LESSONS LEARNED FROM THE ADOPTION OF MOBILE INTERNET SERVICES IN JAPAN

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Resumen

El crecimiento explosivo de los servicios móviles de Internet en el Japón ha origina-do gran interés en entender el porqué del éxito. Dado que los ratios de difusión de estos servicios difieren según los países, algunos trabajos sugieren que deben cum-plirse una serie de requisitos y otros proponen que la cultura es uno de los principa-les factores. Además, es importante mencionar que aún son escasos los trabajos de investigación para desarrollar un modelo que integre los elementos que intervienen en la oferta y demanda de estos servicios y ayuden a entender el porqué de su adop-ción. Para reducir esta brecha, el objetivo de este artículo es proponer un modelo integral desde el punto de vista de la demanda y oferta de los elementos que inter-vienen en la adopción de estos servicios. Para su desarrollo se considera un conjun-to de teorías: difusión de innovaciones, comercio electrónico y comercio móvil, uso de tecnologías de información, cadena de valor inalámbrica, y cultura. Además, con este marco se investiga los factores que afectan la adopción de los servicios móviles de Internet en el Japón. Específicamente se considera el caso de NTT DoCoMo y otros operadores de telecomunicaciones. Finalmente, se sugiere algunas lecciones aprendidas que pueden ser útiles para el investigador y empresario involucrado en la rama de Internet móviles.

Introduction

The mobile Internet is the use of Internet and mobile networks by customers who can access services via mobile devices anytime and anywhere. The mobile Internet revolution is underway. For instance, it was reported that the mobile Internet had grown to almost 70 million customers and a market of almost US$800 million per month in Japan. These customers have adopted such simple applications as ring tones, news, music, and email. Also, the numbers of customers of mobile Internet

services already exceeds that of the fixed line Internet customers in Japan (Lee Funk 2000). Furthermore, the global mobile customers are growing rapidly and are expected to be more than 1,764 million by the beginning of 2005. These results serve as a clear indication of the bright future of the mobile Internet. There are many areas for business and research. Kalakota (2002) has identified seven areas in the mobile Internet landscape: network infrastructure, access, content, commerce, software, hardware, and applications.

The study of mobile Internet is becoming popular among academics and practitioners. However, our review of literature suggests that there is little research on the adoption of mobile Internet services. Current researches have focused on technology issues rather than understanding the adoption of mobile Internet services. Thus, the main purpose of this paper is to attempt to develop an integrating framework to understand the adoption of mobile Internet services based on different theories: Difussion of innovations, e-business, m-business, IT use, culture and economic aspects, and wireless value chain.

In summary, the objectives of this paper are: (1) to determine the factors which explain the adoption of mobile Internet services, (2) to understand the mobile Internet value chain and the relationship between its players, (3) to propose an integrating framework from two perspectives: the demand and supply side, and (4) to illustrate the applications of this framework through examples of the successful adoption of mobile Internet services in Japan and the significant implications for business and research.

1. Background

Mobile Internet

Mobile Internet is defined as the use of the Internet and wireless via mobile devices. The number of mobile customers is increasing at astonishing rates and is expected to surpass the number of Internet customers in a few years. Mobile Internet offers the potential platform for many business opportunities such as m-commerce and m-business. The combination of Internet, wireless and e-business is m-business. According to Kalakota (2002), m-business is the application infrastructure required to maintain business relationships and sell information, services, and commodities by means of the mobile devices However, m-commerce is defined as any transaction with monetary value, either direct or indirect, that is conducted over wireless telecommunication networks (Sadeh 2002).

Every mobile business activity must start with the understanding of customer needs. It is very important for organizations to be aware of what the mobile Internet can do for customers. In this new economy, customers are more demanding for better services with special features and reasonable prices (Kalakota 2002, Slywotzky and Morrison 2000). The proper information is one of the features that customer are looking for. Evans and Wurster (1998) introduce two useful concepts about information: richness, which refers to the quality of information, and reach, which refers to the number of customers that receive a certain type of information. They mention that there is a trade-off between reach and richness. Also, from different sources (Kalakota 2002, Slywotzky and Morrison 2000,

Schneider and Perry 2000), we have selected other important features of mobile Internet services for creating mobile customer value: ubiquity, localization, convenience, security, accessibility, personalization, capacity, size and forms, security, and price.

Strategy and Business Model

Strategy is defined as the creation of a unique and valuable position, involving a different set of activities, and is the starting point to set proper goals for your business. Porter (2001) argues that strategy is more vital than ever in this new economy, and suggests that Internet initiatives and strategy should be integrated to create competitive advantage. Eisenhardt and Sull (2001) also emphasize the importance of strategy in today's unpredictable and complex markets. They mention keeping strategy clear and simple by focusing on a unique set of strategic processes.

A business model is a method of doing business to generate revenue streams within the value chain. Applegate (2001) describes a business model as a shorthand way of describing how a business is structured. The shorthand tells us how our company interacts with another in the industry and, most importantly, how it makes money and delivers value. Sandberg (2002) recommends that a business model do four things: (1) identify the customers you want to serve, (2) spell out how your business is different from all the others (its unique value proposition), (3) explain how you will implement the value proposition, and (4) describe the profit patterns and the attendant risks. Devine and Holmqvist (2001) identify six core business models in m-commerce: User Fee Business Models, Shopping Business

Models, Marketing Business Models, Improved Efficiency Business Models, Advertising Business Models, and Revenue Business Models.

Competitive strategy is about being different. It means deliberately chossing different activities to deliver a unique mix of value (Porter 1996). A business model is the vehicle for operationalizing these differences. A good competitive strategy with proper business models is fundamental for creating customer value in the mobile market. Therefore, competitive strategy and business models are concepts used to develop our framework.

The Wireless Value Chain

The mobile Internet involves a number of players in a chain of value, adding activities that terminate with the customer. The purpose of the value chain is to support the needs of the customers and organize the interactions of the players for creating customer value. In Gulati *et al.* (2003), the wireless value chain considers component makers, manufactures of infrastructure and devices, wireless carriers, enabling software, service providers and content providers. In Barnes (2002), a wireless value chain is proposed that consists of six core processes in two main areas: (a) content (Content Creation, Content Packaging, Market Making), and (b) infrastructure and services (Mobile Transport, Mobile Services & Delivery Support, Mobile Interface & Applications). For our framework, we mainly consider the concept of the wireless value chain model showed in Barnes (2002)

Adoption of Innovations

Previous related works have used the the-

ory of diffusion of innovations (Rogers 1995) to understand the adoption of new ideas, services and products by individuals, firms or industries. Rogers (1995) identifies five innovation attributes: relative advantage, compatibility, complexity, trialability, and observability. Tornatzky and Klein (1982) proposed some generalization on the relationship between a few innovation characteristics and adoption/diffusion. Their analysis revealed that the findings of the past studies were inconsistent and only three characteristics were consistently found to be significant: compatibility, relative advantage, and complexity.
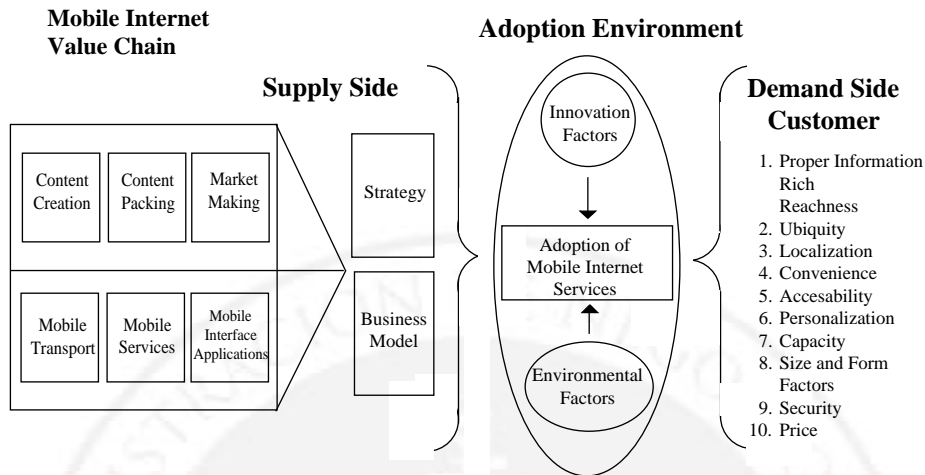
Most of the studies on adoption have focused on particular types of technology or application in an organization. Iacovou *et al*. (1995.) identified three major factors that influenced EDI adoption by small organizations: organizational readiness, external pressures, and perceived benefits. Mehrtens *et al*. (2001) identified similarities between Internet adoption and EDI adoption in SMEs. However, little work has been done to understand the adoption of mobile Internet services. Some of the previous works suggested that the study on adoption of an innovation required additional factors besides innovation factors (Rogers 1995). Moreover, past studies on national diffusion of technology have observed that an innovation diffuses differently in different cultures depending on the sociocultural environments (Gatignon *et al.* 1989). An important work was done by Hofstede (Tsang 2002). Hofstede found that the rate of adoption of some innovations could be explained from four core cultural values: individualism, power distance, masculinity, and uncertainty avoidance. Another critical factor is the government's support or involvement in the

adoption of m-commerce. The impact of government policies and initiatives has been shown to have direct and indirect stimulation to the adoption and diffusion of new technology (Lynn, 1998). Kaufman (2002) suggested that adoption patterns of mobile phones are different according to economic characteristics. Therefore, innovation factors, cultural differences, government support and economic characteristics of the country are considered in our framework.

2. An Integrating Framework for Adoption of Mobile Internet Services

This research seeks to explain the adoption of mobile Internet services from two perspectives: supply side and consumer side. Based on review of the literature, we consider Innovation factors from Tornatzky and Klein (1982) (relative advantage, compatibility, and complexity) and Environmental factors (cultural differences, government support, and economic characteristics) as the main factors that could explain the adoption of mobile Internet services. The relationships of these factors with the players on the supply side and the variables on the demand side are shown in next figure.

On the supply side, we consider the players of the mobile Internet value chain. The players must cooperate to develop the appropriate environment for mobile Internet adoption. The appropriate environment is defined here as on adoption environment. Also, a strategy and business model must be developed from the customer's perspective. The players and elements of the mobile Internet value chain must be organized to set the appropriate

**Mobile Internet
Value Chain**

Adoption Environment

Supply Side

**Demand Side
Customer**

Content Creation	Content Packing	Market Making
Mobile Transport	Mobile Services	Mobile Interface Applications

Strategy

Business Model

Innovation Factors

Adoption of Mobile Internet Services

Environmental Factors

1. Proper Information Rich Reachness
2. Ubiquity
3. Localization
4. Convenience
5. Accesability
6. Personalization
7. Capacity
8. Size and Form Factors
9. Security
10. Price

The Integrating Framework of Adoption of Mobile Internet

goals to create customer value, and then mobile Internet services can be adopted. On the demand side, we consider the following aspects of customer needs: proper information, ubiquity, localization, convenience, security, accessibility, personalization, capacity, size and forms, security, and price.

Adoption Environment

Innovation Factors. (1) Relative Advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of relative advantage is often expressed in terms of economic profitability, social prestige, or other benefits. (2) Compatilibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. An innovation can be compatible with socio-cultural values and beliefs, with previous ideas, or with clients' need for the innovation. (3) Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use.

Environmental Factors. (1) Level of government support. The impact of government policies and initiatives has been shown to have indirect and direct stimulation to the adoption and diffusion of new technology (Lynn, 1998). Regulatory aspects are important to influence adoption of m-commerce (Gulati 2003, Lee Funk 2000, Vandai 1998). (2) Cultural differences and economic aspects. Many studies have been conducted on cultural differences to explain the adoption of an innovation. We consider the work proposed by Hofstede to classify culture: uncertainty avoidance, power distance, individual collectivism, and masculinity.

Other studies have conducted research on aspects of the national economy to explain the important determinants on IT adoption and diffusion, including mobile communications. Kaufman (2002) suggested that adoption patterns of mobile phones were different according to economic characteristics: GDP per capita or information technology infrastructure can impact mobile Internet adoption.

Demand Size

Customers are demanding more facilities for about mobile Internet. (1) Proper Information refers to the trade-off between richness and reach to create customer value. (2) Ubiquity refers to mobile devices that can provide real time information and communication independent of the customer's location. (3) Localization refers to mobile devices that can provide useful information according to their location. (4) Convenience refers to customers who are not limited by time and place. (5) Accessibility refers to customers can access services easily anytime and anywhere. (6) Personalization refers to customer who can customize their handsets. (7) Capacity refers to the features of the mobile network. (8) Size and forms refers to the features of the handsets. (9) Security refers to the level of protection and privacy of communications. (10) Price refers to the cost of services and handsets.

Supply Side

Mobile Internet Value Chain. There are 6 core processes where players can participate: (1) Mobile Transport is a basic network involved in communications, including transportations, transmissions and switches for voice and data. It also includes technology supply. (2) Mobile services and delivery support involves, for example, the infrastructure connecting the Internet, security, sever platform, and payment systems. (3) Mobile Interface applications center on integrating the infrastructure and systems with users, hardware, software, and communications. (4) Content creation is responsible for creating original digital content such as audio, video and textual information. (5) Content Packing is responsible for processing digital content for consumption. (6) Market Making is responsible for content selection.

Strategy and Business Model. The strategy must be designed according to the necessities of the customer (demand side). This concept is useful to help players in the mobile Internet business to set proper and common business goals. Then, business models must be developed along with the technology to create customer value.

3. Adoption of Mobile Internet Services in Japan

In 1992, the Japanese market was heavily regulated. Fees were high, handsets could only be leased, and cellular penetration was low. However, in 1994 the MPT (Ministry of Post and Telecommunications) liberalized the mobile market. At the same time, many companies entered this market and the competition was ferocious. By the end of 2000, there were only three operators: NTT DoCoMo, KDDI and J-phone. NTT DoCoMo/I-mode was spun off from the giant NTT (Nippon Telegraph and Telephone Corporation) in 1991. The mobile Internet service was named I-mode. KDDI/au is the result of merging KDD (main international operator), DDI (long distance company), and IDO (mobile phone operator). The mobile service was named au in November 2000. KDDI/Tu-ka is an affiliate company of KDDI. The main shareholders are KDDI, Motorola, Sony, and Hitachi. J-Phone was established in 1991. The main shareholders are Japan Telecom, Vodafone, and British Telecom. The mobile Internet service was named J-Sky. Actually, Japan had almost 70 million mobile Internet customers (by the end of January 2003).

NTT DoCoMo was the leader with more than 43 million customers using I-mode mobile Internet services, followed by KDDI and J-Phone with 13,5 million customers by the end of January 2003. KDDI uses WAP technology and has more WAP subscribers than most of the rest of the world.

Analysis of the adoption of mobile Internet services in Japan

a) Innovation Factors

Relative Advantage. The case supported the concept of relative advantage to mobile Internet services over traditional methods of communicating, such as fixed line Internet or PHS (personal handy phone system). PHS phones were very popular, especially for young people, but cellular phones are new winning the battle over PHS phones. The concepts of ubiquity, accessibility, personalization, fashion, and convenience formed part of the relative advantage of mobile Internet phones. For instance, I-Mode is a fashion. It is the new way of communicating by young people. Also, the Japanese spend a long time in trains, so having access to mobile Internet services anytime and anywhere through small cellular phones is suitable for them.

Compatibility. The price of cellular phones and their fees were relatively low, so the phones were affordable. NTT DoCoMo and other operators are expected to make their profits from traffic. Also, Japanese love gadgets so cellular phones were very attractive because of their peculiar design. The micropayment system was a very convenient way for the Japanese to pay their bills. Thus, the case provides strong support for including compatibility as a factor that influences mobile Internet adoption.

Complexity. The handset was small and light but easy to use Japanese characters with. The simple applications were the key for the spread of mobile Internet services. Simple information was provided by content providers. The most popular applications are e-mail, screen savers, ring tones, games, and news. NTT DoCoMo and other mobile Japanese companies emphasized reach rather than richness concerning information as its initial approach. They understood Japanese customer needs very well and created customer value with simple applications (they emphasized reach of information rather than richness of information at the beginning stage). Customization of their cellular phones is also easy. Thus, the case supports complexity as a critical factor in our framework.

b) Environmental Factors

Level of Government Support. The level of adoption of mobile Internet services in Japan had been low until 1991. After the deregulation of the cellular market, many companies entered the market and the m-commerce revolution began. The evidence suggests including government support as a critical variable to increased mobile Internet adoption.

Cultural Differences and Economic Aspects. The Japanese market is homogeneous (individual collectivism). They prefer to communicate via email, before making a phone. It is the way of starting a conversation. Some questions such as, «Are you busy now?» and «Where are you?» are very common. Japanese spend a long time travelling by train. Thus, the Japa-

nese can use their small and light handsets while they are travelling.

In addition, Japan is the second largest economy in the world and its average GDP per capita is high. Thus, the price and fees of mobile Internet services are affordable for them. The case gives strong support that cultural differences and economic aspects are important variables that influence mobile Internet adoption.

c) Supply Side

To create the adoption environment, clever strategy and innovative business models have been developed in Japan. Also, players of the mobile Internet value chain are cooperating to create customer value. For instance, NTT DoCoMo worked as a key player in the mobile Internet value chain and dominated it. NTT DoCoMo has a strong relationship with players in the value chain. By having the proper and interactive strategy, NTT DoCoMo, with other players in the mobile Internet value chain, implemented innovative business models supported by simple technology, and customers were attracted. NTT DoCoMo is always listening to its customers to create value for them in a proactive way. For example, prices of handsets were high at the beginning and the rate of adoption of I-mode was low. NTT DoCoMo reacted to this situation and proactively reduced the cost of handsets. Then, the rate of mobile Internet adoption increased. NTT DoCoMo knew that price of its services is very sensitive for customers, so NTT DoCoMo developed a packet switching network to bill for packet traffic rather than connection time.

4. Lessons Learned

We conclude the following lessons learned about the adoption of Mobile Internet services, drawn from research in Japan:

A number of factors must appear to create the appropriate environment for mobile Internet adoption. According to our research, innovation (relative advantage, compatibility, and complexity) and environmental factors (culture, economic, and government support) influence the mobile Internet adoption.

Customers always come first. Mobile initiatives must be performed with an understanding of customer priorities. NTT DoCoMo's strategy kept on mind what customer preferences were. For instance, i-mode features attracted Japanese customers; they were charged by the amount of information downloaded rather than their time online. Therefore, I-mode is now a way Japanese people communicate. Young people often use email messages as a way to initiate a phone conversation. Light handsets with colorful screens are very attractive for Japanese customers too.

Strategy is more vital than ever to survive in this new revolution. Strategy must help organizations to set proper goals and create customer value. The strategy of NTT DoCoMo was mainly based on the following factors: (1)large degrees of influence over other players in the mobile Internet value chain, (2) adoption of AOL's business model, (3) simple and fresh content, (4) use of successful micropayment system, (5) charges based on packet traffic rather than time connection, and (6) pretty, inexpensive, and colourful handsets.

Establish solid and innovative Business models. NTT DoCoMo's emphasis on developing a business model that encourages cooperation from players in the mobile Internet value chain was one of the most important elements that influence NTT DoCoMo's success.

Technology is also an important aspect that must support your business model. NTT DoCoMo's I-mode consists of the following technologies: an advanced and pretty handset, a packet switching network, nation-wide coverage, and c-html. These technologies supported NTT DoCoMo's business model and helped NTT DoCoMo to achieve success.

Work independently from the mothership, because organizations must be flexible and react to customer needs rapidly. NTT DoCoMo was spun off from the giant Japanese Telecom Company NTT. This situation permitted NTT DoCoMo to move quickly and more flexibly.

Active cooperation and strong partnerships between players in the mobile Internet value chain is necessary. NTT DoCoMo has a strong influence with over players in the mobile Internet value chain. For example, NTT DoCoMo coordinates very closely with handset manufactures such as Sony, Sharp and Kyocera to develop next generation mobile phone models.

Existing potential market. NTT DoCoMo had an established customer base as a provider of mobile phone services to the Japanese Market.

Conclusion

The purpose of this study was to identify the key factors that influence the adoption of mobile Internet services. Based on literature from different fields, an integrating framework was developed. This framework constitutes an attempt to integrate several research domains: strategy and business models, e-commerce and m-commerce, diffusion of innovations, wireless chain value, economics aspects and culture.

An important contribution of this paper is that it is one of the very few works that examined the adoption of mobile Internet services from the supply and demand side. The resulting framework has added substantially to understanding the adoption of mobile Internet services. This work affirms that many factors are necessary to create the appropriate environment for mobile Internet adoption. Also, the research shows areas where customers may be concerned and it should help players in the value chain better to understand the mobile Internet. Moreover, the findings provide a number of applications for research and practice.

There are limitations of this framework. The data analysis may have been influenced by researcher interpretation and can be a source of bias. However, we believe that this study constitutes an excellent framework to examine the mobile Internet.

The study could be extended in other countries. Alternative research approaches could be used to improve our understanding of mobile Internet adoption in a country.

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