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A Comparison of Mobile Financial Services in Japan and Korea

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***Abstract*—Since the emergence of mobile telecommunication service, mobile telecommunication services have evolved from voice-centric ~~services~~ to entertainment and lifestyle support services. The current mobile services are not only for communication, but also support diverse purposes by pursuing new levels of service quality. Mobile financial services such as DCMX and MONETA are innovative, value-added mobile services in Japan and Korea. Through these services, mobile phones can be utilized as electronic money, credit card, and membership card etc. This paper identified which actors and competences are related to and lead to innovation in mobile financial services, according to the layered model of the mobile service. A comparative result of Japanese and Korean cases suggest the implication of service innovation strategies for newly emerging mobile services.**

***Index Terms*— Mobile Innovation, Service Innovation, Mobile Services, Japan, Korea**

I. INTRODUCTION

As mobile telecommunication service market becomes mature, the revenue from voice communication decreases for telecom operators. Table 1 illustrates the current trend of a mobile telecommunication service in Japan and Korea. As of August 2009, the number of mobile phone users in Japan had exceeded 109 million, demonstrating that more than 83% of potential users was using the mobile telecommunication service [1], and the total number of Korean mobile subscriptions passed 47 million and the penetration rate reached over 90% as of March, 2009 [2].

In addition, as it becomes difficult to generate the revenue from voice communication, mobile operators have started pursuing earnings opportunities outside the conventional voice traffic revenues. i-mode and NATE are as part of efforts to offer a variety of data centric services, being the first wireless internet services in Japan and Korea, launched in 1999. They have provided various multimedia and informative services such as e-mail, games, movie and music download, weather forecast and sports results. At present, mobile operators are making an effort to develop a new innovative mobile service such as Location-based services (LBS), Digital Multimedia Broadcasting (DMB), and mobile financial services. In particular, due to the evolution of wireless communication network and diversification of mobile phone functions, mobile Commerce (m-Commerce) have now come into the spotlight as a revenue source of mobile operators. Mobile financial service evolved from the convergence of wireless internet technology and contactless IC card technology. It enabled mobile phones to be used as electronic money, credit card, electronic ticket, membership card, and airline ticket.

TABLE 1
JAPANESE AND KOREAN MOBILE TELECOMMUNICATION MARKET

	Japan	Korea
Mobile subscribers (Aug, 2009)	109,269,300	47,527,645
Market share (Aug, 2009)	NTT DoCoMo (51%) KDDI (29%) SoftBank (19%) EMOBILE (1%)	SK Telecom (51%) KTF (31%) LG Telecom (18%)
Primary data service	i-mode (Feb, 1999) by NTT DoCoMo	Nate (Dec, 1999) by SK Telecom
Mobile internet subscribers (Aug, 2009)	91,882,000	45,777,722
Data revenue as % of the total revenue	24%(2005) 26%(2006) 29%(2007) 34%(2008)	18%(2005) 20%(2006) 19%(2007) 17%(2008)*
Current business	Location information service, "One-Seg" digital terrestrial TV broadcasting service, mobile internet financial business, etc.	Wired and wireless bundled product, 3G mobile commerce, Telematics, Satellite DMB, etc.

* The decrease in data revenue of the Korean mobile service was due to the price reduction such as a SMS charge.
(Source: Telecommunications Carriers Association (www.tca.or.jp), IT Statistics of Korea (http://www.itstat.go.kr), Korea Communications Commission (http://www.kcc.go.kr/), Public sources from DoCoMo, KDDI and SoftBank)

This paper investigates the case of a mobile financial service, which takes place in interaction through mobile handsets between users and service providers, and which supports users' lifestyle. The paper consists of six sections. Section 2 discusses the cognitive framework for characterizing the mobile telecommunication service. Section 3 compares Japanese and Korean mobile financial services by using a layered model of a mobile telecommunication service. Section 4 summarizes the research results, and discusses strategic implications.

II. METHODOLOGICAL FRAMEWORK

A. Innovation in Services

There have been various attempts to define innovation in services: the technologists (assimilation) approach, the service-oriented (demarcation) approach and the integrative (synthesis) approach [3].

The oldest studies tended to take the technologist approach focusing on the introduction of technical systems into service firms and organizations, and the service-oriented approach have sought to highlight the distinctiveness of service innovation.

This paper analyzes innovation in mobile financial services from the perspective of the integrative approach because the current mobile services in Japan and Korea show the trend towards convergence and the blurring of the boundaries between products and services. The definition of service innovation, in this paper, includes not only a new technologically improved service, but also the introduction of a new quality of a service or the opening of a new market.

B. Layered model of Mobile Telecom Industry

The new innovative mobile services are in many cases layered offerings which a network of providers provides. This paper adopts the Fransman (2002)'s Layer Model to explain actors involved in delivering mobile financial services and their competences. Fransman (2002) generated the simplified map of the Old Telecoms Industry (in the 1980s), composing of three layers: the equipment layer, the network layer and the service layer [4].

A simplified layered model of the mobile financial service is provided in Fig 1.

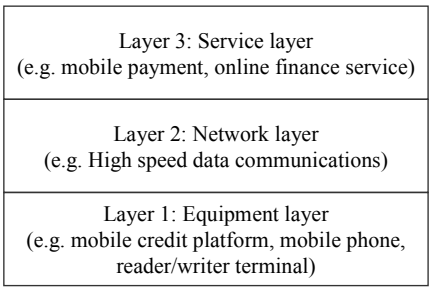

Fig. 1. Layered model of mobile financial services
(Source: based on the Fransman (2002)'s Layer Model)

The equipment layer of the mobile financial service is comprised of a mobile credit platform, a mobile phone equipped with a contactless IC chip, a reader/writer terminal installed in stores, and so on. They are combined to use telecoms networks.

The networks in the network layer are provided by mobile operators to enable high speed data communications. A mobile operator plays an important role as the main innovation leader because the innovation in new mobile services tends to be inspired by mobile operators' strategies. The different corporate and technology strategies of operators are important factors for mobile service diffusion [5]. Aggressive marketing strategies of mobile operators also help mobile users to have good images, high satisfaction, and strong loyalty toward mobile operators [6].

In the service layer, various services such as shopping, entertainment, reservation, transportation, and online finance services are delivered to mobile users by using the equipments and networks.

III. COMPARISON OF INNOVATION IN JAPANESE/KOREAN MOBILE FINANCIAL SERVICES

A. Development Path of Mobile Financial Services

A mobile financial service has moved from the initial phone-bill method to the IC chip method, which is equipped with the finance application on a mobile phone. This paper focuses on the cases of, DCMX and MONETA, provided by NTT DoCoMo and SK Telecom.

In Japan, "Osaifu-Keitai" is a mobile wallet service developed by NTT DoCoMo in 2004, and "DCMX" is the one that evolved form of "Osaifu-Keitai" in 2006. These services include electronic money, credit card, fare collection of public transits, airline ticket, coupons, membership card, identity card, and door keys. In respect of innovation creation, the mobile phones integrated with Sony's FeliCa contactless IC card technology, as well as the services provided by the applications on the phones, have been combined to provide mobile users with various service values such as safety in use, convenience, and ease of use. "DCMX" service was further subdivided into DCMX mini (in 2006), DCMX (in 2006) and DCMX Gold (in 2007) according to the available amount of credit limit and the range of additional benefits.

In Korea, MONETA service was introduced to enable SK Telecom to make payment possible by using mobile phones that are equipped with a smart chip. MONETA was launched in 2002 as a mobile wallet application that allowed customers to make proximity (in-store) payments through several mechanisms. MONETA initially supported a mobile cash payment product (MONETA Cash) and evolved toward a platform to support credit card payments through mobile phones. The IC Credit Cards were issued by prominent banks and credit card companies in Korea and included all conventional credit card functions and others such as e-money (Visa Cash), e-ticket and SK Telecom membership. In early 2003, the upgraded version of 'MONETA Card' was introduced as 'MONETA Chip'. The plug-in type IC credit card, inserted into the mobile phone, contained the Credit Card application, which enables mobile subscribers to use their mobile phone to pay for goods and services by IrFM (Infrared Financial Messaging) or RF (Radio Frequency) at physical terminals. SK Telecom has expanded its MONETA payments services from the merchant proximity payment service to mass transit payments and various

applications.

B. Actors and Actors' competences

Mobile financial services of Japan and Korea are analyzed according to the layered model. The actors and their competences of each layer are identified in Table 2 and Table 3.

TABLE 2
NTT DOCOMO'S MOBILE FINANCIAL SERVICE (DCMX)

Layer	Activity	Example actor	Actor' s competence
Service layer	Diversifying service categories Finding new member stores	Seven-Eleven Japan, Lawson, FamilyMart, Aeon, Sumitomo Mitsui Card, UC Card, etc.	Value added distributors of point of service
Network layer	Providing data communications infrastructure Commercializing the service	NTT DoCoMo	Network technology Customer base
Equipment layer	Developing platforms and equipments Establishing infrastructure	NEC, Hitachi, Fujitsu, Sony Corporation, NTT DoCoMo, etc.	Technology R&D

TABLE 3
SK TELECOM'S MOBILE FINANCIAL SERVICE (MONETA)

Layer	Activity	Example actor	Actor' competence
Service layer	Providing various values to customers Popularizing service usage	E-Mart, Family Mart, Mega Mart, Shinsegae Department Store, Shinhan Card, Samsung Card, etc.	Value added distributors of point of service
Network layer	Enabling high speed data transmission Promoting the service	SK Telecom	Network technology Customer base
Equipment layer	Manufacturing mobile phones and contactless payment readers Developing IC chips Providing payment system solutions	Samsung electronics, LG Electronics, Hismartech, Harex Infotech, SK Telecom, Visa International, etc.	Technology R&D

(1) The equipment layer

The actors in the equipment layer develop the software or equipments such as a mobile credit platform, IC chip, and a reader/writer terminal for easy and effective authentication and payment process between sellers and buyers. As both DCMX and MONETA phones are equipped with a smart card in which various finance applications such as a credit/debit card, e-money and mileage are saved, the infrastructure developed by actors in this layer is the first priority for service realization.

The group of actors who play an important role in the equipment layer consists of three participants.

First, equipment manufacturers provide the phones that can load a smart chip and terminals that are installed in offline retail shops.

In Japan, mobile phone manufactures such as NEC, Hitachi, and Fujitsu are activating the service. The manufacturers of iD (NTT DoCoMo's mobile credit card brand) platform reader/writer terminal also play a significant role in this layer. Pre-installation of iD software in handsets, and improvement of the external interfaces on mobile phones are essential for a fast penetration of the service.

In case of MONETA, mobile phone manufacturers such as Samsung electronics, LG Electronics, and Motorola make the handsets. Hismartech, a smart card terminal manufacturer in Korea, provides a contactless payment reader with SK Telecom.

Second, various technology firms participate in the equipment layer. These firms develop various core technologies for the mobile financial services.

In Japan, with a contactless Felica IC chip developed by Sony Corporation, payments can be completed quickly, simply by waving a mobile phone equipped with a contactless IC chip over a dedicated reader/writer terminal in stores.

On the other hand, Korea's MONETA service has come all along with SK Telecom's mobile projects. SK Telecom began to design Mobile Payment Card in 1996, and finally developed mobile-payment technologies in 1999. Venture firms that develop mobile payment solutions also play an important role. Harex Infotech (mobile payment solutions firm in Korea) enables service providers, such as banks, merchants, transport companies and public authorities, to securely provide and manage their security sensitive applications on the mobile user's mobile devices in cooperation with SK Telecom.

Third, platform developers create a very structured approach to entice their partner to its content and payment platforms and to promote further service innovation. The service platform is important to support a variety of uses beyond e-money, including airplane tickets, membership cards, and house entry keys.

In Japan, the FeliCa-based wallet platform was developed by NTT DoCoMo, based on the success of the i-mode content platform. In Korea, SK Telecom partnered with financial institutions such as Visa International, and created a platform whereby subscribers could download multiple credit card data and applications over the air to the standard SIM (Subscriber Identity Module) card in their phones.

(2) The network layer

As mobile financial applications are based on the mobile telecommunication network, a mobile financial service is highly dependent on mobile operators.

In both cases of DCMX and MONETA, dominant mobile operators in Japan and Korea (NTT DoCoMo and SK Telecom, respectively) play an important role as the main innovation leader. In order to use mobile financial services, the large volume of data has to be transmitted via high speed data communication network. In that sense, mobile operators in the network layer control the overall service quality when the service is delivered to

the customers.

NTT DoCoMo and SK Telecom have over 50% of market share in Japan and Korea. They are in charge of marketing their branded mobile financial services using the existing customer base. They aggressively and strategically revises various rates, such as by introducing a flat-rate packet charge, such as "Pake-hodai double" (NTT DoCoMo's packet flat-rate service), in order to encourage the usage of mobile financial services. In addition, the strategies to raise the delivered value of the service will be significant, such as by diversifying market segments (subdivision into DCMX DCMX mini and DCMX GOLD) and by providing a wide range of customer benefit (compensation plan covering handset damage or loss, free overseas mobile phone rental service, International traveler's insurance, and shopping insurance).

(3) The service layer

The actors in the services layer generate various service values for customers and diversify service categories. There are various actors who participate in this layer, such as banks, merchants, transport companies and public authorities.

DCMX service is becoming more convenient with the introduction of the service at various member stores including major convenience store chains (Seven-Eleven Japan, Lawson, FamilyMart, etc.), McDonald and Aeon stores, the Japanese largest supermarket operator. The service further expanded its usage by deploying iD (NTT DoCoMo's mobile credit card brand) readers in taxis.

MONETA also provides a wide diversity of usage at convenience stores (E-Mart, Family Mart), an internet shopping mall (Mega Mart), a department store (Shinsegae Department Store), taxi and subway.

In particular, for the mobile financial services to be successful, the crucial issue in this layer is how to expand the number of places where it can be used. NTT DoCoMo has secured the cooperation of Sumitomo Mitsui Card, and UC Card, who have also taken on the role of finding new member stores, while SK Telecom is in cooperation with Shinhan Card and Samsung Card.

IV. CONCLUSIONS

At present, mobile services are not only for communication, they also support diverse purposes and user's lifestyles by pursuing new levels of service quality. Portability of a mobile phone and convenience of mobile finance applications accelerate the usage of mobile financial services and substitute mobile phones for cash and credit cards.

The finding of the paper shows that innovation in mobile financial services in Japan and Korea are driven by the combination of various capabilities of different actors within and outside the mobile industry.

Among the various participants, a mobile operator is the most important actor in provision of mobile financial services in Japan and Korea. Mobile phone manufacturers have weak experience in mobile finance business and their role may be relatively small. Moreover, most of the mobile phone manufacturers in Japan and Korea are under a subordinate relationship with their domestic mobile operators. And financial intuitions do not participate in deciding standardization of manufactures. Thus, mobile operators are involved in all procedures for technology development, except payment process solutions. In particular, SK Telecom's MONETA is the structure entirely driven by a mobile operator where a mobile operator is in charge of not only R&D but also marketing procedures, including IC card manufacture and control of member stores.

However, mobile phone manufacturers and other technology firms are also expected to play a technologically important role in the realization of mobile phones equipped with mobile finance application. Penetration of the mobile financial service will ultimately pull the demand of new models of mobile phones and lead to new technological development created by other technology venture firms. Financial institutions cooperate with mobile operators by exchanging mobile operator's strong customer base and financial institution's various finance methods.

In summary, in order to develop these mobile financial services which provide greater convenience and enhanced security function and support wider range of users' lifestyle, a new service value should be founded by converging mobile telecommunication industry and other industries such as transportation and healthcare. Second, new member stores and technically improved devices through alliance with various partners will also create new mobile finance business opportunities. Lastly, although technology is still an important enabler for the mobile financial services, regulations and standards issues should be recognized.

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