Abstract

We expect that one of the earliest and most successful applications of ubiquitous computing will evolve around financial services. From the mobile financial services offered by Korea's SK Telecom (SKT), we can catch a glimpse of emerging value networking many telcos may ultimately adopt not only to survive competition but also to sustain their long-term growth. With the marketplace for mobile communications service approaching saturation, SKT has been looking into associating its infrastructure to content provision, platform/system integration and application service provision to open up new business opportunities. It understood that the fusion between its mobile network and financial services could result in value networks benefiting both service providers and service users. MONETA, as an electronic payment platform, became the cornerstone of SKT's initiative. However, due to its disruptive nature on existing business models, the company had to face significant technical and non-technical challenges.

Keywords: ubiquitous computing, pervasive computing, value networks, business models, business convergence

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INTRODUCTION

Advancement of information and networking technologies and their fusion is breeding a new computing paradigm, ubiquitous computing (UC), that defies traditional boundaries in the spatial scope, the type of computing (or networking) devices, and temporal relevance. Morikawa and Aoyama (2004) characterized it through computing everywhere (everywhere-on), content everywhere (whatever-on), and connectivity everywhere (always-on). UC bridges media breaks between the real world and the digital world by enabling true mobility- and intelligence-based information processing (Strassner and Schoch 2002). Its arrival, therefore, will trigger fundamental changes in every aspect of our life from daily tasks to social dynamics (Banavar and Bernstein 2002). From many technological scenarios, projections, and prototype systems, we can catch a glimpse of the revolutionary changes our life will experience under UC. Its arrival may not be that remote because key networking technologies (i.e., Wi-Fi and Bluetooth) are already in place.

We expect that one of the earliest and most successful applications of UC will evolve around financial services. The case of mobile financial services offered by Korea’s SK Telecom (SKT) gives us a glimpse of a value networking strategy that other telcos may ultimately adopt not only to survive competition but also to sustain their long-term growth. Korea is the most broadband-enabled country in the world and changes taking place in its virtual space could have global implications (Shameen 2004). Also, about 75% of the Korean people were using mobile communication services as of June 2003. As the statistics indicate, Korea’s mobile communications market is approaching saturation and service providers cannot expect yesterday’s rapid revenue growth through traditional business models.

Realizing this, both incumbent telephone service providers and cellular-service providers have been seeking new business models to leverage existing infrastructure. As an organization’s or business unit’s core logic for creating value, a business model represents the system of components, linkages, and associated dynamics to produce values (Afuah and Tucci 2001).

SKT has been leading Korea’s mobile communications market with 50% market share. Despite the
leadership position, it also knew that channelling available resources to pursue new opportunities was crucial to maintain its growth momentum. UC-based financial services naturally emerged as a prospective venue to create new business opportunities. To spearhead the effort, SKT established the m-Finance unit. It understood that the fusion between its mobile network and financial services could breed value networks beneficial to both service providers and service users.

This case study discusses SKT’s efforts to craft new business models grounded on the emerging UC paradigm. The centre of the discussion is its efforts to embark financial services on existing cellular network infrastructure. Especially, the electronic payment system, MONETA, became the cornerstone of the initiative. We discuss the firm’s efforts from the theoretical perspective of value networks.

To gather the study data, four managers (an executive director, two middle managers, and an entry-level manager) from the m-Finance unit were interviewed individually. They represented entire management hierarchy of the m-Finance unit. The executive director provided SKT’s strategic goals, long-term vision, and challenges in diversifying business models. Middle managers offered more practical as well as technical views on the status of financial services. Finally, the assistant manager was highly supportive in compiling and providing internal documents and information.

VALUE AND VALUE NETWORKS

In this section, we discuss the value network concept as the binding theory of this research. Value is an economic concept that makes people engage in business relationships. It is theoretically viewed as the trade-off between benefits and sacrifices (Walter et al. 2001) such as the price/quality ratio of a product (Kambil et al. 1996). Value is a ‘tangible and intangible good or service, knowledge, or benefit that is desirable or useful to its recipients so that they are willing to return a fair exchange’ (Allee 2000b).

Customer values are benefits customers recognize from a firm’s offering in the form of goods or services, knowledge, and intangibles (Allee 2000a). Price, quality, customization, design functions, innovativeness, choices and variety represent key value features of a product (Amit and Zott 2001; Kim and Mauborgne 2000; Parkinson 2002). Many non-product attributes have also been suggested to promote value perceptions among customers. These include convenience (i.e., one-stop shopping), privacy and anonymity, accessibility, quality of service (i.e., return policy), sense of trust and security, and efficiency (Hauswirth et al. 2001; Zott et al. 2000).

In addition to the general value factors, UC-driven services can also offer other unique customer values. Fano and Gershman (2002), for example, summarized them in terms of improved awareness, accessibility, and responsiveness. Watson et al. (2002) characterized them through ubiquity, universality, uniqueness (i.e., service customization, context dependency), and unison (i.e., information transparency and synchronization). Also, Strassner and Schoch’s (2002) taxonomy of UC capacity in terms of identification, monitoring, tracking, and notification indicate how customer experience can be boosted through UC.

Customer values are increasingly optimized through the noble formation of value networks. Value networks are formed so that economic values are generated through dynamic engagements among all business stakeholders of a firm including partners, customers, suppliers, and distributors. Stabell and Fjeldstad (1998) emphasized that value networks are an important venue to produce business and customer values. Especially, there is a growing role of value networks in benefiting participants through knowledge and other intangibles (Allee 2000a). With the emergence of advanced information and communication technologies (ICTs) and network infrastructure, more customer values are created at the relationship level across products and channels rather than at the individual product level.

Naturally, many studies emphasized the gravity of value networks for business success. The importance of moving from linear value chain thinking to the value web thinking was stressed (Allee 2000a). Friedman and Langlinais (1999) discussed buyer-driven value networks in which customer values are created at the network level, across the partnership of product and service providers for a certain target community. The development of two-way, three-way, or more linkage-based affinities was described as a value added network of service providers (Parkinson 2002). Such paradigm change in value creation systems was portrayed as the transition from the multidimensional firm (M-form) to the ecosystem form (E-form) (Alt and Zimmermann 2001). Overall, they stressed the importance of enhanced collaborative services among business partners in creating and delivering customer values (Lunn 2002).

MARKET COMPETITION

In June 2003, 75% (33.2 million) of the Korean population were using the mobile communications service. More than 80% of mobile phones were capable of Internet access. SKT enjoyed about 50% market share with 17.5 million customers, followed by KTF (10.5 million) and LG Telecom (5.2 million). Also, in April 2003, 71% of Korean households (10.93 million homes) had broadband Internet access faster than 1Mbps. Mobile telcos (SKT, KTF, and LG Telecom) have been quick to deploy financial services on their infrastructure. Credit card firms and banks were also entering the fray...
through the partnerships with SKT, KTF, and LG Telecom.

KTF has been SKT’s main rival. With the ultimate goal of creating a wallet-less world, KTF started wireless Internet banking services in 2000 and K-merce mobile payment service in 2003. K-merce uses IrFM (Infrared Financial Messaging) and RF (Radio Frequency) technologies to pass personal information stored in a mobile phone to nearby POS (point of sale) terminals. This setup does not require Internet connections to process payments and therefore reduces the risk of breaching customer privacy. The company also offers e-cash called nPayMagic.

LG Telecom offers various financial services including mobile banking, RF-enabled credit card processing, and integrated financial functions. Started in 2000, its mobile banking enables account balance check and fund transfer through PCS phones. In early 2000, it started the first phone bill-payment service through the Internet in Korea. 019EasyPass that also began in 2000 is an e-cash payment service for public transportation. It started mobile phone-based credit card transaction service in 2002 and added mobile financial service, BankON, in 2003. Customers can use the BankON-enabled phone for various banking functions including account balance check, fund transfer, withdrawal, and personal cheque validation. The company is also expanding to other payment services including transportation, credit card, utility bills, and lottery.

Traditional telephone service providers are entering the market as well. Although SKT’s main rivals have been KTF and LG Telecom, SKT understand that, in the long run, KT (Korea Telecom) will become a more serious contender than anybody else. With virtual monopoly in the traditional telephone (PSTN) service, KT embarked on business diversification to leverage its massive infrastructure. Currently, it enjoys about 50% share of the broadband Internet for residential customers and is expanding the mobile- and LAN-based Internet service. As a matter of fact, SKT believes that KT’s infrastructure that connects the mobile and LAN traffic to the Internet matches SKT’s cellular network in the business potential. Offering financial services on the basis of UC requires an effective integration of mobile network and traditional telephone infrastructure (PSTN). Naturally, KT could become a formidable competitor to SKT.

EVOLUTION OF MOBILE FINANCIAL SERVICES

In this section, we briefly discuss the history of online financial services in Korea that began in 2000 using hand-phones and personal digital assistants (PDAs). In the early days, short messaging system (SMS) was mainly used for the payment of online services including gaming and content subscription. In this setup, the cellular network and the Internet complemented each other to complete payment transactions. The transactions, however, had to be cleared through the traditional credit card system.

Since then, with increased engagement from telcos and the finance industry, with the advancement of wireless and cell-phone technologies, and with the growth in mobile e-commerce, various e-payment systems have been introduced to customers. Also, online financial services that used to be dominated by the finance sector became more diversified and competitive as Internet firms and telcos entered the market. Now, mobile phones have the capacity to augment the effectiveness and efficiency of traditional transaction channels.

Softbank Research (2002) characterized the evolution of mobile e-payment systems in Korea in terms of four generations. In the first generation, Internet solution providers offered basic payment services through short messaging system (SMS). In the second generation, cellular phone service providers took the initiative for financial services. During the period, wireless access to online banking through the Internet was provided. But financial institutes did not set up mobile banking systems. From the third generation, smart cards embedded in cellular-phones were used to provide advanced banking and payment services including fund transfer and remittance. Cellular-phone based financial services moved to off-line sites and diversified into non-banking applications in the fourth generation. This is the stage where more firms joined the value augmentation process of financial transactions.

SKT’S MOBILE FINANCIAL SERVICES

Value network formation

SKT has been looking into associating various financial services to its mobile infrastructure in the form of content provision (i.e., portal), platform/system integration (i.e., payment and security infrastructure), and application service provision (i.e., banking and stock trading). To effectively drive the initiative, it re-organized the internal structure. Above all, units of voice service, Internet service, and m-Finance (created for mobile financial services) were all consolidated under a single business unit to boost their synergy toward the mobile finance business.

SKT’s drive for financial services was initially regarded as competition from the finance industry. SKT, however, stressed that its focus was on realizing a win-win for both parties by expanding business horizons and by creating new markets. As a result, the adversarial attitude from the finance industry started to erode when it saw the synergistic benefits of the mobile service. Taking advantage of its brand, large customer basis, and mobile
network infrastructure, SKT was able to create a value network that bonded key business partners.

SKT formed partnerships with seven major credit card firms and banks to offer a mobile payment service, named MONETA. For the promotion and usage of its e-cash, NEMO, it successfully signed up nine banks. Additionally, it established separate partnerships to promote other financial services including phone-bill, payment gateway, and registration authority. The value network thus formed was deemed ideal because one's strength effectively complements the other's weaknesses. For instance, by becoming a constituent of the value network, finance institutes could appropriate SKT's strengths: large customer basis and their accessibility, mobile network infrastructure, and knowledge in customer relationship management. In exchange, SKT could expand its service portfolio riding on the brand recognition, soft infrastructure, and know-how (i.e., credit risk management) of strategic partners.

SKT and its Korean competitors are taking the value network approach in which a small number of participating firms develop closed and exclusive partnerships (Han 2003). This is a preferred approach at the moment because it is easy to introduce new services rapidly and to achieve a quick return on investment before government regulations or competitors force more open competition. A key success factor of this closed loop strategy is that the participants of a value network should be the leader in their respective industry (Han 2003). From this perspective, the weakness of SKT's value network is that finance firms in the alliance are not heavyweights. For example, while SKT carries 50% market share of cellular-phone service in Korea, its two credit card business partners have only 5% market share respectively. Meanwhile, although KT has a smaller customer base (35% market share) than SKT, its credit card business partners are much larger than SKT's with more than 38% combined market share. The disparity becomes a major roadblock for SKT to drive its market strategy.

**MONETA platform**

MONETA is a vehicle on which various financial and non-financial services SKT is envisioning can be delivered. The enabling technology of MONETA is a plug-in chip-set embedded within the MONETA-ready cellular-phones. The chip-set can execute a variety of functions necessary for mobile, on-line, and off-line transactions including transportation payment, security provision, stock trading, bill payment, and membership services. It also carries information on medical records, digital cash, credit cards, and other membership cards.

In introducing MONETA, SKT initially preferred a one-chip approach in which one smart-card chip stores all types of information. This approach was ideal for SKT because it could own rights for chip issuance and content management. Finance firms, however, were against the one-chip idea because that could lead to the loss of credit card business and of customer information to SKT. Naturally, they preferred a dual-chip solution that separates financial information from the other. The trend, however, was the one-chip solution to keep the size of cellular-phones small. Through the negotiation, SKT and its partners agreed to adopt the one-chip system in which the rights of chip issuance (SKT) and content management (finance institutes) were separated.

MONETA, launched in April 2002, started as an e-payment system for product purchase and electronic fund transfer. In its early stage, SKT was not focused on generating revenue, but on developing customer loyalty and lock-in by offering a convenient and user-friendly payment channel to existing customers. SKT plans to evolve it into a platform for advanced customer relationship management, which could stabilize revenue growth in the long-term. SKT believes that the growth potential of MONETA rests much on the synergistic partnership between SKT and associate firms to take advantage of each other's strengths and to complement weaknesses.

SKT recognizes the importance of linking mobile, online, and off-line processes to diversify services on the MONETA platform. As for the mobile-phone service, SKT already owns about 50% of the Korean market. Its online presence is through the portal, NATE.COM, acquired from Lycos Korea. Finally, its off-line connection is through MONETA readers installed at participating stores. About 260,000 MONETA readers were deployed as of July 2003, falling short of target to reach 440,000 that represented about 80% of stores and store chains accepting credit cards. Naturally, SKT’s challenge is first to expand its online and off-line presence, and then to create synergy among three channels (mobile, online, and off-line).

Besides the e-payment, MONETA offers other services concurrently. NEMO is an e-cash service that enables fund transfer (see Figure 1). As bank accounts usually become the starting and ending points of transferred funds, NEMO's connection to existing banking systems is a necessary condition for its existence. In addition, NEMO can process payments of mobile, online, and off-line transactions through virtual accounts. There are, however, barriers against its growth path, especially in promoting the virtual account. Banks are not enthusiastic about it mainly because they cannot track the usage of e-funds transferred from bank accounts to virtual accounts.

**Evolutionary vision**

SKT foresees the growth of UC-driven mobile financial services in four stages. The first stage witnesses the formation of necessary infrastructure. This includes the
introduction of MONETA card readers and their installations, and the deployment of MONETA-ready cellular phones. Only early adopters are expected to try the service. SKT feels that three factors are instrumental to drive the business beyond the first stage. First, enough customers should sign up to the service to justify its existence as a business model. Second, its mobile finance technology should lead the standardization process. Third, SKT should amass knowledge to offer more advanced and diversified services.

At the second stage, the general structure of mobile financial services takes shape and its boundaries emerge. Services are expected to evolve from the payment focus to a financial portal in which its NATE.COM will bind various mobile, online, and off-line activities. Even if the website (NATE.COM) currently provides simple financial services within a directory, it is overall too limited to function as an advanced portal. SKT’s next goal is, therefore, to add other capacities to existing payment service. Ultimately, the portal is to offer integrated balance sheet (IBS) services in which mobile and non-moblie activities are linked and processed seamlessly. Under the linkage, customers can register the portal through the web, cellular phones, personal digital assistants (PDAs) and other network-enabled devices.

The financial portal should offer rich customer values through the provision of financial information, consulting, merchandising, or the mediation of customized services. Stock trading, banking, real estate, credit and other cards, tax, and insurance will be the main business applications of the portal. Existing MONETA (e-payment) and NEMO (e-cash) services will be consolidated to the portal. Figure 2 shows the layout of the financial portal and its service portfolios. SKT divided them into the categories of financial information (i.e., personal finance management), and so called financial supermarket (i.e., price comparison, product recommendation).

The refinement of service quality for existing customers will take place at the third stage. For example, information on current customers will be utilized to manage customer relationships better and to offer value added services. Service rendering becomes more proactive (rather than reactive) and dynamic (i.e., customization). Proactive customer engagement demands a thorough understanding of customers’ behavioural patterns and their temporal, geographical and other contextual circumstances (i.e., birthdays, holidays, tasks).

The goal will pose a significant challenge to SKT because, above all, adequate and creative value networks among business stakeholders should be in place. It also requires the mobilization of various technological elements and their integration. These include data warehousing (i.e., customer database), data mining (i.e., customers’ behavioural patterns), position tracking, customer relationship management, and mobile marketing (i.e., e-coupons). As a simple scenario, MONETA servers, through the CRM system, can send customers a reminder (i.e., wedding anniversary) along with promotional messages. This requires that the database system must keep track of customers’ demographics information (both dynamic and static). Promotions from value network partners must be negotiated and updated. The promotions may be either static or dynamic (i.e., context driven). Also, e-payment and other auxiliary systems should link the value network partners.

In the last stage of growth, seamless integration and transparency among financial services is expected to emerge. One of its driving forces should be the intelligence of participating systems. Intelligence may be implemented in mutual dependency (or reciprocity) between computing devices (or systems). In this set-up,
affiliated devices (or systems) will have the capacity to obtain or detect information from each other and dynamically develop computing or response models (Lyytinen and Yoo 2003). Services may be found by programs (program-centred interactions) and driven by non-human participants, making human–computer interactions increasingly implicit (Waldo 2002). For this, various concepts of system intelligence (i.e., intelligent agents, adaptive intelligence, and context-driven computing) have been discussed. At this stage, it is also expected that value networks will evolve to the open alliance (see Table 1) in which firms share available resources and information to offer truly flexible and pervasive services.

Challenges

UC-based applications, in general, pose many technical, social and organizational challenges (Lyytinen and Yoo 2003). Given the pioneering nature of mobile financial services, SKT had to face many challenges before and after its launch. We discuss important ones here.

Above all, acquiring government permission was an extremely frustrating experience. Government regulations on SKT’s business are mostly from the Ministry of Information and Telecommunications. With the planned financial services, however, SKT had to apply for a business licence to the Ministry of Finance. Finance and telecommunications are probably two most heavily regulated sectors in Korea. Naturally, inflexibility in existing regulations, the lack of coordination among government ministries, and bureaucracy were major barriers SKT had to overcome.

Initially, the Ministry of Finance was very negative on the prospect of a mobile telco offering financial services. It was skeptical about the security and reliability of such mobile transactions. Even when the Ministry conceded the integrity of mobile services after lengthy persuasion and education from SKT, it suggested that a credit card firm, not SKT, apply for the business licence. That was, however, almost impossible at the time because credit card firms regarded SKT as a threat rather than as a potential partner.

Besides, due to the lack of laws, regulations and other provisions, government ministries were not ready to effectively support SKT’s initiative. In fact, they had to come up with an agreement regarding its business nature and industry classification in the first hand. Finally, recognizing the emerging convergence between telecom and finance sectors, the Ministry of Finance submitted so called ‘the law of electronic financial trading’ to congress.

The second barrier SKT faced was the difficulty in finding partnerships among financial institutes (i.e., banks and credit card firms) because they perceived SKT’s drive as a threat to their existing services. Close partnerships with the finance sector were crucial to SKT. Finance firms, however, are known for their conservativeness and risk aversion. They were against any regulations that might formally endorse SKT’s new business models. Although their negative attitude has been changing gradually, the perception gap still remains. From the beginning of partnership negotiation, this gap led to a significant disagreement on cost sharing. SKT, as a result, failed to sign up major credit card firms and had to settle with smaller players. This
became a significant hurdle against the market penetration of the MONETA-platform.

Third, the lack of technology standards running the financial services constituted a major threat to SKT. Mobile service providers had different preferences for networking technologies. SKT developed IrFM0.56 (Infrared Financial Messaging), conforming to EMV (Europay-Master-Visa) specifications for the communication between terminal devices. The IrFM technology was adopted as an international standard for communicating with VISA services. KTF developed its own communication protocol rather than using SKT’s technology as it feared to lose competition. LG Telecom uses SKT’s technology after failing to develop its own version. The Korean government plans to develop IrFM1.0. KTF, as a latecomer to the financial service market, can deploy the new standard to cellular phones and readers without sacrificing current investment. However, SKT will be forced to upgrade existing MONETA phones and readers already deployed. It has invested about $50 millions to install 260,000 (as of July 2003) MONETA readers at participating retail stores. Updating them to conform to the new standard could cost the company an additional $10 million. In fact, this financial risk could be rather small compared to the potential loss of opportunities due to the operational delay in the domestic and foreign marketplaces.

The banks have been pushing their own e-cash system. The effort, however, has a major limitation because they do not own the network infrastructure to run the e-cash service. For this reason, the finance sector’s e-cash system may not be able to compete effectively against those from mobile telcos. So far, SKT’s e-cash programme has signed up nine Korean banks as partners, but three largest banks are missing from the list. Accordingly, SKT’s e-cash service has not reached its ‘critical mass’ status to influence the market dynamics.

Fourth, there is a major challenge to minimize customers’ concerns about privacy violation in using the services. Privacy itself is a multidimensional concept with natural, social, spatial and temporal elements (Marx 2001). Langheinrich (2002) emphasized that protecting or respecting customers’ empowerment, utility, dignity and constraint of power is crucial to maintain their sense of privacy. A MONETA phone carries a chip-set that stores customers’ financial and personal information that can be misused. People are also concerned with the digital trace of mobile computing (Jessup and Robey 2002). Marx’s (2001) and Langheinrich’s (2002) studies reveal how such mobile financial services may affect individual privacy and what measures should be taken to address the potential risk.

Finally, although everyone agrees that the emergence of financial services running on UC technologies is inevitable, there is much unpredictability on how quickly people will embrace them. SKT has invested heavily in developing and deploying infrastructure technologies. If the market formation for mobile financial services is delayed, the m-Finance group will face a serious challenge from other business units. In fact, the mobile communications service still remains as SKT’s cash cow

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<th>Classification</th>
<th>Closed Competition Strategy</th>
<th>Open Alliance Strategy</th>
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<td>- Maximum Value for Mobile Communication Company (MCC)</td>
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<td>- Monopoly in Mobile Channel</td>
<td>- Partners without Critical Mass (customers) and Core Resources</td>
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Source: Han (2003)
and there has been internal resistance in shifting business emphasis from communication to financial services.

CONCLUSIONS

With the prevalence of wireless Internet and cellular phones, mobile financial services are growing in Korea. We conducted a case study on this topic. For this, we interviewed key management figures from SK Telecom (SKT), the industry leader in mobile communications service. SKT’s financial services are being rendered on MONETA, a vehicle that offers financial functions through industry partnerships. SKT recognizes that its value network-driven financial services are at the early stage of growth. Nonetheless, the trajectory of value network formation around SKT offers a glance of how mobile computing may re-shape the nature of financial services.

SKT understood the potential of integrated financial services. It also had vision and strategy to push them in a large scale. However, due to their potential to disrupt established business practices, the company had to face many technical and non-technical challenges. Overall, prohibitive government regulations and bureaucracy, antagonism from the finance industry and resulting difficulties in finding partnerships, the lack of technology standardization among service providers, and customers’ concern with their privacy were identified as the major risk factors.

The research of business models built on the UC paradigm has been rare. Much more work can be done on this field. Among the related topics are the critical success factors of UC-driven business models in general and mobile financial services in particular; the design and assessment methods of UC-driven business models; and effective value networking strategy for UC-driven business models. With the findings above, we believe that this case study has laid a partial groundwork to understand critical success factors of mobile financial services.

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