

VALUE CREATION IN MOBILE COMMERCE: FINDINGS FROM A CONSUMER SURVEY

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ABSTRACT

Although little is known about consumers' attitudes towards wireless marketing channels, many organizations are today making considerable investments to take advantage of the new business possibilities offered by wireless technologies - encouraged by optimistic, yet contradictory forecast on the future volume of m-commerce. This paper highlights the importance of setting out from a consumer perspective when developing m-commerce strategies, proposing an analytical framework that can be used to assess whether, and in what ways, specific mobile services are likely to offer value for wireless Internet users. The paper reports on a national consumer survey conducted to investigate the Finnish consumers' willingness to use a number of initial mobile services, and to explore whether consumers recognize the value proposition of these applications. Besides offering theoretical and empirical insights relating to the value-creating features of m-commerce from a consumer's point of view, the study presents results indicating a rather low willingness to use mobile services in general, but an exceptionally high willingness to use some applications. The results do not, however, support the supposition that m-commerce is likely to increase the overall volume of e-commerce significantly by penetrating into untapped markets (non-PC users).

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INTRODUCTION

Mobile commerce, or e-commerce over mobile devices, has become a major topic of interest for the IS research community and a key priority for many business organizations as it is becoming increasingly evident that PC-based e-commerce has not lived up to the expectations and achieved true mass adoption (Prabhaker 2000, Ropers 2001). Nevertheless, in spite of the fact that - or perhaps even because - e-commerce has not reached the volume and the explosive growth figures commonly predicted in the mid-1990s, the eyes of scholars and industry representatives are now on the opportunities offered by wireless media, envisaging that the next - or the real phase of e-business growth will be in the area of mobile commerce (see e.g. Varshney *et al.* 2000, Varshney and Vetter 2001, Keen and Mackintosh 2001, Kalakota and Robinson 2001).

Predictions, based on both anecdotal and empirical evidence, on the future popularity and volume of m-commerce have been widely presented in the academic literature and the business and technology press. In general, the forecasts have been highly contradictory: While many authors and research firms believe that the demand for m-commerce services will skyrocket over the next five years (Strategy Analytics 2001), with mobile access dominating the scene as a means for Internet access by 2005 (Vetter 2001, Vittet-Philippe

and Navarro 2000), others have been far more careful in their predictions (Batstone 2000, O’Brien 2001, Forrester Research 2000). Although this may seem like a mobilephile vs. mobilephobe debate, such contradictions are natural when a new technology is launched (Shuster 2001), and could be seen in the early years of e-commerce as well.

The fact remains that many empirically supported (optimistic) predictions on the future popularity of m-commerce rely on indirect units of measurement rather than direct studies on consumers’ willingness to embrace m-commerce. Many scholars have, for instance, asserted that there is a huge market potential

CONTRIBUTION

This paper draws on consumer intention data collected through a national mail survey to offer a number of important contributions for managers as well as the academic community in the area of mobile commerce:

- 1) It identifies the potential value-adding features of m-commerce by presenting an analytical tool for assessing the extent to which any mobile service is likely to offer customer value in comparison to stationary electronic channels.
- 2) With a reference to the proposed analytical tool, it provides some early findings on the sources of value recognized as the primary motivators for m-commerce adoption by consumers.
- 3) It identifies the potential early success applications in B-to-C m-commerce as well as the primary target groups, in terms of gender and age, for these services.

Providing indications as to the size of future mobile markets, it is the first study to investigate the plausibility of the wider market hypothesis, i.e. common assumption that the overall volume of e-commerce will experience a significant growth with the linkage of mobile phones and the Internet. Providing evidence that current adopters of the Internet and transaction-based wired e-commerce are much more willing to embrace m-commerce than the corresponding non-adopters (i.e. the ‘untapped market’), the results suggest that consumers see the mobile Internet and m-commerce primarily as a supplement rather than as a substitute to the wired Internet and e-commerce. This result bears some important managerial implications with regard to e.g. the marketing of mobile services to early adopters, and the likely appeal of multichannel solutions to consumers.

for mobile applications, primarily supporting their assumptions with predictions of the global penetration rate of mobile devices (Carlsson 2000, Daitch *et al.* 2000, Hampe *et al.* 2000, Müller-Versee 2000, Kannan *et al.* 2001, May 2001). Recognizing that this issue is related to how the concept m-commerce is defined, we nevertheless argue that the popularity of m-commerce cannot be measured by the popularity of mobile devices, just as the popularity of wired e-commerce cannot - as has been proven - be measured by the popularity of computers. M-commerce goes far beyond mobile telephony (Vittet-Philippe and Navarro 2000), meaning that a substantial volume of m-commerce should not be seen as an obvious outcome of high penetration rates of mobile phones. Rather, mobile devices with wireless Internet connections should be seen as a prerequisite for m-commerce. After all, just because a retail sale is possible on a device, it does not make it probable (Forrester Research, 2000).

A wireless, mobile device has been seen as the optimum tool to handle a great number of different commerce-related tasks, and in many sectors the benefits offered by such a medium are, indeed, intuitively unparalleled. Nevertheless, we argue that a launch of business-to-consumer (B-to-C) electronic services - or a prediction of the future market potential of a specific service, wired or wireless, should be preceded by an assessment of the suitability of the offering for being traded over different electronic media, including empirical studies on the target consumers' needs, wants and expectations. In the area of wired Internet commerce, many companies, especially early embracers of B-to-C e-commerce, seem to have neglected the consumer perspective when formulating their Internet strategies. Hence, many Internet ventures and investments have been characterized by a technocist focus, which can mean a neglect of customer orientation and other factors influencing consumers' purchase behavior (Bruce 1991). This technological blindness has been typical for the business concepts and models in many purely Web-based companies, which may explain why many ambitious Internet projects have collapsed.

Building successful strategies for the mobile marketplace begins, no doubt, by recognizing the forces driving the emergence of m-commerce (Senn 2000). As noted by Carlsson and Walden (2001), the investments in the new mobile technology are likely to fail if the m-commerce products and services lack real substance. Yet, at times it may seem like many players in the field of m-commerce are developing, as put by Gimein (2000), 'solutions that are still searching for a problem.' Consequently, the key question for m-commerce is to find some way to assess the value of mobile applications to prospective users (Carlsson and Walden 2002).

THEORETICAL FOUNDATIONS

The Wider Market Hypothesis

It has been pointed out that the proportion of population able to use e-commerce via Web-enabled PCs still is rather limited, and that the linkage of mobile phones and Internet obviously has an enormous potential to increase the overall volume of e-commerce (Carlsson 2000, Delichte 2001, Hampe *et al.* 2000, Müller-Versee 2000, Nokia Networks 2000), as many consumers who are not yet Internet adopters due to (i) the greater hardware *investments*, and (ii) the *proficiency* with PCs needed in PC-based e-commerce will now access the Internet due to the lower costs involved (cf. Yankee Group 2000b), and their familiarity with the device. It has been argued that the learning curve for m-commerce is much faster than for other information and communication technology (ICT) applications (Vittet-Philippe and Navarro 2000), and that m-commerce applications are likely to be user-friendlier than corresponding PC-based applications. Ropers (2001) points out that today's Internet relies on the PC as the access device, which means that daily usage is limited to consumers who can afford and are able to operate a PC. The author raises the question of how much e-business results would benefit from a wider market that included older people, consumers in emerging third-world countries, and those who cannot afford or simply do not want to use a PC (Ropers 2001). According to Daitch *et al.* (2000), wireless Internet access, transactions and applications will far exceed those conducted on PCs (cf.

May 2001). This conjecture, here referred to as the *wider market hypothesis*, seems to be supported by (non-academic) empirical studies: According to research conducted by e-MORI (Mformobile.com 2001) in six markets, including Finland, the number of people interested in using m-commerce is eight times as many as those currently using e-commerce.

Perceived Value and M-commerce Adoption

As the wider market hypothesis suggests, there are great expectations regarding consumer adoption of MC technologies and applications. Yet, because electronic distribution channels are in very early stages of development, little is still known about consumer attitudes toward adopting, or not adopting, electronic media and factors that influence consumers’ attitudes and value perceptions about them (Eastlick and Lotz 1999; Rowley 2000, Amit and Zott 2001, Han and Han 2001, Venkatesh and Brown 2001). Just as we are gradually starting to gain an understanding of the unique characteristics of the Internet, a new medium has emerged, the wireless Internet, which raises many of the same questions in a new context (Gurley 2000, May 2001). While a growing body of literature, matched by limited empirical evidence, has pointed out the main value-adding elements in m-commerce, the consumers’ actual reasons - the primary drivers - for adopting and intending to adopt mobile services remain unclear (cf. Urbaczewski *et al.* 2002, Pedersen *et al.* 2002). Likewise, little - if any - research has been conducted to identify the primary target groups for mobile services (of different types) even with regard to basic demographic variables such as gender and age, although an understanding of the impact of such factors are crucial from a marketing point of view, and previous research has suggested and verified gender and age to be relevant factors in terms of technology adoption and usage (Morris and Venkatesh 2000, Venkatesh and Morris 2000, Carroll *et al.* 2002).

As pointed out by Shuster (2001), there are almost no direct, comprehensive studies on consumer behavior and preferences related to the wireless Internet in the public domain, and little research has been conducted to identify

the key contexts in which people use the mobile Internet most frequently (Kim *et al.* 2002). As argued by Pedersen *et al.* (2002), the fact that the consumer perspective has been almost absent in most projects studying the end-user in telecommunication services is particularly disturbing since many of the services introduced in third-generation wireless networks will be consumer-oriented. Empirical studies relating to consumer adoption of MC are, however, gradually starting to appear: Khalifa and Cheng (2002) present survey findings indicating that the exposure of an individual to MC influences positively the individual’s intention to adopt MC, whereas Aarnio *et al.* (2002) show that the consumer masses are not using mobile services, and that the pricing of mobile services is currently a significant barrier to adoption of mobile commerce. Recent, yet unpublished research by Naruse and Kim¹ (2002) provide many important insights related to adoption patterns by current mobile Internet users in Korea and Japan. Among other things, the results show that those who have experiences of using fixed e-commerce have been more eager to adopt the mobile Internet, and are also using it more frequently.

Considerations relating to *customer perceived value*², broadly defined as the results or benefits customers receive in relation to total costs (McDougall and Levesque 2000), i.e. a customer’s overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given (Zeithaml 1988), can be seen to pertain not only to products and services, but also to the use of an innovation or a commercial medium (cf. Han and Han 2001, Anckar 2002).

¹ The lead author wishes to thank Prof. Jinwoo Kim at the Yonsei University, Korea, for kindly providing us with the early results of the extensive consumer surveys conducted in Korea and Japan.

² As noted by Sweeney and Soutar (2001), perceived value should not be confused with *satisfaction*: Value perceptions can be generated without the product or service [or medium] being bought or used, while satisfaction depends on experience of having used the product or service [or medium].

Empirical findings by Anckar (2002) indicate, in fact, that electronic channel adoption/rejection decisions by consumers are determined by their perceived value of a channel in comparison to existing alternatives, and thus that *customer perceived value* is a relevant construct in terms of channel adoption/rejection decisions.

On electronic markets, firms can create value for customers in a manner that is different from that which has been achieved in conventional business (Han and Han 2001). Correspondingly, m-commerce not only extends the benefits of the Web, but also allows for unique services and additional benefits when compared to traditional e-commerce applications (Mobilocity 2000, Tsalgatidou and Pitoura 2001). As noted by Keen and Mackintosh (2001), the demand side of m-commerce is a search for *value*, and hence there is a need to build an understanding of the elements and special features of wireless electronic channels that are value-adding from the consumer's point of view. Every company entering the mobile space has the same goal: leveraging this channel to create customer value (Kalakota and Robinson 2001), and they are thus asking for proof that the introduction of mobile services will add value to their businesses (Mobilocity 2001), and respectively, to consumers. In view of that, we need to identify what is distinctive about the mobile channel in its own right, and rather than focusing on the perceived limitations of the current generation of mobile devices, look at where the mobile platform clearly wins over the fixed Internet (May 2001).

Analytical Framework

The adoption of B-to-C e-commerce has been surprisingly slow in comparison to early predictions by experts. The frontrunners have been the industry sectors in which consumers are offered indisputable benefits by the new medium as compared to the physical marketplace. In the same way, the 'winners' in m-commerce will be, we argue, the industry sectors/products/services offering users of wireless channels indisputable benefits in comparison to (i) the physical marketplace and (ii) fixed electronic channels. Since this

translates into a proposition that different channels (physical, wired, wireless) vary in suitability in terms of marketing and distributing different products and services, we propose an analytical framework that can be used to evaluate, theoretically, the suitability of specific services for m-commerce. The framework, depicted in Figure 1, was constructed in a conceptual research effort based on theoretical reasoning with the objective of identifying the value-adding features of m-commerce. The framework constituents were thus established in a theory formation process in which we did not rely on prior empirical or anecdotal evidence, but rather on what Clarke (2000) refers to as 'armchair analysis.' Many of the ideas and underlying assumptions that the categorization rests on are, however, supported by the m-commerce literature, as is evident from the following discussion, which provides an explanation of each of the framework constituents.

In the framework, a distinction is made between the value offered by the wireless Internet technology in itself; *wireless value*, and the value emerging from the actual mobile use of a device; *mobile value*. Wireless value can be created through the use of any wireless device, irrespective of the service/application (a *service-independent* phenomenon), whereas mobile value is created only through certain types of wireless services (a *service-dependent* phenomenon).

Wireless Value

As pointed out by Varshney and Vetter (2000), mobile and wireless systems are not the same even though there is considerable overlap; wireless interfaces do not necessarily need to support mobility (cf. May 2001). In addition to such obvious advantages of wireless technologies as using your computer without any cables, an important benefit of the wireless Internet is the opportunity to use a wireless device (mobile phone, PDA) to do almost all types of e-commerce related activities without having to invest in, or connect using, a computer. Besides offering obvious *convenience* benefits (cf. Müller-

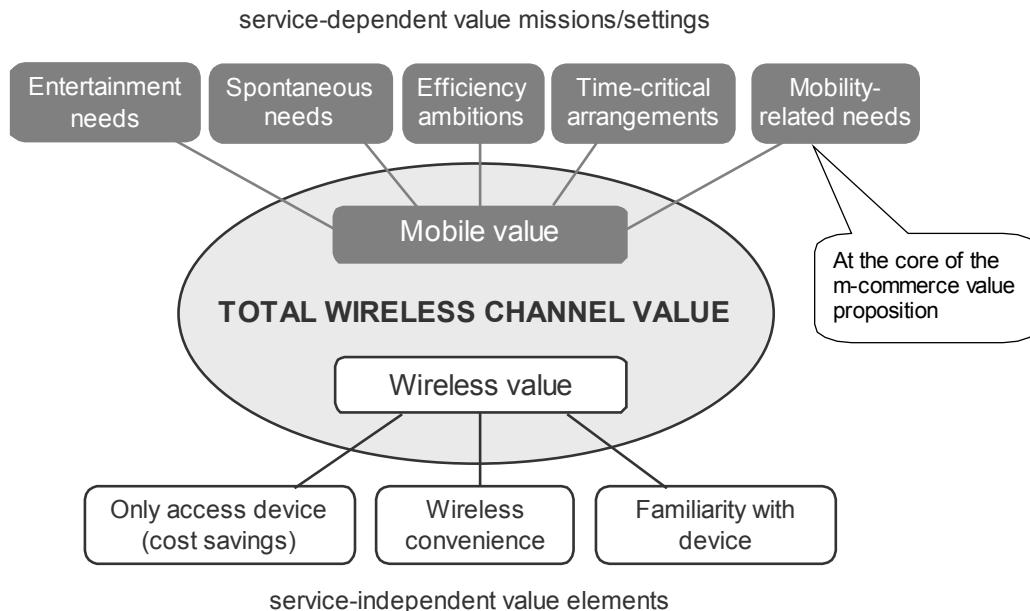


Figure 1. The analytical framework

Versee 2000), this may bring significant advantages for consumers that lack *proficiency with computers*, but are familiar with mobile phones (cf. Ropers 2001). Moreover, there may be *cost savings* involved for consumers who are satisfied with the more limited computing power offered by handheld devices, especially as owning a mobile phone already is a matter of course for most consumers, especially in Europe.

Tang and Veijalainen (2001) assert that the main force for the rapid acceptance rate of m-commerce will be its increased convenience and efficiency in performing simple transactions compared with the stationary machines, thereby implying that *wireless value* is likely to be a main driver for m-commerce.

Mobile Value

Mobile value signifies the value arising from the mobility of the new medium, i.e. making use of electronic services while ‘on the move/road,’ and m-commerce has, in fact, been defined as “e-commerce for users on the move” (Vittet-Philippe and Navarro 2000, Kalakota and Robinson 2001). As argued by Kleinrock (1996), most people are ‘nomads’ when it comes to computing and

communications. We live, no doubt, in a disconnected world and an increasingly mobile society (see Varshney and Vetter 2001, Kakihara and Sørensen 2002), and therefore we need interfaces and electronic services that support our mobile lifestyle (cf. Vanderheiden 1997).

According to Keen and Mackintosh (2001), the key value proposition of mobility is the creation of choice, or new *freedoms*, for customers. In a similar way, words commonly used to describe the main value-adding feature of m-commerce include *flexibility*, *convenience*, and *ubiquity*. While being pertinent and illuminating, such terms nevertheless appear to be too general to grasp the essence of the consumer value creation process in m-commerce, as they fail to address the relevance of contextuality (cf. Kakihara and Sørensen 2002): The distinctive feature of mobile commerce is the significance of the user’s *location*, his *situation*, and his *mission* (May 2001), and to gain an understanding of the drivers for consumer adoption and usage of m-commerce services, there is, thus, a need to look into *why* and *when* flexibility is valuable to customers. It is, after all, obvious that the freedom benefits created by mobility are not equally valid for different mobile services and

for different settings. As an outcome of our analytical effort, we identified five different missions/settings in which wireless services can provide mobile value:

1. Time-critical needs and arrangements. As noted by May (2001), time adds a dimension to m-commerce that is commonly absent in fixed e-commerce, presenting new opportunities in situations where the interaction is characterized by *urgency* (cf. Datamonitor 2000): M-commerce is introducing us to instant gratification anywhere (Peters 2002) and enables the delivery of time-sensitive information the value of which depends on its timely use (Tsalgatidou and Pitoura 2001). Time-critical situations where immediacy is essential, or at least desirable, typically arise from *external events*, which means that the always-on connectivity of the medium is an important feature in this regard, as it allows for on-demand push-technological solutions (alerts and reminders) on certain topics that the user recognizes as time-critical (such as alerts for stock traders).

2. Spontaneous needs and decisions. Many needs and wants arise and are satisfied *spontaneously* rather than as a result of carefully planned behavior. In contrast to time-critical needs, spontaneous needs are internally awakened and not a result of external events (such as alerts, etc.). In general, these needs are related to products and services that are characterized by the purchasing decision being straightforward, meaning that the if/when/where decisions do not require careful consideration. Spontaneous needs can also be entertainment-related, efficiency-related, or even time-critical in nature. Herman (2002) argues that for consumers, m-commerce is to a great extent about spontaneous and instant shopping. Similarly, Hennessy (2001) as well as the consulting firm Booz, Allen & Hamilton (2000) contend that the greatest demand for mobile applications will be in areas that are spontaneous, time-critical, or location-specific in nature, such as auctions, e-mail, ticketing, news, and online games. May (2001) mentions the opportunity for balance checking on an *instinctive basis* as an example of a value-adding feature of mobile banking services.

3. Entertainment needs. According to Kalakota and Robinson (2001), fast and easy access to *entertainment* is always appealing to customers. The combination of mobility and entertainment appears intuitively appealing for many customer segments due to the opportunity to kill time/have fun in situations when wired entertainment appliances cannot be accessed. Using the term “time filler” rather than “time killer” services, Kalakota and Robinson (2001) argue that entertainment applications such as digital music and games can be seen as the perfect complement to mobile devices. Varshney *et al.* (2000) present a similar contention, maintaining that people still want to enjoy entertainment while mobile. Entertainment needs are, by their very nature, generally also *spontaneous* in character, especially in mobile settings.

4. Efficiency needs and ambitions. Mobile devices are, in essence, developed to increase productivity while mobile (Peters 2002). According to Kalakota and Robinson (2001), today’s consumers constantly look for more efficient ways to do simple everyday activities, and as a timesaver for practical activities such as mobile banking, and making travel reservations. M-commerce gives time-pressured consumers possibilities for increased productivity (e.g. of working time) by providing them with the opportunity to use the ‘dead spots’ in the day (e.g. during the daily commute between home and work) more effectively (Datamonitor 2000, PricewaterhouseCoopers 2001). According to Maginnis *et al.* (2000), the chief benefit, so far, of portable computing devices has been to increase worker productivity, and after all, businesspeople who can check their schedules and access corporate information as needed are likely to be more efficient than their competitors who have to call into the office continually (Delichte 2001).

5. Mobility-related needs. Perhaps the most interesting aspect of m-commerce is the potential for launching services that are, in essence, of value *only* through a mobile medium, as needs for such services predominantly arise when away from home and ‘on the move.’ Examples include the widely discussed *loction-based services* (see e.g. McGinity 1999, Narayanan 2001, Cousins

and Varshney 2001, Tapscott and Stevens-Guille 2002) such as routing and tracking/pinpointing, and ‘roadside’ services such as vending/parking machine payments, etc. As these types of services are of value exclusively in mobile settings, we believe that they are likely to constitute the core of the m-commerce value proposition.

It should be noted that the *personalization* of services, which has been pointed out as a value-adding feature in m-commerce by numerous authors (e.g. Carlsson and Walden 2001, Müller-Versee 2000, Ropers 2001), obviously might be an additional benefit for many users. It is, however, not only a controversial issue, but also one of the foundation pillars of wired e-commerce, and hence not a benefit that can be reaped only through a mobile medium. Thus, personalized services do not - at least not unquestionably - offer mobile value from a consumer perspective, although they intuitively fit well with mobile media. Rather, personalized services should be seen as a prerequisite for m-commerce due to the imperfect usability (the limited screen size) of handsets and the situations and settings in which many m-transactions are likely to be made.

In accordance with this line of reasoning, we argue that the m-commerce is going to obtain a dominant channel position in product/service categories where the use of mobile applications offers customers indisputable mobile value by grasping the very essence of the combination of mobility and computing, ideally by providing mobile value on several of the proposed dimensions. In some cases (cf. mobility-related needs), these services will be valuable - and available - exclusively through mobile devices. For services that do not bring mobile value, but only wireless value, it can be hypothesized that mobile devices will be used primarily for reasons of convenience or because of a lack of alternative ways to connect to the Internet. In these cases, we believe that mobile channels are likely to remain in a secondary position due to the higher usability offered by desktop PCs and/or iDTVs.

MOBILE SUCCESS APPLICATIONS: A BRIEF LITERATURE REVIEW

With m-commerce still in its infancy, a topic of interest among scholars, and a main focus of the business/technology press, has been to identify, typically through theoretical argumentation, the services that are most suitable for wireless media, or the emerging success (or ‘killer’) applications of m-commerce. It should be noted that the concept ‘success application’ could be interpreted in a number of different ways, ranging from applications that rapidly are embraced on a broad scale, to ones that directly generate the highest revenues for the service providers. Since (i) we argue that the success of m-commerce will not depend on the economic fortune of a particular business venture, and (ii) this research focuses on the B-to-C arena, the concept success application is, for the purpose of this paper, operationalized according to the former definition, i.e. as applications that reach widespread popularity among masses of consumers.

Due to the novelty of the phenomenon, the academic literature offers few contributions in the area of prospective m-commerce success applications, whereas the issue has gathered much greater attention in the online and offline business and technology press. In addition, many market research institutions and industry players have made important contributions, including extensive empirical studies on the subject. Although commercial publications are not principally cited in academic research, we feel that the current state of the research in this specific area of m-commerce necessitates a deviation from this principle, especially as commercial research reports generally are very up-to-date, and also contribute to the directions taken by the industry. In this section we list some of the commonly hypothesized initial success applications in MC. Pointing out the disagreement among experts and scholars as well as the conflicting empirical research findings in this respect, our aim is to highlight the need for studies on the target consumers’ needs, wants and intentions in order to support business decision-making, investment decisions, and the development of purposeful mobile services.

In the case of the wired Internet, *e-mail* has without any doubt played a significant role in the rapid increase of households' Internet connections, and most scholars and analysts seem to agree that e-mail will emerge as an initial killer m-application (e.g. Guerley 2000, Ghosh and Swaminatha 2001, Kannan *et al.* 2001, Müller-Versee 2000, Herman and Neff 2002). This assumption is supported by the results of consumer surveys conducted by e.g. the Yankee Group (2000a) and Accenture (2001), but challenged by the findings from a study conducted by Strategis Group (see Batstone 2000), surprisingly indicating that 65 percent of the users of mobile devices in the U.S. have no desire for wireless e-mail services.

According to Ghosh and Swaminatha (2001), major applications are Web access for *information services* such as weather reports, sport scores, etc. However, the Yankee Group (2000a) discovered limited consumer interest in such applications, with only 19% of European mobile users interested in information services. Kannan *et al.* (2001) argue that the most significant possibilities in m-commerce lie in the marketing of services, ranging from e.g. *interactive games, gambling, travel bookings, banking*, and in dynamic transactions where continued interactivity is essential and useful, for instance *auctions* and *stock trading* (cf. Müller-Versee 2000; Urbaczewski *et al.* 2002). Mobile applications related to the financial industry are, generally speaking, interesting: In 2000, online services were offered by 94% of all banks in Europe (Müller-Versee 2000), and wireless technologies are expected to expand the benefits offered by online banking. Surveys show that 29% of the Europeans are either interested or definitely interested in mobile banking (Yankee Group 2000a). According to Varshney (2001) and Kalakota and Robinson (2001), mobile financial applications are likely to be one of the most important components of m-commerce: A mobile device could turn into a business tool, replacing bank, ATM, and credit card, thus allowing for value-added services such as *micropayments for purchases at vending machines* and *payments in shops* (Varshney and Vetter 2001). According to Senn (2000), the highest m-commerce transaction volume will probably occur in

micro-transactions. However, more advanced financial activities such as *loans negotiations* and *sending notifications of claims to insurance companies* could also become feasible through mobile channels.

Vittet-Philippe and Navarro (2000) contend that the radical changes brought about by e-commerce in the financial services industry will pale in comparison with the revolution which m-commerce may bring to the *retail* sector, where it will offer many retailers the opportunity for service differentiation. In contrast, Batstone (2000) argues that retail will be the most unpredictable sector and the biggest sinkhole for failed mobile experiments. According to Forrester Research (2000), mobile phones will account for only 3 % of total online retail sales in Europe by 2005, whereas PCs will capture more than 80%. According to Strategy Analytics (2001), successful m-commerce applications will include *electronic ticketing* and *online shopping and payment for various goods and services*. Varshney and Vetter (2000) point at applications such as *emergency management*, and *remote operation of appliances*. A Finnish consumer survey conducted by Nokia Networks (2000) indicated that the most demanded product/service category for m-commerce is likely to be *cinema and theatre tickets* (cf. Forrester Research 2000), closely followed by *travel-related services* (cf. May 2001, Urbaczewski *et al.* 2002), and *books, magazines and music*. In general, the study showed that the most popular services for m-commerce are likely to be the same as they have been for e-commerce, but that the overall demand is likely to be much greater. Paradoxically, the survey respondents perceived m-commerce as less reliable, less useful, less practical and less safe in comparison to wired e-commerce (Nokia Networks 2000).

RESEARCH QUESTIONS

With reference to the theoretical foundations presented above, this research has the following aims: (i) to propose an analytical framework that is useful for assessing whether, and in what ways, a specific service/application is likely to offer customer

Table 1. Sources of mobile value offered by the applications included in the empirical study

Mobile service	Source of mobile value				
	TC	SP	EN	EF	MO
Read and receive news (through subscription services or browsing)	●	●	●	●	
Send/receive emails	●	●		●	
Routine bank services (pay bills, check accounts, etc.)	●	●		●	
Book travel tickets	●	●		●	
Remote activation/control of home appliances (heating system, sauna, car)	●	●			●
Calendaring and alerting Internet services (not using phone-internal functions)	●			●	●
Stock trading on the Internet	●			●	
Play online games on the Internet		●	●		
Listen to/download music from the Internet		●	●		
Online chat with strangers		●	●		
Shop for goods on the Internet (books, flowers, groceries, etc.)		●		●	
Electronic payment in physical shops		●			●
Take part in Internet auctions	●				
Book cinema or theatre tickets		●			
Restaurant table reservations		●			
Advanced (non-routine) banking services (e.g. loans negotiations, ordering credit cards)				●	
Fill out and send damage reports (notifications of claim) to insurance companies				●	
Receive personalized shopping offers					

TC = time-critical needs SP = spontaneous needs/decisions EN = entertainment needs EF = efficiency needs/ambitions MO = mobility-related needs

value over a wireless medium; (ii) to empirically investigate the Finnish consumers’ willingness to use a number of initial mobile applications (relating to the presented framework), also (iii) investigating whether m-commerce is likely to increase the overall volume of e-commerce significantly by penetrating into untapped markets, and (iv) identifying the primary target groups for the suggested m-services in terms of gender and age. The focus is on the value-adding features, or the *drivers* for m-commerce adoption rather than on the adoption *inhibitors*.

In the brief literature review above we listed a number of commonly proposed potential success m-applications. Based on the anecdotal and empirical evidence presented in the section, we picked out some of the most frequently mentioned applications (as well as some other interesting m-services) to be included in the empirical study, and used the proposed analytical framework to evaluate, theoretically, the suitability of each of the service for a mobile channel by assessing whether, and in what ways, a specific application is likely to offer *mobile value* to consumers. The m-applications selected for empirical investigation can be seen in Table 1,

which also shows the sources of mobile value for each of the services (i.e. the results of the conceptual analysis in which the framework was applied).

Building on the preceding discussion, the following four research questions can be stated:

[RQ1] To what extent are the different m-services subject of investigation likely to gain popularity among Finnish consumers in the early years of m-commerce?

[RQ2] In which consumer groups, in terms of gender and age, do we find the primary target groups for the m-services subject of investigation?

[RQ3] Do consumers recognize the mobile value offered by the m-services subject of investigation, i.e. are consumers likely to favor m-services that offer a broad range of mobile value, and do some sources of mobile value stand out as especially relevant?

[RQ4] Will m-commerce be able to increase the overall market for Internet commerce? This research question is investigated in a number of different

ways; (i) do consumers that are *not yet Internet adopters* show a willingness to engage in mobile commerce?; (ii) do consumers that have *not yet embraced e-shopping* show a willingness to engage in mobile commerce?; (iii) are persons that perceive high *barriers* to e-commerce in terms of *costs of entry* and a *low proficiency with computers* likely to engage in m-commerce?

THE EMPIRICAL STUDY

Sample and Data Collection Procedures

To obtain a sample representative for the target population, defined as the Finnish population in the age 16-74 years, the electronic sampling frame provided by Finnish Population Register Centre was used to produce a sample of 1000 consumers based on a stratified sampling procedure. Because of the large size of the sampling frame, which includes the entire Finnish population (approximately 5.2 million inhabitants), the sample was drawn using a two-stage sampling method³. In the first stage, 15 municipalities - one city and two rural municipalities from each of the five Finnish counties were randomly selected, thus reducing the sampling frame to approximately 650.000 population elements. In the second stage, the sample was randomly drawn based on the relative population in the chosen municipalities, otherwise in line with the national demographic characteristics.

Data were collected using a non-interactive, self-administered questionnaire, which was mailed out to the consumers in January 2001, with a second mailing to all non-respondents three weeks later. In order to increase the response rate and thereby minimize the risk for non-response bias, an attempt was made to motivate the respondents to complete and return the questionnaire by

announcing the drawing of, among other things, a top-of-the-line mobile phone among all respondents. 8 questionnaires were returned undelivered due to incorrect addresses. A total of 497 returns were received by the deadline. Of these, 485 questionnaires were usable, giving an effective response rate of 48.9%. The responding sample was manually checked for possible nonresponse error on a number of variables (gender; age group; area of residence; native language), as this was possible even with the anonymous survey design.

In the questionnaire, the respondents were instructed to indicate the likelihood (on a 5-point scale: 5 = yes, definitely; 4 = likely; 3 = not sure; 2 = unlikely, 1 = definitely not) that they would use different mobile services. In addition, the respondents were instructed to indicate how strongly they agree or disagree with a number of statements relating to their perceived magnitude of some barriers to embracing Internet commerce with a special relevance in m-commerce settings. For this, a five-point Likert scale was used (5 = strongly agree, 1 = strongly disagree).

Data Analysis and Results

Of the respondents, 208 (43.5%) were males, and 270 (56.5%) females. All age groups were represented in proportions corresponding well to the population demographics (cf. Väestökisterikeskus, 2000). Only 5.6% of the respondents reported that they did not know what the Internet is, and did therefore not complete the rest of the questionnaire. 43.1% were regular Internet users, 24.3% use it occasionally, and 11,3% had only tried. 6.6% had not yet tried, but reported that they were interested to. Another 6,6% had not yet tried, and had no intention to do it. 31,7% reported that they had made purchases over the Internet. As many as 40.1% had not yet made any purchases, but were interested to, whereas 28% had no intention to make purchases over the Internet. Comparing these figures to the findings from other (non-academic) studies (Suomen Gallup Web 2001; Taloustutkimus 2001), the sample appeared to

³ Due to hardware limitations, the sample provider was unable to make runs with a sampling frame exceeding 1 million inhabitants, outsourcing all requests for samples covering the entire Finnish population. Since this would have caused delays and increases in costs, a two-stage sampling method was chosen.

Table 2. Mobile willingness of all respondents (N=445)

Mobile service	Mean	Interest ¹	Median	SD
Send/receive emails	3.97	79.5%	4.00	1.16
Routine bank services	3.64	66.7%	4.00	1.25
Book cinema/theatre tickets	3.26	53.7%	4.00	1.24
Remote activation of appliances	3.14	47.0%	3.00	1.24
Restaurant table reservations	3.00	39.7%	3.00	1.21
Calendaring/alerting services	2.94	32.1%	3.00	1.13
Read and receive news	2.77	33.3%	2.00	1.21
Book travel tickets	2.71	28.3%	2.00	1.00
Payment in physical shops	2.69	29.3%	2.00	1.18
Buy products online	2.65	26.1%	2.00	1.17
Receive personalized offers	2.64	25.3%	3.00	1.12
Listen to/download music	2.46	25.4%	2.00	1.29
Play online games	2.14	17.4%	2.00	1.18
Send insurance damage reports	2.12	12.5%	2.00	1.04
Online chat with strangers	2.05	13.2%	2.00	1.14
Stock trading	1.95	9.6%	2.00	1.02
Take part in Internet auctions	1.94	6.6%	2.00	.92
Advanced banking services	1.89	9.8%	2.00	1.03

¹ Percentage of consumers who responded *yes, definitely* (5) or *likely* (4)

be slightly skewed towards Internet adopters and consumers with online shopping experience. 85.7% of the respondents owned a GSM phone, 7.6% a WAP-enabled phone, and 4.4% a palm device. Only 8.2% reported that they do not own a mobile device of any kind. 32.3% of those who owned a mobile device reported that they intend to upgrade it within a time frame of one year, with an additional 23.6% intending to upgrade it within the next two years. 41.2% of the owners had no intention to upgrade their mobile device within the next two years.

Research Questions 1 and 2

In general, the results (see Table 2) showed a rather low willingness among the respondents to use the suggested m-services. However, a remarkably high portion of the respondents indicated a willingness to use *m-mail* and *routine bank services*. Somewhat surprisingly, *reservation of cinema/theatre tickets* and *remote control of home appliances* were seen as much more interesting m-services than e.g. *playing online games* and *reading/receiving news* even in the younger age categories.

As different m-services address different needs and customer segments, the study aimed at, relating to *RQ2*, investigating

whether there are significant variations in the m-willingness between respondents in different age groups and of different gender. As data from attitude measures such as Likert scales generally are treated as interval scale data, all the sample subgroups were analyzed for differences by comparing the mean scores. Hence, we used the *t*-test to investigate whether there are significant variations in the m-willingness between women and men. As shown in Table 3, the test reported significant variations on five variables: Women were more eager to *reserve cinema/theatre tickets*, whereas men showed a significantly higher willingness to use m-services for *stock trading*, *remote control of home appliance*, *playing online games*, and *taking part in Internet auctions*. Interestingly enough, women showed a higher willingness to use mobile services on 11 of 18 variables.

In order to test the relevance of the variable *age* in terms of m-willingness, we used one-way analysis of variance, as there were five levels of this independent variable. The test indicated, as could have been expected, significant variations between respondents in the different age groups, with the oldest age group typically showing a much

Table 3. M-willingness of respondents in different age groups

Mobile service	All respond.		Gender		Sig.	Age group					Sig.
	Mean	Interest	M	F		16-22	23-35	36-50	51-65	66-74	
Send/receive emails	3.97	79.5 %	3.96	3.98	.885	4.15	4.11	3.93	3.89	2.73	.000**
Routine bank services	3.64	66.7 %	3.51	3.73	.066	3.99	3.90	3.51	3.31	2.94	.000**
Book cinema/theatre tickets	3.26	53.7 %	3.05	3.42	.002**	3.59	3.44	3.03	3.12	2.73	.002**
Remote activation of appliances	3.14	47.0 %	3.35	2.98	.002**	3.15	3.35	3.22	2.85	2.67	.015*
Restaurant table reservations	3.00	39.7 %	2.93	3.04	.337	3.04	3.11	2.88	2.97	2.87	.626
Calendaring/alerting services	2.94	32.1 %	2.92	2.96	.726	3.29	3.01	2.95	2.71	2.20	.001**
Read and receive news	2.77	33.3 %	2.84	2.73	.351	2.99	2.69	2.75	2.84	2.20	.158
Booking travel tickets	2.71	28.3 %	2.66	2.74	.422	2.63	2.65	2.69	2.86	2.69	.489
Payment in physical shops	2.69	29.3 %	2.72	2.67	.656	3.08	2.79	2.60	2.50	1.80	.000**
Buying products online	2.65	26.1 %	2.63	2.66	.767	3.18	2.74	2.49	2.47	1.73	.000**
Receive personalized offers	2.64	25.3 %	2.71	2.60	.333	2.83	2.80	2.60	2.48	1.87	.006**
Listen to/download music	2.46	25.4 %	2.45	2.47	.902	3.42	2.61	2.23	1.92	1.87	.000**
Play online games	2.14	17.4 %	2.37	1.96	.000**	2.41	2.20	2.13	2.20	1.73	.038*
Send insurance damage reports	2.12	12.5 %	2.10	2.12	.866	2.15	2.07	2.13	2.20	1.73	.533
Online chat with strangers	2.05	13.2 %	2.01	2.08	.493	2.71	1.99	1.84	1.94	1.73	.000**
Stock trading	1.95	9.6 %	2.13	1.82	.002**	2.14	1.99	1.83	1.99	1.40	.067
Take part in Internet auctions	1.94	6.6 %	2.14	1.80	.000**	2.14	1.99	1.85	1.90	1.60	.141
Advanced banking services	1.89	9.8 %	1.86	1.91	.668	1.99	1.80	1.91	1.94	1.67	.615

N(16-22)=73 N(23-35)=135 N(36-50)=116 N(51-65)=103 N(66-74)=15

* Significant at the .05 probability level

** Significant at the .01 probability level

lower m-willingness than the other groups, and especially the youngest respondents (see Table 3).

Research Question 3

A further aim of the study was to explore if consumers are likely to favor m-services that offer a broad range of mobile value, and if some sources of mobile value stand out as especially relevant. Tables 4 and 5 show the services ranked according to the reported m-willingness using the *mean score* and the *portion of interested respondents* as measures. From the tables we can see, with some exceptions (especially *reservation services for cinema/theatre tickets* and *restaurant tables*, as well as *receiving personalized shopping offers*), a pattern where services offering mobile value on several dimensions are perceived as more interesting by the respondents than those offering mobile value on only one dimension. Furthermore, the patterns indicate that consumers seem to recognize especially the mobile value arising from the opportunity to meet *spontaneous needs* and *time-critical needs*, whereas they do not acknowledge mobile value that is *entertainment- or efficiency-based* equally well. Services offering mobile value by

satisfying *mobility-related needs* did not rank among to the top three applications.

Research Question 4

As pointed out in section 1, there is anecdotal and empirical evidence to suggest that there are significantly more people interested in using m-commerce than those currently using wired e-commerce. As stated in *RQ4*, the plausibility of this supposition was explored with a threefold statistical analysis. First, we investigated, using the *t*-test, if there are significant variations in the m-willingness between (i) consumers who have made purchases on the Internet (*e-commerce adopters*), and those who have not yet embraced e-shopping (*EC non-adopters*), and (ii) between *Internet adopters* (i.e. the respondents who reported that they use the Internet regularly or occasionally) and *Internet non-adopters* (respondents who have not yet used the Internet). By conducting these tests, we wanted to explore if the respondents representing the 'untapped market' actually do show a high willingness to engage in m-commerce, and if their willingness is significantly different from that of the embracers of wired Internet/e-commerce.

Table 4. Recognition of mobile value: rank by mean scores

Mobile service	Mean	Source of mobile value				
		TC	SP	EN	EF	MO
Send/receive emails	3.97	●	●		●	
Routine bank services	3.64	●	●		●	
Book cinema/theatre tickets	3.26		●			
Remote activation of appliances	3.14	●	●			●
Restaurant table reservations	3.00		●			
Calendaring/alerting services	2.94	●			●	●
Read and receive news	2.77	●	●	●	●	
Book travel tickets	2.71	●	●		●	
Payment in physical shops	2.69		●			●
Buy products online	2.65		●		●	
Receive personalized shopping offers	2.64					
Listen to/download music	2.46		●	●		
Play online games	2.14		●	●		
Send insurance damage reports	2.12				●	
Online chat with strangers	2.05		●	●		
Stock trading	1.95	●			●	
Take part in Internet auctions	1.94	●				
Advanced banking services	1.89				●	

Table 5. Recognition of mobile value: rank by portion of interested respondents

Mobile service	Interest	Source of mobile value				
		TC	SP	EN	EF	MO
Send/receive emails	79.5 %	●	●		●	
Routine bank services	66.7 %	●	●		●	
Book cinema/theatre tickets	53.7 %		●			
Remote activation of appliances	47.0 %	●	●			●
Restaurant table reservations	39.7 %		●			
Read and receive news	33.3 %	●	●	●	●	
Calendaring/alerting services	32.1 %	●			●	●
Payment in physical shops	29.3 %		●			●
Book travel tickets	28.3 %	●	●		●	
Buy products online	26.1 %		●		●	
Listen to/download music	25.4 %		●	●		
Receive personalized shopping offers	25.3 %					
Play online games	17.4 %		●	●		
Online chat with strangers	13.2 %		●	●		
Send insurance damage reports	12.5 %				●	
Advanced banking services	9.8 %				●	
Stock trading	9.6 %	●			●	
Take part in Internet auctions	6.6 %	●				

Hence, the higher the mobile willingness of the EC/Internet non-adopters in comparison to their counterparts, the stronger support we would find for the hypothesis of a wider market for m-commerce than for wired e-commerce.

As can be seen in Table 6, EC adopters reported, however, a higher willingness to use mobile services than *non-shoppers* on all the variables, with significant variations between the subsamples on all applications except for

reading/receiving news, booking travel tickets, and advanced banking services. When comparing the mean values of Internet *adopters* and *non-adopters*, we found significant differences on all the variables except the willingness to *receive personalized shopping offers* (p= .051). For all the services investigated, the current (wired) Internet users were much more willing to embrace m-commerce than the non-Internet users.

Table 6. Reported m-willingness by adopters/non-adopters of Internet and e-commerce.

Mobile service	Mean, (% interested)			Mean, (% interested)		
	Internet adopters	Internet non-adopt.	Sig.	EC adopters	EC non-adopters	Sig.
Send/receive emails	4.11 (83.5%)	3.22 (56.4%)	.000**	4.27 (86.6%)	3.82 (75.9%)	.000**
Routine bank services	3.72 (68.3%)	3.09 (52.7%)	.004**	3.85 (68.6%)	3.53 (65.5%)	.010*
Book cinema/theatre tickets	3.43 (60.3%)	2.36 (21.4%)	.000**	3.72 (71.8%)	3.05 (45.6%)	.000**
Remote activation of appliances	3.28 (51.6%)	2.59 (30.3%)	.001**	3.48 (57.4%)	2.99 (42.4%)	.000**
Restaurant table reservations	3.12 (43.0%)	2.27 (18.2%)	.000**	3.34 (51.8%)	2.84 (34.2%)	.000**
Calendaring/alerting services	3.07 (37.5%)	2.44 (12.7%)	.000**	3.13 (41.6%)	2.85 (27.9%)	.024*
Buy products online	2.81 (30.6%)	1.96 (8.9%)	.000**	3.11 (41.6%)	2.44 (18.9%)	.000**
Payment in physical shops	2.84 (34.0%)	2.05 (12.7%)	.000**	3.00 (41.3%)	2.54 (23.7%)	.000**
Read and receive news	2.83 (35.6%)	2.36 (16.1%)	.005**	2.90 (39.2%)	2.71 (30.5%)	.116
Receive personalized offers	2.70 (27.8%)	2.39 (14.9%)	.051	2.84 (31.5%)	2.55 (22.6%)	.014*
Book travel tickets	2.74 (28.9%)	2.39 (19.6%)	.032*	2.83 (32.7%)	2.65 (26.4%)	.084
Listen to/download music	2.53 (26.7%)	1.80 (12.5%)	.000**	2.66 (30.1%)	2.36 (23.2%)	.020*
Play online games	2.18 (18.1%)	1.82 (10.7%)	.027*	2.32 (21.7%)	2.05 (15.5%)	.030*
Send insurance damage reports	2.21 (13.9%)	1.79 (7.7%)	.006**	2.29 (14.0%)	2.03 (11.5%)	.012*
Online chat with strangers	2.09 (13.2%)	1.64 (7.2%)	.005**	2.21 (17.0%)	1.96 (11.2%)	.041*
Stock trading	2.05 (10.9%)	1.52 (3.6%)	.000**	2.32 (16.2%)	1.78 (6.5%)	.000**
Take part in Internet auctions	2.00 (6.6%)	1.65 (1.8%)	.004**	2.24 (10.5%)	1.80 (4.4%)	.000**
Advanced banking services	1.94 (11.1%)	1.64 (5.4%)	.038*	2.02 (13.3%)	1.83 (8.2%)	.073

Table 7. M-willingness of respondents agreeing and disagreeing to perceiving entry barriers

Barrier	N		Mean ³		SD		Sig.
	Agree ¹	Disagree ²	Agree	Disagree	Agree	Disagree	
Costs of entry	172	205	2.62	2.71	.65	.73	.208
Limited proficiency	113	250	2.53	2.77	.74	.66	.004**

¹ Respondents who *agreed* or *strongly agreed* to perceiving barrier

² Respondents who *disagreed* or *strongly disagreed* to perceiving barrier

³ M-willingness, aggregate value

** significant at the .01 probability level

In section 1, we conveyed a supposition that the overall volume of e-commerce may experience a significant growth with mobile technologies, as many consumers who are not yet Internet adopters due to the greater hardware investments and the proficiency with PCs needed in wired e-commerce will now access the Internet due to the *lower costs* involved and their *familiarity* with mobile device. In order to investigate the plausibility of *RQ4* with reference to this issue, we conducted the *t*-test to find out if respondents who perceived high *barriers* to e-commerce in terms of *costs of entry* and a *low proficiency with computers* show a significantly different m-willingness than respondents who did not perceive barriers in this respect. For this, the *aggregate mean value* was calculated (by combining the obtained scores for all the individual m-applications subject of investigation), and used as an indicator of the respondents' general m-willingness.

As can be seen in Table 7, the respondents who disagreed to perceiving barriers in terms of cost of entry and a limited computer/Internet experience show a higher willingness to use mobile services than those who agreed to perceiving barriers, with significant differences between the two groups on the variable *limited computer/Internet proficiency*, but not on *cost of entry*.

DISCUSSION AND MANAGERIAL IMPLICATIONS

In line with the contention that the demand side of m-commerce is a search for *value* (Keen and Mackintosh (2001), this paper has highlighted the importance of adopting a consumer-centric approach when developing m-commerce strategies. In order to support business decision-making, investment decisions, and the development of purposeful mobile services, an understanding of the

elements and special features of wireless electronic channels that are value-adding from the consumer’s point of view needs to be built.

We argued that at a very early development stage, an analysis should be carried out to assess whether and how different m-services are likely to provide added value to consumers. As a tool to this end, we presented an analytical framework describing how sources of *wireless value*, which are service-independent in nature, should be separated from the service-dependent sources of *mobile value*. The framework was applied to evaluate the suitability of a number of commonly proposed success applications for mobile settings by assessing whether they add mobile value from the consumers’ point of view. The results of the study indicated, although not unequivocally, that services offering mobile value on several dimensions are perceived as more interesting by the respondents than those offering mobile value on only one dimension, reflecting rationality in the consumers’ intended behavior. Although it was conjectured that applications satisfying *mobility-related needs* will constitute the core of the m-commerce value proposition, as such services are of value exclusively when provided through a mobile medium, the empirical evidence suggested that consumers, at this point, seem to recognize particularly the mobile value arising from the opportunity to meet *spontaneous* and *time-critical* needs. *Entertainment-* or *efficiency-based* mobile value was not acknowledged equally well. It should, however, be pointed out that no general conclusions should be drawn from the observed patterns with reference to the *relative* importance of the mobile value dimensions, since the perceived magnitude of any offered dimension is not only a service-dependent, but also a user-dependent phenomenon. Nevertheless, we believe that the analytical framework may serve as a valuable tool for managers and executives in assessing the extent to which a proposed service is likely to offer customer value in comparison to wired electronic channels, and more importantly, to determine the features and add-on services needed to support the provision of mobile value to consumers.

Although the collected data indicated a rather low willingness among the respondents to use most of the m-services subject of investigation, a number of facts should, nevertheless, be kept in mind when interpreting the results: First, for some of the hypothesized success applications, the observed willingness was remarkably high both when examining the mean values and the proportion of the respondents who reported that they “definitely” or “likely” would use such services: Even when comparing the observed m-willingness, using the latter indicator, to the results of similar (non-academic) studies (e.g. Yankee Group 2000a), the figures for the top applications are exceptionally high. Moreover, the results do, in fact, indicate that more than a quarter of the Finnish consumers are likely to use as many as 12 of the 18 suggested initial m-applications. Second, it should be noted that the low average willingness can, at least partly, be explained by the speculative nature of the questions: As some of the mobile services suggested are not yet available, and as the vast majority of the respondents most likely have not tested a single one of the available ones, their appreciation of the associated benefits may at this point be limited. It is, after all, hard to state the likelihood of using something that does not exist and/or you have not tried. According to Yankee Group (2000c), companies attempting to predict consumer interest in brand new products or service concepts are often greeted with a disappointing show of interest from the end user. The author correctly points out that the ongoing challenge is to demonstrate the benefits of the new offering to the user. A number of new technology companies have, according to Shuster (2001), erred in launching products by failing to educate potential users about the benefits and uses of the new technology.

Whereas it is not surprising that the *m-mail* and *routine bank services* constitute the two top applications given the exceptionally high adoption rate of online banking in Finland, the popularity of *reservation services* (cinema/theatre tickets and restaurant tables) was somewhat surprising, as was the unexpectedly low popularity of commonly hypothesized killer applications such as *online games*, *music*, and *news services*. Many

proposed m-commerce applications are likely to be highly *personalized*, using personal preferences as well as geographic location information. As is pointed out by Ghosh and Swaminatha (2001), many consumers may consider these services value-added, while others consider them invasive. Interestingly, the results of this study indicated that the average consumer is reluctant to accept personalized shopping offers on his mobile device.

As regards our objective to identify the primary target groups for the m-services subject of investigation, the data did not present any obvious tendencies based on the independent variables gender and age, with the exception that the oldest consumers, as could have been expected, constitute an insignificant target group for most mobile services. Although the youngest users are likely to form the primary customer group for most m-services, especially entertainment-related applications, the observed m-willingness was, relatively speaking, surprisingly high even in the older age groups.

A central objective of this research was to investigate whether m-commerce will be able to increase, as has commonly been suggested, the overall market for e-commerce. The results of the study do not support this speculation, as the current (i) Internet adopters and (ii) adopters of transaction-based e-commerce were, for all the services investigated, much more willing to embrace m-commerce than the corresponding non-adopters (i.e. the 'untapped market'), with statistically significant differences between the groups on nearly all services. Moreover, the respondents who disagreed to perceiving Internet entry barriers in terms of *cost of entry* and a *limited computer/Internet experience* showed a higher willingness to use mobile services than those who agreed to perceiving barriers, which gives further evidence contradicting the 'wider market hypothesis.' More precisely, the results suggest that consumers see the mobile Internet and m-commerce primarily as a *supplement* rather than as a *substitute* to the wired Internet and e-commerce. This key finding bears some important managerial implications: First, it suggests, although just implicitly, that

initiatives aimed at identifying, more precisely, the potential early adopters of m-commerce could start by looking at the characteristics of consumers who have been early adopters of wired e-commerce. Second, it gives cause for considerations regarding not only the conceptualization and development of initial m-commerce applications, but also, and especially, the marketing and distribution of the services to potential consumers groups: The Internet could prove to be a very efficient channel for marketing activities aimed at encouraging the adoption and use of m-applications among consumers. Third, and related to this, the observation that the wireless Internet is seen as a supplementary rather than a substitute channel suggests that electronic businesses initiatives should not focus solely or excessively on providing services and value through mobile channels, but should rather reflect a broader view and elaborate processes to deliver value to customer in *both* wired and wireless electronic environments. Multi-channel/multi-access solutions have been seen as a base requirement for m-commerce providers (Delichte 2001), and they are, no doubt, at the core of the modern freedom economy, which changes the limits of the possible in the structures of everyday life through the creation of new freedoms (Keen and Mackintosh 2001).

Limitations of the Study and Directions for Future Research

This study has helped to develop our understanding of the mobile Internet as a medium for commercial use in the B-to-C arena, a sector where the lack of empirical academic studies is striking due to the novelty of the phenomenon. Although the findings rest upon a rather extensive empirical investigation, a number of obvious shortcomings related to the chosen research approach must be acknowledged: A limitation inherent in the use of self-administered questionnaires in consumer surveys is that they necessitate a line of questions rather straightforward and general in nature. While intention data are often collected to predict actions, and many studies have found a positive relationship between intentions and behavior, the decision-making process often involves, however, many contextual factors

that cannot be expressed in short, written questions. The threat to predictive validity arising from a possible discrepancy between intention and behavior due to a simplified contextual perspective seems particularly disruptive in issues relating to technology adoption, where many external factors may influence the final decision, especially as consumers learn more about the real benefits, limitations, and costs involved. Likewise, the emergence and new technologies may render survey findings obsolete. However, in the survey reported here, the questions (which had to be kept at a general level due to the fact that technology standards are usually not apparent for the average consumer), were not related to any particular mobile platform or generation of network technology (such as GSM, GPRS, or UMTS), but rather to the consumers’ willingness to adopt different mobile services in general. Since many of the services subject of investigation were not available at the time of the study, and since the vast majority of the consumers had not tried any of the available 2G services, there was however, an implicit assumption that the questions concerned future (primarily 3G and beyond) networks, which will be able to provide functional services and advanced interfaces. Nevertheless, due to the speculative nature of the questions, and especially the aforementioned limitations, this research should be seen as a preliminary study reflecting the mass users’ perceptions, and not as conclusive research on the future popularity of different types of mobile applications.

While this research has given some (although limited) indications of the target customer groups for certain applications, they have been based only on the variables gender

and age. Other variables certainly need to be taken into account when identifying the target groups, and empirical studies on the mobile willingness of respondents in more narrowly defined target groups should be conducted. It should be noted that the study conducted was a national consumer survey measuring how likely a mass market of consumers will use these new types of services. We speculate that this could be the reason for the surveyed sample not showing a strong interest in the suggested applications, e.g. stock-trading, that are of likely interest only for a narrowly defined market. Further investigations should be carried out in order to clearly identify and measure the interest of more carefully selected customer groups to use targeted services, for instance the actual stock-traders’ willingness to use mobile stock-trading applications. In addition, research efforts should be carried out in the area of consumer behavior in relation to multi-channel marketing settings.

A final, yet important point to be made is that the results of the study are valid only for the Finnish society, which is characterized by a very high penetration rate of mobile phones, and a very high adoption rate in terms of Internet usage. More empirical studies should be carried out in cross-cultural settings to widen our knowledge of the near future market potential for mobile value-added services.

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