

A Framework for Understanding Adoption and Diffusion Processes for Mobile Commerce Products and Services and its Potential Implications for Planning Industry Foresight

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Abstract. *Mobile commerce (m-commerce)—is the term for the extension of electronic commerce (e-commerce) from wired to wireless computers and telecommunications, and from fixed locations to anytime, anywhere and anyone(Keen and Mackintosh, 2001), also defined as all activities related to a (potential) commercial transaction conducted through communications networks that interface with wireless (or mobile) devices(Tarasewich et al 2002, Barnes 2002). M-commerce is gaining more and more attention from both the IS research community and business organisations. This paper will propose a framework for understanding the adoption and diffusion processes for m-commerce products and services from a holistic perspective, and how they can be implemented in field research. We think that the information and knowledge derived from such research could be used by industry when drawing up foresights for m-commerce by producers/suppliers in the mobile commerce industry (MCI). The arguments in this paper are theoretically oriented and try to briefly point out the potential implications of adoption and diffusion studies for making industry foresights. The validity of this framework in practice still depends on empirical studies with adequate adoption and diffusion models. These will be done in the future.*

1 Introduction

Today, with the explosion and development of the wireless networks and technology to 3G and 4G, m-commerce is becoming a new issue in IS research agenda (e.g. Müller-Verse 2000, Carlsson and

Walden, 2001, Keen and Mackintosh, 2001, May, 2001, Kalakota and Robinson, 2001, Ropers, 2001, Tarasewich et al, 2002)

M-commerce— is the term for the extension of electronic commerce (e-commerce) from wired to wireless computers and telecommunications, and from fixed locations to anytime, anywhere and anyone (Keen and Mackintosh, 2001). Tarasewich et al (2002), and Barnes (2002) argue that, m-commerce could also be defined as all activities related to a (potential) commercial transaction conducted through communications networks that interface with wireless (or mobile) devices. They say that, m-commerce marks the start of a new era in business. It opens up new business opportunities and turns wireless technology into the value for both customer and company that ensure profitable innovation. There are few studies on adoption and diffusion processes for m-commerce. Pederson et al, (2002) have pointed out the importance of studying these processes. Although there are several empirical studies done (see, Aarnio et al, 2002; Anckar and Davide 2002; Khalifa and Cheng, 2002; Anckar 2002; Carlsson and Walden 2002a, 2002b.), which provide us with information about end-user perceptions, they do not take as a starting point of adoption and diffusion processes for m-commerce products and services. Because they are conducted from an end-user or a consumer perspective, they do not take into consideration the interests, needs and strategic intention of producers/suppliers in the mobile commerce industry (MCI). Since the failure of e-commerce to meet the expectations of the customer to achieve true mass adoption (Ropers, 2001), as well as the tremendous expenditure for 3G licences, have made producers/suppliers in the MCI very cautious to move forward (e.g., Lewell, 2000, McDonough 2001, Mbusiness daily, 2002). The uncertainty, especially created by the future, may give rise to many disappointments for them. Thus, there is an immediate need to develop an understanding of the future and to reduce the existing uncertainty. Industry foresight--a process for organisations discovering a route to a desirable future and about being ready for the future (Walden, et.al, 1999)-- is a recommended approach for building and understanding the future of m-commerce (Han et al., 2002).

In this paper, we will propose a framework for understanding the adoption and diffusion processes for m-commerce products and services, from both producers'/suppliers' and customers' perspective. The aim of the proposed framework is twofold. One is to try to provide a holistic framework for understanding the adoption and diffusion processes for m-commerce products and services. The other is to try to point out the potential implications for industry foresight making. Producers/suppliers in MCI could exploit adoption and diffusion knowledge for their m-commerce industry foresight making. Here, we will present the first aim in details, but only briefly discuss the second aim.

In the following sections, we begin with a brief theoretical overview of adoption and diffusion studies as well as industry foresight approach. We will then discuss the proposed framework and its implementation in the field research. We will point out the potential implications for making the industry foresight for the future of m-commerce. In the conclusion, we will summarize the findings and give some ideas on how to proceed in the future.

2 Theoretical Background: A Brief Review

The adoption and diffusion of new products or services or innovations have been richly studied from many perspectives, e.g. economy, sociology, and marketing, etc (Gopalakrishnan and Damanpour 1997). Roger (1995) illustrated a simple idea of adoption and diffusion. Diffusion is a function of

communications, whereas adoption is a function of the decision making process. In the B2C market, Engel et al., (1990) developed a comprehensive model for studying consumer behaviour. Three broad factors - environmental influences, individual differences, and psychological processes - influence the decision-making process of consumer behaviour (including adoption and buying behaviour). The result of decision-making drives producers/suppliers' marketing strategy (Engel et al, 1990). In the B2B market, organisational decision-making for adoption is a result of organisational traits, environmental characteristics, and individual employee influences (Kennedy, 1983). Characteristics of the technology, existing organisational business models and paradigms, pushes from within the industry etc are also important variables in organisational studies for adoption of technology (King and Gribbins, 2002). The process of diffusion may be characterized as the (1) acceptance, (2) over time, (3) of some specific item—an idea or practice, (4) by individuals, groups or other adopting units, linked (5) to specific channels of communication, (6) to a social structure, and (7) to a given system of values, or culture (Katz et al., 1963). Apparently, adoption and diffusion studies involve aspects of micro consumer and organisation behaviour, and macro environmental and social changes.

A sufficient understanding of current and future changes from many aspects is required in strategic planning for the future of m-commerce. The planning process usually begins with an extensive situational analysis that pays particular attention to environmental changes that come from political, behavioural, economic, sociological, and technological sources (Cooper 2000). In their book “Competing for the Future”, Hamel and Prahalad (1994) argue that for future conditions, we need a “future-oriented” approach to find out what the market may be, especially in strategic planning for an emerging and immaturely structured industry, which is appreciable in MCI. If we can envisage the future and work backward to build a specific strategy or strategic architecture for that direction, discovery and destination, then this will make it possible to be competitive in the future. The goal of industry foresight is to build the best possible assumption base about the future and thereby develop the prescience needed (strategy intent or architecture) to proactively shape how the industry will evolve (Hamel and Prahalad 1994). Essentially, industry foresight encompasses three points of view about the future: customer benefits (value), organisation core competencies, and customer interface.

If we understand the richness of adoption and diffusion studies and basic requirement of producers/suppliers in the MCI for industry foresight making, we can propose a framework that could help us better interpreting the adoption and diffusion processes for m-commerce products and services including producers/suppliers strategic intention. They may also have implications for making industry foresight.

3 A framework for Understanding Adoption and Diffusion Processes for Mobile Commerce Products and Services

In order to understand the adoption and diffusion processes of m-commerce products and services, we need to develop a comprehensive framework (Methlie & Pedersen, 2001, Pedersen, 2001). Moreover, we have to interpret it holistically from customer, producer and management perspectives in order to provide more information and knowledge about potential changes in customer value, interfaces, and

the core competencies that make them real. This could help producers/suppliers in the MCI to make more effectively an industry foresight for the future of m-commerce. We propose a simple supply / demand relationship map that can illustrate the complicated adoption and diffusion processes for m-commerce products and services (See figure 1).

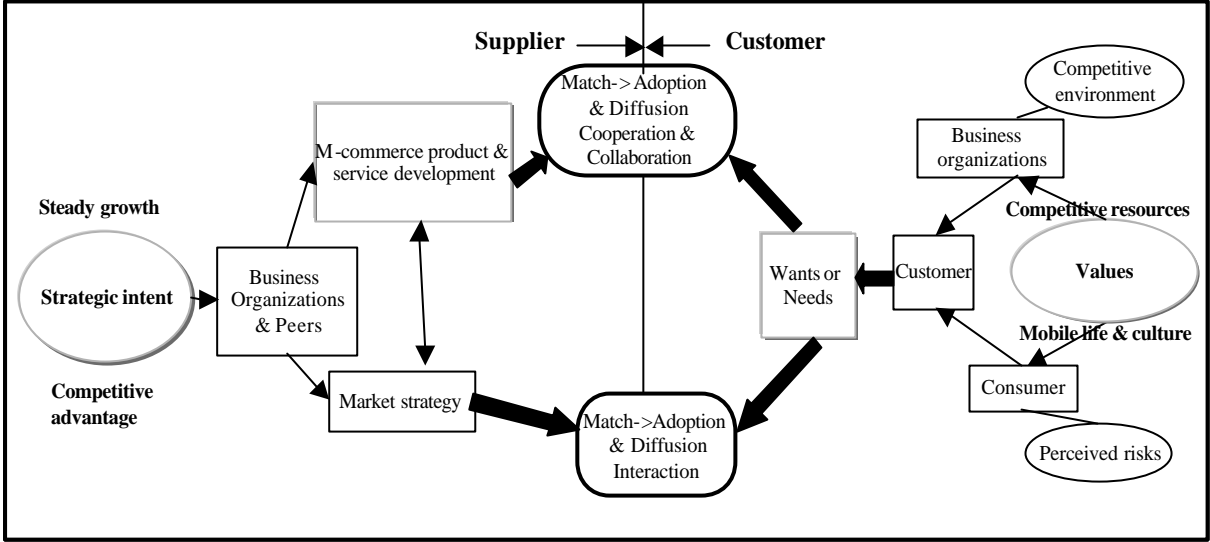


Figure1: A simple map of adoption and diffusion processes for m-commerce products and services

In figure 1, we demonstrate that the m-commerce market is basically composed of two groups, product and service producers/suppliers, and adopters or customers including consumers and business organisations. We assume that, in a completely free market, an equilibrium is formed when supply and demand coincide. Hence, the basic assumption of our framework for understanding the adoption and diffusion processes for m-commerce products and services is that adoption and diffusion have taken place when the producers/suppliers’ products or services match the needs or wants of the customers. The suppliers develop m-commerce products and services pushed by strategic intent (architecture), which envisions a desired leadership position and establishes the criterion the organisation will use to chart its progress (Hamel and Prahalad 1989). In order to fulfil the intent and to develop successful product and service and marketing strategies, which sustain and create such a “match”, producers/suppliers need to cooperate and collaborate with the organisations of the demand side, good interaction with the consumers is also necessary (Barnes, 2002). “All relationship is valuable” (Ford and McDowell 1999), that will enhance customers satisfaction, and maintain their loyalty for gaining competitive position and sustaining long-term relationships (Mandjak and Durrieu, 2000, Stabell and Fjeldstad, 1998) Organisations adopt innovations because they form a critical success factor within a given market and a competitive industry environment (Cooper 1998). Consumers adopt m-commerce products and services when their value (e.g. mobile life and culture) exceeds the perceived risk from a specific individual point of view. (Black et al, 2001)

Different m-commerce products and services may vary in the speed and timing of their adoption and diffusion, but in general, they may follow the same simple map of adoption and diffusion. There are two possible extremes when it comes to the adoption and diffusion processes for m-commerce products and service in the future – rapid versus slow.

If the process takes place rapidly, the MCI will be very prosperous. M-commerce will become the source of a competitive advantage for corporations (Keen and Mackintosh, 2001, May, 2001). Producers/suppliers launch products and services on the market at an alarming rate because of a huge demand from organisations and consumers. Steady growth and competitive advantage as their ultimate aims will push suppliers to be more innovative (Porter, 1980, Krogh and Cusumano, 2001). In a competitive environment organisations on the demand side will adopt the new m-commerce products and services for the same ultimate reason (Robertson and Gatignon, 1986). Consumers desire an easy, flexible and personalised mobile life, which requires that all producers/suppliers in the m-commerce value chain communicate, cooperate and collaborate seamlessly (Pederson, 2001). Learning from the consumer, especially the early adoption consumer will provide crucial information for drawing up marketing strategy and product development strategy (Saban et al, 2000). The technology and non-technology requirements of adopting m-commerce products and services on both the supply and the demand side match at the right time, in the right place and in the right context. Such “right” may cause integration and standardization to become a cut-throat battle (Shapiro and Varian, 1998). But, motivation for further developments may derive as well. Because of the network externalities effect, every supplier/producer in the MCI may try to allow their m-commerce products and services to be integrated in some context (e.g., MeT Initiative, Mobey Forum, Mobile Services Initiative, Location Interoperability Forum (LIF)). They may try to play a dominating role in the specific standardization process. All these efforts will push the development of m-commerce products and services into a new arena very fast.

If the process occurs slowly, the MCI will be still in the infant stage and adoption requirements cannot match in a proper way. Thus, all producers/suppliers in the m-commerce value chain need more time and effort to make fast adoption happen. Most of the producers/suppliers may be reluctant to develop new mobile products and services due to low demand from the market and the high risk involved. Only leading suppliers, for instance, network operators, may aggressively invest in this new area owing to their tremendously high cost of buying 3G licences. (cellular-news,2002) The demand organisations may take the perceived risk seriously and wait for the products and services from suppliers, that match their immediate wants and needs (e.g., Mbusiness daily, 2002). Only highly innovative organisation may take the first-purchase action. Consumers, on the other hand, may lack the needs or wants for a mobile life. Only highly innovative consumers (Citrin et al, 2000) will start to adopt available m-commerce products and services. Thus, producers/suppliers need more promotion to educate their customers and enrich their knowledge of m-commerce.

The two possible extremes could provide different information on changes in the social environment, economy, organisations and consumer decision-making processes. These differences reflect varying implications as regards customer value, customer interface and the core competence hidden behind them from the producers’/suppliers’ perspective. When producers/suppliers within the MCI build a specific industry foresight for the future, they have to consider these two possible processes carefully and create precisely needed strategy architecture to handle both extremes equally. Producers/suppliers have to continuously adjust their strategies to remain one step— but only one step— ahead of the customer (Kalakota and Robinson, 2001) in order to lower uncertainties and to exploit emerging opportunities.

The proposed framework is intuitive and rational. It concerns strategic intention of producers/suppliers in the MCI and describes the possible extremes of adoption and diffusion processes for m-commerce products and services.

4 Implementing the Framework in Field Research

The implementation of the framework in field research consists of three steps. The first step is to identify the elements and features of mobile products and services. The second step is to select adequate available adoption and diffusion models to study the adoption and diffusion processes for m-commerce products and services. We recommend that producers/suppliers in the MCI might possibly take the third step. They could extract the information and knowledge from adoption and diffusion studies and include them in the industry foresight building by targeting three points of view: customer value, organisation core competencies, customer interface by adopting a *disciplined imagination* approach.

4.1. Identifying mobile commerce products and services

Development of m-commerce products and services is one of the industry drivers for the MCI. We need to probe deeply inside to describe what they are. Carlsson and Walden (2001) provide a conceptual framework for m-commerce products and services from three perspectives: the customer, the producer and the management. They propose to build them around value-added product and service modules, some of which are completely new so that we can take advantage of the new mobile technology. M-commerce products and services viewed from different perspectives have different distinguishing elements. These embedded elements actually describe what the m-commerce products and services will be. From the customer perspective, they are durable technological products and technology-based services where repeat purchases are motivated by an increase in user-perceived functionality that triggers generational transitions (Bass P. and Bass F, 2001). From the producer perspective, they are new concept products that will boost companies' profits or even create a sustainable competitive advantage. From the management perspective, they are new information systems for decision-making, or business models, that need a new strategy architecture to push companies ahead of their competitors in the future.

M-commerce products and services are innovations. In the business-to-consumer market, according to Rogers' (1995) definition—an innovation is “an idea, practice, or object perceived as new by an individual”, e.g. mobile gaming, mobile e-mail, mobile shopping, mobile banking etc. In the business-to-business market, innovations are “new product inputs, machines, processes, and techniques adopted by firms or entrepreneurs for their own use (Frambach, 1993), for example, mobile customer-relationship management, mobile supply-chain management, or mobile virtual teamwork. Innovations play a very important role in nurturing the economy, in enhancing and sustaining the high performance of firms, in building industrial competitiveness, in improving the standard of living, and in creating a better quality of life (Gopalakrishnan and Damanpour 1997). Innovation is the very lifeblood of high-technology firms (William and Keith, 1997). Consequently, the development of m-commerce is a must. By reason of the multi-dimension features embedded in m-commerce products and services, we can study their adoption and diffusion processes by using different adoption and diffusion models.

4.2. Different adoption and diffusion models

Users' perceptions of and intentions to adopt the IS and the rate of diffusion and penetration of technology within and across organisations are two important foci in IS research (e.g. Straub et al, 1995; Taylor and Todd, 1995). They are understood to represent or stand for the essential aspect, property or value of the information technology (Orlikowski and Iacono, 2001). With the development of Internet and its adoption by the business world, researchers in IS community conduct many studies on adoption and diffusion of World Wide Web and PC-based e-commerce (Henderson et al, 1998; Tan and Teo, 2000; Gefen and Straub, 2000; Lederer et al, 2000; Jiang et al, 2000; Bhattacharjee, 2001; Frech and O'Cass 2001; Moon and Kim, 2001; Liang and Lai, 2002; Sciglimpaglia, and Ely 2002; Van der Heijden, and Verhagen 2002). Generally, studies in m-commerce product and service adoption may follow methods of previous studies and choose one of three possible approaches: an adoption approach, a diffusion approach, and a domestication approach (Pedersen and Ling, 2002). Three models are widely applied in the adoption approach: the technology acceptance model (TAM) (Davis, 1989), the theory of reasoned action (TRA) (Fishbein and Ajzen, 1975), and the theory of planned behaviour (TPB) (Ajzen, 1985). These three models study micro, individual level behaviour and are applied primarily to explaining the individual adoption and acceptance of technologies in the workplace. (e.g. Ajzen 1975, Davids, 1989, Venkatesh and Davis 2000, Venkatesh 1999). Also, Venkatesh and Brown (2001) adapted TPB as a guide to developing a model of how households to adopt technology. Basically, TAM compares favourably with TRA and TPB (Venkatesh 1999, Venkatesh and Davis 2000). Pedersen (2002) has decomposed TAM and TPB to study the end-user behaviour of adopting mobile Internet services. Khalifa & Cheng (2002) maintain that exposure of an individual to m-commerce influences positively the individual's intention to adopt m-commerce. The TPB model is their theoretical basis. These adoption models provide information and knowledge about the characteristics of a particular information system/product, end-user behavioural intention and adoption requirements, i.e. usefulness or ease of use.

Diffusion models include the diffusion of innovation (DOI) (Rogers, 1995), Bass new product growth model and multi-generation technology diffusion model (Bass 1969; Norton and Bass 1987,1992; Bass et al., 1994). The DOI model is aggressive and has been widely used to study consumer behaviour in marketing, organisation adoption and diffusion behaviour in a social system and in the IS research field. (e.g., Bass, 1969; Norton & Bass 1987, 1992; Wind ed. 1981; Mahajan et al., 1990; Cooper & Zmud, 1990; Roger, 1995; Roberson & Gatignon 1986; Hannan & McDowell 1987; Frambach, 1993; Yamada et al., 2001; Black et al., 2001; Crawford 1996, Gopalakrishnan and Damanpour, 1997). The Bass model (Bass, 1969) was developed to explain how customers adopt consumer durables. This model is a growth model focusing on the timing of the initial adoption of new consumer products. Norton and Bass (1987,1992,) took the Bass model and combined it with Fisher and Pry's (1971) technological substitution model that studies the dynamic sales behaviour of successive generations of high-technology products. Thus, they developed a model that encompasses both diffusion and substitution. This model is most applicable to products that have potential use in strategic planning for high technology applications (William and Keith, 1997). Jain (et al., 1999) and Danaher (et al., 2001) studied cellular phone services in the US and the European markets by integrating marketing-mix variables with this model. The results of studies with these diffusion models provide information and knowledge on product characteristics, diffusion stages and speed, adopter categories, social, environmental, market dynamics changes, etc. It also may help managers understand the substitution of mobile technologies by different generations, GPRS, 3G or 4G, WLAN

and their applications, in the long run. The domestication approach studies every day life by adopting and using a particular technology. We could incorporate the domestication approach into the adoption tradition from a broader perspective. (e.g., Venkatesh and Morris, 2000)

So far, the selection of a proper model for studying the adoption and diffusion processes of m-commerce products and services is determined by two requirements. One is the distinguishing features embedded in particular m-commerce products and services offered by different producers/suppliers; the other is what kind of information or points of view producers/suppliers within the MCI want to have from such studies when considering their industry foresight.

4.3 Potential implications for and exploiting the knowledge into industry foresight making

Szulanski & Amin (2001) point out that the foresight approach rests much on imagination and argue that companies need to use *disciplined imagination* in the process of strategic planning. They say that disciplined imagination balances exploration and exploitation by combining a process for generating diverse options with another for evaluating them consistently. They discard the bad ones and develop further the good ones. Imagination generates wide options, while discipline evaluates the options consistently in order to maintain greater consensus among top managers.

Satisfying the wants or needs of customers is a key success factor in the context of m-commerce (Kalakota & Robinson, 2001). Obviously, for producers/suppliers in the MCI, “learning from your customer” is a wise practice. They could develop “discipline” - focus on core competencies, customer value and customer interface - by studying the adoption and diffusion processes for m-commerce products and services among customers, and use the results to evaluate “imagination options” for the future of m-commerce. At the same time, they may imagine the future on the basis of some weak signals discovered by such studies. As Hamel and Prahalad (1994, p81) stated: “The cues, weak signals and trend lines that suggest how the future might be different are there for everyone to observe”. We believe that incorporating knowledge about adoption and diffusion processes into industry foresight making might help producers/suppliers in the MCI to keep a competitive industry foresight on the right track. Thus, we recommend them to continue this study further in their industry foresight making process.

The results obtained by applying the established models could describe the reality of the adoption and diffusion processes for m-commerce products and services. Producers/suppliers should go beyond this and identify the reality in order to understand where the true sources of the relative advantages of their m-commerce products and services come from. The analysis could be made from three critical points of view in building industry foresight: customer values, customer interfaces, core competencies. Firstly, MCI producers/suppliers need to analyse those m-commerce products and services that make a significant contribution to their revenue, profit and strategic purpose in order to identify preferred customer values and interfaces. Secondly, to unearth the core competencies, they could follow the way demonstrated by Tampoe (1994) i.e. to “separate these products and services to identify the core products and services. Those core products and service are then further separated into constituent parts to unearth the basic technologies, people skills, processes and strategic assets, which combine to produce these core products. At the end of this activity the core competence of the producers’ organisation becomes apparent.” After detecting the customer values, interfaces and the core competencies already possessed, producers/suppliers could develop a set of rules, or “discipline”, to

avoid letting their imagination roam too widely. They should also go still further to have a vivid imagination for the future. They have to escape the myopia of the current market and product concept, extrapolate from their traditional product and service definitions and focus on the underlying functional elements that a single or combined m-commerce product and service has. They have to create and embrace a new opportunity horizon within the MCI and refine their product portfolio, management process, customer interfaces and core competencies to craft strategic intent (architecture) in order to lead the future.

5 Conclusion

This paper has shown a framework for understanding adoption and diffusion processes for m-commerce products and services that takes producers'/suppliers' strategic intent into consideration. The arguments are theoretically oriented. We recommend that producers/suppliers exploit the knowledge from adoption and diffusion studies to establish industry foresight for the future of m-commerce. This may introduce "disciplined imagination" into their strategic planning for the future of m-commerce.

The main limitation of the paper is that we touch on many theoretical areas, e.g., adoption and diffusion theories, industry foresight theories. This makes our argumentation lacks deep analysis and only skims the content of each subject.

For future field research, we will focus on the first two steps to validate the proposed framework. We will select three available m-commerce products and services, e.g., mobile ticketing, mobile banking and mobile e-health, in order to study the adoption and diffusion processes and examine the impacts of producers'/suppliers' intentions on the processes. The third step is a recommendation for producers/suppliers in the MCI to continue in making their industry foresight. In order to study the processes in more detail, we will do a case study in one of the chosen areas. Our research will basically enhance, extend and modify available IS adoption and diffusion models in the context of m-commerce and will further the body of thought in making industry foresight.

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