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Ubiquitous Money and Walking Banks: Environment, Technology, and Competition in Mobile Banking

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UBIQUITOUS MONEY AND WALKING BANKS: ENVIRONMENT, TECHNOLOGY, AND COMPETITION IN MOBILE BANKING

*Jongho Kim Ph.D**

ABSTRACT

Academic research on mobile banking has been scarce, and the subject has remained more or less unexplored territory. This study provides new information regarding the socioeconomic environment, technology, and competition issues in the dramatically changing global financial services industry. The more we know about mobile banking, the more we are likely to gain insights useful to bankers, regulators, customers, and policy makers who accept the various types of new services as means to their goals. This study breaks new ground by addressing law and technology issues, as well as managerial initiatives, in the mobile banking business mainstream.

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I. INTRODUCTION

Over the last two decades, a large diffusion of mobile communication devices with “highly innovative technology”¹ has fundamentally transformed the “banking business,”² and added complexities for bank personnel, consumers, and regulatory authorities.³ From the traditional financial institution’s perspective, the advent of new technology such as Internet banking and mobile banking may be warning shots that increase competition with new market entrants or existing competitors.⁴ For instance, the appearance of Internet banking services⁵ calls for new market players, such as telecommunication firms and Internet payment companies that once only served financial institutions.⁶

Boyd defined mobile banking as “the use of mobile-phone-based interfaces to provide account information and transaction opportunities to customers of financial institutions.”⁷ In this article, I examined Korean banks’ mobile banking services in terms of the business model

¹ See generally Jongho Kim, *Deep Impact on the Mobile Communications Market: A Case Study in Applying the Regulatory Rules to Assess a Proposed Enterprise Combination*, 5.2 SCRIPTED 309, 315–21 (2008), available at <http://www.law.ed.ac.uk/ahrc/script-ed/vol5-2/kim.pdf>.

² In Korea, the term “banking business” refers to the business of lending funds raised by bearing debt from many unspecified persons through the receipt of deposits and issuance of securities and other bonds. See Banking Act art. 2(1)1. (Act No. 6691, Apr. 27, 2002).

³ See GAVIN TROY KRUGEL, *MOBILE BANKING TECHNOLOGY OPTIONS: AN OVERVIEW OF THE DIFFERENT MOBILE BANKING TECHNOLOGY OPTIONS, AND THEIR IMPACT ON THE MOBILE BANKING MARKET* 35 (2007), available at http://74.125.45.132/search?q=cache:uIqywt_gIQwJ:mmt.gsmworld.com/downloads/finmark_mbt_aug_07.pdf (explaining that “[t]he regulatory impact results from the actual application of the technology.”).

⁴ Mari Suoranta, *Adoption of Mobile Banking in Finland*, 28 J. FIN. SERVICES MARKETING 11 (2003) (on file at the University of Jyväskylä on Dec. 18, 2003) (“The internal wave of technological development in banking began as far back as the 1960s and 1970s.”).

⁵ *Id.* at 13 (“[O]n a global level the first Internet-based banking service system was in fact launched in Finland [in 1996]”).

⁶ See KPMG, *MOBILE PAYMENTS IN ASIA PACIFIC: INFORMATION, COMMUNICATIONS & ENTERTAINMENT* 25 (2007), available at http://www.trp.hku.hk/publications/mobile_payments.pdf (“Broadband mobile phone networks are making access to online virtual worlds easier and ubiquitous. Virtual money is being created in these virtual worlds, and m-payments are becoming a vital part of it.”).

⁷ See CAROLINE BOYD, *MOBILE FINANCIAL SERVICES AND THE UNDERBANKED: OPPORTUNITIES AND CHALLENGES FOR M-BANKING AND M-PAYMENTS* 6 (2007), available at <http://www.cfsinnovation.com/document/mbanking.pdf>.

and current development, in order to expose the implications of the topic to the regulatory authorities.⁸

The first part of the paper defines mobile banking and outlines its efficiencies. I discuss a comprehensive meaning of online banking and the relationships between mobile banking and Internet banking. I also discuss the economic efficiency of banks that are applying mobile banking service in their businesses, and whether the business model of mobile banking can be sufficiently distinct from more traditional banking services.

Part two of the paper examines the environment of wireless telecommunication in Korea and describes the rapid growth of Korean mobile banking services compared to that of other countries.

Part three examines the issue of mobile banking service expansion, the real mobile financial business model, issues related to wireless security and authentication, subscription fee issues, system maintenance, and protection of customers and providers. This part of the paper also discusses the most desirable direction of mobile banking development and the implications for the Korean market.

In part four, I address the competition and strategic alliances between financial institutions and mobile communication firms. Financial institutions are reluctant to introduce mobile banking as a regular service because it brings mobile telecommunication firms, who are strong potential competitors, into the financial markets. Even mega-banks, if they do not follow up on the global trend, like a Japanese i-mode case, may experience a setback in one of their epigonic financial institutions which was impelled to provide mobile banking. The type of competition and the necessity of strategic alliances are the main issues in this part of the paper.

In part five, I discuss the situations and prospects of Korean mobile banking services, the number of mobile banking service subscribers, details about the service, and financial institutions which have already applied mobile banking services. I conclude that Korean banks' mobile banking services present a striking contrast to financial institutions in other countries, which are more passive in their infrastructure investments while, in Korea, mobile banking grows rapidly in concert with Internet banking.

In part six, two Korean banks active in mobile banking services are presented as case studies. Using Woori Bank and Shinhan Bank, I

⁸ In the true legal sense, regardless of type of delivery channels, banking activities encompass the opening of accounts, accepting deposit and withdrawals, etc. See generally TIMOTHY R. LYMAN, MARK PICKENS, & DAVID PORTEOUS, *REGULATING TRANSFORMATIONAL BRANCHLESS BANKING: MOBILE PHONES AND OTHER TECHNOLOGY TO INCREASE ACCESS TO FINANCE* 24 (2008), available at http://www.dfid.gov.uk/pubs/files/m-banking_focusnote.pdf [hereinafter CGAP FOCUS NOTE].

describe the decisions of the biggest commercial banks, after the Asian financial crisis, to set up an integrated mobile banking system linked with rapidly spreading Internet banking.⁹ I also outline the relationships between the banks, technology providers and mobile communication carriers for mobile banking services, and other relationships.

II. CONCEPT AND CHARACTERISTICS OF MOBILE BANKING

There are many reasons why banks should change. First, industries are converging, and the financial industry, in particular, is gradually becoming closer to the communications, retail sales, and consumer goods industries through the convergence of logistics, communications, and services.¹⁰ Second, market entry costs are lower than before, particularly as online financial institutions appear in the market.¹¹ Third, market transparency has been enhanced so that services and price are easily compared with one click, disclosing the relative superiority or inferiority of one financial institution to the others.¹² Fourth, user-friendly technology is being introduced in a steady stream, and the rapid development of user-friendly technology, such as wireless Internet, enables technology products to launch directly into the mass market to customers looking for highly sophisticated devices.¹³ Finally, customers want to remove the disintermediation inherent in obtaining financial services.¹⁴

It is easier than ever before for customers to form a relationship with non-traditional market entrants who provide financial services. More and more end users use the kind of online financial services which provide service and benefits without an intermediate agency (for example, accounting firms may provide cash management service to their clients or a financial portal may sell financial products

⁹ Much of the existing literature regarding electronic banking services has researched upon the organizational or distribution channel perspective. See Minna Mattila, *Factors Affecting the Adoption of Mobile Banking Service*, 8.1 J. INTERNET BANKING & COM. (2003), <http://www.arraydev.com/commerce/jibc/0306-04.html>.

¹⁰ See Teemu Haukioja & Jarmo Hahl, *The Emergence of the New Economy and Its Challenge to Financial Intermediation and Banking: A Survey* 14–15 (Research Institute for the Finnish Economy, Working Paper No. 772, 2003), available at http://www.etla.fi/files/594_dp772.pdf.

¹¹ *Id.* at 15.

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.* (“[I]nnovations may affect customers’ behavior in a way that, for example, the expected gains from diminished average cost per transaction are cancelled by the increase in the number of transactions.”).

directly to its members).¹⁵ Such changes provide customers with new services and more attractive price choices, and negatively impact market players who do not or cannot adjust to the changes and new competition. A networked society that is connected by telecommunications and media networks and structured by individual and complex organizations requires financial institutions that provide mobile banking services.¹⁶

A. *Definition of Mobile Banking*

Mobile banking is a term used for performing financial transactions such as balance checks, account transactions, payments,¹⁷ and stock market transactions via a mobile device such as a mobile phone or Personal Digital Assistant ("PDA").¹⁸ Mobile banking includes three concepts: a financial service (banking)¹⁹ that is available anywhere (ubiquity) and anytime (immediacy).²⁰ More specifically, the features of wireless banking are a mixture of personal, transit, and convenient,²¹ while the features online banking are a blended concept of net-

¹⁵ KPMG, *supra* note 6, at 19 ("Banks have an opportunity to increase customer number through m-payment systems, but also need to gauge the amount of credit that can be issued against increased risk.").

¹⁶ See Suoranta, *supra* note 4, at 13 ("The basic trends affecting the financial market are globalization, deregulation, liberalization, mergers and acquisitions, competition, technology and new demographic trends.").

¹⁷ Since mobile payment constitutes an independent business field that does not necessarily involve banks, some researchers have not considered it as a mobile banking category. See Rajnish Tiwari, Stephan Buse, & Cornelius Herstatt, *Mobile Services in Banking Sector: The Role of Innovative Business Solutions in Generating Competitive Advantage* 3 (Technische Universität Hamburg-Harburg, Working Paper No. 48, 2007).

¹⁸ See *infra* notes 481–92 and accompanying text.

¹⁹ See Adel Al-Taitoon & Carsten Sørensen, *Supporting Mobile Professionals in Global Banking: The Role of Global ICT-Support Call-Centres*, J. COMPUTING & INFO. TECH. 297, 297–98 (2004), available at <http://eprints.lse.ac.uk/9726/> (follow "Official URL" hyperlink) ("Previously, in order for customers to utilize banking services, they had to travel to a bank branch or a CD/ATM, but with the inception of phone banking, there was no longer a need to do so, which saved them time and effort. After that, PC propagation and internet infrastructure installation caused internet banking to expand, allowing the banking services to be done conveniently at home and in the workplace. Unlike internet banking services, which can be used only in fixed areas such as at home and work, mobile banking service allows the banking customers to bank anywhere and anytime, assuming they have the appropriate device.").

²⁰ See Suoranta, *supra* note 4, at 12.

²¹ See BOYD, *supra* note 7, at 6.

work, Internet, computer, and automatic.²² Mobile banking is built upon the online banking concept, but a few simple additions create synergy in the financial sector. Therefore, wireless service, plus online service, plus banking provides financial information and transaction opportunities, as well as value added through new types of financial services,²³ such as mobile payment (“m-payment”), account aggregation,²⁴ electronic bill presentment and payment (“EBPP”) and a financial portal.²⁵

As an internationally renowned news magazine has recently pointed out, “[t]he capabilities of mobile banking, essentially, doing transactions on-the-go using a cellular phone or other mobile device,

²² In one public report, the term mobile banking is used broadly to refer to the delivery of banking services through mobile phones. See GAUTAM IVATURY & MARK PICKENS, THE UNITED NATIONS FOUNDATION, MOBILE PHONE BANKING AND LOW-INCOME CUSTOMERS EVIDENCE FROM SOUTH AFRICA 1 (2006).

²³ Tiwari et al., *supra* note 17, at 3 (noting that there are different ways of defining mobile banking: “Mobile Banking refers to provision and availment of banking and financial services with the help of mobile telecommunication devices. The scope of offered services may include facilities to conduct bank and stock market transactions, to administer accounts and to access customized information.”).

²⁴ See generally Hiroshi Fujii, Taeko Okano, Stuart Madnick, & Michael Siegel, *E-Aggregation: The Present and Future of Online Financial Services in Asia-Pacific* (CISL Working Paper No. 2001-02), available at web.mit.edu/sloan-msa/Papers/3.14.pdf (“A financial aggregation service is defined as a service that collects financial information transparently from multiple sources and analyzes it. A financial aggregator is defined as an entity of financial aggregation service. In this process, the aggregator interprets the information in various ways based on the meaning and context of the information being collected. In contrast, Yahoo and other financial portal sites only link information and provide that information for use without interpretation. They show the linked site by using the URL and display exactly as they are written. Therefore, if a user needs specific information from some part of the site, the user must search for the information on multiple screens. In contrast, a financial aggregator can extract information from multiple web sites using web-wrapping technologies, such as “screen scraping.” By automating this process, a financial aggregator can gather all the financial information needed by the user and show it in one place. The most famous example of the financial aggregator is an account aggregator, which gathers personal account information from multiple financial institutions.”).

²⁵ See Shaker Ibne Amin, *M-banking — To Bank the ‘Un-banked,’ Frost & Sullivan Market Insight* *2 (May 14, 2007), available at <http://www.frost.com/prod/servlet/market-insight-print.pag?docid=98655381> (“The service refers to the provisioning and availability of banking and financial services through the mobile technology and the scope of offered services may include facilities to conduct bank and stock market transactions, as well as enabling users to access customized information.”).

are practically the same as online banking.”²⁶ Internet banking links the financial institution’s website through the computer or web browser of a mobile phone, so wireless banking or mobile banking can be included in this category in the sense that it uses the public network of the Internet to enable access to the bank.

Through recent innovations in technology, financial institutions have overcome the traditional understanding that mobile banking is just a business channel; instead, it has emerged as a tool that offers its own benefits.²⁷ Mobile finance will be a stepping stone to a cashless society.²⁸

The development of mobile finance can be summarized as taking place in three stages:²⁹ (i) in the first stage, by partnering with an individual communications firm, a financial institution starts limited services, such as notice, price inquiry, account check, and news; (ii) next, the service includes payment settlement, such as funds transfer among accounts, by creating single-source content using middleware between web and a wireless communication device;³⁰ and (iii) the service may develop toward providing single-source content via Extensible Markup Language (“XML”),³¹ financing and investment counseling based on upgraded interchangeable network functions, customer support with two way operated communication, and construction of individual portal services adjusted according to customers’ preferences.

²⁶ See *Mobile Banking, Still Unpopular in the US, Could Attract New, Younger Customers*, INT’L HERALD TRIBUNE, Apr. 21, 2008, available at <http://www.ihf.com/articles/ap/2008/04/21/business/NA-FIN-US-Mobile-Banking.php> [hereinafter *Mobile Banking*].

²⁷ The mobile banking service is a type of mobile device used for a pre-existing banking service’s transmission channel and is similar to the previous internet banking service provided through a bank’s PC and cable internet network. In other words, the PC is replaced by a mobile PC for banking services, and the data transfer methods are mobile communication, wireless LAN, and cable internet.

²⁸ See generally Daniel D. Garcia Swartz, Robert W. Hahn, & Anne Layne-Farrar, *Move Toward a Cashless Society: A Closer Look at Payment Instrument Economics*, 5.2 REV. OF NETWORK ECON. 175 (2006) (arguing the move toward of a cashless society based on the empirical examination using benefits as well as costs analysis).

²⁹ Cf. *infra* notes 58–63 (discussing business model of mobile financial services).

³⁰ PayPal, About PayPal, available at http://www.paypal.com/cgi-bin/webscr?cmd=_p/gen/about-outside (last visited Feb. 26, 2009) (“The service allows anyone to pay in any way they prefer, including through credit cards, bank accounts, buyer credit or account balances, without sharing financial information.”).

³¹ Extensible Markup Language, <http://www.w3.org/XML/> (last visited Feb. 26, 2009) (“XML is a simple, very flexible text format [which was] designed to meet the challenges of large-scale electronic publishing, [and] is also playing an increasingly important role in the exchange of a wide variety of data on the Web . . .”).

Currently, customers can obtain banking services through several service channels:³² face-to-face, ATMs, Tele-banking, PC banking, Internet banking, and interactive TV banking services.³³ Recently, out of those channels, the ratio of business transactions through Internet banking and mobile banking in Korea has dramatically increased,³⁴ from 8.8% in December 2001, to 35.9% of in and out transactions and 67.9% of account inquiry in March 2008.³⁵

B. Economic Efficiency of Mobile Banking

1. Economic Effect of Mobile Banking

Since 1999, the majority of Korean banks have actively adopted new channels of mobile banking services through the Internet and wireless systems, investing manpower and capital in technology systems and infrastructure in a rush to be competitive.³⁶ The idea that mobile phones bring economic benefits is now widely accepted in society.³⁷

What are the economic benefits? The first benefit is competitive power in the financial market.³⁸ The current business trend in the global banking sector is expansion and integration.³⁹ Through

³² In order to meet the customer's need, modern global banks are pursuing a multi-channel strategy. See Tiwari et al., *supra* note 17, at 5.

³³ Woori Bank first acquired certification of Internet banking among Korean Financial institutions on August 31, 2001, and introduced the first TV banking service in Korea on July 2, 2004. See <http://www.wooribank.com/> (last visited Feb. 26, 2009).

³⁴ KRUGEL, *supra* note 3, at 2 ("Its channels include the traditional bricks and mortar branch, ATMs, POS and the internet.").

³⁵ See Press Release, Bank of Korea, Present Conditions of Subscribing Internet Banking Service in the First Quarter of 2008 (Apr. 24, 2008) (on file with author) [hereinafter Bank of Korea].

³⁶ IMF asked to restructure financial institutions. As the financial sector problems were a major cause of the crisis, the centerpiece of the Asian programs became the reform of the financial systems. See Stanley Fischer, First Deputy Managing Dir. of the Int'l Monetary Fund, The Asian Crisis: A View from the IMF, Address before the Midwinter Conference of the Bankers' Association for Foreign Trade, Washington, D.C., *2-4 (Jan. 22, 1998) (transcript available at <http://www.imf.org/external/np/speeches/1998/012298.html>).

³⁷ Leonard Waverman of the London Business School has estimated that an extra ten mobile phones per 100 people in a typical developing country leads to an extra half a percentage point of growth in GDP per person." See *A Bank in Every Pocket?*, ECONOMIST, Nov. 15, 2007, at *1, available at http://www.economist.com/opinion/displaystory.cfm?story_id=10133998.

³⁸ See *infra* text accompanying notes 78-83.

³⁹ See Jongho Kim, *From Vanilla Swaps to Exotic Credit Derivatives: How to Approach the Interpretation of Credit Event*, 13 FORDHAM J. CORP. & FIN. L. 705, 712 (2008).

mergers and acquisitions, mega banks have appeared, and the boundaries of the financial industry have been blurred by deregulation.⁴⁰ Under these circumstances, competition among financial institutions has become fierce, and banks secure new customers and retain their old ones by providing innovative services, such as Internet and mobile banking services.⁴¹

A second economic benefit is that automated procedures for banking operations may bring with them a reduction of costs.⁴² According to Infogile Technologies, "[t]he biggest advantage that mobile banking offers to banks is that it drastically cuts down the costs of providing service to the customers."⁴³ Branch office operations for banking services produce significant managerial cost, including employment of human resources and "bricks and mortar,"⁴⁴ while the advent of Internet and mobile technology as a tool of cheap service transmission⁴⁵ will drastically cut banks' cost per transaction.⁴⁶ In addition, mobile banking "facilitates and reduces the cost of remittances and enables financial transactions without the costs and risks associated with the use of cash, including theft and cost of travel to pay-in-person."⁴⁷ One case study diagnosed that:

For service providers, mobile banking offers the next sure way to achieve growth. For countries like Korea,

⁴⁰ *Id.*

⁴¹ *Mobile Banking*, *supra* note 26 ("Losing mobile-banking business to other companies could mean losing out on billions of dollars of potential deposits.").

⁴² See Tiwari et al., *supra* note 17, at 6.

⁴³ See INFOGILE TECHNOLOGIES, MOBILE BANKING – THE FUTURE 7 (Aug. 2007), available at http://www.infogile.com/pdf/Mobile_Banking.pdf.

⁴⁴ IVATURY & PICKENS, *supra* note 22, at 1 ("[S]ince m-banking transactions cost far less to process than transactions at an automated teller machine (ATM) or branch, banks can make a profit handling even small money transfers and payments."); see also INFOGILE TECHNOLOGIES, *supra* note 43, at 8 ("Research indicates that the number of footfalls at a bank's branch has fallen down drastically after the installation of ATMs. As such with mobile services, a bank will need to hire even less employees as people will no longer need to visit bank branches apart from certain occasions.").

⁴⁵ See Arnab Datta, Mehmet Pasa, & Tom Schnitker, *Could Mobile Banking Go Global?* 4 MCKINSEY Q. 71, 72 (2001).

⁴⁶ Tiwari et al., *supra* note 17, at 5 ("One researcher stated that: The significance of retail banking for Postbank, [a publicly-listed, erstwhile subsidiary of Deutsche Post AG], can be gauged from the fact that nearly 80% of its balance sheet-related revenues and 82% of profits-before-tax were generated by the retail business. Return-on-equity in retail banking was with 27.3% almost twice as high as that for the whole group (14.6%). The reason for this remarkable success in the retail banking segment is attributed by the bank to a "successful mix of product classics and innovations.").

⁴⁷ See Amin, *supra* note 25, at *2.

where mobile penetration is nearing saturation, mobile banking is helping service providers increase revenues from the now static subscriber base. Service providers are increasingly using the complexity of their supported mobile banking services to attract new customers and retain old ones.⁴⁸

Furthermore, “[a]s far as technology providers are concerned, [mobile banking services] are seen as useful tools to generate additional revenues and secure a serious image which is invariably associated with banks.”⁴⁹ The early-mover financial institutions that incorporate innovative technology in their businesses quickly may hope to win or retain a positive brand image among technology-savvy sections of the society and strengthen the brand-power of being innovative and visionary.⁵⁰ One industry research analyst observed, “[mobile network operators] have a unique and advantageous position, as they are the first-point contact with the customers, to tap the growing subscriber base with new offerings providing consumers a strong value proposition.”⁵¹

2. *Mobile Banking Business Model*

From the traditional perspective, mobile banking is simply another channel of banking service.⁵² Whether this is correct or not, however, depends on what services are provided by the mobile banking service application and what kind of business model is applied in the mobile banking mechanism.⁵³ Therefore, it is a financial institution’s choice to develop mobile banking as a new business model or to regard it simply as one of many optional business tools.

In Korea, the current stage of mobile banking development is evolving through: (i) marketing innovation; (ii) transmission channel innovation; (iii) innovation of goods and services; and (iv) recreation of business models.⁵⁴ Korean mobile banking services are in phases 3 and 4 of the service development (see Table 1), and Korean financial

⁴⁸ See INFOGILE, TECHNOLOGIES, *supra* note 43.

⁴⁹ See Tiwari et al., *supra* note 17, at 11.

⁵⁰ See Rajnish Tiwari, Stephan Buse, & Cornelius Herstatt, *The Mobile Commerce Technologies: Generations, Standards And Protocols* 6 (Inst. of Tech. & Innovation Mgmt. in Hamburg Univ., Working Paper No. 40, 2006).

⁵¹ See Amin, *supra* note 25, at *2.

⁵² See Mattila, *supra* note 9 and accompanying text.

⁵³ See generally INFOGILE TECHNOLOGIES, *supra* note 43, at 2 (addressing mobile banking business models classified into three broad categories: Bank Focused, Bank-Led, and Non Bank-Led.).

⁵⁴ One industry analyst identified eight business models for mobile financial services. See Datta et al., *supra* note 45, at 73.

institutions are working actively to upgrade their service levels by applying various business models.⁵⁵

<TABLE 1>

INNOVATION LADDER IN MOBILE BANKING⁵⁶

Standard	Degree of innovation	Content	Application to banking business
Phase 4	Recreation of business model	How to change the old business model and create new value?	Integration of entire financial-service and all financial-transaction-related functions.
↑ Phase 3	Products and services innovation	What are the possible unique financial services in the mobile system?	Provide mobile financial portal.
↑ Phase 2	Transmission channel innovation	How to sell financial service products through the mobile device	Full-dressed mobile banking and stock trading services (e.g., brokerage)
↑ Phase 1	Marketing innovation	How to provide and what service should be provided to customers who subscribe to mobile phone service	Account balance and related services provided via mobile device

Meanwhile, based upon the characteristics of the service, *McKinsey Quarterly*, the business journal of marketing, classified the business model of mobile financial services as consisting of four categories:⁵⁷ (i) the payment settlement transaction business,⁵⁸ (ii) the contents business,⁵⁹ (iii) the integrated service business,⁶⁰ and (iv) the

⁵⁵ See *infra* discussion Part VI of the Woori Bank and Shinhan Bank cases.

⁵⁶ See ARTHUR D. LITTLE, WHAT DOES E-BUSINESS MEAN FOR FINANCIAL INSTITUTIONS 3 (2001).

⁵⁷ See David Maude, Raghunath Sahay, & Peter Sends, *Banking on the Device*, MCKINSEY Q. 87, 87–97 (2000).

⁵⁸ See Datta et al., *supra* note 45, at 74.

⁵⁹ Individual mobile financial services enable customers to perform banking transactions, securities trading, and/or buy and manage insurance products with their mobile handsets. It is very similar to online services on the PC. Mobile communication carriers can generate revenues from communication fees and additional benefits may be realized. When a seller of retail products can collect cash from the customers' bank account by accessing the SIM card within a retailer's handset device, the result is a low cost mobile banking service. The sellers of the retail products provide the main interface between customers and their financial accounts, so banks may earn revenues from accounts being opened. If the bank charges for account transactions are low, mobile communication firms make profits from subscription fees. Retail sellers may get money from withdrawal or deposit fees. See *id.* at 74–75.

access business.⁶¹ Another writer divided the business model of mobile financial services into mobile banking and m-payments.⁶²

The payment settlement transaction business is a business model for earning profits by dealing with online and offline commercial payment transactions.⁶³ Here, "a payment is the transfer of ownership of assets, generally, but not necessarily money, to be accepted as a form of settlement of a claim."⁶⁴ As Rosenberg remarked, "[r]ecent studies suggest that the rise in mobile telecommunications and electronic payments each will generate an economic 'growth dividend' in the developing world of about 0.6% of GDP."⁶⁵

The contents business is a business model that provides banking content for basic banking. The integrated service business model refers to integrating financial services to improve the completion of service with a mobile portal.⁶⁶ The access business model involves earning profits by providing mobile network access, such as the mobile virtual network operator ("MVNO"), which "provides the mobile phone

The business under this model will bring great advantages for all participants involved in the transactions if there is a sufficient amount of trading. However, this business has not yet reached a massive scale even in the emerging market because many low-income countries do not have well equipped communication networks. The potential energy of this business model may induce financial services providers to invest in low-income countries or areas with infrastructures characterized by poor communications. *See id.*

⁶⁰ The portal carriers who own mobile information service media can provide service for the majority of customers who use mobile handsets, as well as individualized types of service. Portal carriers may earn fees through the transaction agreement entered into via the portal site and mobile communication carriers can make profits from the subscription contract. *See id.* at 75.

⁶¹ *See id.* at 75; *see also* Web Artificial Intelligence, Can Mobile Banking Expand to the Whole World?, available at http://www.waisolutions.com/our_company/overview.php (last visited Feb. 26, 2009).

⁶² *See* BOYD, *supra* note 7, at 6.

⁶³ *See* CGAP FOCUS NOTE, *supra* note 8, at 12 ("A growing number have already moved beyond pure payment services to offer a virtual transaction account where customers can "park" repayable stored value in electronic form for an indeterminate period and make payments and other money transfers when they choose to. These models, to the extent that they facilitate payments via mobile phones, offer great potential for transformational branchless banking because they effectively constitute a retail payments network far beyond the current banking and POS networks.").

⁶⁴ IVAN MORTIMER-SCHUTTS, THE REGULATORY IMPLICATIONS OF MOBILE AND FINANCIAL SERVICES CONVERGENCE 3 (2007).

⁶⁵ *See* Arnold S. Rosenberg, *Better than Cash? Global Proliferation of Payment Cards and Consumer Protection Policy*, 44 COLUM. J. TRANSNAT'L L. 520, 541 (2006) (internal citation omitted).

⁶⁶ *See infra* note 333.

and the ability to use the mobile phone for providing banking services to the consumer.”⁶⁷

C. *Characteristics of Mobile Banking*

Since the mobile banking service is noticeably different from Internet banking in its approach to access and services, the interpretation and legal treatment of the two services should be different.⁶⁸

1. *Convenience*

The most significant characteristic of mobile banking is that it is more convenient than any other type of banking service.⁶⁹ Generally, the customer need not even stand in line in front of an ATM—unless, of course, she wants cash in hand. Even though the number of Internet banking customers has increased, the service is available only where there is a PC.⁷⁰ Some adults are reluctant to use Internet banking because it is difficult to learn.⁷¹ However, because people can use their cell phones just like credit or debit cards,⁷² mobile banking is simpler and more convenient than using a PC.⁷³

Cellular phone subscribers of the domestic mobile communication company SK Telecom (“SKT”) can use services after accessing the service tool provided by SKT, choosing the banks they wish to access, and entering the appropriate account numbers and passwords. Currently, mobile banking allows customers to check balances, perform banking transactions without a passbook, apply for loans, do transfers of funds, check exchange rates, and monitor fraudulent activity.⁷⁴ These services may also be easily used by Internet banking customers without a certificate. Mobile phone users with Internet banking ser-

⁶⁷ See KRUGEL, *supra* note 3, at 3.

⁶⁸ Suoranta, *supra* note 4, at 15 (“Using a variety of platforms, services are being created to enable mobile devices to perform many activities which earlier have been available only as Internet services.”).

⁶⁹ One survey reported that customers use a cell phone-based banking facility, WIZZIT, because it is “cheaper” (70%), “safe” (69%), “convenient” (68%), and “fast” (68%). IVATURY & PICKENS, *supra* note 22, at 3.

⁷⁰ See INFOGILE TECHNOLOGIES, *supra* note 43, at 1–2.

⁷¹ See *Mobile Banking*, *supra* note 26 (“Most Americans are still hesitant about banking with their cell phones and PDAs, but young people are increasingly coming around to the idea of mobile banking, according to a new survey.”).

⁷² Rosenberg, *supra* note 65, at 525 (“Debit cards, sometimes issued as ‘ATM cards,’ ‘check cards,’ ‘cash cards,’ or ‘Smart Cards’ are proliferating worldwide at a staggering rate.”).

⁷³ Suoranta, *supra* note 4, at 27 (“[The] complexity is a subjective concept and not an innate attribute of a product or service, and can be perceived differently by different individual.”).

⁷⁴ The technology of mobile banking enables such services. See *id.* at 16.

vice can access the “n.Top” stock, financial and economic strategy function. If they click to be connected to the financial institution, they can make inquiries.

Korea Telecom Freetel’s (“KTF”) “K-merce” banking combines a mobile phone with a multi-pack and “magic” to enable access to its mobile multi-banking service for all kinds of banking, regardless of customer’s location.⁷⁵ The available service includes searching individual banks’ branch locations based on GPS service and credit card and checking inquiries.

Generally, the ID, password and account number have to be input for Internet banking, but mobile services save the information in an icon. This makes it possible to check account balances, transfer money, pay bills, and even pay taxes by choosing an icon representing payment, pocket money, monthly salary, regular-interval savings, or savings account. However, the menu system (for example, “press 1 for yes, press 2 for no”) differs depending on the mobile phone number.⁷⁶

2. Efficiency

Without exception, investment on a grand scale for a huge-capacity technology system that covers sophisticated mobile banking service is underway throughout the world.⁷⁷ The economic benefits of applying this new transmission channel are significant.⁷⁸

First, this strategy improves competition within the financial market.⁷⁹ The recent expansion of financial institutions through mergers and acquisitions has created intense competition in response to the removal of obstacles in the business areas between financial institutions.⁸⁰ Using this strategy, banks hope to retain old customers and secure new ones to enforce their competitive power. There is also an economic advantage because banking costs are reduced by the in-

⁷⁵ See Korea Telecom Freetel, *KTF-Kookmin Bank Service Begins*, FTF NEWS, Feb. 25, 2004, available at <http://english.ktf.com.eng/>.

⁷⁶ KRUGEL, *supra* note 3, at 15 (“The service provider would use the consumer’s mobile number forwarded by the network operator to identify the consumer and as a factor of authentication.”).

⁷⁷ See Jinseo Cho, SKT, *Citi to Work Together in M-Banking*, KOREA TIMES BIZ/FINANCE, Mar. 6, 2008, available at http://www.koreatimes.co.kr/www/news/biz/2008/03/123_20253.html.

⁷⁸ Generally, there are four monetary transmission channels. See Jongho Kim, *The Impact Of Derivative Financial Market Expansion On The Central Bank’s Monetary Policy*, 86 U. DET. MERCY L. REV. 131 (2009).

⁷⁹ See *infra* discussion Part III, IV.B.2.

⁸⁰ Maria J. Nieto, *Reflections on the Regulatory Approach to E-Finance*, 7 BIS PAPERS 90, 91 (“Deregulation in the financial sector aimed at increasing competition and integrating financial markets while preserving financial stability”).

creased use of automatic equipment.⁸¹ Earlier iterations of banking service incurred much higher management costs through heavy reliance on “bricks and mortar” and employees, but the advent of mobile technology in the banking industry drastically reduces transaction costs.⁸²

3. Security

The primary interests, “[a]mong the factors that may be holding back customers from adopting mobile banking, are concerns about security.”⁸³ The issue, therefore, is whether mobile financial service providers “can balance convenience and security to ensure that both users and providers are fully protected against fraud, data theft, and other threats.”⁸⁴ It is common sense that “[t]he level of technology will determine the level of secure encryption and the sophistication of secure content that can be provided.”⁸⁵

It is generally accepted that wireless LAN security is superior to wire line.⁸⁶ For instance, wiretapping of cable connections may be possible without any particularly challenging technological requirements, but wireless LAN requires encryption and attestation and prevents data leakage.⁸⁷ Nevertheless, in adopting the policy of wireless LAN operation, efforts should be made to ensure security.⁸⁸ There

⁸¹ See Ahmad Mashhour & Zakaria Zaatreh, *A Framework for Evaluating the Effectiveness of Information Systems at Jordan Banks: An Empirical Study*, 13 J. INTERNET BANKING & COM 1, 2–3 (2008).

⁸² KRUGEL, *supra* note 3, at 1 (noting that the overall world situation is no longer in doubt. The only issue is “how it could dramatically lower the cost of banking and more effectively reach the mass market”); see also Datta et al., *supra* note 45, at 72.

⁸³ See Nancy Feig, *Mobile Banking Experiencing Increased Adoption*, BANK SYS. & TECH, Dec. 23, 2007, available at <http://www.banktech.com/news/showArticle.jhtml?articleID=204803647&pgno=1>.

⁸⁴ BOYD, *supra* note 7, at 15.

⁸⁵ KPMG, *supra* note 6, at 40.

⁸⁶ KRUGEL, *supra* note 3, at 28 (“In comparing fixed line communication protocols to that of mobile, a clear differentiation on the protection of the carried data emerges . . .”).

⁸⁷ Robert Vamosi, *Mobile Banking Security Watch: Don't get burned by Viruses and Hackers*, CNET REVIEWS, May 18, 2007, available at http://reviews.cnet.com/4520-3513_7-6735587-1.html (“In general, cell phone signals are harder to hack into, thus cell-modems are a much safer way for a laptop to connect to the Internet than public Wi-Fi However, many new mobile phones are now integrating Wi-Fi services, so traditional hacking methods may soon come into play with mobile banking.”).

⁸⁸ KRUGEL, *supra* note 3, at 28 (“‘Over-the-air’ or ‘in-the-clear’ are terms often used in the financial industry when referring to banking transactions transported across unencrypted communication protocols.”).

are several primary issues regarding mobile banking security: (i) what are consumers' security perceptions of mobile banking and how should financial institutions address them?⁸⁹ (ii) what are potential obstacles to adoption of security policies based on these perceptions? (iii) what real security issues do financial institutions face, and how are they securing their mobile channels?⁹⁰ (iv) how serious are these threats and where might they go in the future? and (v) what are the security advantages and disadvantages of each of the three mobile banking platforms: browser-based, SMS, and downloadable applications?⁹¹

Since society is becoming networked,⁹² people have more occasions to use credit. As a result the ability to access funds through electronic medium, including mobile devices, there is a naturally high risk of crime through hacking.⁹³ The "word helper service" is a service for sending text messages to cellular phones regarding information, such as the expected amount of payment and payment approval information.⁹⁴ If an individual's credit card is lost, the card holder may prevent the lost card from being used with the help of the simultaneous notice functions that appear on the mobile phone screen.⁹⁵ This text

⁸⁹ *Id.* at 28 ("The concerns are that a fraudster is able to tap-in or listen in to your call, or data transmission, and record the data for malicious or fraudulent reasons.").

⁹⁰ *Id.* at 30 ("Data carried across the mobile network is protected by the standard GSM security protocols at the communication layer. The subscriber identity is also protected across this chain. The risk in transporting data across the GSM channel may be found in the number of stops the data makes before reaching the bank. Unlike fixed line communication, data being carried across the mobile network jumps from one base station to the next, which means that the chain of encrypted communication is broken. The data is also unencrypted when it hits the network operator. Thus, there is a broken encryption between the consumer and the bank.").

⁹¹ Mobile banking service with cellular phones are divided into SMS (Short Message Service) mode, browser mode, VM (Virtual Machine) mode, and IC chip mode, based on the method of access. See *infra* discussion Part II.D.3.

⁹² See *supra* note 16 and accompanying text.

⁹³ See Michael Ena, *Securing Online Transactions: Crime Prevention Is The Key*, 35 *FORDHAM URB. L.J.* 147, 159–60 (2008).

⁹⁴ Feig, *supra* note 83 (noting that in the United States "[m]any banks have decided to hedge their bets by offering more than one option, or a combination of functionality, to their customers. For example, Bank of America's (\$1.3 trillion in assets) mobile banking service, which launched in May [2007], is a browser-based system. But customers also can receive customized alerts via text message, according to the Charlotte, N.C.-based bank.").

⁹⁵ See INFOGILE TECHNOLOGIES, *supra* note 43 ("A bank could, through the use of mobile technology, inform owners each time purchases above a certain value have been made on their card. . . . This way the owner is always informed when their card is used, and how much money was taken for each transaction."); Rosenberg,

message service provides safety and confidence by instantaneously sending account information to the cardholder whenever the lost card is used.⁹⁶

No matter how safe a service may be, “[f]rom a security perspective, within m-payments there is a technology paradox,”⁹⁷ because “[a]s a general rule, technologies become more, not less secure.”⁹⁸ Even though mobile banking services and Internet banking services have similar systems and business logic, mobile banking service users still claim there is significantly less security.⁹⁹ Many solutions have been developed and proposed for a major overhaul to heighten system security. The end-to-end wireless security solution, however, does not allow for hacking possibilities in wireless areas,¹⁰⁰ and the strong security function of the IC chip model with its PIN insert can make it much safer than Internet banking with a PC.¹⁰¹ Since it is mandatory for Internet banking services to incorporate PKI security, the security and privacy of all customer information and transactions are guaranteed, whereas mobile banking services still utilize password insertion for transactions. In order to guarantee the same level of security, the wireless certificate service of Wireless Public Key Infrastructure (“WPKI”) should be applied.¹⁰²

supra note 65, at 524 (“Current rules on the allocation of loss in payment card transactions—the \$50 ‘deductible’ for unauthorized credit card transactions in the United States, the ‘bank statement rule’ and deductibles applicable to debit cards, and the fault-based rules adopted in Europe—should be rejected in favor of a simple rule that unauthorized transactions be charged back to the merchant, regardless of the type of card used.”).

⁹⁶ The text-messaging service is the most basic level of cell-phone banking in the United States. See FDIC, Speed Paying and Banking, Consumer News (Spring 2007), <http://www.fdic.gov/consumers/consumer/news/cnspr07/speed.html> [hereinafter FDIC News].

⁹⁷ See KPMG, *supra* note 6, at 41.

⁹⁸ See *id.*

⁹⁹ See Ena, *supra* note 93, at 160 (“Many consumers doubt the security of mobile banking. Recent research shows that security concerns in the United States will likely delay the adoption of mobile banking.”).

¹⁰⁰ See CISCO SYSTEMS INC. PRODUCT BULLETIN, CISCO AIRONET SECURITY SOLUTION PROVIDES DYNAMIC WEP TO ADDRESS RESEARCHERS’ CONCERNS at *2, available at http://www.cisco.com/warp/public/cc/pd/witc/ao350ap/prodlit/1281_pp.html.

¹⁰¹ KRUGEL, *supra* note 3, at 34 (noting that in order to protect banking transaction, “[t]he PIN should be customer selected PIN, and never stored on the mobile banking platform or application as a PIN but rather as a PIN Offset . . . [a]s an additional measure it is recommended that the customer be asked for certain elements of their PIN for validation (challenge response) as apposed to the full PIN.”).

¹⁰² Generally, PKI is executed by an encryption key with one set of encryptions and decryptions. Public keys, which are sets of private keys, are provided only to

Even though one of the best solutions for mobile banking services is certainly a public wireless authentication service, there was once a three-layer security system of PIN, mobile banking secret password, and a security card. Since the IC card can solve the security problems of magnetic cards, the Korean Financial Supervisory Service ("FSS") recommended gradually transitioning to the IC card by the end of 2008, in order to avoid illegal counterfeiting.¹⁰³ Therefore, banks should evolve from the mobile banking systems of the previous WAP and ME browsing system¹⁰⁴ and the VM system,¹⁰⁵ towards the IC chip system for mobile banking. In the meantime, users' vague concerns about security must be allayed by publicizing that the IC chip system has strengthened security and is safe to use.¹⁰⁶

4. Application

Broader financial services, including the banking business, can be accomplished using mobile communications systems. In the United States, "[r]egardless of the debate over current demand for mobile banking, banks will continue to test different types of solutions to find the ones that fit their customer bases."¹⁰⁷

Within Korea, the focus is on providing financial information rather than financial transactions, whereas the mobile financial service in Japan utilizes a system almost identical to PC-based Internet banking, and the information provided and range targets are constantly expanding. Wireless Internet service use in Japan is very high and affordable for many users, with practical financial transactions, as well as information and entertainment, provided through cellular phone service, establishing wireless as a transaction base.¹⁰⁸ Business transactions such as reservations, buying books and games, and other commercial transactions that support financial services have been ac-

recipients. PKI plays an essential role in securing legal binding concerning messages as it attaches a digital signature to transfer the message on the mobile internet. Also, as it provides end-to-end security service, it is expected to provide an extensive security system, which the previous password certificate method was unable to provide.

¹⁰³ See Electronic Financial Transactions Act, Act No. 7929, art. 21(3) (2006).

¹⁰⁴ See *infra* discussion Part II.D.3.

¹⁰⁵ See *id.*

¹⁰⁶ See *Mobile Banking*, *supra* note 26 ("[T]he biggest reason for avoiding mobile banking, given by 65 percent of respondents, was that consumers are worried their personal information is not secure.").

¹⁰⁷ See Feig, *supra* note 83.

¹⁰⁸ See *infra* notes 287–88, 294 and accompanying text; *infra* Part IV.B.

tivated, including various types of offline base payments, such as paid by issuing check, and debit card payments.¹⁰⁹

KTF, a Korean telecommunications company, provides micro-payment service through online retailers;¹¹⁰ the customer pays for products after undergoing an authorized confirmation, choosing content and products, and choosing to pay by cellular phone.¹¹¹ Since the payment is added onto the following month's phone bill, one disadvantage is that the service is limited to a certain number of dollars a month and to online retailers.¹¹²

D. *The Main Characteristics of Mobile Banking*

This part of the paper discusses the environmental, technological, managerial, theoretical and practical aspects of mobile banking services, based on the consideration of trend.

1. *Circumstances*

Mobile banking technological bases are rooted in the effort to integrate mobile communications and the Internet, which has accelerated the application of integrated mobile services in the banking business.¹¹³ Until recently, the Korean government tended to develop the communications services that the national population needs from an industrial political perspective. However, when technologies have dramatically improved, service development should be based on customer preference. Environmental characteristics that affect the expansion of mobile banking can be divided into legal, institutional, and social characteristics.

From the legal and institutional perspective, the first step in expanding the role of mobile banking to strengthen international competitiveness is to improve the legislation that supports private mobile

¹⁰⁹ KPMG, *supra* note 6, at 16 ("In recent years, companies from a wide range of sectors have adopted and participated in different types of m-payments.").

¹¹⁰ M-payments can enable the extension of microfinance, either through direct access or through the provision of cash management and loan disbursement tools to local institutions. *See id.* at 19.

¹¹¹ KTF Home Page, <http://www.ktf.co.kr> (last visited Aug. 30, 2008).

¹¹² *See* Boyd, *supra* note 7, at 7 (noting that in the United States, "m-payments may be classified according to their value: micro payments (under \$2), mini payments (\$2 to \$20), and macro payments (over \$20), although these terms are not generally accepted definitions").

¹¹³ Suoranta, *supra* note 4, at 34 ("[I]n the case of mobile phones, and consequently in the case of mobile banking services, we can observe characteristics that differ sharply from such wired line devices such as personal computers or televisions.").

banking.¹¹⁴ In the future, since the concepts of electronic shopping, payment and money will be broadened, improvement of related laws, including legal protection of mobile banking users, should be enacted, and alternatives for international banking to protect customers should be developed.¹¹⁵ Also, since security, safety, privacy protection, and crime prevention in case of lost phones are all important issues in mobile banking,¹¹⁶ related financial systems, issuing institutions and monetary policy should be considered.¹¹⁷

From the social perspective, the percentage and total number of mobile users is a factor,¹¹⁸ as expansion of mobile usage strengthens the role of mobile banking users and plays a central role in affecting

¹¹⁴ ECONOMIST, *supra* note 37, at *2 (“In many countries only licensed banks are allowed to collect deposits. Even if a mobile operator forms a partnership with a bank, its agents may have to comply with banking rules covering everything from the height of the counter to the installation of alarms. Financial institutions may have to provide detailed statements to the central bank every week Some countries have rigid rules on the documents demanded of anybody opening an account, which excludes many.”).

¹¹⁵ Decisions on Bank Applications: Volkswagen Bank USA (Proposed), <http://www.fdic.gov/regulations/laws/bankdecisions/depins/VolkswagenBank.html> (“A foreign banking [sic] organization is a foreign bank, as defined by §I(b)(7) of the International Banking Act (12 U.S.C. 3101(7)), that operates a branch, agency, or commercial lending company subsidiary in the U.S. or that controls a bank in the U.S. and any company of which the foreign bank is a subsidiary (Federal Reserve Board Regulation K). A foreign bank means any company organized under the laws of a foreign country, a territory of the U.S., Puerto Rico, Guam, American Samoa, or the Virgin Islands, which engages in the business of banking, or any subsidiary or affiliate, organized under such law, of any such company. For the purposes of this Act, the term foreign bank includes, without limitation, foreign commercial banks, foreign merchant banks and other foreign institutions that engage in banking activities in the countries where such foreign institutions are organized or operating (International Banking Act).”) (last visited Feb. 26, 2009).

¹¹⁶ I think the same rule may apply in the case of a lost mobile phone. Rosenberg, *supra* note 65, at 581 (“If a consumer in the United States loses a blank check on the bus, and a thief forges the consumer’s signature, the loss normally falls on the payor bank absent fault on the part of the consumer, but if the loss of the check was caused by the consumer’s negligence, the consumer bears at least part of the loss on comparative fault principles However, if the same consumer lost a credit card along with the check, and the same thief used the credit card to make a purchase, the consumer’s liability would be limited by law to a maximum of \$50, regardless of the amount of the purchase, the consumer’s negligence in losing the card, and the consumer’s further negligence in failing to review credit card statements.”).

¹¹⁷ ECONOMIST, *supra* note 37, at *2 (“[E]xisting m-banking schemes set a limit on the size of transactions that is low enough to deter money-launderers.”).

¹¹⁸ See Kim, *supra* note 1, at 332 (arguing Network Externalities).

the formation of the Korean mobile banking system.¹¹⁹ As an element of social infrastructure, how the informatics communication network infrastructure is established is an important social element for mobile banking;¹²⁰ even though this is related to the development of information techniques, it is still connected to indirect social capital investment, so it is an issue that ought to be reviewed from a social perspective. Satellite communications equipment, light cable communications equipment, propagation of Personal Communication Services ("PCS"), the number of Internet service providers, and propagation of cellular phones form the social foundation for expanding mobile banking.¹²¹ The related government agency—in Korea, the Ministry of Information and Communication—should support banks that execute mobile banking in order to increase consumer confidence, and to establish a policy to help systematize proper procedures.¹²²

Given the huge ripple effect of the economy, in order to activate mobile banking services, the government should plan to support education related to mobile banking, provide technology assistance, simplify regulations to speed up the business approval process,¹²³ and operate mobile service centers that promote such businesses.¹²⁴ It is

¹¹⁹ Suoranta, *supra* note 4, at 12 ("[T]he ongoing expansion of delivery channels should enhance future market growth.").

¹²⁰ See JAMES ABRAHAM, DAVIS R. DEAN, ARVIND SUBRAMANIAN, RINGING IN THE NEXT BILLION MOBILE CONSUMERS—A ROAD MAP FOR ACCELERATING TELECOM GROWTH IN INDIA, THE BOSTON CONSULTING GROUP REP. 26 (2007) ("Whereas Internet banking has become a complementary banking channel in developed markets, the mobile handset could become the only banking channel for many consumer in [poor country]—particularly the next billion.").

¹²¹ See Datta et al., *supra* note 45, at 73 ("In the case of mobile banking . . . the most suitable market would have many people already using the Internet as a major banking-access channel.").

¹²² The possible arising issues would be: (i) Should cross-border transfers be subject to taxation, and if so in which jurisdiction—in the vicinity where the mobile customer is at the time of the purchase, where the customer's network operator is located, or where the merchant is located? (ii) Do existing privacy and personal data protection laws clash with the need to monitor m-payments when crossing ('roaming') borders? (iii) Are general laws sufficient to address m-payments theft and fraud? See KPMG, *supra* note 6, at 30.

¹²³ See *id.* at 32 ("An implementation threshold policy for deposit-taking licenses requires high standards of data recording and reporting by and from banks and non-banks to the Central Bank or monetary authorities. This remains a major challenge in many jurisdictions, hindering the development of laws and regulations and thus holding back the offering of m-payment services.").

¹²⁴ The U.K.'s Financial Services Authority offers proportionate regulation based upon a cost-benefit analysis of proposed regulatory requirements. CGAP Focus NOTE, *supra* note 8, at 6 ("[P]roportionate means that the legal and regulatory framework . . . should not be overly restrictive and burdensome relative to the

advisable that “[w]hen a bank decides to add a mobile option, it considers the necessary . . . regulations that are relevant to the implementation.”¹²⁵ In addition, “[t]here may be a need to assess the potential risk of fraud and to make provision for it, especially in the light of the Basle II implementation.”¹²⁶

2. Operation

The administrative characteristics of mobile banking are a combination of the merits of earlier forms of banking service and wireless communication, but a totally new service with only wireless characteristics is in development. There are several choices when banks consider how to implement mobile banking.¹²⁷ Ubiquity, reachability, security, convenience location, connectivity, and personalization are the present and future aspects of the mobile banking business.¹²⁸

Ubiquity is the predominant benefit in mobile banking.¹²⁹ According to one report, customers spend an average of thirty-two minutes and \$2.27 to reach a bank branch by bus or other transport.¹³⁰ These barriers may be easily overcome with application of mobile systems. Based upon Smartphone or a communication-type wireless terminal, the system support user can search information and communicate in real time wherever he or she is located.¹³¹

Mobile banking users with wireless devices are able to connect wherever and whenever they desire,¹³² and they have the power to regulate access to certain people at given times.¹³³

possible issues it is designed to tackle or the number and value of [transactions] involved . . .”).

¹²⁵ See KRUGEL, *supra* note 3, at 35.

¹²⁶ See *id.*

¹²⁷ See *id.* (“These choices include whether or not to develop the technology within the bank, use a shared infrastructure, or purchase the enabling technology from one of many vendors.”).

¹²⁸ One scholar classified the feature of mobile services as mobility, reachability, localization, and personalization. See Suoranta, *supra* note 4, at 12.

¹²⁹ See IVATURY & PICKENS, *supra* note 22, at 3.

¹³⁰ See *id.*

¹³¹ See Tiwari et al., *supra* note 17, at 3 (“[T]echnological developments especially in the field of telecommunication have made it possible to offer innovative, location-sensitive services on ubiquitous (anytime, anywhere) basis to customers on the move.”).

¹³² See Suoranta, *supra* note 4, at 34.

¹³³ IVATURY & PICKENS, *supra* note 22, at 3 (“Although customers must still visit bank branches for cash deposits, with m-banking they can use their mobile phones to check their account balance, make payments, or transfer money to friends and family—without expending valuable time and financial resources.”).

The security technology of mobile banking is already shaping up well in the closed end-to-end security system that resolves the so-called "air gap" as in shape of Secure Socket Layer ("SSL") that enables users to transmit confidential information over the Web and other networks.¹³⁴ In Europe, a smartcard attached to devices¹³⁵ and a Subscriber Identification Module ("SIM") card certifies the users and maintains a higher level of security¹³⁶ than that of the fixed Internet network.¹³⁷ "Once the application is on the SIM, instructions from the consumer can be entered, encrypted, and transported by SMS to the service provider or bank."¹³⁸

The convenience of a wireless device plays a key role in the expansion of mobile banking.¹³⁹ The convenience of having financial information accessible wherever and whenever it is needed, compared to wire-based Internet banking, which requires complicated manipulations through PCs, can be a primary driver.¹⁴⁰

Wireless devices can add value by combining the location searching service and application under the satellite global positioning system-based technology.¹⁴¹ If it can be determined where a user is at

¹³⁴ Secure Sockets Layer (SSL): How it Works, <http://www.verisign.com/ssl/ssl-information-center/how-ssl-security-works/> (last visited Feb. 26, 2009) ("Secure Sockets Layer (SSL) technology protects your Web site and makes it easy for your Web site visitors to trust you in three essential ways: (i) An SSL Certificate enables ENCRYPTION of sensitive information during online transactions. (ii) Each SSL Certificate contains unique, AUTHENTICATED information about the certificate owner. (iii) A Certificate Authority VERIFIES the identity of the certificate owner when it is issued.").

¹³⁵ Rosenberg, *supra* note 65, at 529 ("Rather than a magnetic strip, Smart Cards contain a microchip This makes them capable of storing a greater volume of data and performing multiple functions.").

¹³⁶ See DAESUNG CHO, KT, FIRST TO DEVELOP SIM CARD FOR WiBro & WCDMA, ZDNET KOREA (2006), <http://www.zdnet.co.kr/etc/eyeon/network/0,39036963,39147647,00.html> (last visited Feb. 26, 2009).

¹³⁷ INFOGILE TECHNOLOGIES, *supra* note 43, at 2 (In Korea, "two SIM Cards are used in mobile phones One for the telephonic purpose and another for banking Bank account data is encrypted on a smart-card chip.").

¹³⁸ See KRUGEL, *supra* note 3, at 21.

¹³⁹ See Suoranta, *supra* note 4, at 15.

¹⁴⁰ See Amin, *supra* note 25, at *6 ("Many [financial] institutions are now working toward low-cost delivery options such as internet banking and cashless transactions to help the rural poor. In fact, it may not be the internet, but the mobile devices that could be a more efficient tool for such transactions. For people in such rural areas, using computers is often a problem due to faulty internet connections and frequent power failures. Hence, providing micro-credits through a mobile platform (SMS-based) could be the best way to reach out to the poor.").

¹⁴¹ See Suoranta, *supra* note 4, at 34.

a given time, appropriate services can be provided to the user.¹⁴² For example, a businessman who arrives at an airport can receive hotel information about that town.

Wireless devices make it practical to access the Internet instantly. If packet system communication services such as GPRS¹⁴³ or IS-95-C (also called “CDMA2000”) wireless are introduced, there is no need to connect to the Internet, and the mobile banking service can be used even more easily.

Personalization is offered, although with limitations. Since personalized information searches and transaction services can be improved through wireless portals, wireless devices tailored to users will ultimately be essential for our daily lives.¹⁴⁴

The ubiquity of mobile banking allows searches for information and communication in real time wherever the user is located. Mobile banking also features accessibility, allowing limited access to specific wireless users at certain times. It is convenient, making it easy to transfer financial information anywhere, anytime, compared to cable Internet banking, which requires complicated communications through PCs. Finally, mobile banking has a stronger security system for certifying users than cable Internet banking does.¹⁴⁵ In the future, with more developments to attract users with services related to their varying locations, the instant connectivity which allows quicker mobile banking without setting up an Internet connection, and the current trend of providing an increasing amount of limited personalization services, the characteristics of mobile banking will together contribute towards propagating the service.

¹⁴² In the United States, FCC regulations state that wireless communication carriers should be able to identify the location by a deviation of no more than 120m and at least 67% connection regardless of call traffic.

¹⁴³ See GPRS—General Packet Radio Service, http://www.ericsson.com/technology/tech_articles/GPRS.shtml (last visited Feb. 26, 2009) (“GPRS is a packet-linked technology that enables wireless internet and other data communications GPRS provides more than four-times faster speeds than conventional GSM systems Using a packet-data service, subscribers are always connected and always on line so services are quick and easy to access.”).

¹⁴⁴ See Suoranta, *supra* note 4, at 34.

¹⁴⁵ IVATURY & PICKENS, *supra* note 22, at 4 (“According to one survey, mobile banking users appear to “conduct more banking transactions per month using the mobile phone than nonusers conduct using all other channels. [In particular, mobile banking] users check their account balance on their mobile phones twice as often as nonusers check their balance (2.3 times per month to 1.3 times per month) . . . This may be because it is convenient to check balances using a mobile phone or it may be because of the lower cost of using [mobile banking service].”).

3. Technology

In order to get Internet banking services in a mobile environment, the mobile phone subscriber should have Internet access and support for the terminal and network-related technology.¹⁴⁶ The first issue is what wireless Internet architecture can be applied. The second issue is what types of wireless communication devices and operating systems can be used for mobile banking under the given technology standard. The third issue is what banks or financial institutions can be accessed for services.

First, in order for mobile phone users to exchange information after accessing the Internet, the appropriate protocol, such as a web browser or programming language, is necessary.¹⁴⁷ Generally, there are three mobile banking formats: text messages (i.e., SMS),¹⁴⁸ Web browsers, and downloadable applications.¹⁴⁹ Currently there are three protocols applied in the wireless Internet environment: Wireless Application Protocol ("WAP"), W3C ("i-mode"), and Mobile Explore ("ME mode").¹⁵⁰

WAP mode is a standard for allowing wireless Internet services for mobile phones introduced at the WAP forum formed by Ericsson, Motorola, Nokia, and Phone.com in 1997.¹⁵¹ It is used by the largest number of business users internationally.¹⁵² The most widely adopted

¹⁴⁶ See ABRAHAM ET AL., *supra* note 120, at 26 ("With such a critical role to play in bringing banking services to the [new consumer], telecommunication players should begin exploring opportunities to collaborate with financial institutions and to radically alter the economics of serving this segment.").

¹⁴⁷ A Web browser is software that permits a user to view graphical pages over the World Wide Web. The two most popular browsers are Microsoft Internet Explorer and Mozilla Firefox. See SANS Top-20 2007 Security Risks, <http://www.sans.org/top20/> (last visited Feb. 26, 2009).

¹⁴⁸ See INFOGILE TECHNOLOGIES, *supra* note 43, at 5 ("The main advantage of deploying mobile applications over SMS is that almost all mobile phones are SMS enabled.").

¹⁴⁹ See Feig, *supra* note 83.

¹⁵⁰ The three methods are online mobile banking services, transfer banking services (used after transferring banking servers and data through a wireless network with wireless internet by using a communications network), and wireless LAN access.

¹⁵¹ WAP Forum, *Wireless Application Protocol White Paper 4* (2000), http://www.wapforum.org/what/WAP_white_pages.pdf.

¹⁵² See Johan Hjelm, Bruce Martin & Peter King, *W3C Note, WAP Forum — W3C Cooperation White Paper*, Oct. 30, 1998, <http://www.w3.org/TR/1998/NOTE-WAP-19981030> (last visited Feb. 26, 2009) ("The Wireless Application Protocol (WAP) Forum is an industry group dedicated to the goal of enabling sophisticated telephony and information services on hand-held wireless devices such as mobile telephones, pagers, personal digital assistants (PDAs) and other wireless terminals. . . . The WAP Forum has drafted a global wireless protocol specification

wireless Internet protocols in Korea are WAP and the ME system.¹⁵³ The main players in the IT industry, such as Microsoft, IBM, Intel, SKT, Shinsegi Telecom,¹⁵⁴ and LG Telecom (“LGT”), have adopted the WAP system, which “offers a consumer a similar experience to that of internet banking.”¹⁵⁵

Browser mode, a way of reading mobile banking sites, is written in a mobile mark-up language such as Wireless Markup Language (“WML”),¹⁵⁶ mobile-HTML (“m-HTML”), or Handheld Device Markup Language (“HDML”),¹⁵⁷ with WAP on the cellular phone or on the ME browser. Most commonly, “[b]anks maintain WAP sites for customer access using a WAP compatible browser on their mobile phones.”¹⁵⁸ Mobile banking service uses the same mechanism as cable Internet banking, where a customer’s PC Internet browser accesses an Internet

for all wireless networks and will contribute it to appropriate industry and standards bodies. WAP will enable manufacturers, network operators, content providers and application developers to offer compatible products and secure services on all devices and networks, resulting in greater economies of scale and universal access to information.”).

¹⁵³ See KRUGEL, *supra* note 3, at 19 (“WAP is an open international standard for applications that use wireless communication . . . [I]ts principal application is to enable access to the Internet from a mobile phone or PDA.”).

¹⁵⁴ See Kim, *supra* note 1, at 321 (explaining that Shinsegi Telecom merged into SKT).

¹⁵⁵ See KRUGEL, *supra* note 3, at 19.

¹⁵⁶ See Technology Reports: WAP Wireless Markup Language Specification (Robin Cover ed.), <http://xml.coverpages.org/wap-wml.html> (last visited Feb. 26, 2009) (“WML (Wireless Markup Language) is a markup language based on XML, and is intended for use in specifying content and user interface for narrowband devices, including cellular phones and pagers. WML is designed with the constraints of small narrowband devices in mind. These constraints include: (1) Small display and limited user input facilities; (2) Narrowband network connection; and (3) Limited memory and computational resources. WML includes four major functional areas: (1) Text presentation and layout — WML includes text and image support, including a variety of formatting and layout commands; (2) Deck/card organizational metaphor — all information in WML is organized into a collection of cards and decks; (3) Inter-card navigation and linking — WML includes support for explicitly managing the navigation between cards and decks; and (4) String parameterization and state management — all WML decks can be parameterized, using a state model.”).

¹⁵⁷ DevX.com, Wireless Glossary, <http://www.devx.com/wireless/Door/11287> (last visited Feb. 26, 2009) (“Handheld Device Markup Language is used to format content for Web-enabled mobile phones. HDML allows Internet access from wireless devices and is derived from HTML. Openwave created this proprietary language, and it can only be viewed on mobile phones that use Openwave browsers. HDML was created before a WAP standard was defined. It uses Openwave’s Handheld Device Transport Protocol (HDTP) instead of WAP.”).

¹⁵⁸ See INFOGILE TECHNOLOGIES, *supra* note 43, at 5.

banking site written in HTML and data is transferred.¹⁵⁹ Web programs for cable Internet banking, such as Active Server Pages ("ASP")¹⁶⁰ or Java Server Pages ("JSP"),¹⁶¹ function identically in the mobile phone environment, but the viewer interface on the cellular phone screen varies according to different types of hand-sets, wireless Internet protocol, and mark-up language. Therefore, "[a] WAP-based service requires hosting a WAP gateway."¹⁶²

In fact, banks' socket communications programs and web programs that link account systems with databases are similar to the program module of Internet banking. Even with the addition of wireless Internet, since databases are operated by a communications company, banks that are connected with communication companies by cable do not need to concern themselves with it.¹⁶³ However, considering the narrow bandwidth of wireless Internet, the program should be designed so that mobile banking service is possible with the minimal amount of data.¹⁶⁴ Since browser mode can be used by cellular phones that allow wireless Internet, that mode can be used regardless of time or place.

Even though WAP mode has the merit of having many users and the advantage of being the public standard, it is not compatible with Internet protocol HTTP, so it cannot access previously viewed Internet sites.¹⁶⁵ Since ME mode uses the basic language m-HTML, it does not need to utilize the gateway and can use the pre-existing

¹⁵⁹ See KRUGEL, *supra* note 3, at 20 ("The data is typically encrypted prior to leaving the handset and being sent to the service provider or bank. Once received, the service provider or bank would decrypt the message and process the consumer's instruction.").

¹⁶⁰ See Web Wiz Guide, *What Are Active Server Pages (ASP)?*, http://www.webwizguide.com/kb/asp_tutorials/what_is_asp.asp (last visited Feb. 26, 2009) ("Active Server Pages or ASP, as it is more commonly known, is a technology that enables you to make dynamic and interactive web pages.").

¹⁶¹ See Sun Microsystems, *JavaServer Pages Overview*, <http://java.sun.com/products/jsp/overview.html> (last visited Feb. 26, 2009) ("JSP technology enables rapid development of web-based applications that are server—and platform—independent.").

¹⁶² See INFOGILE TECHNOLOGIES, *supra* note 43, at 6 ("Mobile Application users access the bank's site through the WAP gateway to carry out transactions, much like internet users access a web portal for accessing the banks services.").

¹⁶³ See *infra* notes 303, 312, 458 and accompanying text.

¹⁶⁴ See Kim, *supra* note 1, at 363–65 (arguing gains from reallocation of frequencies and wireless broadband).

¹⁶⁵ See INFOGILE TECHNOLOGIES, *supra* note 43, at 6 (demonstrating the framework for enabling mobile applications over WAP). Technically, quick View does not process server script or server-based controls. Customers can see pages with server script running by returning to the previous view and choosing "View in Browser" from the View menu.

HTML content, reducing the investment costs for providers and offering convenience to content-provider companies. ME mode uses the same TCP/IP protocol as cable Internet and is designed to use the maximum content of cable Internet. Even though the transfer speed initially was inferior to that of the WAP mode, WAP and ME are now exactly the same because of developments in communications infrastructure.

In Korea, Korea Telecom, M.com and KTF adopted ME systems to provide services. On the other hand, Japanese NTTDOCOMO provides an independent wireless Internet system, the so-called i-Mode.¹⁶⁶ The NTTDOCOMO system is not the world standard, but is still a successful case as evidenced by the fact that it now serves more than 52 million subscribers since its inception in 1999.¹⁶⁷ The Japanese NTTDOCOMO's i-Mode is based on the HTML/HTTP mode and can transform the pre-existing Internet content to i-Mode through Compact HTML ("C-HTML").¹⁶⁸ In addition, it has the great advantage of reducing fees for subscribers because it adopted a packet system that charges subscription fees based upon the amount of information the user accesses.¹⁶⁹

The necessary technology for operating a network for wireless Internet services represents 2.5 generations of mobile communication

¹⁶⁶ See NTT DOCOMO: i-mode, <http://www.nttdocomo.com/services/imode/index.html> (last visited Feb. 26, 2009) ("[The] i-mode is a mobile Internet service that has caused a revolution in both business and private lifestyles in Japan. 48 million subscribers have been attracted to this service since its start in February 1999 and currently more than 95,000 Internet sites are providing a variety of contents.").

¹⁶⁷ NTTDOCOMO.com, <http://www.nttdocomo.com/pr/2007/001335.html> (last visited Feb. 27, 2009). Unlike the Internet, the i-mode, which is a thoroughly prepared and planned mobile Internet service by NTT.DoCoMo, has been able to daily service by outsmart WAP, which was prepared by European firms. In this case, the Japanese cooperation style was more effective than the European open system.

¹⁶⁸ See Wireless Glossary: Compact HTML, <http://www.devx.com/wireless/Door/11273> (last visited Feb. 27, 2009) (defining Compact HTML (cHTML) as "[a] subset of HTML for small information devices, such as smart phones and PDAs. cHTML is a scaled down version of regular HTML . . . cHTML does not support JPEG images, tables, image maps, multiple fonts and styles of fonts, background colors and images, frames, style sheets and more than two colors, typically black and white. . . . In many environments, XHTML is replacing cHTML.").

¹⁶⁹ See KPMG, *supra* note 6, at 9 ("DoCoMo's strategy . . . is to build the supply side of the market by offering attractive commercial terms to banks . . . and simultaneously to attract customers on the demand side through an aggressive handset subsidy policy.").

technology.¹⁷⁰ Generally, the first generation ("1G") is AMPS by analogue mode,¹⁷¹ the second generation ("2G") is mobile telephone systems by digital mode,¹⁷² and the third generation ("3G") is CDMA2000, North American mode, or W-CDMA, European mode, which are next-generation mobile communications or IMT-2000.¹⁷³

Currently, technology is evolving from 3G to 3.5G, that is, from the first and second generations of voice communication service and simple text messaging service, Short Messaging Service ("SMS") through third-generation mobile communication service known as International Mobile Telecommunication 2000 ("IMT-2000"). High-speed wireless access, which can be used internationally with a single device, is guaranteed, meaning that it is being developed to where multi-media services, including voice, data, and video, can be provided.¹⁷⁴

According to KPMG, "[t]he shift to next-generation phones is all about convergence."¹⁷⁵ They observed that "Smartphones are converging with computers and handsets; Apple's i-Phone is converging with i-Pods and handsets; and Near Field Communications ("NFC") is helping the convergence of contactless card technology and handsets."¹⁷⁶ Also, unlike Internet banking, banking technology and mobile devices themselves are both important in the development of mobile banking. Even though mobile banking and Internet banking both use the Internet, the former cannot be used without its own mobile technical support.

The Korean wireless Internet platform that is equipped for public service can be classified by Java language and non-Java lan-

¹⁷⁰ See Jongho Kim, *Can We Put New Wine in Old Bottles? The Highly Innovative Mobile Communication Market and Regulatory Rules*, 2008-2 RDAI/IBLJ 210 (2008).

¹⁷¹ See *id.*; see also KPMG, *supra* note 6, at 40 ("The shift from analogue first generation (1G) to digital second generation (2G) cellular networks opened the way for SMS text-based m-payments.").

¹⁷² Kim, *supra* note 170, at 210; see also KPMG, *supra* note 6, at 40 ("The shift from 2G to Internet Protocol (IP)-based 2.5G networks opened the way for WAP (Wireless Application Protocol) access to MNO-supported websites, and to OTA (over-the-air) downloads of Java-based applications. This enables credit, debit and loyalty card details to be stored in m-wallets on the handset.").

¹⁷³ See Kim, *supra* note 170, at 210; see also KPMG, *supra* note 6, at 41 ("The shift from 2.5G to third generation (3G) networks and beyond is all about bandwidth, higher download and uploads speeds, from less than 1 MBps to over 10 MBps possible today.").

¹⁷⁴ See Kim, *supra* note 170, at 210-11.

¹⁷⁵ See KPMG, *supra* note 6, at 41.

¹⁷⁶ See *id.*

guage (“C++”).¹⁷⁷ For instance, SKT has been using XVM, GVM, Wi-Top;¹⁷⁸ KTF has been using MAP, BREW;¹⁷⁹ and LGT has been using CLDC, the MIDP of JavaStation.¹⁸⁰ These three carriers had considered what effect would appear if they adopted integrated Wireless Internet Platform for Interoperability (“WIPI”) into their businesses.¹⁸¹

a. XVM

Service commenced in August of 2001 for SKT, SK-VM—Java-based wireless Internet platform that XCE independently developed using opened Java spec, XCE—SK company’s internal venture, XVM—eXtended Virtual Machine, and n.Top Wizard.¹⁸² Java Virtual Machine (JVM), a set of computer software programs and data structures, is from Korea XCE, not from SUN; MIDP¹⁸³ and Clean Room Implementation mode can be used without paying royalties.¹⁸⁴ Content size is under 90K, includes RMS size, and the profile mode is Java 2 Platform Mobile Edition (“J2ME”) of SUN/MIDP+SKT with a run time RAM (Heap) of 180K.¹⁸⁵ The size of operative content and memory capacity is good. XVM is trying to expand its business into South-

¹⁷⁷ See KRUGEL, *supra* note 3, at 10 (“The platform allows a consumer with an application on their phone, or on a server, to authenticate (usually with a PIN) and deliver an instruction to the platform.”).

¹⁷⁸ See Wanshin Gang, Virtual Machine, at *4 (2003), available at <http://www.cinelove.het/vm.html>.

¹⁷⁹ See *id.*

¹⁸⁰ See Jaeho Lee, Sunja Kim, Sangyun Lee, Woosik Kim & Hwangu Lee, Implementing WIPI for Linux-based Smartphone, at 1, (2005), available at <http://tree.celinuxforum.org/CelfPubWiki/MppWiPi?action=attachFile&do=get&target=mppwgWipiIcactPaper050713.pdf>.

¹⁸¹ See *id.* (“The advent and development of WIPI will pave the way for Korean telecom companies to lead the global wireless Internet industry.”).

¹⁸² See Gang, *supra* note 178, at *2.

¹⁸³ See Sun Microsystems, Mobile Information Device Profile, <http://java.sun.com/products/midp/overview.html> (last visited Feb. 27, 2009) (“The Mobile Information Device Profile (MIDP) is a key element of the Java 2 Platform, Mobile Edition (J2ME). When combined with the Connected Limited Device Configuration (CLDC), MIDP provides a standard Java runtime environment for today’s most popular mobile information devices, such as cell phones and mainstream personal digital assistants (PDAs). The MIDP specification was defined through the Java Community Process (JCP) by an expert group of more than 50 companies, including leading device manufacturers, wireless carriers, and vendors of mobile software. It defines a platform for dynamically and securely deploying optimized, graphical, networked applications.”).

¹⁸⁴ See Gang, *supra* note 178, at *6.

¹⁸⁵ See *id.* at *4.

east Asia, China,¹⁸⁶ Taiwan, Hong Kong,¹⁸⁷ and Japan, as well as into North America and Europe. Notable strengths are its multi-spread program, network function, and the lack of a pre-authorization system.

b. GVM

General Virtual Machine ("GVM"), a pure Korean domestic product,¹⁸⁸ is a middleware solution which enables the user to download the application through the wireless communication and operate on the handset.¹⁸⁹ Users can download the customized service anywhere at any time.¹⁹⁰

Virtual Machine ("VM") mode allows cellular phone users to use banking services after accessing a wireless Internet service and downloading the Internet banking services program to their cellular phones.¹⁹¹ Unlike the browser mode, which needs to transfer data unrelated to banking to mobile web screens (for WAP mode, a WML mode page that consists of a mobile banking service screen),¹⁹² this transfers only the data related to banking, so the service time and wireless data usage cost is reduced.¹⁹³ Also, the pyramid access process by menu shift is omitted and, with a multimedia screen and icon type similar to Windows, it is more convenient to use than the browser mode.¹⁹⁴

Services used via a cellular phone, one that allows wireless Internet, also contain VM, which is a wireless Internet platform that can operate in cellular phones after downloading content and applications.¹⁹⁵ VM, a further upgrade from browsing technology like WAP and ME, is a form of middleware between content (applications) and

¹⁸⁶ See KPMG, *supra* note 6, at 13 (explaining that China is the mobile giant because there are 480 million subscribers in the mobile communication market).

¹⁸⁷ See *id.* at 11 (noting that Taiwan and Hong Kong are "mobile tigers").

¹⁸⁸ See Gang, *supra* note 178, at *4.

¹⁸⁹ See *id.* at *2.

¹⁹⁰ See Venture119, http://www.venture119.re.kr/2003/Eng_venture1/itexpo/itexpo_view_new.php?idx=1727&page=28&1=1 (last visited Feb. 27, 2009).

¹⁹¹ Gang, *supra* note 178.

¹⁹² *Id.*

¹⁹³ KRUGEL, *supra* note 3, at 25 ("The initial cost to the consumer is affected by the type of handset required, and whether or not the consumer has a capable SIM card to house the application.").

¹⁹⁴ *Id.* ("It seems that the higher the requirement for a more capable handset, the lower the cost of transacting and the better the consumer experience (colors and graphics).").

¹⁹⁵ *Id.* at 10 ("The platform, depicted in the diagram, will extract the consumer's bank account data and pass the instruction to the application management environment.").

hardware that is inserted inside cellular phones as they are produced.¹⁹⁶

VM mode, designed based on Mobile C language,¹⁹⁷ which is most appropriate for a wireless environment, began service as n.Top by SKT in October 2000.¹⁹⁸ It boasts the vast majority of users and content and has been used on most cellular phones. To compete, many kinds of cellular phones were produced to be sold on the market, and lots of newly-shaped devices are waiting to enter the market in every year.¹⁹⁹

GVM has an independent development environment that has ventured out on its own and does not require royalties because it was designed in Korea. SKT is trying to spread to China and Japan, and since it has Mini C, which compresses and simplifies language, it uses a small memory CPU, facilitates the development of various applications, and has a good communications quality.²⁰⁰ It also provides service regardless of browser mode after directly connecting to socket-based communications that utilize Transmission Control Protocol/Internet Protocol ("TCP/IP") and supports MIDI sound.²⁰¹

c. *MAP*

Mobile Application S/W Plug-in Service ("MAP"), a Korean domestic product,²⁰² was developed based on language C, and was introduced to customers in March 2001 by Korea Telecom, which merged later with KTF.²⁰³ The carrier initially saved costs by direct operation of Mobiletop download server, web server, DB server, text server, and point server. This technology may be further developed using Visual C++ that enables developers to build Web applications and helps users to handle mobile devices easily.²⁰⁴ MAP overcomes the restrictions of

¹⁹⁶ Gang, *supra* note 178.

¹⁹⁷ See *id.* at *7.

¹⁹⁸ Telephone Interview with Senior Manager of Customer Service Representative, SK Telecom, in Seoul, Korea (Aug. 1, 2008) [hereinafter Customer Service Interview].

¹⁹⁹ KRUGEL, *supra* note 3, at 3 ("The global mobile phone market is becoming more competitive, with reducing prices, increasing customer churn, and reduction in profits.").

²⁰⁰ See Customer Service Interview, *supra* note 198.

²⁰¹ See Gang, *supra* note 178, at *11.

²⁰² See *id.* at *4.

²⁰³ Press Release, Qualcomm, Qualcomm's gpsOne Technology Supports First Nationwide Launch of GPS Solutions on Wireless Handsets by KTF in South Korea (Feb. 12, 2002), available at <http://www.qualcomm.com/news/releases/2002/press697.html>.

²⁰⁴ See Microsoft Corporation C++ Developed Center, <http://msdn.microsoft.com/en-us/visualc/default.aspx> (last visited Feb. 27, 2009).

web browsers in terms of limited expression in graphics and sounds and slow speed, and it makes it possible to operate any content both online and offline. Because it is already part of the cellular phone's software, it offers high-speed calculator function and independently provides an image and sound converter for operating multimedia programs quickly.²⁰⁵

d. BREW

The Binary Runtime Environment for Wireless ("BREW"), was developed by Qualcomm and can be used anywhere in the world that CDMA chips are used.²⁰⁶ Japan's KDDI and China's Unicom are considering adapting it for use in their business environments.²⁰⁷ BREW provides functions like GPS service by GPS-One, Bluetooth utilization,²⁰⁸ cash management service ("CMS") multimedia function, and continual saving function through the use of a socket communication file system.²⁰⁹ Various application program interfaces, ("API") for sound players, map viewers, games, personal information management systems ("PIMS"), and e-mail are offered, although only Qualcomm's associate registered development companies can develop the module and register through module information format ("MIF").²¹⁰ Even though BREW provides the Java operation environment, there are concerns about Qualcomm's monopoly and sovereignty

²⁰⁵ See Yeongmi Jin, Review and Forecast of Mobile Wireless Internet Technologies, KOSEN/OSTIN EXPERT REVIEW 19 (2001) (S. Korea).

²⁰⁶ See Lee et al., *supra* note 180, at 1.

²⁰⁷ On February 27, 2003, www.3g.co.uk, a U.K.-based news and information provider, reported industry news that KDDI introduced BREW wireless in Japan, and that China Unicom adopted CDMA Wireless. See China Unicom Foster CDMA Wireless Adoption in China, <http://www.3g.co.uk/PR/Feb2003/4968.html> (last visited Feb. 27, 2009); KDDI Introduces BREW Wireless in Japan, <http://www.3g.co.uk/PR/Feb2003/4967.html> (last visited Feb. 27, 2009).

²⁰⁸ Bluetooth, the industrial standard for personal area networks (PANs), was developed by Ericsson in 1994. It is the industrial standard for computers and communication and shows how easily technology connects the home and workplace via mobile phones, computers, and PDAs. Bluetooth was the nickname of King Herald in Danish legend, who was especially adept at negotiating with and unifying enemy tribes. Thus it is an appropriate name for the technique that allows communications between different devices. See, e.g. RAJNISH TIWARI & STEPHAN BUSE, THE MOBILE COMMERCE PROSPECTS: A STRATEGIC ANALYSIS OF OPPORTUNITIES IN THE BANKING SECTOR 57-58 (2007); David Flynn, *Byte Therapy*, SYDNEY MORNING HERALD, Mar. 3, 2008, available at <http://www.smh.com.au/news/articles/byte-therapy/2008/03/01/1204227046756.html?page=fullpage#contentSwap2>.

²⁰⁹ See Gang, *supra* note 178, at *5.

²¹⁰ SEE QUALCOMM Inc., BREW MIF Editor Guide 7-9 (2001), available at <http://www.wade.prestridge.name/brew/BREWMIFEditorGuide.pdf>; see also Jin, *supra* note 205, at 14-16.

in the CDMA market.²¹¹ Because of integrated technology, mobile banking needs to be sensitive to these concerns.

e. *JavaStation*

With the next version of CLDC/KittyHawk,²¹² for the first time internationally there will be java-porting to cellular phones.²¹³ These systems began with i-Book in August 2000, and are comparable to SUN's CLDC/MIDP.²¹⁴ They provide JavaStation's service, which is upgraded to J2ME,²¹⁵ and have added the multimedia phone profile ("MMPP") OEM specification API.²¹⁶

Finally, the SMS mode of mobile banking service is the type where, if cellular phone users send a service request SMS through the linkage of a bank's mobile banking server and a mobile communications company's ISMS server, they can receive the results on their cellular phones.²¹⁷ "SMS banking is deemed to be the least secure of the mobile bearer channels,"²¹⁸ since there is no security protocol operating, so it has been utilized only in checking services, which have an inherently low risk of hacking.²¹⁹

²¹¹ MORTIMER-SCHUTTS, *supra* note 64, at 2 ("The network structure emerging from convergence between payments, retail banking and telecommunications will be difficult to alter once established. Hence it is all the more important that regulatory and institutional frameworks set the right incentives early on in the process of innovation to capture the full benefits that may be generated through the development of m-banking and payments.").

²¹² Sun Microsystems Home Page, <http://docs.sun.com/app/docs/doc/820-3753/ggdar?l=ko&a=view> (last visited Feb. 27, 2009) (explaining that the Connected Limited Device Configuration (CLDC) is a "specification of a framework for Java ME applications targeted at devices with very limited resources, such as pagers and mobile phones.").

²¹³ See Gang, *supra* note 178, at *5.

²¹⁴ See *id.* at *4.

²¹⁵ KRUGEL, *supra* note 3, at 20 ("J2ME is a feature that allows the device to run small, user-installable software applications written especially for mobile devices such as phones.").

²¹⁶ VELOXSOFT, INC., INSTALLATION GUIDE AND USER MANUAL VERSION 1.0 OF LGT JAVASTATION SDK 3 (2001), available at http://mobilelab.co.kr/programming/up/data_j2me/LGTJavaStationSDK.pdf (last visited Aug. 19, 2008).

²¹⁷ See KRUGEL, *supra* note 3, at 14 ("SMS . . . allows users to send and receive text messages on a mobile phone using the numbered keypad on the handset to input characters.").

²¹⁸ See *id.* at 31.

²¹⁹ See INFOFILE TECHNOLOGIES, *supra* note 43, at 5 (explaining that it is the same situation in India.); KRUGEL, *supra* note 3, at 31 ("The SMS would be automatically stored on the handset and be available to anyone that looks at the consumer's phone. The SMS would then pass through the encrypted GSM communication channel, through the base stations and terminate at the mobile network operator,

Currently, 10% of the 33 million mobile phone users in Korea have phones with only the capacity to utilize the SMS mode of mobile banking service. Considering both, the mobile banking service limitations, such as the impossibility of wiring money, and Korean's consumer's 2-3-year cycle for changing mobile phones, this SMS service is meaningless.²²⁰ "However, in markets like India, where the bulk of mobile population users' phones can only support SMS-based services, this might be the only option left."²²¹

III. CONTROVERSIES AND PROBLEMS OF MOBILE BANKING

In order to expand the use of mobile banking services, financial institutions need to overcome several obstacles that exist from the consumer and provider perspective.²²² This begins with the fact that mobile financial services differ from cable Internet financial service systems, as well as the fact that mobile financial services do not yet have a noticeable profit model.²²³ Additionally, mobile transactions are performed by wireless communication rather than cable, which requires a new set of solutions.

First, financial institutions that provide mobile financial services must calculate the costs and benefits of these services. Many factors must be considered, including the possibility of falling behind in technology, customer inconvenience resulting from system replacement, a decrease in customer confidence, and the actual profits of mobile financial services.

Second, a strong firewall must be constructed to prevent hacking into computer networks and leaking personal data. System opera-

where it is typically stored unencrypted. The MNO may at this point pass the message onto the bank's wireless application processor, SMS gateway, or mobile banking processor (which may be a third party), where it is stored either encrypted or unencrypted. The third party would then pass the message to the bank across an encrypted fixed line to the bank where it is typically stored in a secured environment.").

²²⁰ KRUGEL, *supra* note 3, at 14 ("It is estimated that a worldwide total of 1 trillion text messages were sent in 2005."). *But see* Sarah Reedy, *Mobile Banking Grows in Prevalence*, TELEPHONY ONLINE, Apr. 22, 2008, <http://telephonyonline.com/wireless/news/mobile-banking-prevalence-0422/> ("[S]hort message service (SMS) will remain the dominant mobile payment technology through 2011.").

²²¹ *See* INFOGILE TECHNOLOGIES, *supra* note 43, at 10.

²²² *See* Suoranta, *supra* note 4, at 27 (arguing that "[t]he perception of the complexity involved in conducting a financial transaction via a mobile channel is inversely related to the customer's experience with technology in general.").

²²³ *See* Datta et al., *supra* note 45, at 77 ("Before choosing to launch a mobile financial service that promises indirect benefits only, a provider must therefore know that it can hold on to the benefits long enough to justify the investment.").

tions and information encoding for encryption is necessary.²²⁴ This issue is related to the technological suitability and security of payment settlement systems. When cellular phones or mobile PDAs are used for financial transactions, the transaction confirmation function and financial institution approval function are both important in securing the payment method for the transaction.

Third, there are issues related to communication fees incurred in addition to wireless Internet subscription fees,²²⁵ since the communication fee for mobile financial transactions is high, as it requires the use of video data.²²⁶

Fourth, the maintenance and repair of the systems for pre-existing mobile services is as important as an initial investment. Since cellular phone devices and their technology were developed, consistent investments in and maintenance of mobile financial service systems provided by financial institutions has been the standard for competitiveness.

A. *Business Model of Mobile Financial Services*

Woori Bank and Shinhan Bank's mobile banking business operating budget continuously increases, but cost and profit analyses for the introduction of the mobile financial services system is needed. A mobile financial transaction system is certain to provide the convenience and immediacy of transactions to financial investors²²⁷ and to give banks the "ability to cross-sell up-sell their other complex banking products and service, such as vehicle loans and credit cards."²²⁸ However, it is doubtful that wireless mobile financial services will surge as rapidly as Internet financial services because of technology and customer tendencies. Even so, many financial institutions have commenced mobile financial services or are in the process of reviewing

²²⁴ Encryption is the process of mathematically changing characters into a form that can be read only by the intended receiver. To decipher the message, the receiver of the encrypted data must have the proper decryption key. In traditional encryption schemes, the sender and the receiver use the same key to encrypt and decrypt data. See, e.g., Bill Hayes, *Decipher The Secret World of Encryption*, 5 SECURITY 162, 162 (2001).

²²⁵ In Korea, KCC (Korea Communications Commission) and KFTC (Korea Fair Trading Commission) regulate fee policy in order to protect customers. See KCC Policy Page, <http://eng.kcc.go.kr/html/policy.html> (last visited Feb. 27, 2009); KFTC Overview Page, <http://eng.ftc.go.kr/about/overview.jsp> (last visited Feb. 27, 2009).

²²⁶ See *infra* text accompanying note 248 ("[M]obile users connecting to the internet generally pay substantial fees for premium digital content, whether in the form of a higher monthly subscription or per-use charges.").

²²⁷ See BOYD, *supra* note 7, at 6.

²²⁸ See INFOGILE TECHNOLOGIES, *supra* note 43.

such a move because they intend to secure potential customers,²²⁹ as opposed to seeking immediate profit,²³⁰ by targeting people in their 20s and 30s who are more accustomed to cellular phones than to banking.²³¹ Even when older customers temporarily need the mobile financial services because of time or location considerations, if the bank does not offer such services the customers may seek out other financial institutions which do provide such mobile financial services.²³² In other words, the mobile financial service is provided, at least in part, with the goal of preventing the loss of customers.

The mobile financial service is establishing itself as a supplementary transaction channel,²³³ like the Internet banking system, rather than as an independent profit model. However, becoming a dependable central communications channel requires a long development time because the number and frequency of transactions should be exploded as a main channel.

B. Wireless Security and Authentication

Because mobile devices have been developed as a payment channel and payment medium, mobile financial services-related technology has developed with a focus on how efficiently the personal security information can be certified.²³⁴ From the outset, mobile financial services security requires personal credit information to be entered by clicking buttons on the phone, barcode recognition in cellular phones, saving information on an IC chip, saving information in a mobile electronic wallet, wireless infrared communication method, iris recognition through using biological engineering technology,²³⁵ and/or Radio Frequency Identification ("RFID").²³⁶

²²⁹ See *supra* Part II.B.1.

²³⁰ See *id.*

²³¹ See *supra* text accompanying note 72.

²³² See *supra* Part II.B.1.

²³³ See Kim, *supra* note 78.

²³⁴ KPMG, *supra* note 6, at 16 ("The transport industry, for example, is the champion of contactless or 'touch-and-pay' solutions, whereas the retail industry has driven m-wallet applications.").

²³⁵ Personal Identification Algorithm Using Iris Pattern Recognition is a method of biometric authentication that uses pattern recognition techniques based on high-resolution images of the iris of an individual's eyes.

²³⁶ PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY, RADIO FREQUENCY IDENTIFICATION (RFID) 1 (2004), available at www.parliament.uk/documents/upload/POSTpn225.pdf ("Radio frequency identification (RFID) technology provides a means of automatic identification. It is already widely used in animal tagging and electronic payment. . . . RFID tagging is a form of Automatic Identification and Data Capture (AIDC) technology where data stored on a tag is transferred via a radio frequency link. A RFID reader communicates with the tag to infer the iden-

Mobile financial service security was originally controlled by authentic security protocol from each communication company, but recently, since wireless certificate institutions have commenced service, the wireless mobile security level has become similar to the security level of cable Internet.

C. Communication Fee with Mobile Financial Service

According to Ivatury & Pickens, mobile “banking has been most associated with descriptions such as ‘more affordable,’ ‘more convenient,’ ‘easy to access,’ and ‘lower service fees.’”²³⁷ Wireless PDA diffused to the general public in early 2002; when Korean stock brokerage companies started mobile stock trading services, they provided the device without charge to their royal clients.²³⁸ There has been concern about the high packet fee, however, which charges fees according to how much wireless PDA data is used.

The packet fee system currently charges 2.5 KRW (\$0.0025) for 1 packet (512 bytes), so a single webpage can cost from 700 to 1000 KRW (\$0.7~\$1), depending on the amount of memory stored on the page.²³⁹ For example, if a wireless PDA downloads large video files, it would cost tens or even hundreds of thousands of KRW. In fact, there have been cases recorded where customers’ monthly bills totaled between 300,000 (\$300) and a million KRW (\$1,000). Some securities companies have received three to four complaints a week regarding customer billing. Industry experts have pointed out that the web pages for PCs should be customized to the PDA environment. Considering that a single packet of KRW cost 6.5 (\$.0065), it will be difficult to realize any dramatic reduction in fees in the near future.

tity of the object to which the tag is attached. The principle is similar to the more familiar bar code, where data are transferred optically. However, RFID has advantages over bar codes, such as the ability to store large amounts of data and to read many tags simultaneously.”); *id.* at 4 (“There are potentially large benefits from RFID, both in the commercial sector and in public services. However, consumer and civil liberties groups state that there are privacy issues that must be addressed prior to the large scale implementation of item-level tagging, and that the risk of abuse must be reduced.”).

²³⁷ See IVATURY & PICKENS, *supra* note 22, at 4 (“Nine out of 10 users surveyed say the m-banking service is ‘not expensive’ or is ‘inexpensive’ for the benefits it gives them. In contrast, bank branches and ATMs are strongly associated with having high fees, taking up too much time because of long queues . . . and being unsafe because of risk of robbery.”).

²³⁸ See APEC Working Group on Electronic Financial Transactions Systems (E-FITS), Annex A (Full Reports of Case Studies) at 44 (2002).

²³⁹ See U.S. Patent No. 7,406,541 (filed June 26, 2002), available at <http://www.freepatentsonline.com/7406541.html>.

D. Maintenance

Traditionally, banking has not been classified as a technology-intensive industry. Technologies, however, are important in innovating new forms of finance. Again, "[m]obile banking is . . . an extension of the existing payment infrastructure of a bank to mobile phones as a channel for the leveraging of the mobile network and its reach, to deliver banking services to consumers."²⁴⁰ The mobile equipment and service industry, however, is still in the early stages of the development, so new equipment will continually be introduced for the foreseeable future. SKT, KTF, and LGT are expecting to enter the market on communication PDAs with WinCE and Palm types of PDAs.²⁴¹ The equipment for cellular phones is also developing, and their operating systems are continually being upgraded. Thus, the mobile banking infrastructure is in a technical environment similar to that of ATMs, POS, branches and internet banking services.²⁴² Therefore, if financial institutions do not continuously offer support for mobile financial system budgeting and technology, it will be easy for them to have difficulties.

E. Protection of Customer and Provider

Customers are not ready to exclusively use m-payment services because of security concerns and previous failed experiences with payments.²⁴³ In addition, even though the number of wireless Internet customers is increasing, only small numbers of the customers have actually performed electronic commercial transactions, due to weak infrastructure, insufficient content and providing only entertainment content. Finally, because of limitations of data transfer speed and transfer memory capacity, and expensive service costs resulting from the high costs of color LCDs, customers still do not have the tolerance to pay the high costs of wireless Internet.

Currently, banks, credit card companies, mobile telecommunication carriers, and companies that specialize in payment settlements are all participating in the m-payment settlement service market. However, no service provider has been able to offer the perfect form of m-payment settlement service.²⁴⁴ Financial institutions are insuffi-

²⁴⁰ See KRUGEL, *supra* note 3, at 6.

²⁴¹ See *infra* discussion Part VI.B.

²⁴² See KRUGEL, *supra* note 3, at 6.

²⁴³ See Saji K.B. & Aditya Agarwal, *Mobile Payment: Six Issues*, INT'L J. MOBILE MARKETING at *10, available at <http://www.scribd.com/doc/2241323/Mobile-Payment-I-Six-Issues>.

²⁴⁴ Mobile payment settlement systems replaced mobile handsets through the use of POS terminals by the retail seller. The retail seller would receive the customer's telephone number, and then install a bill, which was composed by tele-

cient in the areas of mobile service capability and micro-payment, whereas communication companies are insufficient in the areas of financial service capabilities and medium to large-sized payments. Furthermore, except for their competitiveness in immediate micro-payments, start-up venture companies feel the limitations of mobile service in comparison to other services provided.

F. Implication and Direction of Mobile Banking Business Expansion

With trends toward high cellular phone penetration and recent cellular phone micro-payment popularity, the potential for Korea, as well as other countries, of m-payment is very high.²⁴⁵ However, because of the slow adoption of wireless Internet activation, resulting from previous weak wireless Internet infrastructure and various policy restrictions, expanding m-payment has been difficult. In Korea, cellular phone payment is being used increasingly as a micro-payment method for Internet content. The service payment by using cellular phones, however, is now in the stages of introducing its availability.²⁴⁶

Cellular phones are utilized as a payment method for content related to entertainment by teenagers and those in their early twenties in Japan and Europe.²⁴⁷ As technology developments have resolved the data transfer speed issue, some of the more aggressive wireless Internet market obstacles, such as expensive fees and slow transfer, have been somewhat surmounted.²⁴⁸ In fact, payments by cellular phones of high amounts for purchases of items, such as flight tickets and offline payments at gas stations have been recorded. Therefore, before the mobile banking market can truly emerge, strong market strategies must be pursued. For example, an appropriate profit model should be developed, the range of customer should be seg-

phone number and trade amount in his/her payment system. The payment is sent from the mobile handset or through an exchange short message with the customer, the payment is then transferred from the customer to the retail sellers account.

²⁴⁵ See Reedy, *supra* note 220 ("The Asia-Pacific region had the most mobile payment users in Gartner's global study, with a projected 28 million users in 2008 – 85% of the worldwide total . . . Western Europe is expected to have 499,000 users in 2008, while North America is projected to have one million users.").

²⁴⁶ Suoranta, *supra* note 4, at 24 ("Mobile banking services represent both an innovative service, considered as something intangible, and an innovative medium of service delivery employing high technology.").

²⁴⁷ One survey shows that mobile banking users belong to the 25–34 age group. See *id.* at 51.

²⁴⁸ See *infra* text accompanying note 344; see also Boyd, *supra* note 7, at 8 ("[M]obile users connecting to the internet generally pay substantial fees for premium digital content, whether in the form of a higher monthly subscription or per-use charges.").

mented and targeted, and mobile service should be customized if a bank wants to secure a leading role in the mobile banking market.

From the regulatory agencies' perspective, whether introducing m-payments shakes the stability of the traditional banking system should be considered.²⁴⁹ Boyd observed that, "[m]any regulatory issues facing mobile financial service stem from providers' likely categorization as money services business" such as changing currency, check cashing, issuing money orders, etc.²⁵⁰ According to Boyd, "[o]ther regulatory issues may be raised by specific product offerings and billing procedures."²⁵¹

In the meantime, the competition over securing the lead in the m-payment service race between communications companies and financial institutions will be intense.²⁵² Financial institutions, which are afraid of communications companies entering the financial industry, will want to increase their effectiveness as a defense against communications companies and payment services by cooperating with communications companies and server-type electronic wallets.²⁵³ Since the commencement of the 3.5G service of the IMT-2000, this competition trend will continue to expand.²⁵⁴ Therefore, in order to provide basic services, both kinds of companies need to improve their service quality through establishing a mutual cooperation model of infrastructure and by engaging in friendly competition to provide a high quality of service.

The key to the propagation of mobile banking will be decided by how the consumers who do not actively engage in online transactions can be attracted.²⁵⁵ Since many people do not show any signs of inter-

²⁴⁹ KRUGEL, *supra* note 3, at 35 ("Some regulators appear to be pro-active in supporting mobile banking, as well as open to discussion on how relevant regulations can be implemented or existing regulation can be changed to support implementations, yet still protect the consumers.").

²⁵⁰ See BOYD, *supra* note 7, at 33.

²⁵¹ See *id.* at 34.

²⁵² *Id.* at 7 ("From a location perspective, m-payments can be conducted remotely (top-up of mobile minutes for prepaid accounts, purchase of ring tones and games, and P2P transfers) or locally, using enabled mobile devices that communicate with devices installed at public transit turnstiles, merchant POS, ATMs and other points of access.").

²⁵³ KPMG, *supra* note 6, at 10 (commenting that one report said that "early initiatives by [mobile] carriers and banks fell apart due to mutual distrust" in Korea).

²⁵⁴ Suoranta, *supra* note 4, at 13 (noting that "technology runs through every part of the banking business.").

²⁵⁵ INFOGILE TECHNOLOGIES, *supra* note 43, at 8 ("There are number of reasons that should persuade banks in favor of mobile phones. They are set to become a crucial part of the total banking services experience for the customers. Also, they have the potential to bring down costs for the bank itself. Through mobile messag-

est even in Internet banking, a general transformation to a more user-friendly method for customers is needed, in order for mobile banking to alter the consumer consciousness.

G. Risk Management

In the modern global banking industry, “the ongoing improvements of information processing, telecommunication and financial technologies have enabled global banking professionals [and consumers] to access digitally represented products and [electronically processed] transactions, to [administer] larger information flows from different locations and to manage risk at lower cost.”²⁵⁶ “The increased demand for [mobile financial services] has alerted banks and technology providers alike who sense not only business opportunities in developing and offering such services to their respective customers but also perceive a risk of being left behind in this new, innovative segment.”²⁵⁷

As the risks vary, it is evident that “the kind of regulation that will be proportionate [varies] as well.”²⁵⁸ Upon legal perspective it should be noted that the “[r]isk and security aspects of m-banking projects are generally covered by banking laws . . .”²⁵⁹ Banking regulations may typically capture multiple categories of risk that would be plagued by the application of high technology and that regulatory authorities and internal bank supervisors seek to mitigate.²⁶⁰ As m-payments progress from simple SMS micro-payments to more sophisticated money transfers, and from stored-value cards to m-wallets, both personal risks and the risks to merchants and banks grow.²⁶¹

A number of wireless communication carriers around the world are already offering some sort of banking service.²⁶² As people are increasingly able to synchronize data between their phone or device and their work networks, new risks are emerging.²⁶³ Fraud and money laundering activities through mobile banking will be another issue for

ing and other such interfaces, banks provide value added services to the customer at marginal costs. Such messages also bear the virtue of being targeted and personal making the services offered more effective. They will also carry better results on account of better customer profiling.”).

²⁵⁶ See Al-Taitoon & Sørensen, *supra* note 19, at 297.

²⁵⁷ See Tiwari et al., *supra* note 17, at 3.

²⁵⁸ See CGAP FOCUS NOTE, *supra* note 8, at 5.

²⁵⁹ See KPMG, *supra* note 6, at 32.

²⁶⁰ See *infra* notes 267–268 and accompanying text.

²⁶¹ See KPMG, *supra* note 6, at 41.

²⁶² See IMS Press Release, 900M Users for Mobile Banking & Payment Services in 2012 (MAY 29, 2008).

²⁶³ See KPMG, *supra* note 6, at 41.

the banking part of the service. Some consultants confirmed that "concerns over tax evasion, money-laundering and even terrorist financing are alerting authorities to the need for vigilance over all forms of e-payments."²⁶⁴

Adopting a new technology system may expose banks to strategic risk when the management lacks adequate business judgment regarding the performance of technology-related products that seriously affect delivery channels and service processes.²⁶⁵ Therefore, banks should take into account the importance of strategic risk management when deciding to implement mobile banking.²⁶⁶

Compliance risk such as money-laundering and terrorist financing that are violations of laws, regulatory rules, or ethical standards may arise when banks introduce mobile banking systems because remote transactions may be conducted through the mobile device and across borders, with no physical presence in a nation or specific jurisdiction.²⁶⁷

Operational risk is related to network security, customer data confidentiality, and system integrity with service delivery. Since this type of risk may result from the deficient design and maintenance of the mobile banking system, it can be mitigated, for example, by issuing adequate guidelines concerning maintenance of network security to avoid exposure to risks.²⁶⁸

IV. COMPETITION AND STRATEGIC ALLIANCES BETWEEN FINANCIAL INSTITUTIONS AND MOBILE COMMUNICATIONS FIRMS

Innovative solutions open new doors for technology providers to do business with banks.²⁶⁹ Mobile banking creates a new and wide spectrum of distribution channels, which allow banks to offer financial services outside of the traditional delivery channels.²⁷⁰ "The delivery of mobile banking services to a consumer involves the participation of

²⁶⁴ See *id.* at 29.

²⁶⁵ *Id.* at 19 ("The issue for the banks has been one of customer 'ownership,' along with who should bear the distribution of risk.").

²⁶⁶ Suoranta, *supra* note 4, at 28 (noting it is evident that "[t]he lower the perceived risk of using mobile banking services, the more likely that mobile banking will be adopted.").

²⁶⁷ See CGAP FOCUS NOTE, *supra* note 8, at 7.

²⁶⁸ One leading company in the computer network industry proposed suggestive example of the best practice guideline for network security. See Network Security Policy: Best Practices White Paper, http://www.cisco.com/en/US/tech/tk869/tk769/technologies_white_paper09186a008014f945.shtml (last visited Feb. 27, 2009).

²⁶⁹ See Tiwari, *supra* note 17, at 11.

²⁷⁰ See Suoranta, *supra* note 4, at 9 ("It is evident that the financial services industry has been undergoing a profound transformation.").

four primary players: a bank, a mobile network operator ("MNO"), a mobile banking technology vendor, and the consumer."²⁷¹

According to the Gartner Group, "mobile banking services will have to support a minimum of 50 different device profiles in the near future."²⁷² Tiwari observed that "innovative mobile services are expected to open up a new distribution channel for banks to enforce their multi-channel strategy; for technology-providers they open a new channel of revenue."²⁷³

From a wireless communication firm's point of view, mobile banking is an opportunity to step into the financial field.²⁷⁴ As the market for the existing communication industry becomes saturated, and it becomes apparent that the lucrative IMT-2000 service market is not so optimistic,²⁷⁵ there is a strong motivation for entry into the financial market as a mobile communications firm. Korean banks have already rushed into emergency mode to survive the anticipated competition resulting from the start of daily mobile banking service. The types of competition strategy and cooperation that evolve will define the two industries' futures.

A. *Types of Competition*

Companies know that new banking services can create greater customer loyalty.²⁷⁶ In the first stages of the competition between financial institutions and communications companies over mobile financial servicing, communication companies were able to engage immediately with customers as multi-functional wireless service providers by enabling customers to execute tasks ranging from simple communication services to m-payments.²⁷⁷ This was an effective way of strengthening customer loyalty for the communications companies and

²⁷¹ See KRUGEL, *supra* note 3, at 2.

²⁷² See INFOGILE TECHNOLOGIES, *supra* note 43, at 10.

²⁷³ See Tiwari, *supra* note 17, at 11.

²⁷⁴ Suoranta, *supra* note 4, at 26 (arguing that "[t]he greater the perceived relative advantage of using mobile banking services, the more likely that mobile banking will be adopted").

²⁷⁵ See Kim, *supra* note 1, at 325–26, 360; WiMAX Day, WiMAX comes of Age and Gains IMT-2000 Classification, (Oct. 19, 2007), *available at* <http://www.wimaxday.net/site> ("IMT-2000 is a global standard for third generation (3G) mobile wireless communications that was defined by the ITU in 1999 The original members of the IMT-2000 family included the technologies UMTS, CDMA2000, TD-CDMA, EDGE and DECT."); *see also* Kim, *supra* note 170, at 220–21.

²⁷⁶ FDIC News, *supra* note 96 (quoting Donald Saxinger, an FDIC electronic banking specialist).

²⁷⁷ See Suoranta, *supra* note 4, at 9 ("Rapid changes in the banking environment, increased competition by new players from the non-banking sector, product innovations, globalization and technological advancement-all these have led to a mar-

became a new source of profit,²⁷⁸ so communications companies focused on mobile financial services as the core of their future corporate strategies.²⁷⁹ At least the first stage of mobile financial services was possible from the communications companies' existing portals,²⁸⁰ and the companies could use the information acquired from the range of transactions.

From the outset, regardless of the mechanism for the transfer of data, communications companies worked to reduce the price for services. This required cooperation from financial institutions because providing services together could decrease the overall participation fee.²⁸¹ As time passed, communications companies became accustomed to the customer consumption patterns and customer activities of financial institutions, which allowed them to provide services directly to customers with the help of financial solution providers other than financial institutions. This created an evolving concern that traditional financial service providers such as banks would become little more than information providers.²⁸²

This risk intensified the competitive relationship between communications companies and financial institutions to take the lead in mobile banking services.²⁸³ The conflict gradually intensified between

ket situation in which the battle for customers is intense. As a consequence, banks have started to offer services through various delivery channels.”).

²⁷⁸ See Rosenberg, *supra* note 65, at 599 (“As mobile telephone service providers and other intermediaries enter the market for payment services, insolvency of payment service providers and money remitters has become a consumer issue in the developed world as well. Numerous payment services have been dissolved or have initiated bankruptcy cases in the United States, and the legal system has had to address issues regarding the entitlement of consumers and payees to funds deposited with the payment service. If mobile telephone service providers become major providers of payment services, the legal system may confront the same issues with respect to telephone service providers that become insolvent.”).

²⁷⁹ KRUGEL, *supra* note 3, at 2 (“In most instances the mobile banking vendor has been the pioneer in shaping industry adoption and lobbying the other two principle stakeholders on the value of extending the banking franchise to mobile.”).

²⁸⁰ See *infra* discussion Part IV.B.2.

²⁸¹ In Korea, telecommunications firms, rather than financial institutions, have driven the growth of the mobile banking by securing partnerships with financial institutions. See BOYD, *supra* note 7, at 10.

²⁸² See Rosenberg, *supra* note 65, at 541–42 (“Mobile telephone service providers may also emerge as serious competition for banks and money remitters, as prepaid phone cards make it possible for consumers to pay for goods and services, and to transfer funds, using short mobile phone messages rather than checks, credit cards, wire transfers, and other services offered by traditional financial institutions.”).

²⁸³ Suoranta, *supra* note 4, at 30 (“[C]ommunication is also a critical process factor for the diffusion of innovation in electronic banking.”).

financial institutions, which wanted to delay communications companies' entrance into the financial arena, and the communications companies, which wanted to secure the financial customer databases and shorten the learning curve about customer patterns and activities and credit risk management.²⁸⁴

However, it happened that mobile banking services provided by communications companies were not popular because of (i) financial product limitations resulting from the conflict between communications companies and financial companies, (ii) usage complications resulting from the lack of integration between financial and communication systems, (iii) entry barriers under the Banking Act,²⁸⁵ (iv) the burden of fees and communication bills charged for mobile financial transactions, and (v) security concerns.

B. *Necessity for Strategic Alliance*

The high levels of cellular phone propagation and cellular phone micro-payments²⁸⁶ show that the potential for the Korean mobile phone payment market is strong.²⁸⁷ Some forecast that "[m]obile payments may become a common method by which to circumvent the cash register."²⁸⁸ Nevertheless, m-payment expansion is still a problem²⁸⁹ because of the limitations of mobile services and obstacles to development of the market.²⁹⁰ Therefore, Korean m-payment service providers need to cooperate in order to expand the market and take advantage of market opportunities.²⁹¹ In other words, communication

²⁸⁴ Reedy, *supra* note 220 ("The banks and the carriers are fighting over who gets what piece of the action If carriers can put the banks on their portals, they can get a partial payment on their credit card.").

²⁸⁵ Banking Act (S. Korea), Article 8(1), *available at* <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan011490.pdf> ("Any person who intends to carry on the banking business shall have capital stock of not less than 100 billion won, subject to authorization by the Financial Supervisory Commission.").

²⁸⁶ See INFOGILE TECHNOLOGIES, *supra* note 43.

²⁸⁷ See *id.* at 2 (noting that one industry, White Paper, evaluated that "the most aggressive being Korea which is now witnessing the roll-out of some of the most advanced services like using mobile phones to pay bills in shops and restaurants.").

²⁸⁸ Rosenberg, *supra* note 65, at 542.

²⁸⁹ *Id.* at 563 (citing Professor Mann's assertions that "payments law must resolve four fundamental questions: who bears the risk of unauthorized payments; what must be done about claims of error; when are payments completed so that they discharge the underlying liability; and when can they be reversed?").

²⁹⁰ See *supra* notes 80 and 222 and accompanying text.

²⁹¹ See Datta et al., *supra* note 45, at 78 (stating that one industry analyst advised that "[i]f large financial institutions and mobile operators can execute their joint decisions quickly, cooperation between them will most often be the fastest way to

companies should relinquish their obsession with cornering the m-payment services market.

1. *Direction of Alliances in the Korean Mobile Financial Market*

Banks and credit card companies must adjust their strategies to embrace mutual cooperation models rather than forming competitive relationships over the m-payment market. Mobile payment startup venture companies which specialize in payment settlement business may lose their foothold in the market if communications companies begin providing m-payment services. To survive, they need to focus on pioneering a niche market based on a new business model.²⁹²

As the m-payment market develops, most communications companies who have recognized the potential are expected to overcome the weaknesses of credit risk, financial customer database information security issues, and lack of experience in financial management of private customers through cooperation with financial institutions.²⁹³ However, SKT, which wants to enter into the mobile financial industry, will also want to control the core processes of m-payments, such as customer database security and payment services.²⁹⁴ In this case, to minimize the business risks resulting from lack of experience in the financial industry, SKT will execute limited strategies involving pre-paid payments, micro-payments, and closed-end payments, and will enter the financial industry by gradual expansion through feasibility test.²⁹⁵

On the other hand, financial institutions would prefer to acquire the lead in m-payments based on their well constructed payment network infrastructure, experience and ability in essential accounting

get a mobile financial service into the market, give the size of their combined customer base.”).

²⁹² See Suoranta, *supra* note 4, at 10 (“Bank managers must be increasingly aware of the opportunities that come with technological change.”).

²⁹³ See KPMG, *supra* note 6, at 29 (citing one industry report stated that “[m]obile network operators typically do not require special licenses when they serve as access and transmission networks for banks to provide m-banking services. However, as they become more involved in third-party payments processing and cross-border remittance services, they may be required to apply for licenses under domestic legislation and regulations.”).

²⁹⁴ See Customer Service Interview, *supra* note 198.

²⁹⁵ See KRUGEL, *supra* note 3, at 5 (stating that generally, “[t]he Mobile Banking Vendor supplies the technology that integrates the mobile banking participants (MNO, banking systems, user applications, access channels) and facilitates the translation of the banking instruction from the consumer’s mobile phone to that of a financial message that can be understood by the banking systems.”).

functions, and credit risk management.²⁹⁶ First, they will forge a connection between wireless networks and payment networks through limited exclusive cooperation with communications companies in the form of co-management or co-establishment of software and payment services.²⁹⁷ In the future, they will build strategies around containing the communications companies within the role of a simple carrier through the development of an authentic payment system, and boosting payment system usage with smartcards.²⁹⁸

2. *Types of Strategic Alliances*

Providing mobile financial services through alliances between financial institutions and communications companies will increase the potential for success because of a combination of mutually existing assets and ability, rather than individual business executions.²⁹⁹ In particular, financial institutions can provide financial business licenses,³⁰⁰ credit-valuation skills, and pre-existing branch networking, while communications companies can provide highly recognized brands, communication networks, and broad customer base information.³⁰¹ Because of these mutual contributions, the potential for success will increase for both sides if they cooperate.³⁰² Also, mutual cooperation can shorten the time for implementation and success, al-

²⁹⁶ *Id.* at 2 (“The bank typically has a multi-channel approach to delivering transactional services to its customer base.”).

²⁹⁷ Datta et al., *supra* note 45, at 78 (noting that such alliances may create extraordinary customer service that “benefit from network effects—which make services more useful as more people use them—require special attention.”).

²⁹⁸ See Rosenberg, *supra* note 65, at 525 (noting that “Smart Cards,” also called “chip cards,” are multifunction cards that include a microchip, which can function as debit cards or credit cards, and perform other data functions).

²⁹⁹ See CGAP FOCUS NOTE, *supra* note 8, at 3 (introducing the function of the bank-based and nonbank-based combination models).

³⁰⁰ Regardless of jurisdictions, in existing regulatory frameworks, a banking license is required in order to launch banking business. However, “[t]he process to apply for a banking license can be ill defined, lengthy, costly and uncertain. Moreover, in many jurisdictions, mobile operators may be formally prohibited by various laws from obtaining a banking license or owning a bank. Additionally, ownership of domestic banks by foreign institutions may be prohibited, strictly limited or subject to additional constraints.” MORTIMER-SCHUTTS, *supra* note 64, at 23.

³⁰¹ See Datta et al., *supra* note 45, at 78.

³⁰² See, e.g., KPMG, *supra* note 6, at 11 (“In 2007, SKT teamed up with Visa while rivals KT Freetel joined with MasterCard to relaunch m-payment service. These offerings are designed to migrate from a USIM-card (for 3G phones) to near field communication (NFC) technology when it becomes more widely available in handsets in 2008.”).

though both sides should approach this cooperation strategy carefully.³⁰³

In the longer term, according to a KPMG report, "MNOs will inevitably become part of the banking and payments process in two senses: directly as vehicles for m-banking services, and otherwise as an integral part of e-commerce through the growth of m-payments."³⁰⁴ Theoretically, individual financial institutions will maximize the value of mobile financial services through cooperation with as many communications companies as possible.³⁰⁵ These financial institutions will also want to compete with other financial institutions by marketing to communications customers. Communications companies will be trying to do the same thing with financial customers. However, if either communications companies or financial institutions are able to secure a monopoly, cooperation will be more difficult.³⁰⁶ The values will begin leaning heavily towards one side.³⁰⁷ Because cooperation will be more difficult in a monopoly, the Korean banks are passive while SKT offers more aggressive suggestions for cooperation. However, the question is less a matter of whether communications companies and financial institutions will cooperate than it is the kind of cooperation strategy they will acquire.

The service strategy for pre-existing customers could either be a one-to-one cooperation model, which consists of pairing one financial institution with a single communications company, or the many-to-many cooperation model, where groups of financial institutions cooperate with groups of communications companies. Even though the many-to-many cooperation model would eat significantly into profits because of large-scale cooperation, there would be compensation in the form of a higher potential for broadened and immediate new busi-

³⁰³ Either way, the key issue for the market players in the banking industry is maximizing customers' satisfaction. See Suoranta, *supra* note 4, at 10.

³⁰⁴ KPMG, *supra* note 6, at 31.

³⁰⁵ See ABRAHAM ET AL., *supra* note 120, at 27 (stating that MNOs "and banks should not see each other as adversaries. Players from each industry can share portions of their offerings and value chains in ways that provide mutual benefits—specifically, more attractive, targeted products and lower costs.").

³⁰⁶ See CGAP FOCUS NOTE, *supra* note 8, at 17 ("Regulation mandating interoperability could be imposed *ex ante*, if policy makers convince themselves that they must intervene to avert a significant market failure (such as "tipping" the market for mobile phone-based branchless banking to a single dominant mobile network operator). Or it could be imposed *ex post*—once there is evidence that a dominant player or players (such as a clearing and settlement platform owned by a group of large banks) have begun to exploit such a market failure.").

³⁰⁷ Market players who participated in banking industry should keep mind that "[h]ow much value a mobile financial-services-business can create depends largely on its relevance to a given market." Datta et al., *supra* note 45, at 76.

ness.³⁰⁸ In fact, the one-to-one cooperation model is expected to be ruled out quickly because the temporary success of a one-to-one cooperation model would boost cooperation among the other companies, which would lead to intensified competition in the long run or inspire a competition-boosting policy through the government's monopoly regulation.³⁰⁹

Therefore, the financial institutions and communications companies that consider a one-to-one cooperation model must consider how much safe profit they can obtain before the market competition begins to infringe upon their success.³¹⁰ Of course, if that number exceeds the investment costs, it would be an appropriate model to choose, but the companies must also be sure to design an effective strategy by which they can maintain their customer bases when the competition begins to court their customers. However, this kind of strategy also needs to be supported by a basic core ability to broaden the customer base and differentiate service.³¹¹

On the other hand, the open, many-to-many cooperation model is appropriate if the companies are not sufficiently confident of acquiring profit in a one-to-one cooperation model. This kind of strategy could make it possible to maintain the market share which could be lost by the one-to-one cooperation strategy. Since the choice of a cooperation model will have different results depending on individual market situations and available partner companies, establishing an appropriate cooperation strategy is important.³¹²

³⁰⁸ See *id.* at 78 ("Theoretically, a financial institution, by allying with as many telecom companies as possible, could maximize the value of a mobile financial service with network effects.").

³⁰⁹ See *id.*

³¹⁰ See KRUGEL, *supra* note 3, at 4 (stating that one option for MNOs mobile banking would be to become a bank using "a partner financial institution and its banking license, or through the successful application for a banking or e-money license.").

³¹¹ See *id.* at 2 ("We have also seen a migration strategy from the banks to move their customers away from the more fixed-cost based infrastructures, such as branches, to those with less resource and operational costs such as ATMs, POS and ultimately the internet.").

³¹² Datta et al., *supra* note 45, at 78 ("The real choice facing both is between a system featuring one financial player and one telecommunications company and initially closed to users outside their customer bases, on the one hand, and a system open from the outset, with all telephone companies allowed to ally themselves with any financial firms, on the other.").

V. CHARACTERISTICS OF THE KOREAN MOBILE BANKING INDUSTRY

The banking business revolves on two fields: the intermediation of payment and settlement, and extending loans and receiving deposits.³¹³ These basic functions have not changed even in the mobile banking era;³¹⁴ only the forms and types of services have changed to keep pace with developing technology.³¹⁵ The appearance of Volkswagen Bank, Siemens Financial Services, and Sony Bank are examples of the paradigm shift in the financial industry.³¹⁶

A. *Status of Global Mobile Banking Industry*

1. *United States*

Even though the United States is a leading country in the Internet revolution, it lags behind Europe and Asia in the area of wireless banking transactions.³¹⁷ Mobile banking in the U.S. first appeared late in the 20th century, but it did not catch on, so most banks abandoned the idea.³¹⁸ Europe's mobile phone propagation is high and their wireless communication network is standardized, however, in the United States, PC propagation is high, there are many cable-Internet services, and financial institutions consider mobile banking as only an auxiliary method of online banking.³¹⁹ In the long

³¹³ See KPMG, *supra* note 6, at 31 ("Banks are deposit-taking financial institutions that use their deposits to create credit in the form of overdrafts and loans. MNOs and payment processors take de facto deposits in various ways, for example when issuing a pre-paid phone card or when storing value in an m-wallet, and they create de facto credit whenever they do not require instantaneous bill settlement, for example in cases of post-paid subscribers and monthly billing.").

³¹⁴ See Haukioja & Hahl, *supra* note 10, at 277 ("Technology, availability of information, and property rights have developed so profoundly that at least some of the historical reasons for banks have eroded. Despite of this, banks still have a role in providing liquidity.").

³¹⁵ See Datta et al., *supra* note 45, at 76 ("History shows that customers are slow to adopt new financial services . . .").

³¹⁶ See Mattila, *supra* note 9.

³¹⁷ Thomas Meyer, *Mobile Banking is Ringing Again. Will Customer Answer?*, DEUTSCHE BANK RESEARCH, Oct. 2007, http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000216894.pdf ("Few customers are dying to use their mobile to pay bills, check their balance or trade stocks. . . . [O]nly around 4% of US online consumers with a mobile phone use a feature of mobile banking today. Another 5% are interested or very interested but 72% are not interested at all. However, it is probably difficult for many consumers to imagine something that is not yet widespread.").

³¹⁸ See Feig, *supra* note 83.

³¹⁹ See BOYD, *supra* note 7, at 12 ("The analysts and company leaders interviewed for this paper agree that mobile financial services have not exhibited the same

run, the wireless-Internet market in the United States is expected to improve significantly.³²⁰ Many institutions, from Citibank to E-Trade, will seek to take first place in offering mobile services.³²¹ Currently, in the United States more than 150 financial institutions—including Bank of America,³²² Wells Fargo,³²³ Citi Group,³²⁴ and Wachovia³²⁵—provide mobile banking services.³²⁶ Online financial service companies in the United States provide a wide range of basic financial information concerning the stock market, account information, bill payments (“EBPP”), investment and retirement pension plan counseling, and various other financial tools.³²⁷ However, the percentage of users of online financial services, 23%, is still lower than the percent-

degree of technological innovation and market penetration in the United States as in many international markets.”).

³²⁰ See *Mobile Banking*, *supra* note 26.

³²¹ See *Mobile Banking Availability Could Double By 2010, Survey Finds*, AM. BANKER & SOURCE MEDIA, INC., May 7, 2008, <http://www.americanbanker.com/printthis.html?id=20080512XCAS6OII> [hereinafter *Mobile Banking Availability*] (“The number of financial institutions offering mobile-banking services could double by 2010, with the United States trying to catch up with Europe and the Asia-Pacific region, suggest new survey data released this week by Sybase Inc.”).

³²² See *Mobile Banking*, *supra* note 26 (“Right now, nine of the 10 top banks offer mobile banking to customers. Bank of America Corp. has the most mobile banking customers — about half a million . . . But setting up the technology is just the first step.”).

³²³ Press Release, Wells Fargo, Wells Fargo Launches Mobile Banking For Small Business Customers (Sept. 18, 2007), https://www.wellsfargo.com/press/20070918_smallbizmobile (“Wells Fargo & Company announced the latest addition to its mobile banking services, *Wells Fargo Mobile*SM for small businesses, a browser-based solution that provides access to business and personal financial information at any time, from anywhere. Once enrolled in the *Wells Fargo Mobile* service, small business customers can check balances of their small business and personal deposit and credit accounts, view transaction history, and transfer money between eligible Wells Fargo accounts on any Web-enabled mobile device by accessing the mobile banking URL *wf.com*.”).

³²⁴ See Vamosi, *supra* note 87 (“CitiBank is carrier independent, which means customers must download an application; unlike Wachovia, but CitiBank’s service is available on AT&T, Verizon, and Sprint.”).

³²⁵ See *id.* (“Wachovia has a mobile banking program in place with AT&T (formerly Cingular).”).

³²⁶ Dan Harmon, *Office Automation: Computer Hardware & Software*, 25 No. 3 LAW. PC 15 (2007) (“David Miller in the September issue looks at the state of mobile banking. Increasingly, Americans are using PDAs to pay bills, make purchases and manage their accounts.”).

³²⁷ See Suoranta, *supra* note 4, at 13 (“In American markets since the early 1990s in addition to the spectacular growth of Internet, the strong bull market has aided the growth of electronic banking.”).

age of users of other online services, such as email and entertainment sites, 81%.³²⁸

From the utilization aspect of online financial services, even though online stock trading has fluctuated, common financial transactions like billing, bank account management, account aggregation, tax payments, and mortgage financial services, as one form of integrated services, have rapidly increased.³²⁹ Account aggregation has the advantage of allowing users to manage many financial accounts.³³⁰ The development of resources like PayPal, which transacts payments through email, and the commercial Internet market has rapidly replaced the American payment culture of using paper checks to pay bills.³³¹ There are sixty different Internet banks in the United States and this number is continuously increasing, surpassing the number of such institutions in all other countries.³³² On the other hand, usage of mobile communications for online financial services is still very low because of network incompatibility, low penetration of the market with communication devices, and slow transfer speed.³³³

The development of online financial services has been profitable for online financial companies.³³⁴ Meanwhile, the global edition of the *New York Times*, *International Herald Tribune*, warned that if banks fail to preoccupy the mobile banking business they will glean the leftovers, because it could mean losing out on billions of dollars of potential deposit, and the little drops of water hardly make a mighty

³²⁸ See KyungHyung Lee, *Online Financial Service, Trend of Information Communication Industry* 184 (2002) [hereinafter *Online Financial Service*].

³²⁹ See Meyer, *supra* note 317, at 4 (stating that “[W]orldwide payments by mobile phone may reach USD 22 bn by 2011— which is still a paltry sum.”).

³³⁰ See Fujii et al., *supra* note 24, at 2 (“In the beginning of 2000, account aggregation services began to appear in web offerings by financial institutions across the United States. Originally, some U.S. banks opposed the use of an account aggregation services. . . . Then the service was exported to the Asia-Pacific countries, mainly Australia, South Korea, and Japan, by U.S. account aggregation vendors. Also, in Asia-Pacific countries, domestic account aggregation vendors entered this field directly, and they could provide services more suitable for these specific markets.”).

³³¹ The initial idea of this business stemmed from trying to get rid of paper checks. See PayPal About Us, <https://www.paypal-media.com/aboutus.cfm> (last visited Feb. 27, 2009) (introducing the history of PayPal).

³³² See Posting of Chris Weeldryer to Cooper Journal, <http://www.cooper.com/journal> (July 1, 2002).

³³³ See Boyd, *supra* note 7, at 12 (stating that “networks in the United States have taken longer to upgrade to the high-speed capability necessary for optimal use of [mobile financial service] MFS.”).

³³⁴ See Suoranta, *supra* note 4, at 12 (noting that in some cases, “developing new processes without having their returns threatened as a result of wasteful expenditure.”).

ocean.³³⁵ In 2007, “[o]nly 400,000 consumers are using mobile banking out of almost 240 million mobile phone users in the U.S.”³³⁶ It is no wonder because “[m]arket conditions alone do not favor much cooperation, since there are more than 18,000 banks in North America with only six mobile carriers, compared to 7,000 banks and 147 mobile operators in Europe.”³³⁷ Furthermore, a 2008, survey found that “only 10% of U.S. banking organizations offer mobile-banking services compared with 57% in Europe and 43% in Asia.”³³⁸

Online financial service users were initially an elite group, but the service soon become popularized, even though the principal set of users is young people.³³⁹ However, Baby Boomers, the generation of people who were born after 1954, are already accustomed to the technology as the user age range has broadened.³⁴⁰ Although the younger generation may be considered more proficient at Internet usage,³⁴¹ their financial lives tend to be basic, so they tend to use only basic financial services.³⁴²

Despite the convenience of online financial services, the risk of leakage of user information remains a large obstacle to expanding ser-

³³⁵ See *Mobile Banking*, *supra* note 26.

³³⁶ Matt Hamblen, *Mobile Banking Catching on in U.S., Slowly*, PCWORLD (May 31, 2007), http://www.pcworld.com/article/132456/mobile_banking_catching_on_in_us_slowly.html.

³³⁷ *Id.*

³³⁸ *Mobile Banking Availability*, *supra* note 321.

³³⁹ As one might expect, younger consumers appear to be jumping aboard the mobile banking trend more quickly than others. The study found that 21 percent of consumers age 18-34 use their cell phone for mobile banking transactions, compared to about 10 percent of the general population. These numbers—particularly for younger consumers—are expected to grow significantly. Research firm Aite Group predicts that mobile banking users in the United States, having ballooned from a negligible number at the end of 2006 to 1.7 million by the end of last year, will rise to 8 million by the end of this year. And by 2010, Aite Group forecasts that 35 million Americans will be mobile banking users. *Mobile Banking*, *supra* note 26.

³⁴⁰ *Id.* (“Traditionally, the innovators in the use of technological products are often characterized as being at a higher professional and educational level, and it has been found, for example, that the non-users of Internet banking are often pensioners. However, the results of [one] survey would appear to contradict this characterization.”).

³⁴¹ See Suoranta, *supra* note 4, at 53 (describing the demographics of the mobile banking users classified by gender, age, marital status, occupation, education, household income and field of employment.”).

³⁴² *Id.* at 54 (“It has often been suggested that the adopters of technology-based [mobile banking] services are relatively young, even though Internet banking studies have shown that the typical Internet banking user is more likely to be middle-aged.”).

vice to more users.³⁴³ Since more of the institutional obstacles have been solved in the United States than in other countries, the focus in the United States has shifted to technical problems.³⁴⁴ However, the lack of customized financial services available in a mobile environment remains an obstacle for expanding service.³⁴⁵

The number of Americans who paid their bills online dramatically increased in accordance with expanding Internet penetration,³⁴⁶ and many Americans file their taxes online.³⁴⁷ Online mortgage lending totaled \$160 billion in 2001, which was 8% of the total loan amount, leading to the conclusion that online financial services in the United States had truly commenced.³⁴⁸

Several factors and trends led to the current condition of the online banking industry in the United States. First, the development electronic bill presentment and payment ("EBPP") derived from billers introducing free service.³⁴⁹ When the first Internet billing service providers, portals, and banks charged customers service fees ranging from five to fifteen dollars, they did not get many takers.³⁵⁰ However,

³⁴³ Under the Gramm-Leach-Bliley Act (15 U.S.C. §§ 6801–6809), banks must give you an opportunity to "opt out" of any policy they may have to share your non-public personal financial information with a third party. If you chose to opt out by notifying the bank in ways that they specify, the bank must not share your information with unaffiliated parties, except in certain limited circumstances. They may, however, share your information with affiliates. You will usually find information about opting out in the same notice that the bank sends you about its privacy policy. Federal Reserve Bank of New York, E-Banking, <http://www.newyork.fed.org/education/ebanking/print.html> (last visited Feb. 27, 2009).

³⁴⁴ One of the significant technology obstacles is relatively slow speed. See Boyd, *supra* note 7, at 1.

³⁴⁵ See *id.* at 12 (stating that "the United States mobile market is only now approaching saturation, carriers have remained more focused on customer acquisition than on increasing functionality, prioritizing 'new subscribers over new services,' in the words of one industry observer.").

³⁴⁶ Reedy, *supra* note 220 (quoting Nick Holland, Aite senior analyst that covers mobile banking, that "[b]ill pay is not going to suddenly migrate to some other channel, certainly not mobile.").

³⁴⁷ Internal Revenue Service, *Most Americans Now Can Prepare and File Their Taxes Online for Free; Treasury, OMB, IRS Launch New Free File Web Site*, <http://www.irs.gov/newsroom/article/0,,id=105843,00.html> (last visited Aug. 30, 2008).

³⁴⁸ See *Online Financial Service*, *supra* note 328, at 185.

³⁴⁹ E-Billing.org, What is EBPP?, <http://www.ebilling.org/EBPP/default.html> (last visited Feb. 27, 2009) ("Electronic Bill Presentment and Payment (EBPP) is the electronic presentation of statements, bills, invoices, and related information sent by a company to its customers, and corresponding payment for goods or services. The Internet provides billing companies and their customers with new methods to deliver and access billing information.").

³⁵⁰ See *Online Financial Service*, *supra* note 328, at 185.

when credit card companies and large-sized billers provided free services to reduce processing costs, the service took off.³⁵¹

Second, online tax payments gradually increased as the U.S. Internal Revenue Service embraced it.³⁵² The IRS provided convenient services for online tax filing deadline extensions to reduce costs, and Congress ratified legislation that enticed about 80% of Americans to file online in 2007.³⁵³

Third, online technology and the financial market environment made huge contributions to service propagation for mortgage loans. Online technology facilitated online mortgage services, continually dropping interest rates which induced customers to make the shift to online loans, causing online mortgage loans to multiply drastically.³⁵⁴ LendingTree, the first dot-com company to offer online mortgages, created the marketplace after linking hundreds of companies by providing loan information on its website and shortening the time it took to originate a loan and reducing loan interest rates.³⁵⁵ IndyMac employees received many offline requests from customers unaccustomed to the Internet, and still put its services online to reduce costs and expand its customer base.³⁵⁶

Fourth, online banking has still prioritized customer service over short-term profits.³⁵⁷ One survey project reveals that online banking has grown more than any other Internet activity.³⁵⁸ Most of the users performed simple tasks like account balance inquiries,

³⁵¹ See Rosenberg, *supra* note 65, at 520.

³⁵² Internal Revenue Service, *EFTPS: The Electronic Federal Tax Payment System*, <http://www.irs.gov/efile/article/0,,id=98005,00.html> (last visited Feb. 27, 2009) ("EFTPS, the Electronic Federal Tax Payment System, is a tax payment system provided free by the U.S. Department of Treasury. More than 8 million taxpayers are currently enrolled in the system. Since EFTPS started in 1996, there have been over 717 million electronic payments made, totaling almost \$17 trillion!").

³⁵³ See *Online Financial Service*, *supra* note 328, at 185.

³⁵⁴ See *Falling Interest Rates Spur Increase in Online Mortgage Applications Through Quicken Loans*, BUS. WIRE, Jan. 3, 2000, available at http://findarticles.com/p/articles/mi_m0EIN/is_2001_Jan_3/ai_68718451.

³⁵⁵ See LendingTree, About Us, <http://www.lendingtree.com/beta/about-us/> (last visited Feb. 27, 2009).

³⁵⁶ See *Online Financial Service*, *supra* note 328, at 186.

³⁵⁷ See *Mobile Banking Availability*, *supra* note 321 (explaining that a mobile banking survey "found that improving customer service, extending Internet banking, and achieving competitive advantages are the top three reasons banks give for offering mobile banking.").

³⁵⁸ Mary Madden, *America's Online Pursuits—The Changing Picture of Who's Online and What They Do*, PEW INTERNET & AM. LIFE PROJECT 51 (2003) available at http://www.pewinternet.org/pdfs/pip_online_pursuits_final.pdf.

rather than financial transactions.³⁵⁹ “The longer an Internet user has been online, the more likely he is to migrate his banking to the Web.”³⁶⁰

Fifth, even though networks and handsets are capable of more sophisticated applications, mobile financing is limited by the low range of service provided with cellular phones.³⁶¹ Even the companies that once provided basic service have stopped doing so.³⁶²

2. Europe

In order to recover from late participation in the Internet banking market and cater to the European technology environment, which focuses more on mobile phone use than personal computer use, European banks are working hard toward full implementation of mobile banking.³⁶³ With only a few nations not participating, Europe’s mobile banking remains at the level of financial information or bank account balance inquiry. Even though each mobile communications company provides payment settlement services by cellular phone and operates its own wireless portal site, the market is still not active.³⁶⁴ However, mobile banking is gradually expanding the number of financial transactions such as wire transfers and bill payments, but the overall financial services are no different from those in Korea.³⁶⁵

³⁵⁹ See Reedy, *supra* note 220 (“Mobile banking is very simple at the moment, deliberately simple.”).

³⁶⁰ Madden, *supra* note 358, at 52.

³⁶¹ See Reedy, *supra* note 220 (stating that “[t]he U.S. was a bit of laggard in terms of mobile banking adoption, but the majority of the U.S. population has used text messaging.”).

³⁶² See Boyd, *supra* note 7, at 12 (stating that “some experts suggest that consumers in the United States may be less willing to engage new technology than in other markets [and] [t]his lack of consumer demand may also help to explain why mobile operators and financial institutions in this country have not pushed harder to make MFS available to their customers.”).

³⁶³ *Mobile Banking Services To Increase In Europe*, BANKING BUS. REV. ONLINE, May 14, 2008, http://www.banking-business-review.com/article_news.asp?guid=0BF67054-69B9-477E-8061-C61960C85631 (stating that “[t]he adoption of mobile banking is set to increase rapidly in major European markets over the next few years, from an average of 6% today to 25% by 2010, according to a report published by Celent.”).

³⁶⁴ Meyer, *supra* note 317, at 1 (“Many banks and financial firms are reactivating or rejuvenating their mobile banking offerings. Most stopped or marginalized [sic] mobile banking after the first launches failed to gain traction in the early 2000s. But now, better technology may warrant a new attempt.”).

³⁶⁵ See Boyd, *supra* note 7, at 9–10 (“The terms ‘mobile banking’ and ‘mobile payments’ describe distinct but in some cases overlapping sets of products. Some m-banking platforms provide services, such as money transfers, that are considered forms of mobile payment, while some m-payments products are so closely linked to

Recent research found that mobile banking in Europe still fails to get the attraction of customers even though the size of the mobile service sales market in Europe greatly increased.³⁶⁶ In particular, the mobile content in Europe leads the global market, and the m-payment market covering medium and large online payments and offline payments of all sizes is expected to expand gradually.

European countries, including England, started Internet banking in 1998 and have consistently improved upon it since then. England's Egg Bank, established in October 1998, first recorded a profit in the fourth quarter of 2001, making it a business model for Internet banks.³⁶⁷ While online financing comprised 1% of retail financial service sales in 2000 in Europe, the number increased to 17% by 2005 and Juniper Research has forecast that "41.5 billion mobile financial service transactions will be made by the end of 2011."³⁶⁸

Internet usage is strong in Northern Europe, so Internet banking is rapidly expanding in this region. Internet banking improvements by PC is expected to continue, and mobile banking with cellular phones and personal digital assistants ("PDAs") is forecast to outpace that in the United States.³⁶⁹ Digital television is expected to emerge as a new financial channel for online banking in European countries such as England.³⁷⁰

According to Forrester Research, as of December 2001, 42 million Europeans, which represents more than a third of European Internet users (approximately 14% of European adults), were using Internet banking.³⁷¹ This is a strong forecast that the net banking will soar.³⁷²

bank accounts as the source of funds that they assume m-banking functions. And while banks are most visible as the institutions supporting m-banking platforms, given the structure of the payments industry, they will play a key role in settling m-payments whether or not bank accounts represent the source of funds.

³⁶⁶ Julian Goldsmith, *Mobile Banking Doesn't Do It For Europe. . . But Online Banking Is A Hit*, Nov. 9, 2007, available at <http://www.silicon.com/financialservices/0,3800010322,39169100,00.html>.

³⁶⁷ See Egg, A Bit About Us, http://new.egg.com/visitor/0,,3_54009—View_994,00.html (last visited Feb. 27, 2009) (noting that Egg Bank is the world's largest pure online bank and it offers borrowing, saving, and insurance).

³⁶⁸ Mobile Europe Home Page, http://www.mobileeurope.co.uk/news_wire/113937 (last visited Feb. 27, 2009).

³⁶⁹ See *Online Financial Service*, *supra* note 328, at 187.

³⁷⁰ Television-based banking has been available since 1998. See Suoranta, *supra* note 4, at 16.

³⁷¹ *Internet Banking has the Potential to Reach 110 Million Europeans by 2005, Predicts Forrester*, Dec. 10, 2001, available at http://banners.noticiasdot.com/termometro/boletines/docs/consultoras/forrester/2001/forrester_10_12_01.html.

³⁷² See *id.*

A report into the mobile financial services sector found that “the number of consumers accessing banking services and products via their mobile phones will reach 816 million by 2011, a tenfold increase on the number using such services in 2007.”³⁷³ Another survey shows a significant increase in activity across the advanced payments sector in Europe.³⁷⁴ In relation to other platforms (cellular phone, television, branch retailers, call centers, etc.) Internet financial services are expected to be the core services.³⁷⁵

According to Datamonitor, a U.S.-based global research and consulting group, European customers prefer face-to-face interaction for acquiring financial products.³⁷⁶ Half of customers in England and 77.2% of customers in Sweden use branch banks to receive information, while only 21% of the Swedish customers use the Internet for banking.³⁷⁷

The most frequently used online banking service is account inquiries; Datamonitor announced that 37% of online banking customers in Europe check their accounts two to six times per week.³⁷⁸ In the meantime, it is expected that the majority of European online banking customers will use account aggregation in the near future.³⁷⁹

In Europe, where mobile phone users exceed PC users, mobile financial services are expected to grow rapidly. In Europe’s mobile financial market, mobile handset companies, financial institutions, communication companies, and wireless Internet technology companies form networks with the aggressive participation of existing cable Internet portal companies.³⁸⁰ Under these circumstances, “[t]he most important business strategy and regulatory issues m-payments operators have to confront will arise precisely from attempts to make adjustments to these kinds of complementary processes and structures in order to enhance the overall value of mobiles in payment and retail financial services.”³⁸¹

³⁷³ *Juniper Forecasts Over 800 Million Consumers to Use Mobile Banking Services by 2011*, MOBILE EUR., available at http://www.mobileeurope.co.uk/news_wire/113815.

³⁷⁴ See Mobile Europe Home Page, http://www.mobileeurope.co.uk/news_wire/113746 (last visited Sep. 13, 2008).

³⁷⁵ See KRUGEL, *supra* note 3, at 10 (“The platform can be housed at the bank, MNO, or third-party processor.”).

³⁷⁶ See *Online Financial Service*, *supra* note 328, at 188.

³⁷⁷ See *id.*

³⁷⁸ See *id.*

³⁷⁹ See UNISYS FINANCIAL, ACCOUNT AGGREGATION: CONSOLIDATE OR BE CONSOLIDATED? 1 (2008), http://www.unisys.com/financial/insights/white_papers/papers.html?insightsID=86783; see also *supra* text accompanying note 25.

³⁸⁰ See *Online Financial Service*, *supra* note 328, at 189.

³⁸¹ MORTIMER-SCHUTTS, *supra* note 64, at 21.

Currently, European financial services institutions, mainly banks and insurance firms, are fiercely challenged by the latecomer non-financial institutions (e.g., Orange, Centrica, Volkswagen) who provide mobile financial services.³⁸² Centrica and Volkswagen started financial services with pre-existing customer brand recognition and companies like Orange will start their businesses in the future with a broader customer foundation and an existing billing relationship with customers.³⁸³ In March 2002, Vodafone, a mobile operator, started micro-payments in England and tested of wallet payment systems for medium and large payments began in regions of England, Germany, and Italy at the same time.³⁸⁴ In the Scandinavian countries and England, services based on business with existing financial institutions are central. Payment service is the major form of mobile banking in France.³⁸⁵

According to Datamonitor, less than 20% of French and Swedish customers are willing to purchase banking products from communications companies, with the more precise breakdown as follows: Spain 19%, Italy 13%, Germany 12%, and England 4%.³⁸⁶ European customers, excluding England, feel more comfortable about purchasing products from communications companies than from financial supermarkets.³⁸⁷

Despite the "significant number of banks providing mobile banking services (using WAP on 2G mobile generation, or SMS) both in EU15 and in Candidate Countries, access technology obstacles, limited adequacy of technology to the application, and service quality, have limited consumer adoption of the services."³⁸⁸

3. Japan

In Japan, the mobile financial services offered on cellular phones are nearly identical to the services offered online, and the range of provision and transaction areas is continuously expanding.

³⁸² See *Online Financial Service*, *supra* note 328, at 189.

³⁸³ See Timo Poropudas, *Mobile Operators Have The Tools To Challenge Financial Industry*, MOBILE COMMERCE.NET INTELLIGENCE REPORTS (2002), available at <http://www.nordicwirelesswatch.com/newsletter/archive/2002-03-22.html>.

³⁸⁴ See *id.*

³⁸⁵ See *Online Financial Service*, *supra* note 328, at 189.

³⁸⁶ See Poropudas, *supra* note 383, at 2.

³⁸⁷ See *id.*

³⁸⁸ Clara Centeno, *Adoption of Internet Services in the Enlarged European Union—Lessons from the Internet Banking Case*, EUR 20822 EN, at 23 (June 2003) ("Factors such as network incompatibilities, reliability and latency of connections, slow transmission speeds, expensive data communications, security weaknesses and device limitations have dampened market interest in using mobile devices for financial applications.").

Financial transactions are executed by cellular phones; mobile financial services have become the foundation of a new era of financial transactions. After making reservations or purchasing books and games by mobile phone,³⁸⁹ customers have various payment alternatives, such as pre-paid cards and offline payments, so commercial support for financial services is growing.

Japanese mobile banking services are continuously growing and financial transactions are at the first stage.³⁹⁰ Nearly 40 million mobile users use wireless Internet, ample mobile content, well prepared infrastructure, subscriber-friendly integrated service, pre-paid cards, and unique payment systems linked with a traditional form of settlement are the driving forces of growth in mobile financial services.

In January 2006, the *Guinness Book of World Records* reported DoCoMo as the world's largest wireless internet provider with 45.68 million users.³⁹¹ With this trend, Internet banking is expected to expand. Mobile banking usage by using NTT.DoCoMo's mobile information service, i-Mode, is also growing.³⁹²

Even though the establishment of full Internet banking is slower in Japan than in Europe and America, four banks now offer customized service. By the first half of 2001, four Internet banks (Japan Net Bank, IY Bank, Sony Bank, and eBank) recorded a deficit because of high startup costs.³⁹³ However, after watching the trend of Internet banks in Europe and America, which eventually turned a profit, Internet banks in Japan have hopeful prospects.³⁹⁴

Perhaps the most interesting development in Japan is the trial of coupling mobile phones with the ATM networks of Internet banks. This capitalizes on the characteristic Japanese enthusiasm for innovative service and mobile technology use. For example, IY Bank, the off-spring company of a Japanese distribution company, provides banking services via IY Bank ATMs installed in convenience stores through a partnership with NTT.DoCoMo.³⁹⁵ This service allows customers to deposit and withdraw through their high-speed cellular phones, and saves account information within their cellular phone chips.³⁹⁶

³⁸⁹ See *Mobility*, NTT.DoCoMo NEWSLETTER (NTT.DoCoMo, Inc., Japan) Feb. 2007, at 4, available at http://www.nttdocomo.com/binary/about/mobility_doc_10.pdf.

³⁹⁰ See, e.g., *supra* notes 29–31 and accompanying text.

³⁹¹ See *Mobility*, *supra* note 389, at 4.

³⁹² See Tiwari et al., *supra* note 17.

³⁹³ See *Online Financial Service*, *supra* note 328, at 190.

³⁹⁴ See *id.* at 189.

³⁹⁵ See *id.* at 190.

³⁹⁶ See *id.*

B. Characteristics of the Korean Mobile Communication Environment

The environment of Korean mobile telecommunications has features and characteristics unique to those of the United States and Europe.³⁹⁷ Korea is unparalleled in the adaptation of innovative mobile communication and data communication technology. During the last several years, Korea has been the most aggressive in the world in these areas.³⁹⁸ This trend resulted from reciprocal interactions among mobile communications carriers, the government, domestic phone manufacturers, and mobile content-programming firms.³⁹⁹ Korean consumers utilize both channels—the mobile Internet via handset terminal and cable Internet through desktop computer—at high levels.

Korea's mobile communications environment has four distinctive features: (i) technology standardization with priority given to CDMA, (ii) communications service with post-payment plans, (iii) close relationships between mobile communication service firms and terminal manufacturers, and (iv) deep intervention of government agencies in the mobile communications market.⁴⁰⁰ Table 2 shows a comparison of mobile communications environments among three nations.

³⁹⁷ See generally Kim, *supra* note 170, at 216–20.

³⁹⁸ See Suoranta, *supra* note 4, at 63 (“Innovators are often technology enthusiasts [and] they are willing to tolerate the initial glitches that typically accompany a technology-based innovation when it has just come onto the market.”).

³⁹⁹ See Boyd, *supra* note 7, at 9 (“Key reasons why [mobile financial service] have proven more successful in some countries than others are variations in the structure of mobile industries and the presence of legacy systems, the competitive landscape for financial services in each country, and the relative availability of competing technologies.”).

⁴⁰⁰ See Kim, *supra* note 170, at 207–17.

<TABLE 2>

COMPARISON OF MOBILE COMMUNICATIONS ENVIRONMENTS:
KOREA, UNITED STATES, AND EUROPE

Category	Korea	USA	Europe
Technology standard of mobile communication	CDMA-based	CDMA2000	GSM-based
Dependency of pre-paid or direct payment	Mostly post-payment	Post-billed ⁴⁰¹	Mostly pre-paid
Relationship between mobile communication carriers and phone manufacturers	Close	Rare	Loose
Level of government intervention	High	Intermediate	High

1. *Technology Standardization towards CDMA*

Europe and many Asian countries adopted GSM as a 2G technology standard, but Korea adopted CDMA as its standard⁴⁰² because a centrally unified CDMA technology standard allowed interoperability among Korean mobile communication companies. Text messaging services also advanced the mobile cellular phone market, and are expected to usher into the 3.5G and 4G eras of communication.⁴⁰³

2. *Communications Services Focusing on Post-Payment*

Mobile users will be offered either subscription or per-usage payment models. In Europe, a high percentage of subscriptions are pre-paid communication services, but almost all Korean subscriptions are to post-payment communication services.⁴⁰⁴ For example, 75% of Netherlander mobile communication users pre-pay their fees, but only 2% of mobile phone users in Korea do so.⁴⁰⁵ Customers of these pre-paid communications services paid extraordinarily low fees compared

⁴⁰¹ See BOYD, *supra* note 7, at 28 ("Though the United States mobile industry has been characterized by the dominance of post-billed service, the prepaid wireless market is growing quickly.").

⁴⁰² See Kim, *supra* note 170, at 208–10.

⁴⁰³ See *id.* at 210–11.

⁴⁰⁴ See BOYD, *supra* note 7, at 7 ("Charging method represents another important distinction among types of payments. M-payments may be 'prepaid' (either with phone minutes or through a prepaid platform loaded with cash), 'pay-now' (in which the payment occurs in real-time or 'near real time' in the case of debit cards), and 'postpaid' (charged after the fact to the user's phone bill, credit card, or bank account).").

⁴⁰⁵ Malcolm Spicer, *Competitive Market Demands Competitive Measure in Europe*, COMM. TODAY, July 7, 2000, available at http://findarticles.com/p/articles/mi_m0BMD/is_129_6/ai_63268817.

to customers who chose the post-payment option in terms of average revenue per user ("ARPU"). Pre-paid users of Netherlands Telfort paid \$101 in ARPU, while post-payment users' ARPU was \$674.⁴⁰⁶

3. *Close Relationship between Mobile Communications Carriers and Phone Manufacturers*

The close cooperation between mobile communication services providers and terminal manufacturers is rare in Europe and North America, but not in Korea (Table 2).⁴⁰⁷ Consumers benefit greatly from the connection in terms of more convenient service. For instance, the close relationship of these two business enterprises make a smoother presentation of mobile phones in the market when adopting new technology such as color screens, one-click Internet access buttons, and mobile phones with cameras. By July 2008, 17.82 million of the 22 million SKT customers used a 3G cellular phone that support mobile banking service without change of SIM card by each financial institution.⁴⁰⁸

4. *Intensive Market Intervention by Governments*

Because each government authority's role in modern industrialized countries is complex, "there is a significant risk that the different authorities will not coordinate with each other and that they may even work at cross-purposes."⁴⁰⁹ Compared with Europe and North America, the Korean government's intervention in the mobile communications market is very strong and deep.⁴¹⁰ Korea's policy is very similar to the Japanese regulation policy scheme⁴¹¹ in that government intervention encourages competition among carriers, adopts standards of communication and decides appropriate subscription fees for customers' welfare.

The concerns of government agencies regarding mobile banking market significant regulation and supervision include (i) effective

⁴⁰⁶ However, "post-paid subscriptions grew faster than pre-paid contracts in 2006 resulting in an increase of overall revenues as post-paid customers generate a higher ARPU (Average Revenue Per User)." Commission Regulation 139/2004, Merger Procedure, Article 6(1)(B), 2007 (L 2985) ¶ 29 (EC).

⁴⁰⁷ See BOYD, *supra* note 7, at 9 ("[I]n countries with less vertically integrated mobile industries, progress is inevitably slower.").

⁴⁰⁸ See Customer Service Interview, *supra* note 198.

⁴⁰⁹ See CGAP FOCUS NOTE, *supra* note 8, at 6.

⁴¹⁰ Such as fee policy, wireless frequency band allocation, and subsidy policy.

⁴¹¹ See, e.g., CGAP FOCUS NOTE, *supra* note 8, at 6 ("The United Kingdom's Financial Services Authority (FSA) is required by law to use regulation efficiently to maintain confidence in the financial system, promote public understanding of the financial system, protect consumers of financial services, and reduce financial crime.").

consumer protection,⁴¹² (ii) inclusive e-commerce and security, (iii) foreign exchange control, (iv) prudent risk management, (v) payment systems,⁴¹³ (vi) telecommunications regulation, (vii) fair competition,⁴¹⁴ and (viii) taxation.⁴¹⁵

C. *The Current Situation and Prospects of Mobile Banking in Korea*

In 1995, 80% of Korean banking transactions were processed in offline branch transactions.⁴¹⁶ However, branch transactions dropped to 42% by June 2002, and in recent years the most developed financial service transaction channel has been the Internet.⁴¹⁷ The number of customers registered for Internet banking was 1.23 million by the end of June 2000, but that number grew to 4.09 million by the end of 2000, 7.43 million by June 2001, and 46.94 million by April 2008.⁴¹⁸ Defying many researcher's expectations, the penetration of Internet banking levels were reached far earlier.

"[T]he number of mobile transactions in South Korea rose on a daily average to 287,000 in 2005 up 104%, the number of registered users by 108% in comparison to 2004."⁴¹⁹ Compared to the dramatic increases in cable Internet banking users, mobile banking users' numbers increased from 200,000 at the end of 2000 to 5,700,000 as of March 2008.⁴²⁰

By the second quarter of 2004, there had been \$2.2 billion in mobile banking transactions in Korea.⁴²¹ During the last several years, the total number of mobile banking transactions has been ballooning,⁴²² money transfer services increased by geometric progression, and various check services also skyrocketed thousands of times.⁴²³

⁴¹² See generally *id.* at 14.

⁴¹³ See generally *id.* at 15.

⁴¹⁴ See generally *id.* at 17.

⁴¹⁵ See KPMG, *supra* note 6, at 25 (stating that due to the advance of technology, "monetary and tax authorities are taking a closer look at the implications: the former to protect the value of the national currency, and the latter to determine when virtual money revenues really become taxable.").

⁴¹⁶ One survey reported that "[i]n branch offices, consumers would be most willing to deal with a loan application (86.5%), obtain legal advisory services (80%), and order currency (74.8%)." Suoranta, *supra* note 4, at 61.

⁴¹⁷ See Bank of Korea, *supra* note 35.

⁴¹⁸ See *id.*

⁴¹⁹ See Tiwari et al., *supra* note 17, at 3.

⁴²⁰ See *id.*

⁴²¹ See Boyd, *supra* note 7, at 10.

⁴²² See Bank of Korea, *supra* note 35.

⁴²³ See *id.*

Only a few years ago, domestic banks, like Seoul Bank, and foreign banks, like Citi Bank and HSBC, did not offer mobile banking services.⁴²⁴ Now there is literally no bank which does not offer the service. Currently, almost 5.7 million of Korea's 43 million mobile phone subscribers use mobile banking of some kind.⁴²⁵

Currently, Korean domestic banks provide mobile banking services that are more diversified. More banks offer cash back service and loan services via mobile banking, as well as simple financial transactions like balance checks, transaction receipt checks, and wire transfers.⁴²⁶ Most banks also provide currency checks, personal check inquiries, and cash services. However, loan services and anti-theft services are more sporadic. Compared to U.S. and European leading banks, which reduced investment in mobile banking or stopped the service back in late 2001 or early 2002,⁴²⁷ Korean banks continue to play hardball in the mobile banking business, an indication of the country's maturing economy. This focus has occurred because Korean domestic banks consider cable Internet banking and mobile banking to be essential channels for securing current and future customers. Korean banks compete for first place in providing mobile banking services.

Korean mobile communications carriers have begun providing mobile banking services to their customers through wireless Internet service systems.⁴²⁸ For instance, KTF opened a cyber bank within the wireless Internet 'magic' system by securing the technological cooperation of fifteen commercial banks and SKT and LGT, which also support the bank's mobile banking service through n.Top and eZ-I channels.⁴²⁹

VI. SUCCESSFUL MOBILE BANKING SERVICE CASES IN KOREA

In the mobile banking industry, "[a] key business question would be how to load the purse or stored value application with cash since there is no bank account connected to the traditional channels of electronic credits, ATMs and branches."⁴³⁰ Currently, "[s]ince the development of m-payment is at a relatively early stage and does not yet have a substantial market in terms of volume, most economies in the

⁴²⁴ See Fujii et al., *supra* note 24, at 5.

⁴²⁵ See BOYD, *supra* note 7, at 9; see also Bank of Korea, *supra* note 35.

⁴²⁶ See Datta et al., *supra* note 45, at 72.

⁴²⁷ For example, Bank of America (U.S.), Egg Bank and National Westminster (U.K.).

⁴²⁸ See *supra* discussion Part IV.B.2. (discussing many-to-many model).

⁴²⁹ Yeongsam Yun, Trend and Prospect of Mobile Banking Service, Issue Analysis 2008.7 at 6 (2008) (S. Korea).

⁴³⁰ See KRUGEL, *supra* note 3, at 11.

Asia-Pacific region are approaching the subject with caution.”⁴³¹ Some industry experts observed that, “[s]ince the m-payments industry is in its infancy, industry and public consultations are another common policy feature.”⁴³²

This part of the paper introduces two Korean commercial banks that have successful mobile banking business stories and customer protection policies.

A. Woori Bank

Woori Bank provides banking services to its customers through an Internet banking service mechanism. Currently, Woori Bank focuses on Internet banking services for individual customers, but it is gradually pursuing targeting of corporate customers such as small or medium-size companies and self-employed individuals. In the meantime, considering that mobile banking services are still in their initial stages,⁴³³ Woori Bank is strategically entering the market now to respond to market needs.

1. Overview

Woori Bank incorporated in 2002 by changing its name from Hanvit to Woori Bank.⁴³⁴ Hanvit Bank had been formed by the merger of Korean Commercial Bank and Hanil Bank in 1999.⁴³⁵ In 2001, other Korean domestic banks merged into Hanvit Bank and set up Woori Financial Group in order to restructure the financial institutions and liquidate the non-performing loans of the many domestic banks that resulted from government programs during the period after the Asian economic crisis.⁴³⁶

Presently, the Woori Financial Group consists of assets from five local banks such as Gwangju Bank, Woori Bank, Gyungnam Bank, Pyunghwa Bank, and Hanaro Investment Bank.⁴³⁷ Woori Bank is by far the biggest shareholder in the Woori Financial Group and is, in fact, the biggest commercial bank in Korea, an authorized capital of

⁴³¹ See KPMG, *supra* note 6, at 29.

⁴³² See *id.* at 33.

⁴³³ See Suoranta, *supra* note 4, at 63 (comparing to Korea, “[i]n the Finnish setting, a explanation could lie in the fact that the diffusion of mobile banking is still at a relatively early stage [and] those customers who have already adopted mobile banking can be categorized as innovators. . . .”)

⁴³⁴ The bank has been running for the last 110 years. The original firm of Woori Bank was established in January 1899. See <http://www.wooribank.com/> (last visited Feb. 27, 2009).

⁴³⁵ *Id.*

⁴³⁶ *Id.*

⁴³⁷ *Id.*

3.179 trillion KRW, with assets totaling 236 trillion KRW.⁴³⁸ It also has the second-largest network in Korea, with over 15,000 employees.⁴³⁹ Based on the revenue report released in April 2008, the net profits of Woori Bank totaled 1.49 trillion KRW, out of which approximately 642 billion KRW was profit derived from credit card sales.⁴⁴⁰ Woori Bank's IT budget increased slightly from 10.5 billion KRW in 2000 to 40 billion KRW in 2008.⁴⁴¹

2. Mobile Banking Service

Currently, Woori Bank has 14 million individual customers and more than two million corporate clients, and nearly 65% of its customers, or approximately 7.4 million, use Internet banking services.⁴⁴² Also, 40% of the Internet banking service users, or around 2.9 million customers, utilize mobile banking services.⁴⁴³ In Korea, mobile banking services were used 50,000 times per year in 2000, but in the first half of 2008, this number soared to over 893,000 times per day.⁴⁴⁴ Accordingly, Woori Bank forecasts 7 million service users for mobile banking by 2010.⁴⁴⁵

Woori Bank even offered limited mobile banking services in 2000 when its name was Hanvit Bank. Based on this, it began to offer broader and safer mobile banking services beginning in 2001.⁴⁴⁶ While Woori Bank provides mobile banking services, it is also focusing on an integrated system setup connected with the previous banking system because the system prevents duplicate investments and allows the bank to provide services through both wire and wireless Internet.⁴⁴⁷ In order to do this, Woori Bank established Woori Bank "e-Com center" in 2000—later changing the name to Woori Bank "e-Business center"—which employed forty-seven highly skilled workers.⁴⁴⁸

The core function of the e-Business center is to operate system technology and perform maintenance for the entire Internet banking

⁴³⁸ Junhwan Ban, *Mr. Haechun Park, Woori Bank CEO—With the Balmy Breeze in One Year Assumption of Office*, MONEY TODAY (Mar. 25, 2008) (S. Korea), available at <http://stock.moneytoday.co.kr/view/mtview.php?no=2008032513005187177&type=1>.

⁴³⁹ *Id.*

⁴⁴⁰ *Id.*

⁴⁴¹ Telephone Interview with Yonghee Lee, Senior Manager of e-Business Team, Woori Bank, in Seoul, Korea (Sept. 15, 2008) [hereinafter Lee Interview].

⁴⁴² *Id.*

⁴⁴³ *Id.*

⁴⁴⁴ *Id.*

⁴⁴⁵ *Id.*

⁴⁴⁶ *Id.*

⁴⁴⁷ Lee Interview, *supra* note 441.

⁴⁴⁸ *Id.*

system of Woori Bank.⁴⁴⁹ The center also operates the hardware and services and maintains both wire and wireless Internet networks for the bank.⁴⁵⁰ At the same time, Woori Bank is pushing the wire and wireless Internet service linked with a direct e-CRM base through the e-Business center.⁴⁵¹

3. *Relationship with Technology Providers for Mobile Banking Services*

For more sophisticated mobile Internet services, Woori Bank has developed good partnership relationships with several existing technology providing carriers.⁴⁵² At the initial stage, 724 Solutions, Inc., NASDAQ listed leading global provider of Internet infrastructure software, provides mobile banking platform technology for Woori Bank,⁴⁵³ including e-Clips service, the first Korean online account aggregation service⁴⁵⁴ through which customers can check their personal online banking transactions at any one of fifty bank and credit card websites.⁴⁵⁵ Even though the infrastructure of Woori Bank's mobile banking service is somewhat set up, the customer-related service currently operating depends mainly on Arreo Networks Inc. and the technology infrastructure of Koreadotcom, Korea's SI company.⁴⁵⁶

Woori Bank's mobile banking platform, established in November 2001, was 724 Solution's first visible accomplishment after starting business in Korea in providing wireless Internet platform technology for financial and communications mobile companies while cooperating with Koreadotcom.⁴⁵⁷ Chart 1, below, reflects a typical mobile banking operating system ("OS").

⁴⁴⁹ *Id.*

⁴⁵⁰ *Id.*

⁴⁵¹ *Id.*

⁴⁵² See Datta, *supra* note 45, at 71.

⁴⁵³ "724 Solutions Inc." is the company that supports services of financial transaction contents, information and messaging by using mobile devices such as handsets, PDA, PAM, and compact i-packs, for 270 million internationally secure private customers. 724 Solutions Software Inc. Home Page, <http://www.724.com/company/> (last visited Aug. 30, 2008).

⁴⁵⁴ Woori Bank Home Page, <http://www.wooribank.com/> (last visited Feb. 27, 2009); see also Lee Interview, *supra* note 441.

⁴⁵⁵ Lee Interview, *supra* note 441.

⁴⁵⁶ *Id.*

⁴⁵⁷ *Id.*

<CHART 1>

Woori Bank's Mobile Banking Operating System

Client-side	Intermediaries		Provider-side (Woori Bank e-Business Center)			
End User	MNO ⁴⁵⁸ & Wireline ISP		Mobile	Applications & Integration		
PC & Mobile phone	Hypertext Markup Language		Banking Platform	Aggregation Server	Mobile Banking Server	Multi-device Server
	WAP	Wireless Markup Language	724	Sun Enterprise Server HW		
			Solutions	Sun Enterprise 3500		
			Inc.→Arreo	Sun Netra T1 → IBM Web-spares		
			Networks Inc.	Sun Enterprise 220Rs (product testing)		

Sun Microsystems, Inc., a U.S.-based world computer equipment manufacturer, went into partnership with Woori Bank to provide the bank's e-Clips and hardware system for its mobile banking service.⁴⁵⁹ The bank's e-Business center had built two Sun Netra T1 systems for proxy server operation⁴⁶⁰ and harmonious maintenance of the management environment.⁴⁶¹ This technological foundation enables the bank to operate the application and database server more effectively, compared to the Sun Enterprise 3500 system it had used previously for a changeover of signal between the bank and communication firms.⁴⁶²

The bank's e-Business center obtained additional web-servers consisting of ten more IBM Web-spares for integrated banking ser-

⁴⁵⁸ KRUGEL, *supra* note 3, at 4 ("The MNO typically has a bigger customer base than that of a bank.").

⁴⁵⁹ See Lee Interview, *supra* note 441 (noting that hardware system supported by Sun Enterprise Server HW did act as an intermediary among servers by channels from the mainframe of HOST).

⁴⁶⁰ *Id.*; see also Public Proxy Servers, <http://www.publicproxyservers.com/> (last visited Feb. 27, 2009) ("A proxy server is a kind of buffer between [user's] computer and the Internet resources [when users] are accessing.").

⁴⁶¹ See Lee Interview, *supra* note 441.

⁴⁶² See *id.*

vices.⁴⁶³ In addition, the bank installed other servers for operation of smooth commercial services.⁴⁶⁴

4. *Relationship with Mobile Carriers*

Woori Bank's mobile banking services are available for use with a mobile device equipped with a mobile browser that can access mobile Internet services such as nate.com of SKT, n.Top of KTF, and eZ-i of LGT.⁴⁶⁵ This is different from the Western European stylesystem approach from the western European style, whose mobile banking services apply a combination of WAP-mode micro-browser functions and SMS functions.⁴⁶⁶

The Korean mobile communications market service standards are primarily being set by CDMA networking technology. Woori Bank, following that technology base and started services for customers who subscribed to mobile services for which Internet communication was possible: SKT, LGT, and KTF.⁴⁶⁷

5. *Mobile Banking Services Functionality*

In response to customer needs, the bank has grown its mobile banking services in stages. The first stage was providing account information, transaction details, and wire transfers between Woori Bank accounts. The wire transfers were provided fee-free, while transfers to banks incurred a small service fee.⁴⁶⁸ All customers with Woori Bank accounts are entitled to simple inquiries, such as account balance, transaction details, and credit card account information.⁴⁶⁹ However,

⁴⁶³ See *id.*

⁴⁶⁴ See *id.*

⁴⁶⁵ KRUGEL, *supra* note 3, at 20 ("A consumer would browse through his phone menu until they find the J2ME application, select and launch the application, and follow the JAVA browser menus to complete a transaction.").

⁴⁶⁶ *Id.* at 33. (describing that "WAP allows for a GPRS session to be opened between the handset web browser and the web application at the bank. This session is protected once again by the encrypted GSM communication layer and then can be further protected by encryption of the actual banking website that is being accessed. This makes WAP banking open to similar threats as internet banking, yet further secured in that the bank can establish that the session has been initiated by the consumer's SIM.").

⁴⁶⁷ See *supra* Part IV.B.2.

⁴⁶⁸ See Lee Interview, *supra* note 441.

⁴⁶⁹ Woori Bank is not a mobile bank but a bank that provides mobile banking services. The mobile bank and mobile banking services are vastly different notion. One Chief Operating Officer of Fundamo stated that:

A mobile bank is essentially a new bank or product built around the understanding that the primary interaction with the bank will be through a mobile device. A mobile banking solution on the

to utilize another service such as wire transfers or credit card cash back service, customers must register for Internet banking beforehand and have cellular phone access with wireless Internet access. Customers log in with an Internet banking ID, and while they are not required to enter their account number, they have access to all mobile banking services in both English and Korean.

Woori Bank's mobile banking financial services have several functions:⁴⁷⁰ (i) account balance and recent activity inquiries, (ii) account funds transfer, (iii) check inquiry,⁴⁷¹ (iv) loan inquiry and payment, (v) initiation of new financial products, (vi) branch location search, (vii) foreign exchange rate inquiry, (viii) credit card cash back services, (ix) mobile account aggregation,⁴⁷² and (x) help functions.⁴⁷³

B. Shinhan Bank

Shinhan Bank ranks third in size among commercial banks in Korea.⁴⁷⁴ The bank provides unique mobile banking service through the use of PDAs and cellular phones and allows 24-hour access to the

other hand is the evolutionary step after Internet banking. It is an additional service bolted on top of an existing solution - making access to services more immediate and reducing customer reliance on branch infrastructure or access to the Internet.

Craig Saks, *Mobile Banking vs. a Mobile Bank*, MOBILEIN, Aug. 30, 2008, available at <http://www.mobilein.com/Perspectives/MobileBanking.html>.

⁴⁷⁰ One case study uniquely classified the mobile banking services.

One way to classify [mobile banking] services depending on the originator of a service session is the 'Push/Pull' nature. 'Push' is when the bank sends out information based upon an agreed set of rules, for example your banks sends out an alert when your account balance goes below a threshold level. 'Pull' is when the customer explicitly requests a service or information from the bank, so a request for your last five transactions statement is a Pull based offering.

INFOGILE TECHNOLOGIES, *supra* note 43, at 3.

⁴⁷¹ This function allows customers to check for any fraudulent activity involving their checking accounts. See Lee Interview, *supra* note 441.

⁴⁷² This function accesses multiple pieces of account information with a single step. See *id.*

⁴⁷³ This function accesses Tele-banking, helper connection, and banknote and card loss reporting. See *id.*

⁴⁷⁴ The information was taken from the bank's website, <http://www.shinhan.com>, and other sources obtained through a telephone interview with manager at the customer service department on July 31, 2008. Telephone Interview with Sangyeol Youn, Customer Service Manager, Shinhan Bank, in Seoul, Korea (July 31, 2008).

inquiry service and fund transfers.⁴⁷⁵ Mobile communication firms charge a monthly transaction fee of 1000 KRW (approximately \$0.90 USD) for fund transfers to other banks. While there is a charge for this value added communication fee, other services are provided free of charge.⁴⁷⁶ Currently, the more accessible mobile banking communications mode is the WAP browser, which allows network identification codes of 011 and 017 (SKT), and 019 (LGT), while the other mode, ME browser, can be accessed by 016 and 018 (KTF), meaning that five different communication companies are all allowed to use the wireless phone service.⁴⁷⁷

The mobile banking service for Shinhan Bank can be divided into three broad sections: a wire transfer service that encompasses both intra-bank transfers and transfers to other banks, credit card companies, and concentrated funds;⁴⁷⁸ inquiries such as account balance and non-currency transaction details;⁴⁷⁹ and credit card services such as remaining balance inquiries, cash back service, and fund transfers.⁴⁸⁰

Shinhan Bank's mobile banking services, as with most other banks, can be used anywhere and anytime.⁴⁸¹ Fees are low; for example, 1000 KRW for wires to other banks, and services are available to all Shinhan Bank customers, not just those registered for Internet banking.⁴⁸²

While Shinhan Bank considers banking service done with mobile devices such as cellular phones or PDAs to be mobile banking services, most banks consider services done through PDAs as a separate service known as PDA banking.⁴⁸³ However, because of the rapid development of mobile devices, the standards for separating services accessed through cellular phones, Smartphones, PDA, and handheld PCs are difficult to define individually. Cellular phones evolved with the

⁴⁷⁵ Telephone Interview with Yeonggil Kim, Press Agent, Shinhan Bank, in Seoul, Korea (Sep. 23, 2008) [hereinafter Kim Interview].

⁴⁷⁶ *Id.*

⁴⁷⁷ In the internal review process before introducing mobile banking, offline mobile banking was considered. Offline mobile banking provides bank services after transferring data to an ATM or POS device linked to bank account systems via radio frequency, barcode scanning, and cellular phone wireless infrared communication, which save financial information in the cellular phone memory or on an IC chip. *See id.*

⁴⁷⁸ *Id.*

⁴⁷⁹ *Id.*

⁴⁸⁰ *Id.*

⁴⁸¹ *See supra* notes 7, 17–18, 23 and accompanying text.

⁴⁸² *See* Kim Interview, *supra* note 475.

⁴⁸³ Suoranta, *supra* note 4, at 13 (“Electronic banking can be defined in various ways.”).

purpose of vocal communication, and PDA-type devices (Smartphone, handheld PCs, etc.) developed as a compact version of the electronic notebook for management of private scheduling. Despite their differences in origin, cellular phones now offer traditional PDA functions and vice versa. Any gap between the two has disappeared and their features are essentially indistinguishable.

In comparison, cellular phones have basic operating systems with the application module added; PDAs are so similar to PCs that it is not much of a stretch to call them miniature PCs. PDAs can set up program applications using a Windows OS similar to PCs. PDAs that use Windows Embedded Compact ("WinCE") as their OS have menus and applications that are similar to the Windows environment. A PDA is essentially a handheld PC.

PDAs are the next-generation personal mobile device that combines wireless communications and information-processing.⁴⁸⁴ A PDA's functions can include those for (i) managing daily schedules, (ii) managing information through the use of an electric pen or writing technology, (iii) searching for references such as dictionaries or reference manuals, and (iv) accessing email, fax, wireless paging, and mobile phone messaging.

There are currently many types of PDA operating systems, including WinCE, Symbian, Palm, and Cellvic, but for PDA banking, most banks provide services that are compatible with WinCE. Because Shinhan Bank's PDA banking services are more similar to PC Internet banking services than to mobile banking services, the popular WinCE mode facilitates user recognition.⁴⁸⁵ For PDAs, access to bank account systems requires only wireless service, but the PKI module for Internet banking services can also be applied to PDAs.⁴⁸⁶ Shinhan Bank's PDA banking services attempt to minimize design and service menus so that Internet banking service web screens can be appropriately used on smaller screens.⁴⁸⁷

In November 2001, prior to the merger of Choheung Bank and Shinhan Bank, Choheung Bank was able to provide the first PDA banking service by applying for a cable certificate issued by the Korea Financial Telecommunications and Clearings Institution ("KFTC").⁴⁸⁸

⁴⁸⁴ See Kim Interview, *supra* note 475.

⁴⁸⁵ See *id.*

⁴⁸⁶ See *id.*

⁴⁸⁷ See *id.*

⁴⁸⁸ See HEWLETT-PACKARD, SUCCESS STORY SETTLING TEN MILLION TRANSACTIONS PER DAY, KOREA FINANCIAL TELECOMMUNICATIONS & CLEARINGS INSTITUTION, available at <http://h20219.www2.hp.com/NonStopComputing/downloads/Korea%20Financial%20Telecom.pdf> ("Korea Financial Telecommunications & Clearings Institution (KFTC) was formed in 1986 through the merger of two entities—Korea Clearing and Credit Reporting Center and Korea Bank Giro Center. KFTC plays

Because the Ministry of Communications and Information Technology did not announce whether PDAs were in the range of cable or wireless communications, the banks that provided PDA banking service used a cable certificate module after making preparations for PDAs.⁴⁸⁹

Services provided by PDA banking are similar to those available through Internet banking: inquiries, wire transfers, and credit card related services. PDA banking service differs from Internet banking only in that PDAs do not use a mobile communication method. PDA banking does not depend on mobile communication networks, so there is a substantial difference from mobile banking services, which are based on cellular phones.

For both Internet and mobile banking services, communication security is the most important aspect of establishing a system. Because PDA banking services use the communication service security module also used by existing Internet banking services, the banks provide PDA banking services with the same security modules from security companies that were used in Internet banking.⁴⁹⁰ Internet banking service registration is mandatory in order to use PDA banking services, and even then only after setting the operating program, installing the security program and receiving certificates.⁴⁹¹

Shinhan Bank's PDA banking is a convenient service used for various inquiries, wire transfers, and cash back service by credit card.⁴⁹² With the selection for certification issued by KFTC so that the security is similar to that of Internet banking, according to the Electronic Signature Act,⁴⁹³ financial transactions are legally binding and can be upheld in court.⁴⁹⁴ In addition to banking services, any client may obtain useful financial information, such as Shinhan Bank news, economic index, and descriptions of financial products on the Shinhan Bank PDA web page.⁴⁹⁵

C. Customer Protection

Beginning January 1, 2007, under the Electronic Financial Transactions Act ("EFTA"),⁴⁹⁶ Korean companies engaged in electronic

an integral role in managing Korea's vibrant financial services infrastructure. The agency handles all interbank routing of financial transactions and real-time funds settlement.").

⁴⁸⁹ See Kim Interview, *supra* note 475.

⁴⁹⁰ *Id.*

⁴⁹¹ See *id.*

⁴⁹² *Id.*

⁴⁹³ Electronic Signature Act, No. 5792 (1999) (S. Korea).

⁴⁹⁴ See Kim Interview, *supra* note 475.

⁴⁹⁵ *Id.*

⁴⁹⁶ Electronic Financial Transactions Act, No. 7929 (2006) (S. Korea).

financial transactions, such as offering credit or deferred terms of payment, means of payment and the process of payment settlements, must obtain a license from the government.⁴⁹⁷ The EFTA is a general rule applicable to any person who engages in electronic, not cash or in kind, financial transactions and businesses. Security issues are inseparable from the idea of mobile banking for customers, service providers, and regulators.⁴⁹⁸ Under the EFTA, payment companies, except for financial institutions, are *prima facie* liable for financial damage to customers and are subject to proof of reasonable security measures, which include adequate insurance.⁴⁹⁹ The commercial operations of MNOs will be subject both to the EFTA and the E-Commerce Act⁵⁰⁰ whenever m-payments involving trades occur. Remittance and related banking services, as an international financial service, inevitably confront a more complex regulatory and policy framework than purely domestic services.⁵⁰¹

Finally, under the Telecommunications Business Act (“TBA”)⁵⁰² persons who operate online marketplaces must have a value-added service provider license, must file reports on their status with the Ministry of Information and Communications and are subject to the Information Communication Network Act that covers access to information and data protection.⁵⁰³

The obligations imposed on online financial companies include: (i) accounting separations between different lines of financial business;⁵⁰⁴ (ii) meeting minimum security standards;⁵⁰⁵ (iii) keeping transactions records for up to five years;⁵⁰⁶ (iv) providing performance

⁴⁹⁷ See TAE HEE LEE, *ELECTRONIC FINANCIAL TRANSACTIONS IN KOREA*, available at <http://www.iflr1000.com/default.asp?page=38&CH=3&sIndex=2&CountryID=22> (“Under the EFTA, any person who wants to engage in the business of issuing and managing electronic money must obtain approval from the Korean Financial Supervisory Commission (FSC).”).

⁴⁹⁸ Posting of Mark Pickens to CGAP Microfinance Blog, <http://technology.cgap.org/2008/04/03/mobile-security-in-mobile-banking/#more-406> (Apr. 4, 2008).

⁴⁹⁹ Electronic Financial Transactions Act, art. 9(1).

⁵⁰⁰ Electronic Commerce Act, No. 7440 (2005) (S. Korea).

⁵⁰¹ In case of cross-border remittance, “[m]obile operators may face operational constraints due to (a) restrictions on cross border trade in retail financial services, (b) currency convertibility and (c) differences between national legislative and regulatory frameworks that erode opportunities for economies of scale to be achieved in a cross-border environment.” MORTIMER-SCHUTTS, *supra* note 64, at 10.

⁵⁰² Telecommunications Business Act, No. 7916 (2006) (S. Korea).

⁵⁰³ *Id.* art. 21.

⁵⁰⁴ Electronic Financial Transactions Act, art. 42(1).

⁵⁰⁵ *Id.* art. 1.

⁵⁰⁶ *Id.* art. 22(1).

reports to the Financial Supervisory Service ("FSS"),⁵⁰⁷ and (v) being subject to FSS supervision.⁵⁰⁸

The regulatory environment delineates financial market opportunities and the cost of compliance, and also influences the assignment of risk and obligations between stakeholders.⁵⁰⁹ Korean regulatory regimes, however, highlight the need for fresh thinking and a new approach regarding redress of grievance and consumer data privacy if the full potential of mobile financial service is to be achieved.⁵¹⁰

The other important issues are the effect of regulation on competition, efficiency, and the quality of mobile financial services.⁵¹¹ Regulatory authorities and policy makers should ensure that current banking regulations do not undermine or limit the growth potential of the market or other innovative trends.⁵¹²

MNOs and payment processors are not necessarily competitors to established financial institutions or big commercial players who seek large potential revenue and other measurable financial benefits, but they have the potential. Therefore, "[i]nteroperability of [mobile banking] schemes must be carefully considered to enable operators to benefit from network effects but ensure that the intensity of competition in new markets and need for innovation is not stifled."⁵¹³

While restrictive financial regulations, including policies governing competition, work to reduce competition, proportional financial regulations are more likely to bring about the benefits of competition among the m-banking and commercial banking players.

VII. CONCLUSION

Despite skepticism from some experts, banks will continue to pursue the mobile banking business because of its potential.⁵¹⁴ Ac-

⁵⁰⁷ *Id.* art. 39(1)–(6).

⁵⁰⁸ *Id.*

⁵⁰⁹ See, e.g., KPMG, *supra* note 6, at 41 ("Yet technologies give the mobile phone more processing power, more memory and therefore more 'reach' into the worlds of banking, finance, and commerce. This also entails greater exposure to risk.").

⁵¹⁰ See Cellular-News, *Vodafone Calls for Regulation to Encourage Mobile Banking*, July 4, 2007, available at <http://www.cellular-news.com/story/24733.php>.

⁵¹¹ See generally DAVID PORTEOUS & NEVILLE WISHART, M-BANKING: A KNOWLEDGE MAP, INFODEV, at 6, available at <http://www.infodev.org/en/Publication.169.html> (advising that "specific regulatory impediments vary by market; but in general a lack of openness . . . and a lack of policy certainty limit the potential of new [banking service] models. Increasing openness and certainty may require support to regulators to outline high level policy, as well as to amend existing regulations or draft new ones where and when required.").

⁵¹² See Cellular-News, *supra* note 510.

⁵¹³ *Id.*

⁵¹⁴ Feig, *supra* note 83.

according to Tiwari, "in the short to medium run, the mobile channel can be expected to become a perhaps indispensable part of the multi-channel strategies in the banking sector, following in the footsteps of online banking."⁵¹⁵

Just as each country creates its own authentic mobile banking market, the Korean mobile banking market has been formed based on its particular domestic environment. In Korea, the Internet environment created by PCs is well structured and includes a high propagation of cellular phones, the use of which is prevalent among the younger generation.⁵¹⁶ Because of these characteristics, mobile banking services were first utilized as an auxiliary method linked to the already popular cable Internet services, rather than having been established as an independent service mechanism. Later, using the mobile portal and led by communications companies, mobile banking services began to be utilized as one of the main menus.

The successful initiation of mobile banking services in Korea suggests that factors that had been considered obstacles in the expansion of mobile banking service were no more than imaginary fears.⁵¹⁷ These fears and obstacles included: (i) slow penetration of mobile phone or PDA into potential subscribers;⁵¹⁸ (ii) insufficient communication protocols and standardization of mobile communication technology; (iii) the inability to build cooperative relationships between mobile communication carriers and phone manufacturers, banks, technology developers, etc; and (iv) the inability to spread mobile banking service to clients. However, Korean business entities actively accepted new technology that related to mobile data communication and the close relationship and cooperation between banks, mobile communication carriers, government, phone manufacturers, and mobile contents service providers enabled mobile banking providers to overcome the obstacles to their growth.⁵¹⁹

An examination of the Woori Bank case clearly shows that the Korean mobile banking business grew dramatically even when only basic services were provided, indicating that Korean subscribers are

⁵¹⁵ Tiwari, *supra* note 17, at 12.

⁵¹⁶ See *supra* notes 339–342 and accompanying text.

⁵¹⁷ See, e.g., BOYD, *supra* note 7, at 10 ("The Korean case suggests at once the broad commercial potential for m-banking and the potential tensions associated with platforms built through cross-industry collaboration.").

⁵¹⁸ See, e.g., Datta et al., *supra* note 45, at 76 (noting that "[i]t took about 30 years for credit cards to catch on in the United States, and although smart cards were launched more than a decade ago, none has yet taken off.").

⁵¹⁹ See generally Kim, *supra* note 1, at 327, 340–41; Kim, *supra* note 170, at 214 (providing examples of business development and relationships in Korea).

ready and willing to use mobile banking services.⁵²⁰ However, for sustainable growth in mobile banking, more sophisticated services, such as m-payment methods and abundant content, should be developed. New financial services based on m-payments will provide additional value for users, so it can be logically expected that a larger demand for mobile banking will develop with the continued growth of electronic commerce. Therefore, banks must actively provide new forms of financial services linked with the strategy of expanding existing services with mobile phones.

One industry analyst advised that “banks, still struggling with the U.S. mortgage crisis, should see mobile banking as way to attract customers and their deposits . . . and trim costs, too.”⁵²¹

⁵²⁰ See, e.g., Suoranta, *supra* note 4, at 29 (insisting that “[i]ndividual differences will have an effect on adoption of mobile banking services in terms of technology perceptions and . . . demographics defined as: (1) gender, (2) age, (3) marital status, (4) education, (5) household income.”).

⁵²¹ *Mobile Banking*, *supra* note 26.