice versa. An increasing amount of consumers corresponds with a larger market while more SPs represent more offerings. The latter can also be regarded as indirect network effects, as the large mobile consumer network attracts complementary products to be sold on the market. Even though the Internet as a whole might offer similar propositions in terms of number of consumers as well as attached SPs, there is hardly any comparable concept as the mobile walled garden shaping a well governed technical and economical system. To sum up, the relatively large mobile market in the light of network effect theory appears as an appealing commercial playground for all involved market players.

H5.1: The existence of a strong intermediary leads to a beneficial transaction cost situation for SPs and consumers. Transaction costs are potentially lower than in other transaction channels where a strong intermediary is missing.

H5.2: The ecosystem of mobile commerce corresponds with networks that involve a high share of the population, resulting in higher direct and indirect network effects than in most other transaction channels

5 Conclusion and Outlook

In this paper we took a first step direction modeling the various factors significant for the take-off of mobile commerce. However, we did not pursue an analytical solution but rather deductive logical reasoning relying, among others, on new institutional economics theory. This procedure appears appropriate owing to little sound empirical evidence as yet as well as latent and hard to operationalize constructs like awareness, transaction costs, or marketing effectiveness.

Our contribution started with a characterization of three major agents in the mobile commerce environment: SPs, MNOs, and consumers. We proceeded by analyzing the characteristics of mobile commerce trying to account for previous classifications. We identified five distinct characteristics: place and time independence, personal relatedness, identity and context detection, as well as limited interaction capabilities. Furthermore, we identified the strong position of intermediaries as a very important force of the industry. Based on this, we provided a definition of mobile commerce which serves to delimit our further considerations. After a brief summary of new institutional economics, network effect theory, and the young stream of attention economics we derived hypotheses on the positive and negative effects of mobile communications specificities on the potential of mobile commerce. The derivation of our hypotheses was based on the aforementioned theoretical framework.

In summary, we put forward the following causal relations. The effect of time and place independence on consumer utility as well as SPs' marketing effectiveness will be positive. A higher share of consumer awareness may be captured. The personal-relation between user and device has also a positive effect on acceptance owing to higher trust and utility in comparison with non-mobile e-commerce. The direct access of the SP to the consumer's personal sphere may positively influence their marketing efficiency and effectiveness. The same positive effect may be hypothesized regarding the effect of identity and context detection on consumer utility and SP marketing performance. The major negative factor is represented by the mobile device's limited interaction capacities possibly mitigated, however, by increasing data rates as well as personalization mechanisms. Finally,

the particular industry structure, comprising an oligopoly of strong intermediaries, implies lower transaction costs as well as higher network effects, thus, having a positive effect on mobile commerce from a consumer as well as supplier point of view.

The following table summarizes our hypotheses and shows that our investigations were not exhaustive in applying economic concept to the identified characteristics. Instead we limited our research to obvious applications.

Table 2 – Derived set of hypotheses

Characteristics	Hypotheses	Involved economic concept				
		principal agent property rights	transaction costs	information economics	network effects	attention
Place and Time Independence	H1.1: Place and time independence decreases transaction costs for consumers compared to other transaction channels.		X			X
	H1.2: Place and time independence decreases transaction costs for the SPs leading to a higher marketing effectiveness compared to other transaction channels.		X			
Personal Relatedness	H2.1: Personal relatedness leads to higher consumer marketing acceptance compared to other transaction channels.	X		X		
	H2.3: The positive implications of personal relatedness face costs of trust uncertainty for the consumer.	X		X		
Identity and Context Detection	H3.1: Identity and context detection decreases transaction costs for consumers compared to other transaction channels.		X			X
	H3.2: Identity and context detection decreases transaction costs for the SPs leading to higher marketing efficiency compared to other transaction channels.		X			
Interaction Capabilities	H4.1: Consumer's acceptance of mobile commerce will be limited to special kinds of goods.			X		
	H4.2: The introduction of multimedia networks and devices as well as personalization techniques broadens the range of goods likely to be purchased via the mobile medium.			X		
Strong Intermediaries	H5.1: The existence of a strong intermediary leads to a beneficial transaction cost situation for SPs and consumers.		X			
	H5.2: The ecosystem of mobile commerce corresponds with networks that involve a high share of the population, resulting in higher direct and indirect network effects.				X	

As stated previously, this contribution is just a first step. Several research tasks are pending in order to comprehensively understand the impact of mobile commerce. First, empirical examinations are necessary in order to verify the various propositions. This includes acceptance and psychological research on the part of the consumer (e.g. measuring awareness, transaction cost savings, or utility from location sensitivity) and marketing and transaction cost analyses on the supply side. For example, in order to estimate the “share of awareness” it is

necessary to develop proper measurement scales. The same applies to network effects. As yet, there are no proper measures for the perception of network effects at the individual level. Second, regarding industry structure the implications of different governance forms, i.e. institutions, is a major unit of investigation. The governance form as well as the revenue model among complementary suppliers has already been identified as a key determinant of network effects (Pedersen and Methlie 2004).

Despite the pending research work our analysis comes to the conclusion that owing to their particularities mobile communications systems have a large potential for new kinds of commerce, however, always keeping in mind the limitations and drawbacks of this channel.

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