



Mobile Banking and Payment in China

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Of the more than 500 million Internet users in China as of June 2013, more than 400 million accessed the Web using mobile devices. This article investigates the development of mobile banking and payment systems in China.

China has developed into an Internet hot spot.¹ In 2008, China surpassed the US in number of Internet users, a number projected to reach 690 million in 2017.² China is also one of the fastest growing mobile markets in the world, with approximately 451 million cellphone owners. Many of these users have not yet availed themselves of 3G mobile services.³

Given the country's sustained economic growth and its 7 to 8 percent gross domestic product (GDP) increase in the past five years, business activities and volumes in China will likely continue their rapid development. Online banking and payment systems have also rapidly developed in the past few years.⁴ At the same time, online retailing transactions and business-to-business online transactions, which demand

prompt payment, continue to increase. Hence, China's fast-growing mobile market, combined with its large and growing consumer economy, means that it now is poised to become a global force in mobile banking and payments. However, a number of significant issues prevent wide-scale adoption of this technology.

Recent Developments

As Figure 1 shows, the number of online banking users increased from 40.3 million in 2007 to 221.5 million in 2012, and the number of online payment users increased from 33.2 million to 220.7 million during the same period. The number of online banking and online payment users increased further to 240.8 and 244.4 million, respectively, during the first half of 2013. However, this only represents 40.8 and 41.8 percent,

respectively, of all Internet users in China. To achieve a number closer to the 61 percent of online banking users in the US, the banking industry in China must explore opportunities provided by online transactions such as electronic banking, payment, and e-ticketing.⁵

Mobile banking is also becoming more popular, as evidenced by the 35 percent of cellphone owners in the US (up from 18 percent in 2011) who conduct their banking through their mobile phones. Meanwhile, only 15.6 percent of cellphone owners in China (up from 8.2 percent in 2011) conduct their bank transactions through their mobile phones.^{4,5}

As Figure 2 shows, the number of cellphone owners in China who use mobile payment and mobile banking has more than doubled in the last 18 months. Mobile commerce in China took off in January 2009, after the central government awarded licenses for 3G mobile networks to three telephone operators: China Mobile, China Unicom, and China Telecom.⁶ Although the Bank of Communications first launched Wireless Application Protocol (WAP) mobile banking services in 2004, the advantages of mobile banking only became apparent to users in 2010.⁷ Now, major domestic banks, including the Industrial and Commercial Bank of China, China Construction Bank, Bank of China, Agricultural Bank of China, China Merchants Bank, Shenzhen Development Bank, and Bank of Beijing, offer a WAP version of mobile banking. All of these banks have integrated traditional online banking functions—such as inquiry, account information notification, financial management consultation, transfers, remittances, stored value, and payment options—to mobile banking.

Online retailing also continues to rapidly expand in China. According to the China Internet Network Information Center (CNNIC), online retailing increased 48-fold from 2006 to 2012, from 2.6 billion Renminbi (RMB) to 1.26 trillion RMB (Figure 3). Annual online retailing transactions are projected to reach 2 trillion RMB in 2015.⁸

Unlike online payments in developed countries such as the US and UK (where online payments are the natural extension of traditional off-line payments), off-line payments and the underlying infrastructure have yet to be established and developed in China. The government, banking

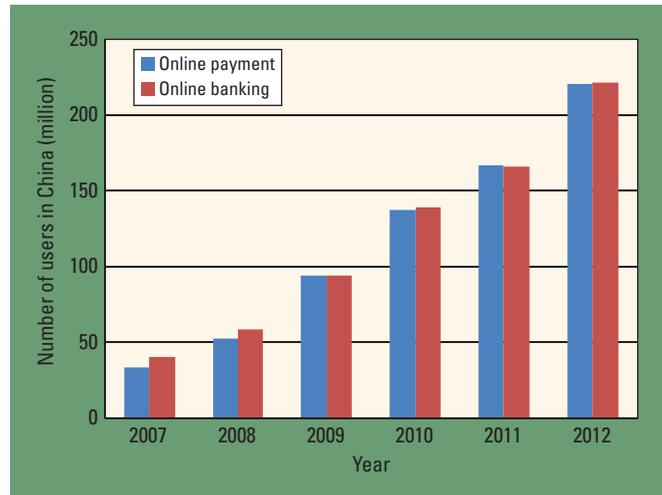


Figure 1. Number of online payment and online banking users in China, 2007–2012.

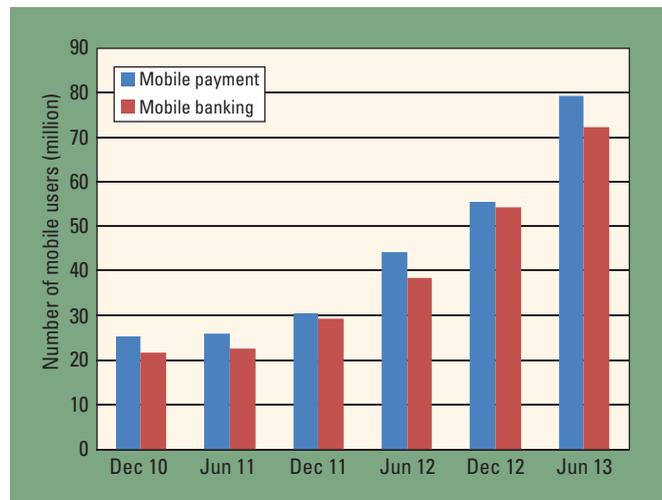


Figure 2. Number of mobile payment and mobile banking users in China, 2010–2013.

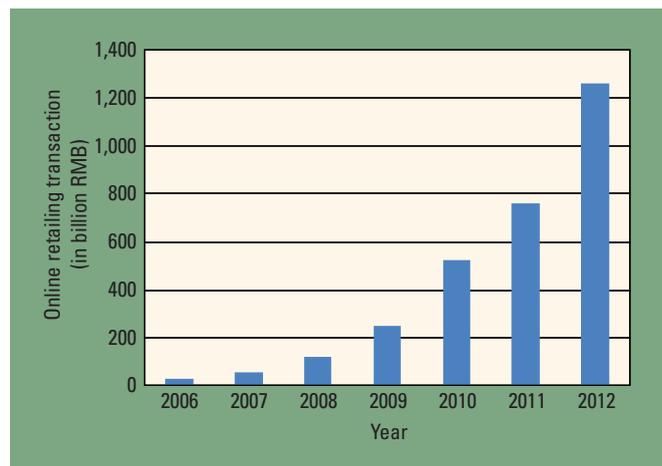


Figure 3. Online retailing transactions in China, 2006–2012.

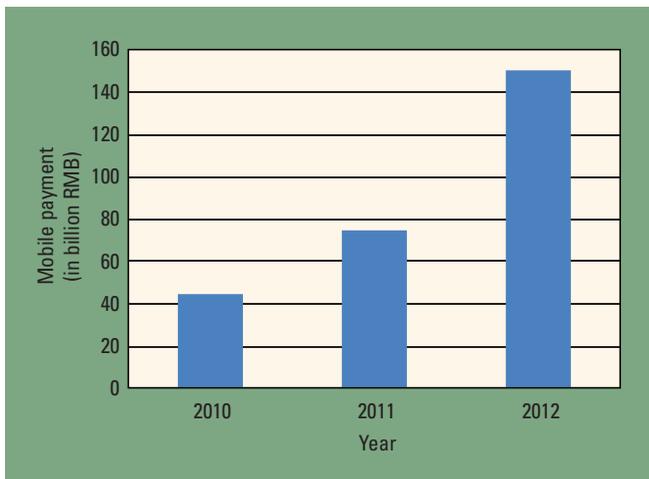


Figure 4. Mobile payments in China, 2010–2012.

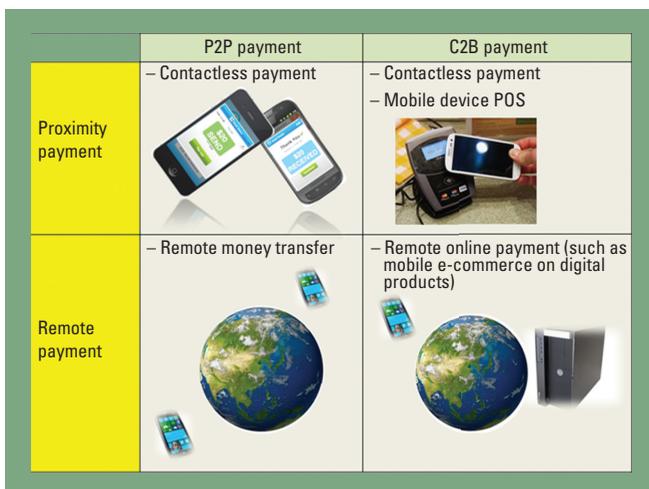


Figure 5. Classification of mobile payments (adopted from Deloitte Consulting¹¹).

industry, and third-party payment industry are thus exploring innovative ways to fulfill online payment demands in China. The online payment process involves several parties, including customers, retailers, banks, third-party payment firms, and clearing firms. Therefore, the main issues in the adoption of online or mobile payments are network security; reliability of electronic signature; liability for loss, cost, and damages; and certification of third-party payment firms. In 2005, the government passed the *Law of the People’s Republic of China on Electronic Signature*, and the People’s Bank of China released the “Electronic Payment Guidelines (No. 1).” In addition, the People’s Bank of China issued the “Rules for Anti-Money Laundering Efforts by Financial Institutions” in 2003, the “Administrative

Measures for the Payment Services Provided by Non-Financial Institutions” in 2010, and the “Administrative Measures for Prepaid Card Business of Payment Institutions” in 2012 to regulate the business activities of financial, nonfinancial, and payment institutions.

The government also requires banks and online payment firms to clearly identify their services and corresponding charges to online/mobile payment users, to verify the identity of their customers and keep the confidentiality of such information for each transaction, and to follow customer orders for payment settlement. The 12th Five-Year Plan for National Economic and Social Development of China includes a mandate to “actively develop e-commerce, improve e-commerce services for small and medium enterprises (SMEs), and promote the building of credit service, online payment, logistics and other supporting services for the public.”⁹ As one of the pillars of online payment and fulfillment, mobile payment has developed rapidly in the past three years, as Figure 4 illustrates.

Mobile payments can be classified using different methods, such as proximity and remote payments.¹⁰ In a proximity payment, the payer and payee (or its equipment) are in the same location and communicate directly with each other using contactless communication technologies, such as near-field communication, Bluetooth, and infrared for data transfer. Remote payments are transactions conducted over telecommunications networks, such as the Global System for Mobile Communications (GSM) or the Internet, and are independent of the payer’s location. Deloitte Consulting considered a broader perspective and suggested that proximity and remote payments can be further categorized based on the nature of the transaction (see Figure 5).¹¹

Public-key infrastructure (PKI) and one-time passwords (OTPs) are two security measures adopted by online payment firms in China. PKI comes in the form of a digital certificate or a USB key. OTPs can be generated by Alipay (a leading third-party payment gateway established by Alibaba that attracts approximately 80 percent of online payment users) for a specific device or can be dynamically generated by a payment firm and sent to the user’s cellphone to activate the online payment.

The China Security Payment Union was formed in 2011 through the collaboration of banks, Alipay, third-party payment firms, network security firms, and portals. Alipay and other industrial leaders established the China Third-Party Payment Security Union in May 2012 to promote information sharing, which could reduce risks in online transactions. During the first half of 2012, 133,000 phishing websites were closed through the collaboration of such unions, thus reducing potential financial losses by more than 90 percent. The PCI Security Standards Council released the *Payment Card Industry Data Security Standard* (PCI-DSS), version 2.0, in October 2010. Most third-party payment firms in China are already certified for PCI-DSS v2.0.

In August 2012, China UnionPay and China Mobile signed an agreement to accelerate the development of mobile payments in China. According to UnionPay,¹² users can avail themselves of remote payment services, such as credit card repayment and utilities payment, and shop online via mobile communication networks by using subscriber identification module (SIM) cards as carriers of bank card accounts. Users can also enjoy quick payments via cellphone contactless functions that are available in shops, convenience stores, vending machines, and other places that display the logos of UnionPay's "Quick Pass" and China Mobile's "Mobile Phone Wallet." UnionPay and China Mobile will work together to enhance the interoperability and interconnection of near-field payment technical standards, near-field communication mobile phone testing, and a trusted service manager (TSM).

User Perspective

According to the CNNIC, approximately 79 percent of online payment users in China regularly use third-party payment firms, 76 percent regularly use online bank payment services, and 40 percent regularly use rapid/card online payment services.⁸ Among the third-party payment firms, Alipay has the largest coverage, with approximately 80 percent of online payment users regularly accessing its services. Alipay is followed by Tenpay (owned by Tencent, which has 800 million QQ instant messenger users), with 21 percent online payment users, and Unionpay, with 17 percent online payment users.

Overall, users have a positive impression of online payment security in China. Approximately 9 percent of online payment users perceive it as very safe, 69 percent as relatively safe, and 16 percent as average. Less than 6 percent of online payment users perceive online payment as unsafe or very unsafe.⁸

With regard to online payment media, 61 percent of online payment users perceive using computers to be safer than using cellphones for several reasons: they're familiar with computer-based online payment processes; computers are equipped with more powerful antivirus and Internet security; and cellphones are often lost. On the other hand, approximately 9 percent of online payment users perceive using cellphones to be safer than using computers because cellphones are less prone to viruses than computers; cellphones are portable; and security technologies for mobile payments are more advanced. Approximately 16 percent of online payment users believe that computers and cellphones are equally safe media for online/mobile payments.

Opportunities for Growth

Although Chinese mobile banking and payment are just beginning to expand, several opportunities are already available in the market. Among these opportunities is the size of the market, particularly in rural poor sectors where there are no banks.¹³ Krish Raghav noted that 64 percent of the rural poor population don't have access to banks.¹³ This situation is exacerbated by the closure of at least 30,000 bank branches in rural regions over the last few years because of economic strain. However, mobile phones have a high penetration rate and don't require the infrastructure and buildings that fixed banking services require. Raghav used the Kenyan-developed M-Pesa model to demonstrate the potential for mobile banking throughout rural regions, including the market's potential size in this population.¹³

A key opportunity in this market taps into existing relationship networks to generate social acceptance. A comparative study on the willingness of Malaysians and Chinese to adopt mobile banking and payment found that consumers highly value trust and social influence (or acceptance and promotion by individuals in a trusted group) over technical factors such as perceived usability.¹⁴ The study found that issues

Related Work in *IT Professional*

Several other *IT Pro* articles have explored mobile payment and banking in emerging economics:

- G. Rossi, S. Murugesan, and N. Godbole, "IT in Emerging Markets," *IT Professional*, vol. 14, no. 4, 2012; doi:10.1109/MITP.2012.79.
- N. Kshetri and S. Acharya, "Mobile Payments in Emerging Markets," *IT Professional*, vol. 14, no. 4, 2012; doi:10.1109/MITP.2012.82.
- S. Murugesan, "Mobile Apps in Africa," *IT Professional*, vol. 15, no. 5, 2013; doi:10.1109/MITP.2012.83.

such as perceived security and lack of a physical interface negatively influence the willingness of Malaysians and Chinese to use online payment services, whereas factors such as perceived social acceptance in personal networks and in society enhance their willingness to use them. Therefore, providers of mobile banking and payment must create trends and lead the acceptance among users to help enhance adoption.

Another opportunity is to make mobile banking and payment as simple as possible and to demonstrate this simplicity to nonusers. A comparative study of users and nonusers of mobile banking and payment in China determined that ease of use is the most important factor for users of such technology.¹⁵ This study also found that self-efficacy, or the belief that an individual can effectively use the technology, is more relevant to nonusers, thus suggesting that demonstrating the ease of use of such technology to mobile phone users can effectively encourage its adoption.

Barriers to Acceptance

Security and trust are significant barriers to the adoption of mobile banking and payment in China. Trust in the technology is based to a certain extent on potential users' security perceptions.¹⁴ A detailed analysis has identified this lack of trust as a technical and a perception-related concern. Mobile banking and payment entail a number of technological risks that can threaten user security, such as technology selection risk (the potential of the user to select insecure or inappropriate technologies), information loss, and attacks (such as denial of service, malware, and other types of direct attacks).¹⁶ Lei Sun and Yingjun Sun note that these risks can also carry significant legal and credit risks to mobile banking users, and that banks might not indemnify for these risks.¹⁶ The legal situation can

also be unclear to users, thus reducing their trust in mobile banking and payment.

Another potential barrier to the adoption of mobile banking and payment in China lies in the fact that 3G services have only been partially adopted in the country, which reflects a technology gap for some potential users. A study of 3G mobile adoption has noted that such technology is relatively new in China and the pressure on existing mobile companies to adopt this technology is minimal.³ A number of highly educated groups are more likely to adopt 3G technology than less-educated users.³ Alain Yee-Loong Chong and his colleagues noted that several factors, such as social influence and service quality, can affect whether a consumer will adopt 3G services.³ Their study has identified 3G adoption as a significant issue related to the potential of 3G-dependent mobile banking and payment services to penetrate the market has also been identified. To overcome this issue, mobile companies must provide information on 3G networks. This process can involve substantial marketing, user education, and construction of influencing networks.

The distrust of online as well as banking and payment technology is embedded in actual legal and credit risks stemming from underlying security failures. To be successful, companies wishing to exploit the technology must use a secure platform. Moreover, liability and credit laws might need to be adjusted to reduce risks for consumers and encourage the adoption of mobile banking and payment in China. We suggest that the Chinese Central government establish mobile banking and payment laws to enhance users' confidence and protect their rights. ■

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