

The Adoption of Advanced Mobile Services

Bo ANDERSSON¹, Jonas HEDMAN², Mikael LIND²

¹*Lund University, Department of Informatics, School of Economics and Management,
S-223 63 LUND Sweden, Email: bo.andersson@ics.lu.se*

²*University College of Borås, School of Business and Informatics,
S-501 90 Borås, Sweden, Email: jonas.hedman@hb.se, mikael.lind@hb.se*

Abstract: From a diffusion and innovation perspective, the use of advanced mobile services is limited, immature, and unsophisticated in several Swedish business organizations. In this paper, we report the result from a survey of the 20 out of the 50 largest business corporations in Sweden. A number of factors explain the current situation, e.g. the mobile phone operators current business models, the lack of service providers working between the user organisations and the operators, difficulties in integrating mobile phones with other systems, and a generation issue where managers perceive advanced mobile service as a teenage thing.

1. Introduction

Advanced mobile services, such as m-commerce and mobile Internet, is an important topic for business and public organisations around the world [1, 2]. The design and development of mobile services has been intensive, such as messaging, games, position technologies, and ring tones. In general these services have been marketed to the individual mobile phone user, in particular the young ones, not for business use [3]. Thus, the diffusion and adoption of advanced mobile service within and between businesses has not progressed as expected [4].

The potential of advanced mobile services for business lie in availability of mobile systems and the installed base of mobile phones around the world [5]. In this paper, we define advanced mobile services as ‘everything except talk when using mobile devices’. This definition includes SMS, MMS, WAP, streaming and other technologies that expand the ability of mobile phones to offer communication and interaction between users. Advanced mobile service provides businesses with new opportunities to increase their revenues by introducing new sales channel and improving communication. It provides standards for sending and receiving messages, such as SMS and MMS, with customers, employees, and suppliers, i.e. a new channel for communication and marketing. Furthermore, mobile service applications can also provide new input and output devices for global information systems, such as ERP-, CRM- and SCM systems. Mobile services and the underlying technology provide companies around the world with new ways of doing business. The theme of this paper is reasons for that the diffusion and adoption of advanced mobile services has not taken off in business organisations.

2. Objectives

In this paper, we focus on the diffusion and adoption of advanced mobile service in Swedish organisations. Sweden can be regarded as an early adopter because the penetration rate of mobile phones is 115 % [1]. Even though that Sweden is a small country the results from this study would potentially indicate what other countries, when reaching the same adoption rate, will be in for a situation. The purpose of this paper is to contribute to our understanding of different mechanisms promoting and inhibiting the diffusion of advanced

mobile services by business organisations on the following accounts. First and most important, we identify some critical factors leading to a slow diffusion of advanced mobile services. Second, we do this from a classical innovation and diffusion perspective and not a technology acceptance approach, e.g. Carlsson et al. [3] and Knutsen [6].

The next section of the paper provides the reader with a short description of the Swedish mobile market. The following section presents a review on diffusion and innovation theory. Then the research approach is described. Section five presents the empirical findings, based on a survey from the largest business organisations in Sweden. The sixth section discusses the empirical findings. The paper is concluded with some final comments and recommendations.

3. The Swedish mobile market in short

3.1 The fundamentals

In Sweden, there are four different mobile networks, 450 Analog, GSM, 3G and 450 Digital. The major network builds upon GSM and 3G technologies. There are also four different carriers in Sweden that operates their own network, TeliaSonera, Telenor (former Vodafone), Tele2/Comviq and Hi3G. Today, approximately 97-98% of the population in Sweden has access to mobile networks from their homes, with either GSM or 3G networks.

3.2 Why focus on SMS and MMS

In Europe the most wanted service among mobile phone users during 2006 were SMS, followed by E-mail. During 2006 2.9 billion SMS were sent, a growth by 37% compared to 2005, but in 2006 only 10% of the SMS-traffic was sent by firms. An important aspect is that SMS and MMS should only be regarded as a channel, not a complete media. The interesting thing is what is delivered by SMS and MMS. It can automatically generate alerts from machines, calendars, CRM systems or ERP system. It can be MMS containing parts of electrical schemas, coupons or tickets.

4. Innovation and diffusion theory

Innovation and diffusion theory [7] is a theory, which attempts to explain the adoption of innovations, such as information systems [8] or mobile phones [9]. The classic diffusion study typically contrasts different user categories, e.g. individual adopters or groups of adopters, to describe the adoption process of an innovation. Users are often classified along a bell curve as innovators (2,5% of the population), early adopters (13,5%), early majority users (34%), late majority users (34%) and laggards (16%).

Diffusion theory explains the adoption process in two ways. The first explanations are related to the attributes of the innovation, such as the perceived relative advantage, compatibility, complexity, trialability and observability as the most important attributes of the innovation [7, p. 250-251]. Relative advantage relates to the users' perception of the innovation in comparison to competing technologies or services, e.g. in financial terms, social prestige, convenience or satisfaction. Compatibility refers both to existing technology and the individual users' values and norms, and relates to whether the user believes or perceives the innovation easy to use and understand. Trialability refers to the user test period, where the user may play with the innovation. Observability relates to whether or not the innovation has any observable impact for the user. The other explanation relates to the adopter's characteristics, their social network, and communication process. For instance, an innovator is suggested to be venturesome rather than a late majority user, which is a more traditional or conservative adopter.

The actual adoption process goes through a five-stage model: The first stage, labelled as knowledge, deals with learning about the existence and function of the innovation. The second stage, labelled as persuasion, is the process of becoming convinced of the value of the innovation. The third stage, labelled as decision, is the actual decision to adopt the innovation. The fourth stage, labelled as implementation, is about beginning to use it. The last stage, labelled as confirmation, deals with the final acceptance of the innovation. In addition, the interactions of innovation attributes and characteristics of the network used to communicate the innovation may be relevant when explaining the adoption process [7 p. 332-333], i.e. network effects.

In relation to mobile services there are a number of studies addressing different issues in diffusion processes, e.g. such as adoption of early generations of mobile services [10]. In summary, they conclude that innovations and diffusion of complex technology systems are collective achievements, contested among many different alternatives, and actors who are involved different and conflicting interests. Therefore, diffusion of advanced mobile services is a political process as much as a technical one.

Critics of innovation and diffusion models suggest that it is an overly simplified representation of a complex reality. A number of other phenomena can influence innovation adoption rates, e.g. customers often adapt technology to their own needs, so the innovation may actually change in nature from the early adopters to the majority of users. A second is that disruptive technologies may radically change the diffusion patterns for established technology by starting a different competing S-curve, e.g. VCR versus VHS. Thirdly, path dependence may lock certain technologies in place, as in the QWERTY keyboard and e-mail.

To conclude advanced mobile services is a fast growing area, with numerous of innovations affecting the global diffusion of mobile services. Research up to date has mainly focused on the individual adopter – less focus on organisations.

5. Research Approach

In the previous section, we have presented our literature review. The classic diffusion study typically contrasts different user categories and attempts to classify them. Our aim is not to classify organisations, but to understand some of the reasons as to why advanced mobile services are not used to a larger extent when co-ordinating and doing business. The focus has been on factors or mechanisms that appear to influence or inhibit the adoption of advanced mobile service at corporate level, such as the adopter characteristics, social network, communication process, promoters' characteristics, and the attributes of the innovation. There are other and more comprehensive frameworks explaining the diffusion and adoption of innovations, e.g. Urbaczewski et al. [11] included innovation and diffusion, technology acceptance, information presentation, cognitive fit, impression management, and culture to provide a more comprehensive picture of the complex phenomena of adoption and use of mobile service. However, our preliminary investigation and existing research, e.g. [4], indicated that the adoption and use of advanced mobile service is low, leading us to apply a less comprehensive research model, but with high integration (logical coherence), practical and theoretical relevance, and relative explanatory power.

5.1 Research Methodology

In the process of selecting empirical cases it was decided to select 50 out of the 100 largest Swedish firms of which 20 participated in the study. In total, 20 interviews were made with the main responsibility for mobile technology/phones at corporate level. The interviews lasted between 10 and 30 minutes and were recorded as well as transcribed. The interviews were semi-structured, including some closed and some open questions to ensure

exploration. The research question was loosely organized around enablers and inhibitors of SMS and MMS use and some overall issues, such as the perception of information technology in general and mobile technology in particular, overall organizational structure, and degree of innovation within the firm. We basically asked the respondents from the headquarter of each participating firm how they perceive the diffusion, use, benefits, drawbacks and inhibitors and enablers, of SMS and MMS based services. The following services are some examples of services used when interviewing the companies:

- SMS for login and authentication
- Error reports
- Reaching people for dispatch centres
- News and information alarms
- MMS for services and information

Note we made it clear that we were only interested in formal use of SMS and MMS – not private use between employees. The reason for choosing SMS and MMS as focal interest is threefold: First, the potential in these standards to develop and existing businesses. Second, it is the first characteristics of advanced use of mobile services [4]. Third, is the global widespread of these standards. Other more advanced services, such as mobile payment, seem to have a very marginal impact on a corporate level.

When analysing the data we used Yin's [12] pattern-matching analysis method, whereby the empirical observations were 'matched' and compared with the theoretical concepts. Being, an exploratory study at improving the understanding of the use and diffusion of advanced mobile services, we used the empirical findings to 'challenge' existing theory and concepts related to the innovation, the diffusion and the adoption. In accordance with the grounded approach, the structure of the presentation of the empirical findings below is based on observations, not primarily on pre-existing theory.

6. Empirical findings

This section is structured around the overall research question: organizational structure and freedom of choice, importance of IT and mobile technology and organizational innovation, current and future use of SMS and MMS, difficulties in using SMS and MMS, and benefits from using SMS and MMS

The participating firms mainly have a centralized control model and in particular in relation to strategic decision-making and investments, such as IT and mobile technology. Only two out of the 20 firms stated that they were decentralized. In these cases, the respondent had a low awareness concerning the use of advanced mobile services around the organization. This was perceived as a disadvantage, since ideas and decisions were much more difficult to enforce in the organizations, but also has its benefits since each organizational unit could be more flexible and rapid in managing change.

The view of IT and mobile technology varied a lot. Eight of the firms perceived IT as an integral part of their business and a source of competitive advantage and six of the firms perceived themselves as innovative IT-users in comparison to their competitors. The general impression is that advanced mobile services is growing and several firms had plans for how to use the technology in the future, but surprisingly two of the firms did not use SMS or MMS. One of the firms stated that they were pushing the mobile operators to develop new services, but the operators' existing business model could not cope with the requirements from the user organisations. Nevertheless, one problem was that the operators had developed their offering for individuals and not value added services for business. The operators do not have the capability to deliver unique services for individual business. Another issue is that several of the organisations did not see any applications for SMS and

MMS, i.e. how these can contribute to the business. Several firms stated internal problems when trying to diffuse and implement advanced mobile service. This was expressed as:

“services such as ‘Vodafone live’ are not positively accepted internally, because no controller or managers appreciate if the employees reads Aftonbladet (large Swedish evening paper) or surf with their mobile phones during work hours”

Most structured use of SMS and MMS is provided from call-centre functions that send dispatch messages to the concerned party. In several of the firms, IT-crises systems included SMS functionality and in particular for the purpose of hardware brake down. SMS is used to publish news and information, such as large sales order. The current use of structured SMS is in general low by most. However, most firm use and allow employees to receive and send SMS - even during meetings. One respondent express this as:

“You don’t disturb the meetings, but you check your SMS’s and if it is important you may leave the meeting and call back. ...It is a new and different culture moving in – absolutely.”

Regarding the use of MMS on the other hand, all respondents said no initially – “MMS is not used at all”. However, after extrapolation and more questioning, several of the firms indicated that MMS is used between experts, for instance to send pictures of broken parts or to choose alternatives for customers. However, the use of MMS is totally ad-hoc and based on individual preferences - there are no services supporting structured processing of MMS:

A technical issue related to the difficulties to switch mobile phones and transfer configuration settings form one mobile phone to another is lack of standards. Benefits with SMS and MMS is 24/7, but there is also a concern if firms begin to send messages around the clock, people would get woken up each time a new message arrive.

An issue affecting the diffusion of SMS and MMS is freedom of choice, i.e. users should be able to decide which communication channel to use. This was one the ideas of user participation. On the other hand, it is also an indication that the perception of SMS and MMS as a communication channel and not as alternative information channel. A consequence is that people allows to decide on the medium for information. Another issue is that several of the corporations do not see any applications for SMS and MMS, i.e. how it can contribute to the business. In addition, several of the participants stated difficulties to switch mobile phones and transfer configuration settings form one mobile to another – a lack of standards between phones. Furthermore, a number of security issues regarding the sender of a SMS were a clear inhibiting factor. Competing technologies, such as e-mail, was perceived as more convenient than SMS. The perception of SMS is that is convenient for reaching people.

7. Discussion and Conclusion

The survey provides us with several examples of interesting issues in relation to diffusion issues of advanced mobile service. We would argue that the fact that diffusion and adoption of advance mobile service is low in Sweden, mainly due to lack of knowledge of advanced mobile service and low perceived relative advantage. Thus, the attributes of the innovation does not lead to use, which is concurrent with innovation and diffusion theory [7]. In addition, the findings are similar to a survey of the Danish market [4], which concluded that the use of advanced mobile service is still low. Therefore, in that sense Sweden is still in the first stage of using advanced mobile services. Hence, it is an example of an immature service from the perception of the user, so to speak. We do not claim that this the entire

view of advanced mobile services in Sweden, there are several cases of the opposite. For instance, most companies allow their employees to receive SMS during meetings. This is a change in meeting culture. This type of use gives support to the second explanation, i.e. adopter characteristics, as a factor explaining use of advanced mobile services. Nevertheless, this highlights an issue related to the definition of an innovation applied in this study and in innovation and diffusion theory, i.e. what is an innovation. The problem we found was that the same innovation was used very differently between organisation and within organisation. An explanation of this lies in the composite nature of advanced mobile service which both has a technological part as well as a service component, which is in line with Lyytinen and Fomin's [10] conclusions.

Not surprisingly, companies in industries with high competition and advanced use of information technology in general are much more positive and use more advanced mobile services than other companies did. In that respect, issues related to organisational politics, power, structure, path dependency, history, and communication are probably important to take into account. We would argue that the incompatible technological standards, such as communication standards offered by operators and mobile phone standards, is a major issue in Sweden. Sweden has "let" the market decide and each operator tries to create lock-in-effects by developing unique standards or make small adjustments to existing standards. This seems to be counterproductive for the whole market as such. Therefore, the operator struggles with a few innovators of the population, instead of opening up the market and get both early adopter and early majority in the game. However, most companies do not know the incompatibility issue between mobile phones – they think that mobile phones and operator technologies are compatible. The firms perceived that advanced mobile services had a relative advantage, compared to phone and e-mail, through the connivance (24/7 and silence with text messages). This was a very clear advantage for sales people or service engineers without 24/7 Internet connection. Thus, advanced mobile service support the nomadic worker and his or hers values and norms. In relation to compatibility, several firms reported problems with integrating mobile phones with their PCs and other infrastructure, but between mobile phones there is a full compatibility. The complexity of advanced mobile services is troublesome, since most mobile phone users receive text messages, but it is more difficult to develop and integrate such services with existing information systems. All types of advanced mobile innovations go through a time of trialability before larger use. It is clear that the perception of observability varied a lot between the organisations - some were not even using advanced mobile services at all. An interesting finding was that the user companies did not feel that the large operators in Sweden had a business model suitable for delivering advanced mobile service for a company. The operators' business models are based on volume only, not quality. This opens up a market for new actors working as service providers between operators and end using companies.

What is interesting from a Swedish perspective is that Sweden is perceived as a mature and advanced country in relation to use of IT and development of mobile phones and systems. However, this has not spilled over to the usage in large Swedish business organisations. Two factors can potentially explain this. The first is the lack of service providers, working between the mobile operators and the user organisations, providing organisational adopted offers. The problem with the operators is that their business models are based on high volume aimed for a mass market with 'simple' offerings, such as talk and SMS sending and receiving, but without any intelligence. This is to some extent fascinating considering firms, such as Ericsson and SonyEricsson, and that Sweden was one of the first countries in Europe to let the mobile market free. A conclusion one could draw is that arenas based on advanced technology needs strong governmental controls in order to take off. A free market tends to sub optimise, cf. European choice of the GSM standard versus USA and CDMA/IS-95, GSM, TDMA, and iDEN.

In relation to future research, we propose the following areas of interest. Similar studies related the corporate use of mobile services in Sweden and around the world. Another important research issue relates to the development of advanced mobile service and the need for service providers, which are lacking in Sweden. A third issue relates to the lack of standards.

References

- [1] Lyytinen, K. and Yoo, Y. (2002). Research Commentary: The Next Wave of Nomadic Computing. *Information Systems Research* 13(4), pp. 377-388.
- [2] Mathew, J. Sarker, S. and Varshney, U. (2004). M-Commerce Services: Promises and Challenges. *Communication of the Association for Information Systems* 14, art. 26.
- [3] Carlsson, C. Carlsson J. Hyvönen, K. Pukakainen, J. and Walden, P. (2006) Adoption of Mobile Devices/Services – Searching for Answers with the UTAUT. *Proceedings of the 39th HICSS* (Ed. Sprague, R.H.), Hawaii, USA.
- [4] Constantiou, I., Damsgaard, J. and Knutsen, L. (2005). Beware of Dane-Geld: Even if Paid, M-Service Adoption can be Slow. *Proceeding of the 13th European Conference on Information Systems* (Ed. Bartmann, D), Regensburg, Germany.
- [5] Wu, J-H. and Wang, S-C. (2005). What Drives Mobile Commerce? An empirical Evaluation of the Revised Technology Acceptance Model. *Information & Management* 42, pp. 719-729.
- [6] Knutsen, L. (2006). M-service Expectancies and Attitudes: Linkage and Effects of First Impression. *Proceedings of the 39th HICSS* (Ed. Sprague, R.H.), Hawaii, USA.
- [7] Rogers, E. (1995). *Diffusion of Innovations*. The Free Press, New York.
- [8] Cooper R. and Zmud, R (1990). Information Technology Implementation Research: A Technological Diffusion Approach, *Management Science*, 36(2), pp. 123-139
- [9] Koski, H and Kretschmer T. (2005). Entry, Standards and Competition: Firm Strategies and the Diffusion of Mobile Telephony, *Review of Industrial Organization* 26(1).
- [10] Lyytinen K. and Fomin V. (2002). Achieving High Momentum in the Evolution of Wireless Infrastructures: The Battle over the 1G Solutions. *Telecommunications Policy*, 26(3), pp. 149-170.
- [11] Urbaczewski, A., Wells, J., Sarker, S. and Koivisto, M. (2002). Exploring Cultural Differences as A Means for Understanding the Global Mobile Internet: A Theoretical Basis and Program of Research. *Proceedings of the 35th HICSS* (Ed. Sprague, R.H.), Hawaii, USA.
- [12] Yin R. (2003). *Case Study Research: Design and Methods*, SAGE.