

# Analysis on Development, Risk and Security Strategy of China's Mobile Banking Service

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**Abstract** –As the virtual work environment of the entity bank, the potential risks of the mobile banking service are far higher than those of the traditional banks. Starting from the development history and business characteristics of mobile banking service, this paper is analyzed on the current situation of our country, and further to mobile banking risks, then based on these, puts forward the corresponding security strategies. It is significant for the authorities to develop the mobile banking service, effectively guard against and control the risks.

**Keywords** –Mobile banking service; Analysis of risk; Security strategy

## 1. The development of mobile banking history and business characteristics

In September 1996, Czechoslovakia launched the world's first commercial mobile banking products, has taken the first step in the global mobile financial services. Since then, Bank of America, Wells Fargo, Deutsche Bank and other well-known international financial institutions have started mobile banking business innovation, and gradually developed into a leader in the field of global mobile banking today. The domestic mobile banking from the beginning of the 21st century start, ICBC, Bank of China, China Construction Bank, China Merchants Bank and China Mobile, China Unicom launched a SMS-based mobile banking. Decades, along with the continuing upgrade of mobile communications and terminal technology, global mobile phone banking also constantly upgrading, show innovative mobile financial services to commercial banks charm.

Overall, the development of the mobile banking business can be divided into three stages: First, SMS mobile banking (2000-2003), the customer is sent to the

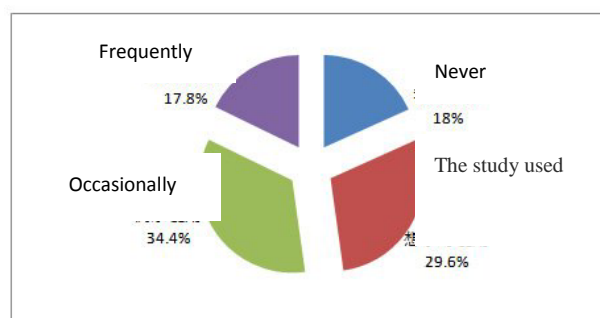
bank specified format of SMS, use account inquiries, bill payment and other financial services. WAP mobile banking (2004-2009), during this period, the mobile Internet portal booming range of traditional CNN, Sina and other Internet information service providers have been offering mobile website, the banking sector will be developed based on WAP technology standard mobile banking products, SMS, WAP mobile banking has a graphical user interface and encryption mechanisms, relatively rich product features, customer experience smoother. Client mobile banking (2009-present), the development and popularization of smart phones lead the global mobile phone banking to enter a new era of application. This stage, a series of revolutionary innovations let the entire world to marvel, especially the IPHONE mobile phones, and the advent of the Apple application store completely subvert the people on the phone. Bank of America, Wells Fargo and other well-known financial industry to respond quickly to the "the phone PC" trend, financial applications for IPHONE phones deployed in succession at the Apple Store. Client mobile banking is not only to provide financial services

to more advanced features of the terminal in the fusion of the "multi-touch, gravity sensor, and location-based services, anytime, anywhere, portable, brand new financial experience for customers.

Meanwhile, as a large family of e-banking, mobile banking, contains a unique business value. First, mobile banking is a trump card to attract high-quality customers. The high-end customers want to enjoy flexible, convenient and personal financial services, mobile banking is highly differentiated, service oriented, has personal experience of the service model to become a weapon to attract high-end customers. Secondly, mobile banking is a good helper to save operating costs. Mobile banking through the terminal and communication network in response to customer demand, without having to rely on intensive physical outlets, you can save a lot of hardware and labor costs. According to industry estimates agree rule, the cost of each counter service equivalent to 6-10 times the phone banks. Finally, the mobile banking permits commercial banks to participate in the next competition. Scale of future bank no longer measure the number of outlets, number of employees, and advanced mobile terminals, as well as the opening up of the customer advantage by virtue of the low cost of Internet, mobile banking will drive new commercial bank business model transformation and change, it is bound to become a foreign Bank focal point of contention.

## 2. The development of China's mobile banking Analysis

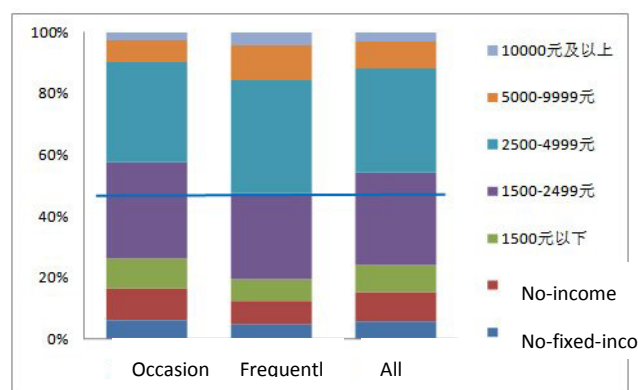
According to the findings of the "2011 Mobile Banking user research report" shows that the utilization rate of mobile phone banking mobile phone users has significantly increased, survey results, 36.8% in July 2010, has risen to 52.2% in February 2011. The same time, mobile phone banking began to spread to the middle-aged population corresponding to the current user's personal monthly income of mobile banking income levels are higher than in July last year, users. Population structure optimization indicates good prospects for the development of mobile banking.



**Figure 1** mobile phone users use mobile banking

Source: 3G portal "2011 China's mobile banking user research report"

Can be seen through different mobile banking users personal monthly income distribution, mobile banking users often use personal monthly income is high, personal monthly income of 5,000 yuan more than the ratio of 15.4%, and the proportion of more than 2,500 yuan, 52.2%, higher than the occasional use of mobile banking users. In fact, users often use mobile banking because of high income and mobile banking use high frequency, is bound to become the core of the mobile phone banking customers, the more affluent target group will largely promote the prosperity of mobile banking.

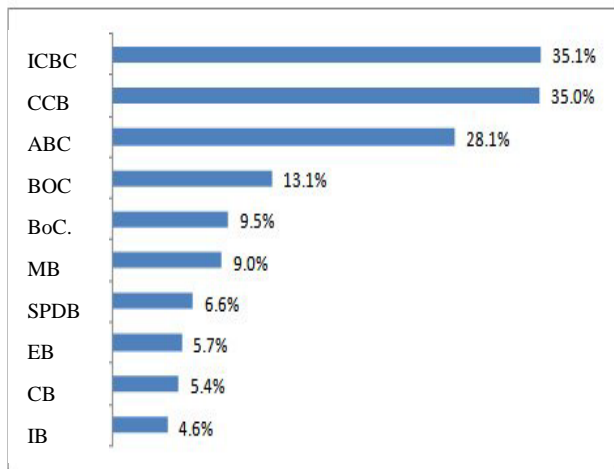


**Figure 2** mobile banking users personal monthly income distribution

Source: 3G portal "2011 China's mobile banking user research report"

Analysis of the use of mobile banking, mobile banking users, the utilization of the ICBC Mobile Banking is still the highest, at 35.1%, followed by Construction Bank to 35.0%. Further analysis found that users often use mobile banking, utilization rates slightly higher than that of the Industrial and Commercial Bank of China Construction Bank mobile banking usage rate (37.4%) (36.0%), which indicates that the CCB users relative to develop the use of mobile banking habits. In addition, the utilization of the Agricultural Bank and the Bank of China significantly in

the past six months has improved, continued to narrow the gap with the industry leader.



**Figure 3** mobile banking usage

Source: 3G portal "2011 China's mobile banking user research report"

In this research, the different groups of people most commonly use mobile banking index analysis showed that school students are more likely to frequent use of mobile banking payment functionality, less use of mobile financial management functions; administrative / institutions, state-owned enterprises cadres prefer remittance function to use mobile banking, payment, credit card, functional and financial management functions, especially financial management functions; administrative / institutions, state-owned enterprises workers often use the credit card function and financial management functions tendency is very obvious; foreign companies / private enterprises, senior director of the more inclined often using a credit card; private business owners often use mobile banking credit card tendentious significant.

**Table 1** of the different groups of people most commonly used functions of mobile banking index analysis

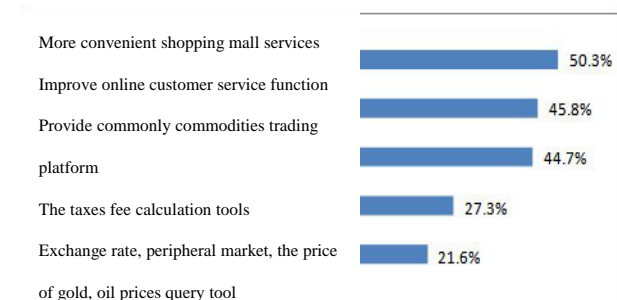
	Account Management	Remittance	Fee function	Payment function	Credit card functions	Financial management
Students in school	101.1	89.4	93.4	121.3	71.4	68.5
Administrative / institutions, state-owned enterprises cadres	94.9	114.9	115.8	86.6	119.7	146.1
Administrative / institutions, state-owned enterprises workers	110.6	99.6	107.0	104.1	126.5	126.0
Foreign companies / private enterprises, senior director of the	99.1	102.2	91.4	86.2	123.1	93.6
Foreign companies / private enterprises staff	106.3	99.8	91.0	92.7	101.4	97.1
Professional and technical personnel	93.5	95.6	110.4	99.5	103.2	101.0
Private entrepreneurs	87.0	99.2	99.7	97.2	126.1	110.9
Self-employed, migrant workers	101.6	111.5	98.8	93.1	94.1	103.4
Farmer	78.1	80.8	83.1	85.2	114.4	117.9

Source: 3G portal "2011 China's mobile banking user research report"

The survey found that more than half of the users want mobile banking to shopping mall, which indicates that the user is a large potential demand for shopping mall. The use the Mall of users of mobile banking accounted for 64.3%, 10.8% of users often use, 31.4% occasional use,

22.1% rarely used. Which administrative / institutions, state-owned enterprises cadres, foreign / private enterprises in middle and senior managers and private entrepreneurs often use mobile banking Mall Service propensity significantly more obvious intention, foreign

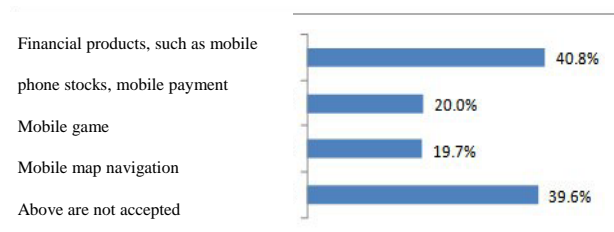
companies / private enterprises in the use of staff, students and farmers' groups rarely and groups of farmers do not intend to use the mobile phone shop tendency is very obvious.



**Figure 4** users hope can provide mobile banking services

Source: 3G portal "2011 China's mobile banking user research report"

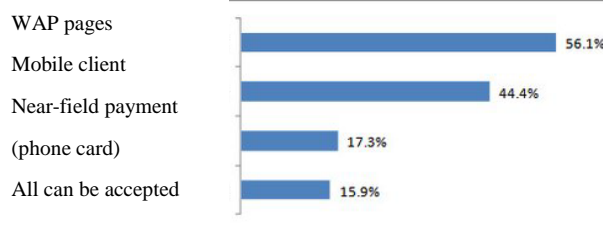
User research data analysis, over 40% of mobile banking users be able to accept the implementation of financial products, such as mobile phone stocks and mobile payment charges, at the same time, about the user to accept the implementation of mobile games and mobile map navigation charges. This indicates that the specific mobile application service charges can be part of the user's acceptance and recognition.



**Figure 5** users can accept mobile application service charges

Source: 3G portal "2011 China's mobile banking user research report"

In addition, mobile banking users use mobile payment, the preferred WAP pages, 56.1% of the users are more willing to adopt this form. Followed by the mobile client, the ratio was 44.4%. The near-field payment (phone card) so pay more innovative forms, are willing to use the proportion of users accounted for only 17.3%. In addition, 15.9% more than in three ways are acceptable.



**Figure 6** mobile banking users willing to adopt the form of mobile payment

Source: 3G portal "2011 China's mobile banking user research report"

Mobile banking users in the use of mobile payment tend to micro-payment, over 70% of users use mobile banking to pay the maximum amount of time in the 1,000 yuan, of which, there are close to half of the user to use the maximum amount of mobile banking payment 500 yuan. Of course, the survey also shows that more than one user maximum amount of \$ 10,000 and above.

Compared with the July 2010 release of "2010 China mobile banking user research report" phone banking in the utilization rate of mobile phone users have increased significantly. On the one hand, the mobile Internet environment is gradually formed, all kinds of enterprises in the mobile Internet industry chain are to provide a better service, using a mobile phone to the service life of Chinese consumers gradually accepted and loved; On the other hand, the major banks actively promote mobile banking, and constantly improve the user experience of mobile banking, while giving consumers a variety of incentives, which contributed to the development of mobile banking into the fast lane. This not only indicates that the mobile banking market prospects, the development of China's mobile phone banking industry more speeding forward.

### 3. Mobile banking risk analysis

Most critical to mobile banking risk is concentrated in three technical risk, legal risk and reputational risk.

#### 3.1 The technology risk of the mobile banking

##### 3.1.1 Technology selection risk

Phone banking to carry out to the appropriate hardware and software platform for the support, the bank must choose specific technology solutions. Certain technical

solutions in the design potential flaws or loopholes in the actual operation of the process will make the bank is facing a real risk. Currently, the endless variety of mobile banking solutions, technical solution providers are recommended to spare no effort in their respective products. Banks choose which company, what kind of solution, and the potential risks faced by the Bank. Once you have selected the mistakes you might make it to the phone banking in technical East old, inconvenience competitive disadvantage, causing huge loss of technological opportunities, and even a huge loss of business opportunities.

### **3.1.2 Information leaks, loss and tampering**

Phone banks need to pass information through the wireless and wired networks, the attacker could lap installed in electromagnetic radiation within the receiver installed inside the way to intercept the transmission of confidential information in the mobile communications and fixed network.

### **3.1.3 Denial of service attacks**

Interference ongoing mobile banking service system through a specific device, change its normal service processes, or perform unrelated to the program to make the system respond to slow down or even paralyzed, so that legitimate users can not normally enter the mobile banking system or cannot get the appropriate services.

### **3.1.4 Virus attack**

Threats facing mobile banking at this stage, not only the spread of computer viruses in computer networks, including the spread of mobile phones in the mobile network virus. Invasion of computer viruses will often cause the network host system crashes, data loss and other serious consequences. Generally renewable alienation can be spread through the network, spread, if not effectively prevent the virus will destroy all data, bring a deadly threat to the banking network system, the hazards of mobile phone virus is mainly limited to the destruction of the phone and computer viruses Clear record information, such as the user's mobile phone, but,

in theory, there are also possible to steal users' confidential information via mobile phone virus.

## **3.2 Mobile Banking legal risks**

The mobile banking legal risks from the possibility of violations of the laws and regulations, as well as the legal rights and obligations of the parties to the transaction are not clear. Mobile banking to retail banking business brought relatively new, and the rights and obligations of the parties to the transaction has not been determined in some cases. Currently, the applicability of our consumer protection laws on the operation of the mobile banking is not clear, and the validity of the agreement by the customer via electronic media also subject to uncertainty, which will lead to legal risks of mobile banking.

Disclosure of customer information and privacy protection, mobile banking is also facing legal risks. If the banks did not fully inform customers of their rights and obligations when there is a dispute between the customer and the bank, the customer will be on the bank to take legal proceedings.

Mobile banking are new things, most of the countries and regions are not supporting laws and regulations with suitable, therefore, the bank is no legal basis for the state to carry out mobile banking basic, the potential risk cannot be ignored.

## **3.3 Mobile banking credit risk**

The so-called reputation risk, is triggered negative public opinion on the bank, the bank customer or a serious loss of capital risk. Reputational risk, including the public behavior continued negative impression of the bank as a whole run, such behavior has seriously damaged the ability of banks to establish and maintain customer relationships. Public loss of confidence in the ability of banks to address the critical issues, it will give rise to reputational risk.

For the bank to carry out mobile banking services, it is essential to provide a reliable service platform. If financial institutions can not continue to provide safe, accurate and timely mobile financial services, the bank's credibility will be compromised. Particularly noteworthy is that, in order to provide mobile banking services, commercial banks must cooperation with third parties

(mobile company), third parties will also affect the quality of service to customers of the bank. For example, serious communications network failures prevent the customers to access their funds or account information will cause customers mobile banking services, suspicion and distrust of banks.

## **4. Mobile banking risk prevention and safety strategy**

### **4.1 preventing technology risk of the mobile banking**

#### **4.1.1 Data confidentiality**

In general, some of the security mechanism has been considered in the design of the mobile phone and the wireless communication network, however, the infrastructure of the wireless transmission, such as the GSM encryption technology is relatively simple, relatively easy to be decrypted. These basic transport layer security mechanisms for the confidential and sensitive information, such as personal identification numbers (personal identification number, PIN) and password protection is often not enough, therefore, end-to-end (End-to-end) application layer encryption essential for the transmission of sensitive information. This end-to-end application-layer security mechanisms, to ensure that sensitive information from the input device to the receiving end until the full data security encryption and sensitive information can not be used in network systems, servers, gateways, and other transmission channels clearly. The encryption, decryption and authentication processing should be performed by a dedicated equipment and procedures to ensure.

#### **4.1.2 System and data integrity**

Often happens when bad into the coverage area of the customer's mobile phone from the wireless signal areas, incomplete data information delay and communication failures. Therefore, in the mobile communication system should provide the corresponding mechanism, is used to prevent the occurrence of such incomplete data. Wireless infrastructure equipment, including operating system, carrier channel, various software applications, mobile

terminals, gateways, servers, hosts and processing equipment, these devices always face of malicious mobile code such as mobile phone viruses and other malicious threats, mobile banking The system shall be equipped with the appropriate security measures such as firewalls, intrusion detection systems, monitoring and control system and fast recovery mechanisms to ensure data security. Integrity mechanisms in order to ensure the integrity of the mobile banking system should be capable of integrity detection system, file encoding to ensure that all unauthorized software and hardware tampering are prohibited. In the process of data transmission, data are incomplete or transmission failure shall promptly record analysis, in order to find security vulnerabilities in the system.

#### **4.1.3 Authentication**

When mobile banking customers need to enter passwords and personal identification numbers, the data should be encrypted coding must ensure unidirectional transmission of confidential information. In this process, the sensitive information can not be displayed on the mobile terminal to prevent password others to see. In order to ensure data integrity in the encryption and identification process of communication, when the phone lines of communication transmission characteristics of mutation or communication process is blocking occurs, the system should be repeated identification process. In order to guarantee the operation of mobile banking is conducted in accordance with the wishes of our customers, the mobile banking systems generally have customer acknowledgment mechanism when a user enters some sort of operating system after these operations on their phone, which increases the risk of information theft. Because this information is very important for phone banks and customers often, so you want to change periodically such personal information.

#### **4.1.4 Disaster recovery**

Mobile banking disaster recovery data disaster recovery and system disaster recovery. Data disaster recovery is the face of natural disasters, computer systems subjected to misuse, virus attacks, hardware failure, system attacks after the incident, save user data "can not be read from a

variety of storage devices, and thus to reduce the loss minimum, the system is capable of re-operation. System disaster recovery is equipped with the necessary recovery and backup system, backup software, hardware and rotation components ensure system recoverability and high system reliability, and to minimize the risk of service interruptions caused by system failures. Disaster recovery strategies include disaster risk assessment; seek solutions, implementation plans and maintenance plans, the operation of the non-repudiation

Customers every time operational information by the user's private key to digitally sign, because the user's private password that only the user have the digital signature of all the information like the user's actual signature and printed sign can be used as a user action evidence. Further, various data information in the customer obligations during operation, such as mobile communication record information, the auxiliary means of the client's identity can also be used as confirmation.

#### 4.2 The legal risks

Phone banking processing should take full advantage of our current contract law, the law of the Accounting Law, Negotiable Instruments Law, "Gross Settlement (RTGS) Measures to develop mobile banking agreement, the development of the business processes and business processing requirements technology security on the full use of the current implementation of administrative regulations on IT security, such as the "PRC Computer Information System Security Protection Ordinance," financial institutions, computer information system security protection Interim Provisions "Commercial banks should focus on transaction data, including electronic data custody and paper certificates, serious study as evidence of the reasonableness of gaining a reasonable belief, to make the necessary preparations for possible disputes or litigation process.

#### 4.3 reputational risk prevention

Prevent reputational risk, focusing on operational risk behavior and mobile banking, financial fraud. Mainly from the bank's internal operational risk, mobile banking should improve its internal control system, the establishment of scientific practices and strict internal

restriction mechanism, separation assurance administrator and clerk, programmer and operator separation, production and execution by separating operation of any system must be documented in the system run record. In the prevention of mobile banking, financial fraud, and in the past we have been monitoring business focused on the retail business for personal services should be timely, with the mobile banking business continues to expand, strengthen monitoring Login focus of mobile banking customers, especially to deal with huge amounts of money in large quantities background monitoring. In accordance with the Basel II regulatory core principles and "about money laundering, seizure and confiscation of proceeds of crime Convention and other international treaties, mobile banking transaction tracking through data mining software to analyze suspicious transactions, illegal funds to prevent the use of mobile banking transactions .

#### V. Conclusion

China's mobile phone banking system banks and operators cannot meet the needs of customers. With the arrival of 3G era, various commercial banks saw the potential business opportunities for mobile banking, have launched a mobile banking. However, as the carrier of a virtual environment transactions, mobile banking risks cannot be ignored. All commercial banks to carry out mobile banking, but also to manage and control the risks of mobile banking. Regulatory authorities should strengthen supervision and effective regulation of mobile banking, according to the electronic banking management approach "and" e-banking security assessment guidelines, the formation of an effective regulatory system is very important to the development of mobile banking.

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