

A Hangzhou Story: The Development of China's Mobile Payment Revolution



On January 11, 2018, a man uses a self-service machine, which allows mobile payment services, in the multi-functional self-service zone at No.1 People's Hospital of Hangzhou. (Picture taken by Sarah Hui Li)

Part 1: Introduction

China's mobile payment revolution has attracted the attention of the rest of the world. But few studies have taken a holistic approach to understanding the phenomenon and discussing the potentials of mobile payment beyond just making final payment in the consumer market.

The purpose of this case study is to present a comprehensive picture of how China is staying ahead of the mobile payment game, particularly how Alipay has become the dominant player in the field. This case also presents Hangzhou's experience as the pioneer in realising the digitalisation of resident's daily activities through mobile payment technology in China. Moreover, this case study also provides a thorough discussion of the drawbacks of a cashless society as well as key takeaways for learning.

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Part 2: Background

In 2018, if a tourist visited China, he or she would soon realise cash had become obsolete in the country, and plastic debit/credit cards were rarely seen. Street vendors, convenient stores, restaurant, and even high-end department stores were more likely to ask to scan the QR (Quick Response) code in your mobile payment application when you wished to make payment.

Certainly, mobile payment had already become a way of life in China while other countries were still trying to contemplate how China was leading this payment revolution. In 2016, China's mobile payment transactions hit US\$5.5 trillion,¹ accounting for 74% of all online payment, and dwarfing any other economies in the world.² The future of China's mobile payment market also looked quite optimistic: projections showed that the market transaction would reach US\$6.3 trillion in 2020.³

In China, the mobile payment market was dominated by two big players: Alipay and WeChat Pay. The former was an affiliate of Alibaba's Ant Financial Service Group, one of the most valuable financial technology (fintech) companies in the world; the latter was an affiliate of Tencent, one of the biggest technology giants in the world. According to a recent study by Analysys, Alipay and Wechat Pay captured 93.08% of the market in 2017 (see Annex 1), giving them the dominant position in the Chinese market.⁴ Between the duopoly, Alipay surpassed WeChat Pay with 53.73% of the market share.⁵ Therefore, for the sake of this case study, we will be using Alipay as an example to show how China is leading the mobile payment game.

The Success Story of Alipay

The success of Alipay cannot be discussed without mentioning China's biggest online shopping platform, Alibaba or Taobao. Initially, Alipay was created as a platform to safeguard the online transactions between consumers and merchants. In the early stage, Alipay's users linked their user accounts to their bank accounts. When they made the purchase, Alipay would hold the money until consumers received the product. As for the merchants, they knew that the cash would be there for them to collect after they dispatched the products.⁶ In a society where consumers and merchants lacked mutual trust, Alipay's role was necessary and crucial. Therefore, Alipay soon became ubiquitous as online shopping was transforming consumers' consumption habits.

¹ Paul Mozur, "In Urban China, Cash Is Rapidly Becoming Obsolete", *New York Times*, July 16, 2017. Accessed February 3, 2018, <https://www.nytimes.com/2017/07/16/business/china-cash-smartphone-payments.html>.

² Chen TingYi, "China Mobile Payment Report 2017", *WALKTHECHAT*, June 25, 2017. Accessed January 2, 2018, <https://walkthechat.com/china-mobile-payment-report-2017/>.

³ Ayoub Aouad. "Alipay is setting up for global dominance", *Business Insider*, May 10, 2017. Accessed November 2, 2017, <http://www.businessinsider.com/alipay-is-setting-up-for-global-dominance-2017-5/?IR=T>.

⁴ Financial World, "Alipay, WeChat: 15.7 Billion for Mobile Payment, How Much Did You Pay?", August 24, 2017. Accessed August 31, 2017, <http://news.iresearch.cn/content/2017/08/270104.shtml>.

⁵ Ibid.

⁶ KZ, "Alipay: Wining the Payments Game in China", last modified November 18, 2016. Accessed January 4, 2018, <https://rctom.hbs.org/submission/alipay-wining-the-payments-game-in-china/>.

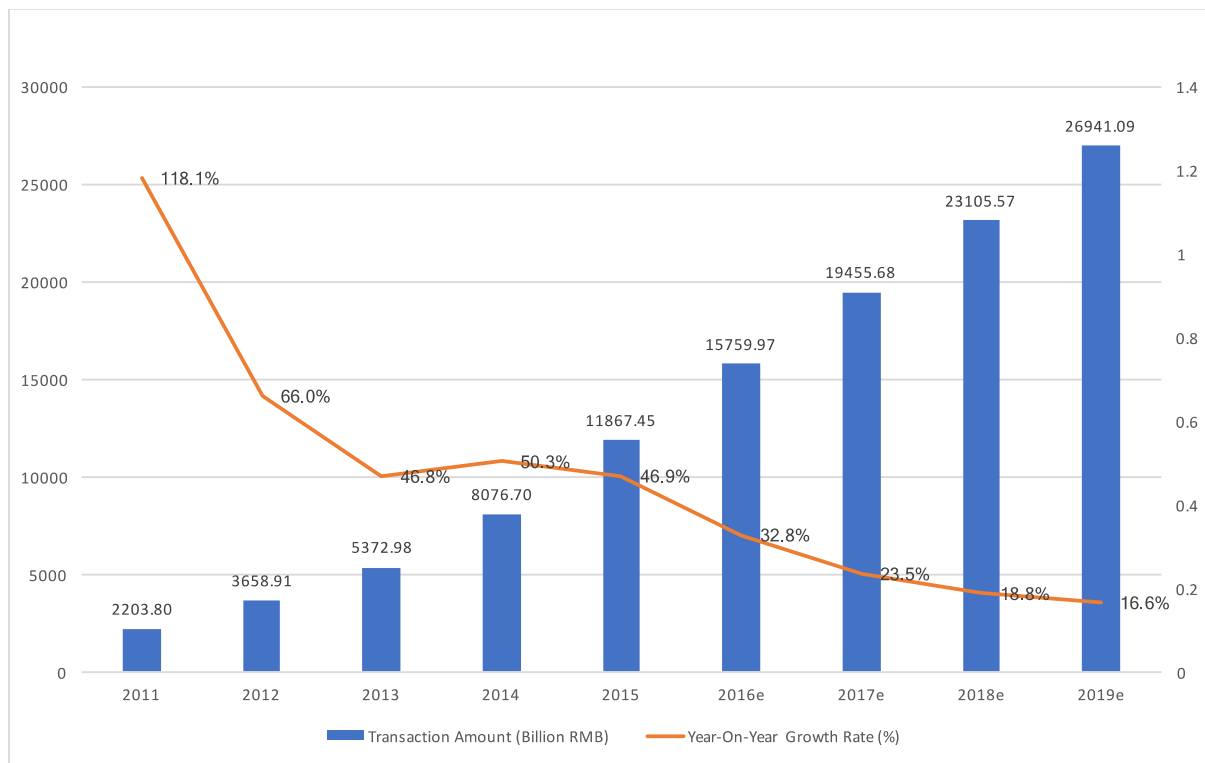


Table 1: China's Third-Party Online Payment Transactions, 2011-2019 (with 2016-2019 prediction)
Source: translated from iResearch Institute 2016.⁷

Alipay did not stand still, but sought opportunities when smartphone became cheaper and mobile network services gradually improved in service and stability in China. In 2008, Alipay tapped into the mobile payment business. Initially, users could use Alipay Wallet to pay for Taobao's products and utility bills. Later in 2011, Alipay designed the QR code payment method which allowed offline partnering stores to accept payment in real-time by scanning an individual's QR code in Alipay Wallet. Because of its convenience and cost-effectiveness, Alipay attracted 200,000 offline partnering stores, and 500,000 taxi partners. In 2016, Alipay's real-name users hit 450 million,⁸ and 71% of the transactions occurred on the mobile end.⁹

One could argue that the reason behind Alipay's success was actually the success of Taobao. Alibaba's business model was focused on serving small businesses so that consumers could enjoy a variety of goods and services. Consequently, Alipay captured a huge share of China's market since people had to rely on Alipay to do transactions.

However, the success of Alipay was not solely a by-product of Taobao's popularity. Alipay was innovating constantly to expand its business, with the QR code payment method being the most prominent example. Moreover, Alipay has made its service cheaper than conventional payment methods such as the point-of-sale (POS) machines. For instance, an offline partnering store only had

⁷ iResearch. 2015 China Internet-Economy Core Data: Mobile Payment, March, 2016. Accessed December 2017, <http://news.iresearch.cn/zt/259694.shtml#a3>.

⁸ "Irreversible Mobile Payment Age Has Come? Alipay Has More Than 450 Million Active Users", *Industry Vision Institution*, July 26, 2017. Accessed February 5, 2018, <http://finance.jrj.com.cn/2017/07/26092222799201.shtml>.

⁹ "Alipay: Mobile Payment Accounts for 71% of 2016's Total Revenue", *People's Daily*, January 5, 2017. Accessed February 3, 2018, <http://www.chinanews.com/business/2017/01-05/8114117.shtml>.

to pay 0.6% per transaction value to Alipay,¹⁰ compared to the maximum of 1.25% for accepting cards using POS machine;¹¹ not to mention that businesses had to purchase and maintain the machine itself, incurring an extra cost.

On top of its conveniences, in 2017 alone, Alipay had invested RMB 1 billion into a promotion campaign to enhance consumer stickiness to its mobile app. In this promotion, consumers would get a digital “red envelope” containing a random amount of cash, which could be used in either online or offline stores. Furthermore, to attract and keep its users, Alipay created an internet finance ecosystem within the application itself by including services such as Yu’e Bao (money market fund platform), Sesame Credit (social credit scoring system), and Ant-micro (micro-loan provider).¹²

These services, together with Alipay Wallet, transformed Alipay from a single payment application to an integrated consumer and financial ecosystem where the users were able to enjoy holistic services without leaving the application. By creating such a comprehensive user experience, Alipay successfully captured the users and integrated itself into their daily activities.

Last but not least, Alipay’s security system had also gained the trust of the Chinese users. According to a recent survey, 90% of the survey respondents thought that Alipay was safe and their data was secure with the company. This was a result of Alipay’s huge investment (US\$6.5 million by 2015) in research and partnerships with software companies to develop security measures in order to safeguard users’ money and information.¹³

Government’s Role in the Mobile payment Industry

When third-party payment platforms were just an up-and-coming industry, the Central Bank of China deliberately set a high registration capital requirement of RMB 100 million for national-wide companies; for regional operators, the registration capital was set at RMB 30 million. By setting such conditions, the Central Bank of China created a high standard for market access.

One might want to argue that setting such a high capital requirement could create a market monopoly that could compromise consumers’ interests. However, it was also fair to say that by only allowing several big players into the market, the mobile payment ecosystem in China was relatively centralized. A centralized payment system could reduce confusion and compatibility issues, which would usually arise when there were multiple payment platforms in the market.

Apart from carefully facilitating a relatively centralized ecosystem, the state had been regulating the market for various reasons, such as preventing the duopoly from gaining excessive market power, and monitoring of illicit transactions. For example, in August 2017, the People’s Bank of China (PBOC) mandated all third-party payment platform to use a new clearing housing for all of their

¹⁰ “Alipay lowers its charges”, *Global Times*, November 16, 2015. Accessed December 23, 2017, <http://www.globaltimes.cn/content/953015.shtml>.

¹¹ “In-depth: The Profit War Behind POS Machine”, *Phoenix Finance WEMONEY*, November 14, 2016. Accessed February 9, 2018. http://finance.ifeng.com/a/20161114/15006921_0.shtml.

¹² Matthias Hendrichs, “Why Alipay is more than just the Chinese equivalent of PayPal”, August 3, 2015. Accessed November 11, 2017, <https://www.techinasia.com/talk/online-payment-provider-alipay-chinese-equivalent-paypal>.

¹³ Nurdianah Md Nur, “Uncovering the secret to Alipay’s success in China”, *CIO Asia*, May 5, 2015. Accessed January 23, 2018. <https://www.cio-asia.com/tech/emerging-technology/uncovering-the-secret-to-alipays-success-in-china/>.

transactions.¹⁴ Moreover, PBOC recently addressed the problem of consumer data protection. The bank required non-bank payment platforms to upgrade their “Know Your Customer”¹⁵ measures to prevent fraud,¹⁶ and safeguard the storage of sensitive information.¹⁷

In recent years, China also witnessed the state’s transition from a referee to an active participant in the fintech and mobile payment game. Recently, state-owned institutions such as China Investment Corp, China Life, and China Development Bank Capital had all made large investments into Ant Financial, the parent company of Alipay.¹⁸

Other Contributing Factors on the National Level

China’s rapid development in the mobile payment market was also a result of its late-mover advantage. According to eMarketer, compared to developed countries such as the U.S., China had adopted the credit card system later.¹⁹ In contrast to other economies, China’s credit card system had yet to achieve maturity. Furthermore, despite its rapid economic growth and emerging middle class with immense purchasing power, China’s banking infrastructure such as commercial bank branches and ATMs were not fulfilling the needs of the Chinese consumers (see Table 2).²⁰ Under such conditions, the technology giants were able to fill the gap in the underdeveloped banking system.

Culturally, Cheng Liang, a research fellow from Chinese Academy of Social Sciences, opined that the Chinese culture opposed the idea of owning anyone money; therefore, credit cards were less appealing to Chinese consumers.²¹

	China	USA & Canada	Europe
Commercial bank branches	8.1	28.2	28
ATMs	55	222	81

Source: World Bank, August 2016

Table 2: Banking infrastructure per 100,000 adults in 2014.

Source: World Bank²²

¹⁴ Gabriel Wildau, “China targets mobile payments oligopoly with clearing mandate”, *Financial Times*, August, 10, 2017. Accessed February 3, 2018, <https://www.ft.com/content/3bcb5150-7cce-11e7-9108-edda0bcb928>.

¹⁵ A set of procedures in identifying customers for particular purposes such as anti-money laundering.

¹⁶ DBS Bank and EY. *The Rise of FinTech in China*, November, 2016. Accessed November 31, 2017.

[http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of-fintech-in-china/\\$FILE/ey-the-rise-of-fintech-in-china.pdf](http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of-fintech-in-china/$FILE/ey-the-rise-of-fintech-in-china.pdf).

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Kuhn, Anthony. “In China, A Cashless Trend Is Taking Hold With Mobile Payments”, June 29, 2017, <https://www.npr.org/sections/alltechconsidered/2017/06/29/534846403/in-china-a-cashless-trend-is-taking-hold-with-mobile-payments>.

²² DBS Bank and EY. *The Rise of FinTech in China*, November, 2016. Accessed November 2017.

[http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of-fintech-in-china/\\$FILE/ey-the-rise-of-fintech-in-china.pdf](http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of-fintech-in-china/$FILE/ey-the-rise-of-fintech-in-china.pdf).

However, mobile payment was not only about being able to pay for products services using your phone. China had gone to a step further in integrating e-payment systems such as Alipay with the livelihoods of the Chinese people.

In the next section, a case study on Hangzhou city in eastern China will be discussed to demonstrate how a city-level government in China had taken an active role to realise digitalisation in its residents' lives. In this case, the local government successfully extended its role from a regulator to an innovator and consumer in the digital age.

Part 3: The Hangzhou Model

In 2012, Hangzhou city government published the "Plan for Building a Smart Hangzhou (2012-2015)". This policy document stated that Hangzhou was experiencing rapid development as well as growing urban pressure: "problems have emerged between urbanisation and social services, human and nature, economic development and resource constraints. New problems keep emerging due to the gap between reality and its residents' expectations. Therefore, the construction of a smart city is the solution to all types of difficulties and conflicts caused by urbanisation."²³

Together with other policies and strategic documents, such as Hangzhou 12th Five Year Plan and Hangzhou Digitalization and Information Development Plan, the Hangzhou government devoted itself to applying modern technology to government service, social service, and other public sectors in order to build a service-oriented government. In order to achieve this, the government provided an open environment for cooperation with domestic and foreign partners. Moreover, Hangzhou, being the home base of the technology and e-commerce giant Alibaba, the government took the opportunity to forge a strategic relationship with the company to build a smart Hangzhou.

Public Health – Smart Healthcare

Mobile payment had penetrated Chinese people's daily life. In Hangzhou city, changes started with its public health sector. The following scenario²⁴ describes a Hangzhou resident's visit to a local hospital:

Before going to the hospital, the resident recalls she saw in the news that from December 20th, 2017 onwards, Hangzhou residents can convert their social security cards into digital ones in the Alipay app. She opens Alipay, clicks on an official account called "Hangzhou Resident Card", and then chooses a tab called "E-Social Security Card" (see Annex 2). Alipay opens the front camera on her phone and asks for a facial recognition verification.²⁵ Together with the ID card, Alipay is able to verify the resident's identity. The whole process only takes less than a minute.

With this e-social security card, the resident is able to make appointments at local hospitals in Hangzhou within the Alipay app. She chooses a hospital, a date and a time, and then clicks the "confirm" button. She receives a text message informing her that the appointment has been

²³ Hangzhou Economic and Information Technology Commission. *Plan for Building a Smart Hangzhou (2012-2015)*, September 20, 2012, http://www.qunzh.com/xxzt/zhjs/zhjszhxz/201507/t20150721_11478.html.

²⁴ Scenario description is based on a field research trip by the authors.

²⁵ Zhang, Bin. *194 Hospitals and Pharmacies in Hangzhou Realize Cashless and Card-less Medical Services*. January 31, 2018. http://society.zjol.com.cn/201801/t20180131_6490598.shtml.

successfully made. A nine-digit code is also included in the message, which she can use to print out her appointment confirmation letter upon arrival. The whole process is completed on her smartphone.

Fifteen minutes before her appointment, the resident arrives at the hospital. She walks to the self-service machine (see Annex 3), scans her e-social security card in her Alipay app, and enters the nine-digit code from the text message. The machine prints her a confirmation letter, which she will be using at the doctor's office. The appointment fee is not covered by her social security insurance, so she taps on the screen and chooses "Alipay" as her payment method. A QR code pops out on the screen. She opens Alipay on her phone, scans the QR code on the self-service machine screen, enters her payment pin, and hits "confirm". The fee is automatically deducted from her bank account via Alipay. So far, the patient has only used her smartphone.

Later in the doctor's office, the doctor gives her a prescription and asks her to confirm it. After getting the patient's confirmation, the doctor then scans her e-social security card on the resident's phone, and the fee for this prescription is automatically deducted from her social security insurance account. The co-payment portion is charged to her bank account via Alipay, just like how she paid the appointment fee. Without having to line-up at the cashier counter, the patient picks up her medicine and leaves for home.

This digital hospital-visiting experience was part of an initiative called Smart Healthcare by Hangzhou, and it was more than just mobile payment. It also included "remote hospital", which allowed patients from the countryside or the elderly to see doctors via video chat without leaving their houses. Another notable feature of this initiative was the "digital patient files". This feature granted doctors and nurses access to a patient's information through computers or tablets within or across hospitals. According to Hangzhou Health and Family Planning Commission, there were more than 6.91 million active Smart Healthcare users in the city.²⁶

This cashless medical care service was also available to non-residents. For visitors in Hangzhou, they could purchase a "Health Card" for RMB 2 (about S\$0.40) at public hospitals. After topping up this Health Card, visitors were also able to pay their fees in the doctor's office using this card and a POS machine. The process of card purchase and top-up could be done using Alipay too, with no cash required.

Hangzhou's Steps Towards Smart Healthcare

Hangzhou's Smart Healthcare initiative was a product of the cooperation between the public and private sectors. The public sector included Hangzhou Health and Family Planning Commission, Hangzhou Human Resources and Social Security Bureau, and local public hospitals. The private sector included Alipay, China Mobile, Hangzhou Resident Card Corporation, a state-owned enterprise (SOE), and Hangzhou Financial Investment. In a phone interview, He Wei,²⁷ the Director of the Information Office at Hangzhou Health and Family Planning Commission, explained the mechanisms behind the cashless experience in Hangzhou's public health sector.

²⁶ Zhang, Ya, Hong Huang, and Wei Yang. "Smart Healthcare Has Changed Hangzhou People's Doctor-seeing Behavior," December 12, 2017. http://ori.hangzhou.com.cn/ornews/content/2017-12/12/content_6740180.htm.

²⁷ Phone interview conducted by the authors with Mrs. He Wei, the director of the information office at Hangzhou Health and Family Planning Commission on January 31, 2018.

According to He, Hangzhou government used to receive many complaints about the long queues and repetitive fee-paying processes during the visits to the doctor. Residents and migrant workers in Hangzhou were previously able to use a smart chip called "Resident Card" for social services, including the Smart Healthcare.

At the beginning of 2015, as part of a strategic cooperation between Alibaba and Hangzhou city government, the Commission allowed patients using Alipay to top up their Smart Healthcare accounts (Resident Card accounts) by scanning QR codes on self-service machines at public hospitals in Hangzhou. In May 2017, the Commission, Hangzhou Bureau of Human Resources and Social Security, and Alibaba deepened their cooperation by allowing residents to link their Alipay account to their Smart Healthcare account. The online appointment-making and medical report-checking services were integrated into Alipay. In hospitals, by inserting the Resident Card into a POS machine, the portion of the fee covered by insurance could be processed. The remaining portion could also be deducted through Alipay. Having made this transition, Hangzhou realised its system of cashless medical services.

Hangzhou Health and Family Planning Commission set a goal for 2018 to minimise the number of trips to hospitals made by patients. According to He, the next upgrade would be focused on the appointment-making system.²⁸ The Commission planned to include appointment-making services for laboratory tests such as the ultrasound, x-ray, and other tests that typically required several days to schedule. The Commission said that this upgrade would save patients' time in running from one lab to another just to make appointments, as well as improve the hospitals' workflow efficiency.

Public Transportation

Besides the public health sector, mobile payment in Hangzhou also covered public transportation. A passenger could use a QR code (see Annex 4) in her Alipay app to pay for bus and subway rides. Using the Alipay app, the passenger would also be able to top up her account and review her trip history. This mobile payment service covered all 72 subway stations and more than 3,000 buses in Hangzhou (see Annex 5).²⁹ It also made Hangzhou the first city in China to realise 100% mobile payment coverage for public transportation.

Mobile payment for public transportation brought significant convenience to residents and travellers in Hangzhou. A Hangzhou resident quoted by China News in a 26th October 2017 news article, said that amongst all the mobile payment services, he liked the public transportation service the most because it saved him from looking for coins and change for bus fees.³⁰ Xu Xiao, the Chairman of Hangzhou Resident Card Company also praised the mobile payment service for solving the problem of residents losing their public transportation cards.³¹

²⁸ Ibid.

²⁹ Yang, Yadong. *Hangzhou: the first city in China realizing mobile payment for subway and public bus*. December 26, 2017. http://www.thepaper.cn/newsDetail_forward_1922569.

³⁰ Hu, Yixin, and Zhewen Hu. *The City of Mobile Payment: In Hangzhou, Cashless Is the New Norm*. October 26, 2017. <http://news.china.com/socialgd/10000169/20171026/31604804.html>.

³¹ An, Zhi. *Hangzhou: Data Changes Public Buses' "Face"*. January 1, 2018. <http://finance.sina.com.cn/roll/2018-01-01/doc-ifyqchnr7976896.shtml>.

Meanwhile, this service also increased productivity and efficiency for the public transportation bureau as it reduced time and effort in processing cash. According to Wu Cunjian, Director of Hangzhou Public Transportation Corporate's Strategy Development Institute, Hangzhou Public Transportation used to receive about RMB 1.7 million worth of coins per day, which comprised 48% of its total fare earnings. With the application of mobile payments such as Alipay app in public transportation, the cash utilisation rate reduced by 20%.³²

Smart City-led Business Growth

The prevalence of mobile payment also boosted business for small and medium enterprises in Hangzhou and across China. They could be categorized into two groups: online and offline businesses.

Online business, or e-commerce, developed quickly after Alibaba Group setup its online trading platform Taobao.com in 2003. From 2003 to 2006, there was no entry barrier for sellers to setup small businesses on Taobao. This approach earned Alibaba RMB 16.9 billion in transaction value by 2006, 65.2% of the customer-to-customer market share in China. It eventually forced eBay to exit China.³³ In 2010, Tmall.com, a business-to-customer e-commerce platform, was established by Alibaba to focus on medium and large businesses. By 2012, the total transaction values of Taobao and Tmall reached RMB 1 trillion.³⁴ Business magazine, *The Economist* crowned Taobao as the biggest online marketplace in China.³⁵

E-commerce quickly moved from the traditional internet platform to mobile platform with the proliferation of smartphones in China. During Alibaba's online shopping festival "Single's Day" on November 11, 2017, the transaction value on Tmall reached RMB 10 billion in 3 minutes, and RMB 168.2 billion for the whole day. According to Alibaba, 90% of this total transaction volume came from its mobile platform.³⁶

This mobile platform, according to data released by Alibaba, paid RMB 36.6 billion in tax to the Chinese government in 2017 – RMB 0.1 billion per day on average.³⁷ It also resulted in RMB 290 billion taxation on upstream and downstream businesses such as manufacturing (RMB 260 billion) and logistics (RMB 30 billion) in 2017.³⁸ According to calculations by China Renmin University, Alibaba generated 33 million jobs in the e-commerce industry in 2017.³⁹

³² Wei, Yijun, "Hangzhou Realizes 100% Mobile Payment Coverage For Public Transportation", *Xinhuanet*, December 1, 2017, http://www.xinhuanet.com/fortune/2017-12/01/c_1122045097.htm.

³³ Xie, Pu, "The Complicated Taobao Story", November 11, 2011, http://tech.hexun.com/2011-11-11/135120861_3.html.

³⁴ Tao, Chi, "Alibaba's E-Commerce Transaction Achieved 1000 Billion RMB", December 3, 2012, <http://www.techweb.com.cn/internet/2012-12-03/1260039.shtml>.

³⁵ "The everything creditor: Bad loans for sale in online auctions", *The Economist*, June 4, 2015. <https://www.economist.com/news/china/21653672-bad-loans-sale-online-auctions-everything-creditor>.

³⁶ Zhou, "New Record for Tmall "Single's Day" Online Shopping Festival Transaction", November 11, 2017. <http://www.techweb.com.cn/internet/2017-11-12/2604935.shtml>.

³⁷ "In 2017, Alibaba pays 0.1 billion tax per day, generates 33 million jobs", *Xinhuanet*, January 23, 2018. http://www.xinhuanet.com/2018-01/23/c_1122301232.htm.

³⁸ Ibid.

³⁹ Ibid.

Due to Hangzhou's success in e-commerce and mobile payment development, in 2015, the State Department of China set up the China (Hangzhou) Cross-border E-commerce Comprehensive Pilot Area in Hangzhou. Since then, Hangzhou became China's e-commerce centre and was able to broaden its mobile payment influence outside China.

Meanwhile, in order to boost its small and medium enterprise (SME) business in China, Alibaba also started its micro-financing service. This included banking (MYbank) and lending (Ant Loan) system, which were built into its mobile payment system, Alipay, and its online credit system, Sesame Credit. Entrepreneurs, as well as buyers, were able to borrow small loans from Alibaba using their Alipay transaction history as their credit history. The concept behind MYbank was to make "small amount, short period" loans to small and medium businesses, which usually had trouble securing loans from traditional banks. By 2016, MYbank provided financial services to 2.77 million small businesses, and lent out RMB 87.9 billion in total. On average, it lent RMB 15,000 to each business.⁴⁰

As for offline SME businesses, the mobile payment brought convenience to the transaction process. Businesses, such as street vendors, could collect payment by scanning QR codes on mobile phones. No cash or POS machine was needed. This saved sellers and customers time counting change and improved businesses efficiency overall.

Part 4: The Problems of a Cashless Society

While Hangzhou and China have made significant achievement in becoming cashless, problems still exist. Two major issues were cybersecurity and tax collection.

Cybersecurity

A recent policy document for Smart Hangzhou, "The Overall Plan for Hangzhou Information Economy and Smart Application (2015-2020)", emphasized the importance of cybersecurity. The plan aimed to establish cybersecurity research institutions, work with the State Department of Internet Monitoring as well as the Internet Security and Information, and provide subsidies or preferential tax rates to encourage Hangzhou local companies to improve their cybersecurity systems.⁴¹

Hangzhou Health and Family Planning Commission's Director He Wei explained that all healthcare data was stored within the government and the mobile payment process was secured by the Resident Card Company, which was a SOE. The Resident Card Company acted as a middleman to communicate with hospitals and Alipay, providing a firewall to protect patients' information from private companies and the general public. The interaction between private companies and the Resident Card Company only pertained to transaction amounts, and included no other details.⁴²

However, whether the information could be considered secure within the government and SOE was another concern. Furthermore, integrated mobile applications like Alipay and WeChat were able to track users' movements in every aspect of their daily life, including chatting history, utility bill

⁴⁰ Zhejiang MYbank Ltd., "2016 Annual Business Report", 2016.

⁴¹ Hangzhou Economic and Information Technology Commission, *The Overall Plan for Hangzhou Information Economy and Smart Application (2015-2020)*, 2015.

⁴² Phone interview conducted by the authors with Mrs. He Wei, the director of the information office at Hangzhou Health and Family Planning Commission on January 31, 2018.

payment, parking records, online shopping preferences etc. Whether it was safe for powerful tech giants to keep such a big volume of personal data was a valid concern.

Tax collection

The convenience of mobile payment made business transactions easier, but also raised an issue about insufficient tax collection. Small businesses such as street vendors were able to collect payments without valid business licenses. Although Alipay allowed businesses to link their corporate accounts to the app, businesses were still able to transfer their revenue into their personal Alipay accounts to avoid taxation. Such behaviours undermined the government's revenue collection.

Part 5: Takeaways for Singapore

Singapore's Prime Minister Lee Hsien Long's National Rally Speech on August 20th, 2017 highlighted the importance of developing e-payments as part of the strategy for the country's economic development. However, he also expressed concerns over problems. For example, Singapore had many mobile payment platforms, such as DBS PayLah and Grab Pay; but they "(didn't) talk to each other".⁴³

While mobile payment applications such as PayNow was working on solving this issue, problems still existed. For businesses, compared to Alipay and the Hangzhou model, mobile payment platforms in Singapore had a higher entry barrier for SMEs. For consumers, according to a recent survey, 90% of Singaporeans still preferred cash payment due to concerns about security and privacy.⁴⁴ These issues resulted in low acceptance among both consumers and businesses for adopting mobile payment methods.

Moreover, mobile payment applications in Singapore were not as well-integrated as those in China. Alipay or WeChat Pay were not just online transaction platforms, but also a place where people could chat, pay utility bills, make doctor's appointments, and enjoy micro-financing services. These highly integrated features kept users around and drove the development of China's mobile payment services. Therefore, the Singapore government and local firms needed to think beyond the framework of the consumer market. Instead, they needed to work cooperatively to overcome the local cultural barrier and the current mindset of consumers to build a mobile payment ecosystem which brought significant value to its users.

The development of Hangzhou and China's mobile payment provided some lessons to Singapore's Smart Nation ambitions. Hangzhou and Singapore had the similar goals to build smart societies. But the difference was that the Hangzhou city government, as well as China's state department, acted directly to achieve its goal through making and implementing policies, as well as negotiating and cooperating with domestic companies. The Chinese government was more than just a policymaker and regulator, but also the innovator, investor, and consumer of mobile payment. Meanwhile, the

⁴³ Lee, Hsien Loong, "National Day Rally 2017: Six key takeaways", *Channel NewsAsia*, August 20, 2017. Accessed February 2, 2018. <https://www.channelnewsasia.com/news/singapore/national-day-rally-2017-six-key-takeaways-9140632>.

⁴⁴ Tan, Weizhen, "90% of Singaporeans prefer cash payments: PayPal", *TODAY*, 29 August, 2017. <https://www.todayonline.com/singapore/90-singaporeans-prefer-cash-payments-paypal>.

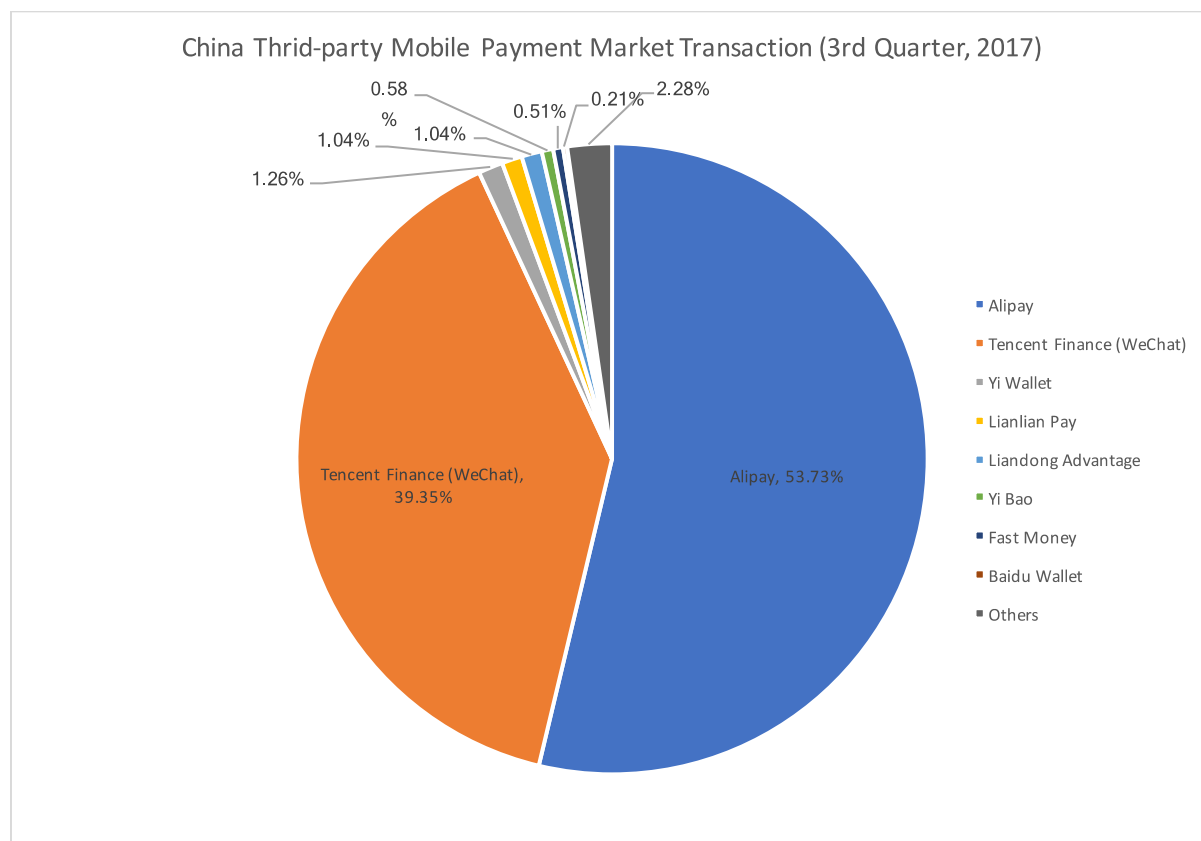
existence of leading tech giants such as Alibaba and Tencent, further stimulated competition and optimised mobile payment technology.

As PayPal's general manager of Southeast Asia, Rahul Shinghal pointed out, "cash has a huge cost for the economy, government, consumer as well as businesses. Singapore spends upwards of \$2 billion in managing cash and cheques. Every percentage point increase in cashless payments benefits everybody."⁴⁵

As Singapore moved towards its goal of becoming a smart nation, how could the government support such transformative development, without having a local technology giant such as Alibaba as the engine? How could banks and government work together to bring positive disruptions to Singapore's well-developed financial sector? How could mobile payments become more palatable to people who are already well aware of cybersecurity and privacy issues? What lessons could Singapore learn from Hangzhou and China, and adapt to her local context?

⁴⁵ Boon, R. "Challenges SMEs face in going cashless", *The Straits Times*, September 2, 2017, <http://www.straitstimes.com/business/banking/challenges-smes-face-in-going-cashless>.

Annex 1: China's Third-Party Mobile payment Transactions



China's Third-party Mobile payment Transactions (3rd Quarter, 2017).

Source: translated from research institute Analysys, 2017.⁴⁶

⁴⁶ "China Third-Party Mobile Payment Market Transaction 2017 3Q", Analysys, December, 2017. Accessed January 2018. <https://www.analysys.cn/analysis/trade/detail/1001110/>.

Annex 2: Example of E-social Security Card in Alipay



Screenshot of a Hangzhou resident's e-social security card in his Alipay app. The e-card also provides QR code for scanning. (The person's name, picture, and QR code were modified to protect personal information.)

Annex 3: Pictures of Smart Hospital Service in Hangzhou



On January 11, 2018, a QR code on a self-service machine for patients to scan with their Alipay app. There are three payment methods: cash, bank cards, and mobile payment. (Picture taken by Sarah Hui Li)

Annex 4: Example of Alipay's QR Code for Subways in Hangzhou



Screenshot of a Hangzhou resident's QR code in his Alipay app for taking subways.

Annex 5: Pictures of Hangzhou's Smart Public Transportation System



On January 11, 2018, on a bus in Hangzhou, there are three payment methods: cash, public transportation card, and mobile payment. (Picture taken by Sarah Hui Li)



On January 11, 2018, A man scanning QR code on his phone as he enters a subway station in Hangzhou, China. (Picture taken by Sarah Hui Li)



At the entrance of a subway station in Hangzhou, a QR code scanner has been installed on the ticket-reading machine. (Picture taken by Sarah Hui Li)