How Mobile Payment Is Changing The World

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1 Introduction

Increased interest in mobile payment heightens its need in the business world. The development of mobile payment demonstrates the increase of technology in people’s lives. It also makes progressive developments for catering to customers’ needs like the convenience and quick transactions [1]. This new paying method presents many advantages when compared with traditional ways. Fewer and fewer people carry physical credit or debit cards to complete payment. It seems mobile payment makes a difference in our daily life.

In our electric commerce period, the traditional payment methods can not keep the pace of high-speed fund transactions. The emergence of mobile payment provides various services [2]. As a new payment method, mobile payment guides a whole new payment concept and trend. Its high speed improves the quantity and quality of mobile business. “Next Generation Payment,” the other name for mobile payment, makes a huge impact on the credit card or debit card payment. It might replace those traditional payments for it makes the payment process more convenient. The mobile payment takes advantage of smartphones which people prefer to carry than physical cards.

This paper first introduces backgrounds of the mobile payment methods, its changing process and the basic research related to it and analysis; it also discusses the differences between those various mobile methods, the effect on different market players, as well as major mobile payment platforms as case studies before drawing a conclusion about it.
2 Background

This paper explains the three leading mobile payment platforms exist in modern society, NFC payment, QR-code payment, and online banking. Then it refers to brief development both in China and in U.S. Also, the last part of this chapter introduces some previous research in related fields.

2.1 Mobile Payment

The definition of “Mobile Payment” means a process of payment for product or service via a portable electronic device like a singular smartphones; besides, it can also be used to transfer money to your friends or family [3]. In other words, mobile payment means payment by mobile devices. Devices can be the tablet, smartwatch and some kinds of credit cards. -Most mobile payment depends on the internet, which means if the devices are out of service, the mobile payment does not work. The mobile payment has several of payment methods,-NFC, QR-code, and Online banking [4]. The NFC has a basic hardware requirement; it enables devices to establish communication with each other when within 4 inches. Those devices have to support NFC technology, and smartphones usually support it [5]. The QR-code contains more meaningful information than the traditional bar codes. For example, personal mobile devices show the QR-Code to make payment by being scanned by a Point Of Sale (POS). The online banking means an online payment system; individuals can complete related financial transactions through financial institution’s website.
Apple Pay exists as the NFC Payment System for some Apple mobile devices. More than 200 retailers support Apple Pay in the United States. It makes mobile devices pay at contactless points of sale via iOS apps or the Web. In the beginning, this service only supported US-issued payments cards, and then in July 2015, it began to support UK-issued payments cards. In February 2016, Apple Pay launched in China, and Chinese customers now use it. Nowadays, an increasing number of countries and institutions accept Apple Pay [6].

QR code means the trademark for a type of the two-dimensional barcode first invented for the automotive industry. A QR code contains much meaningful information using four standardized encoding modes to store those large amounts of data. The encoding methods are numeric, alphanumeric, byte/binary, and Kanji [7]. QR codes gained fame and use in broader areas, including applications which are commercial tracking and which aim at mobile phone users.

In the early 1980s, the existence of distance banking services via electronic media contributed to the invention of online bank services. Then in the late 1980s, the term 'online' referred to manipulating the banking system by devices such as keyboards. Users could not avail themselves of online services until 1981. It emerged in New York. From then on, four of the city's major banks including Citibank, Chase Manhattan, Chemical and Manufacturers Hanover, adapted these services in banking business. Now, this paper introduces a new paying way using virtual currency. The term "virtual currency" means "digital currency." Many institutions prefer this term [8].
2.1.1 NFC Payment

NFC Payment means the transaction via the NFC, so a hardware requirement exists for those devices to support NFC before making payment. Today, some NFC payments include Apple Pay, Google Wallet, and NFC credit card. Apple Pay becomes the first NFC payment system for mobile devices [9]. On Oct 24, 2014, Apple Pay became available in the U.S. and supported almost every credit card and debit card; this system only works for iPhone, iWatch, and iPad [3]. The Apple Pay only runs on Apple products and provides high security for users. Google produces Android Pay, which exists for Android devices which support NFC and accomplishes the same things as Apple Pay. Google launched it in the U.S. in September 2015 [10]. All Android devices with NFC can install it. These two methods for NFC Payment rely on the network, while NFC credit cards can work without the Internet or network environment, popular in Europe and Asia. In the United States, only a few foreign banks provide it, such as Hongkong and Shanghai Banking Corporation (HSBC). The NFC credit card is closest to Apple Pay or Android Pay, but it also can use the chip or magnetic strip. NFC credit cards prove more useful than Apple Pay and Android Pay for the advantage of no Internet requirements.

2.1.2 QR-Code Payment

QR-Code takes up a new generation of wireless payment scheme in the accounting system. In this payment plan, businesses can take account of commodity prices, transaction information to
compile into a two-dimensional code, and print it in newspapers, magazines, advertising, books and other carriers. Payments can be completed by sellers scanning the QR-Code in the payee’s personal phone to gain the money or buyers scanning the printed seller’s QR-code photograph to pay [11]. QR-code payment sounds like a very new technology; in fact, QR-code payment technology has existed since the early 90s, beginning in South Korea and Japan. While this paying method accounts for up to 95 percent of their markets, QR-code also started launching in China. Its popularity is by no means accidental; users can install QR-code recognition software, where a simple brush can complete the transaction [7]. QR-code stores a lot of information making it a good choice in mobile payment.

WeChat Pay, the innovative payment product on WeChat, Tencent Inc’s popular instant-messaging software, become WeChat and Tencent’s first three-party payment platform TenPay [12]. With WeChat pay, the user's smartphone becomes a magic wallet, through which users not only communicate and share with friends, but also pay for the purchase of goods and services with business cooperation. Users only need to associate with a bank card in WeChat and complete the identity authentication, which makes their smartphone equipped with WeChat app into a universal wallet. After the purchase of goods and services and business cooperation, the user only needs to enter the password on their smartphone, with no credit card steps to complete the payment. The whole process runs incredibly straightforward and smoothly. On February 15, 2016, the Tencent public relations official announced that since March 1, WeChat pay would adjust the fee policy to recover the transfer transaction free of excess cash.
The specific charges for fees, according to 0.1 percent of the withdrawal amount, and each at least costs 0.1 Yuan. Each user can enjoy 1000 Yuan free cash amount forever [13]. In June 2015, WeChat officially launched the "fingerprint payment." Users who subscribe to the single function, after entering the payment process, according to the interface prompt, and placing the finger in smartphone fingerprint identification area, achieve the second payment, with no need to get into a password [14]. According to the Fig 1, the users of WeChat payment increase rapidly in the only a year, from 27.51 million in the fourth quarter of 2013 to 119.07 million in the last quarter of 2014. When shopping online, popular in modern society, the third-party payment

![Active Users of WeChat Pay & QQ Wallet in China](image)

**Fig1.** Active Users of WeChat Pay & QQ Wallet in China
methods also become essential in the online payment process. According to the iResearch company, an official electronic commerce research platform, there exist three top mobile payments in China: Alipay, Tenpay, and UnionPay [15].

Alipay, the main third-party payment platform, established in 2004. It provides simple, safe, fast payment solutions, and achieves its payment service based on “trust.” It solved the problem of consumers’ disbelief about online shopping. In the early stage, users transfer the money into Alipay account, and Alipay informs the retailers online for consignment. After consumers receive the goods and they affirm on their Alipay account [16]. Then Alipay transfers the money to the retailer's’ account. “Alipay” is different from “Alipay wallet,” but both operate under Alibaba. From the beginning of the second quarter of 2014, Alipay stands as the top of mobile payment firm around the world [17]. Consumers complete secured transactions, online payment, credit card payments, mobile phone recharge, utility bill payment through Alipay. They also enjoy other services such as paying directly in retail stores, movie theaters, chain stores, taxi services and other industries after Alipay entered the area of mobile payments. Alipay first used QR-code payment technology in Oct 2014, which make its offline payment more convenient and popular. As to Alipay wallet, users finishing their payments only need to click to scan the QR-code. In offline payment, the cashiers finish their work by using the barcode scanners to scan the QR-code which is provided by Alipay users [18].

Tenpay, an online payment platform for Tencent Products, holds nearly a 20 percent share in mobile payment market. It forms a new payment platform which covers Business-to-Business
(B2B), Business-to-Customers (B2C), and Customers-to-Customers (C2C). It offers outstanding online payment and liquidation services [19]. Tenpay provides recharge online, withdraw online, and transaction management for individual users; for corporation users, it offers secure settlement service and abundant marketing resources of Tencent.

### 2.1.3 Online Banking

Online banking has two concepts. One concept allows users to manage their bank accounts through internet. The other one provides financial services through internet. For instance, users manage traditional banking business and emerging business by using the application of information technology [20]. Online banking also means Internet bank, banking through the Internet to provide customers with accounts, inquiries, reconciliations, bank transfers, credit cards, online and traditional services such as investment banking. Clients safely and quickly manage at home demand and deposit, cheques, credit cards and personal investment [21]. In another words, online banking means a virtual bank counter on the Internet. Full realization of convenient, fast, efficient and reliable paperless transactions brings out the advantages of online banking: it significantly reduces bank operating costs and efficiently improves the profitability of banks. With no time and space constraints, it is conducive to expanding the customer base. Moreover, it is conducive to service innovation, to provide clients with a variety of personalized services.
PayPal, one of the online banking applications for mobile payment is a subsidiary of eBay who aims to achieve safe, straightforward and rapid online payment through email. PayPal, the most reliable online email account can decrease the risk of online fraud [22]. More than 90 percent sellers and over 85 percent buyers used the PayPal online payment business in international transactions until 2012. The aim users of PayPal need to send or receive fund with an offshore account [23]. PayPal, the most widely online payment platform around the world, receives foreign trade funds rapidly and conveniently, and traces the capital process. PayPal now supports 25 major international currencies including U.S. dollar, Canadian dollar, Euro, pound, Australian dollar and Japanese yen, etc. [24].

2.2 The situation of Mobile Payment

This section describes the two most important aspects that mobile payment influences: the increasing number of mobile payment users in different areas and its rapid development in the United States. Then it analyzes why it makes such a huge impact on replacing regular payments and the trend of its further development.
Fig2. Non-cash payment As % of consumer payment, 2012

2.2.1 China

Multiple payment methods exist in China. China has witnessed a massive number of reforms in payment platform. We began to know that the different payment methods exert different influences on daily life since the appearance of Jiaozi, one of the oldest payment methods in China. During these years the payment methods in China have greatly changed in an unobtrusive way. The first debit card in China existed in March 1985, released by Bank of China (BOC). The following debit cards of other banks, including Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB) and Agriculture Bank of China (ABC) changes the process in China. BOC released the first credit card in China in June 1986. In 2013, the number of the existing credit cards added up to 4.214 billion, making payment with the card very common. Increasing numbers of people who hold credit cards and conduct banking business
means the banks must develop more convenient banking services. Thus, in 1996, online banking emerged. The first online bank business existed on March 6, 1998. UnionPay’s system set up in 2002. One bank did not admit cards released by other banks before UnionPay system’s appearance, which impedes proper circulation and consumption to a great extent. People only can pay with credit cards on a particular POS and pay with credit cards in Beijing, but not in other cities. The appearance of UnionPay system solved those problems and created favorable conditions for lots of market players, including consumers, financial institutions, and retailers in the field of mobile payment methods [25].

With the development of the Internet, global electronic commerce emerged rapidly, based on the health credit system in the Western world. The Internet soared in China in the 1990s when the number of netizens also rose from 0.1 million in 1996 to 4 million in 1999. The number reached 22.25 million in 2000. In the same year, the first C2C web in China emerged. Electronic commerce has a significant development. Alipay, established in 2003, gives people a new experience in online payment. From the prospectus of Alibaba, the total number of payment of Alipay went up to 3.8720 trillion in 2014, over millions per day. Then Tencent released WeChat 5.0 on August, 2013. It added WePay in WeChat which challenged the dominant position of Alipay. The emergence of WeChat transferred online payment into the mobile payment field. It differed by focusing on the access to mobile payment and users’ habits. In early 2014, Alibaba and Tencent invested more than a billion to their taxi software respectively to cultivate consumers’ mobile payment patterns [26].
On September 10, 2014, Apple released Apple Pay, joining in mobile payment market. Companies including UnionPay and Alibaba want to be Apple’s partners in China to strengthen their positions in mobile payment field.

According to a study of Master company around the world, the trend “payment without cash,” is gaining popularity in China. The speed of money disappearance in the payment process leads the world, which due to the urbanization and policy. The favorite payment method of Chinese people in modern society means to make payment with credit cards. A survey from Nielsen showed that more than 71 percent retailers in the first-tier cities preferred payment with non-cash methods, according to Financial Times in 2012 [27], which displayed the percentage of non-cash payment of several countries around the world.

Several popular mobile payment methods in China including Alipay, Tencent's WePay, and WeChat. With the adoption of smartphones growing, the rate of the Chinese mobile wallet market is soaring. Those native methods account for most of the market. The government of China does not want external payment providers like Apple Pay or Samsung Pay, which makes it hard for those newcomers to expand their market shares to earn the profit. They are developing a new business and service patterns. Some major smartphones manufacturers also design their mobile payment services due to the success of Apple Pay.

The emergence and popularity of some mobile payment products such as Apple Pay, Android Pay, etc., bring consumers’ expectation of mobile payment into climax. In the meantime, the
mobile payment product achieves its updating by combining remote payment with Near Field Communication (NFC). On the other hand, mobile payment helps industry convergence because of its character.

![China Third-party Mobile Payment Market](image)

**Fig3. China Third-party Mobile Payment Market**

According to a survey of China Internet Watch in 2014, the total transaction value of China mobile payment market moved up to 97.628 billion US dollars (5,992.47 billion CNY), 391.3 percent more than last year. People’s Bank of China (PBC) release China’s Payment Market Report 2014 on February 12, 2015. The report showed in 2014, the total transaction volume and non-cash business up to 62.752 billion 294.70 trillion. Non-cash payment business keeps a high speed in development among various payment methods [28]. We can see from the following table that the Chinese third-party mobile payment market developed rapidly from 2009 to 2014, and it has a lower pace from 2013 to 2018. The following figure [Fig 4] shows that Alipay and
Tenpay accounted for 82.05 percent and 10.57 percent respectively. Nowadays, retailers who own the most users have the most market share in the mobile payment period. Alipay grows more and more healthy because of the online shopping market.

Fig4. China Third-party Mobile Payment Market Share in 2014

The reason of turnover on November 11 is that directly on changes in payment methods and consumption habits. As to the Chinese third-party mobile payment market structure, the mobile shopping did not account for a significant part of the whole mobile payment transaction [Fig 5].
2.2.2 The U.S.

Bank of America releases the first credit card in the world in California in 1952. Thus the non-cash payment system in the U.S. begins. The development of mobile electronic commerce and mobile payment market is still not out of the embryonic stage in the United States. The largest mobile communications operator in the U.S., Cingular, holds a market share only more than 30 percent a little [29]. Its influence does not seem enough to dominate the development of mobile payments. In the field of financial services, in the United States, bank cards and personal checks remain highly popular, so banks, consumers, and businesses form a dependent habit of bank cards and checks, and lack the power to convert payment methods [30]. The United States lacks a kind of “mobile phone culture,” which would relate to American lifestyle. According to
the data from a survey of Nielsen 2016, the percentage of non-cash payment with credit cards totals about 56 percent around the world. There are 43 percent part of non-cash payment is mobile payment. Consumers regard the mobile payment method as a substitution payment method.

In 2014, the mobile wallet became a hot topic: in October, Apple Pay jumped online and ran into the business. Although the mobile payment industry grew rapidly, the popularity of mobile wallet for United States consumers grew far more slowly than most industry experts predicted [31]. Even if compared to the convenience of the consumer credit card in the United States and other developed countries, the mobile payment infrastructure obstacles remain, and evident advantage evades users. However, the prospects for the development of mobile payment in markets outside the United States look to be better. Although in Singapore and Netherland payment with cash remains the main method, we live in a payment environment based on cash payment because over 85 percent consumers do fund transactions with paper money and coin [32]. According to a survey from MasterCard Advisor, more than 90 percent of the payment process is cash in some countries and regions, such as in India, Mexico, Italy and Taiwan. Even in the U.S., cash payment accounts for 55 percent of payment methods. Some new payment technologies such as digital wallet, encrypted electronic currency (Bitcoin) and other mobile payment stimulate users to get rid of cash and grow familiar with the mature banking and credit card system not just in the U.S., but in developing countries.
The survey of Nielsen 2016 also showed that the percentage of mobile payment in China is the highest place. More than 86 percent consumers trust mobile payment. The Middle East has the lowest percentage, less than 1 percent. The same survey showed that in America, whose financial industry stepped into a mature stage, the consumers’ behaviors did not concentrate on one kind of method. On the one hand, 74 percent users still choose payment with a credit card as their favorite because of a long history and sophisticated system of the credit card. On the other hand, only 38 percent American consumers get more information about the mobile payment, while in Western European more than 56 percent consumers use mobile payment. In Southeast Asia where the telecommunication has a small level, users add up to only 38 percent [33].

In 1999, PayPal began their business, and they planned to develop mobile phone payment software, but soon they found out that the eBay auction buyers and sellers preferred to use the Internet-based payment method, so they gave up the mobile payment [34]. In March 1999, it launched the mobile payment service PayPal mobile phone SMS. PayPal mobile technologies remain quite primitive. When a customer pays in PayPal, he needs to send the payee’s name, amount and account number via SMS. In addition to PayPal mobile, MasterCard and Visa plan to expand the standard NFC chip configuration of contactless IC cards into the smartphone. According to the Fed's 2013 payment system report in 2012, the U.S. mobile payment transactions amounted to more than $27000, while the Statista data revealed that in 2014 the mobile payment transactions accounted for more than $55 billion, 800 million. Even after two years of rapid development, the size of the U.S. mobile payment market remains very narrow. In
May 2010, the United States Square company announced the launch of new mobile payment services; then the business immediately received the market’s welcome and a rapid rise in trading volume. Square’s own market impact also rapidly expanded, sweeping the U.S. market in just over a year. The mobile payment industry shows a healthy development recently. Remote payment accounts for 90 percent of the transactions. PayPal’s 2011 trading volume reached $4 billion [35].

Fig 6. Number of mobile payment users from 2009 to 2016, by region (in millions)

According to Fig 6, evidence shows that some people using mobile payment increased year by year, though places in the Middle East make less progress. In Asia/Pacific, through the period from 2009 to 2016, users increased from less than 50 million to more than 150 million. However,
North America stands at third place at present with about 90.7 million users, but from the graph, we may find it shows a faster-increasing speed than Africa, and lookd more likely to catch up the second one, which shows 100 million users. In fact, this stable and sustainable level of growth may indicate the increasing trend of the mobile payment use.

3 Statement of Problem

A significant number of researchers devote themselves to this new field. While this project focuses on the following three problems, other gaps remain. This paper answers these problems by elaborating the payment points out three main problems in mobile payment platforms and related research about them.

3.1 How does mobile payment change the trade and finance field?

Mobile payment clients could pay for most common goods and financial products. In order to be successful, mobile payment must support a commercial transactions at a multiple levels. Examining the levels of commercial transactions gives a better understanding of requirements for mobile payment.

3.2 What are advantages of the mobile payment platforms?
Most consumers choose cash, credit card, or debit card for their purchases. Mobile payments systems provide an alternative to these forms of payments. Many businesses and individuals are reluctant to accept mobile payment for their goods and services. As consumers understand the advantages of mobile payment, they become more likely to choose it as an option.

3.3 What are the advantages and disadvantages of three popular mobile payment platforms?

Mobile payment systems allow the purchase of a wide variety of goods and services. Each system provides a differing user experience. A comparison of the systems illustrates each system’s strengths and weaknesses.
4 Business Component

This chapter introduces the main characteristics of mobile payment platforms and their influences on different market players in complex business activities.

4.1 Consumers

When comparing mobile payments with those conventional payment systems, we find that mobility is the main advantage of mobile payment. Individuals do not have to consider time or place when they make their payments because the payments become independent of those factors. Mobile payment convenience and flexibility make more people consider adding the credit card information to smartphones. In a lot of places with the support of mobile payment devices, consumers can choose to bring a smartphone to complete the payment, which avoids restrictions on shopping because of the amount of cash carried on the body. At the same time, scanning QR-codes, entering the password, and other simple payment methods, all can avoid the traditional cumbersome payment procedures and save a lot of time and energy for shoppers, and achieve the business’s target of allowing the current consumer to buy the goods in the shortest possible time. Also, mobile payments largely reduce the additional cost from other companies. In the traditional payment system, every business has another fee, such as the fee for credit card use, which makes the transition more expensive than necessary. Mobile payment, according to the marketing strategy of different businesses, can provide benefits and low prices for business and consumer's requirements.
In summary, consumers are the winners in mobile payment. Consumers gain more benefits from mobile payment than traditional payment methods: better user experience, higher security and larger discounts.

### 4.2 Mobile Device Manufactures

As the popularity of mobile payment increases, mobile device manufacturers engage in supporting mobile payment business, the inevitable trend. For a mobile payment user, when purchasing a new smartphone, the chances of choosing the mobile devices with mobile payment are higher than picking the ones without. At the end of 2013, Samsung and Apple formally announced their cooperation with UnionPay [36]. In the meantime, Huawei launched Huawei Pay in commercial use as well, indicating that the top three mobile device manufacturers in the world established their presence in the area of mobile payment. Microsoft, to not get left behind, announced they would add mobile payment function on smartphone operating on the Windows 10 system. The war of mobile device manufacturers begins.

The reasons of mobile device manufacturers taking part in the mobile payment industry are, first of all, transferring their core business into mobile payment applications, so as to strengthen their services and establish their system. For the mobile device manufacturers joining in the market for this purpose, the excellent application experiences help increase consumer loyalty. Thus, long term benefits become their primary concern. Secondly, some mobile device manufacturers
engage in the mobile payment business, owing to the pressure from other competitors. These
kinds of manufacturers follow the general trend of the market, rather than aiming at
strengthening their services.

However, the reality showed that the mobile payment supported by mobile device manufacturers
was not as attractive as planned. The research report from Trustee indicated that only 20.7
percent of iPhone 6 or iPhone 6 Plus users in the United States had used Apple Pay. Among
those who had used Apple Pay, 57 percent of them said that they had only used it once a week,
while 15.3 percent of them said they had never used the service in the recent week. The results
from Samsung Pay and Android Pay had much lower usage than planned [37]. Although most
mobile device manufacturers have second thoughts on the values of mobile payment due to
slumping market and fierce competition, mobile payment is the development direction in the
future, so they have to set foot in this area sooner or later.

To start with, they must ensure the security of mobile payment, the most obvious advantage of
mobile device manufacturers. Technology products, though providing convenience to daily lives,
increase the opportunities for criminals. Traditional payment with the fake POS machines
resulted in forged and broken credit cards. However, to respond to these issues, mobile device
manufacturers, owing to their advanced technology and experiences regarding hardware, install
encrypted chips designed especially for mobile payment. The Embedded Secure Element (ESE)
chips store the information of credit cards, which then have a higher level of security compared
to third party payments [38]. Besides, fingerprint verification, the regular feature of smartphones,
exists as the double insurance for securing payments. Moreover, accessibility becomes one of the immediate causes for consumers choosing phones with mobile payment functions. Compared to traditional payment with cash and credit cards, there is no doubt mobile payment owns the distinct advantages of accessibility, simplicity in operation and convenience. On the other hand, compared to third party payment, the benefits of mobile device manufacturers supporting mobile payment functions on their phones means fewer procedures in user experiences. Furthermore, usability means another strong suit of mobile device manufacturers to win the competition.

Wider application of mobile payment means more attractions to consumers. Take Huawei Pay for example, besides the pay service updating the Android system; its mobile payment includes a series of available value-added applications including wallet and life services [39]. In other words, Huawei Pay not only accesses for mobile payment, but also provides comprehensive services including entertainment, housekeeper for life, business needs and tourist aids, etc., with the ultimate goal of establishing the financial ecosystem of mobile payment.

In return, what benefit can mobile device manufactures gain from supporting mobile payment? For one thing, the mobile payment enters the lifestyles of consumers gradually, as well as did smartphones. For smartphone device manufacturers, they can control their products and pre-install the mobile payment applications into the mobile phones produced. Competition in the smartphone market is increasing. The leading brands include Apple and Samsung, and other old favorites such as Nokia, Motorola, Lenovo, Sony Ericsson, as well as new arrivals in the market of smartphones like Huawei, ZTE. Under this circumstance, mobile payment is the next
chapter of the smartphone market. The appearance and functions of phones are not easy to innovate in the current market. Thus, many consumers have the idea that the smartphones of top brands are more or less the same as those of small brands, which are lower in price. Mobile payment, however, has higher requirements in technology than only producing a smartphone. Qualifications for building up a payment platform, cost of chips, optimizing payment experiences and improving the additional functions in the platform, etc. are the tests of the general strengths of the mobile device manufacturers [40]. Through supporting mobile payment, the manufacturers emerge as the best among all brands of mobile payment now. They gain enormous profits in the future, including attracting more mobile payment users, establishing the sound basis for a new mobile payment lifestyle, and distinguishing themselves from other small brands.

In other words, mobile payment would not bring any direct interest to mobile device manufactures, but supporting mobile payment becomes the requirement of smartphones, and manufacturers’ own mobile payment will catch consumers’ loyalty and make their brand more famous.

4.3 Credit Card Companies

The effect of mobile payments effect on credit card companies is evident. The biggest winners in the change of payment methods pushed by technology are traditional banks and credit card companies. In developed countries, they digitized the currency for decades. Westerners hardly hold real money. On payday, employers pay salaries to their employees and transfer digital
money to their accounts directly. Such a simple process makes employees use their wages conveniently, including paying the rent, utility bills and student loans, etc.

All the methods of mobile payment are based on the technology including NFC, QR code, and online banking. However, the credit card companies are the real operators in the payment process. The aims of this new technology are to make the existing payment system more convenient and safer. In this way the currency payment can change into electronic payment.

According to Boston Consulting Group (BCG), with changes in technology pushing the annual income of payment industry in 2023 will be twice of that of 2013. It will be over 200 billion USD, most of which previously was currency payment in developing countries. Yet BCG also notes that the mobile payment technology is a double-edged sword to the traditional payment field. It will promote the existing credit card system to perfect itself and prove itself more advantageous than other new competitors [41].

Long established companies, banks, and credit card companies deal with the most non-cash payments today. Most people expect credit card security to be as strong as mobile payment, but it is not; mobile payments are more friendly and secure to users. A well-known example is Apple Pay which launched in China 2016. It is not like other earlier mobile payments such as Google Wallet and PayPal, which to try to replace credit cards in users’ pockets. Instead, it functions just as the same as the credit cards.
Some credit card users think about safety issues in mobile payment. Although traditional credit cards are highly popular, under the impact of the mobile payment, they have gradually lost their appeal. The credit card was extremely unsafe because of the high risk of magnetic strip card cloning. Criminals can use high-tech means to steal the card information and use the clone card for consumption, and ultimately cause huge loss to the original card holder. High-interest rates and high annual fees increase the economic burden of many people and limit consumer behavior. In spite of the high cost of credit cards and interest, using credit card cash to take out money became the choice of many cardholders. According to the different major banks’ annual fee charging standard policy, some banks made it clear that the user still needed to pay an annual fee, even if the credit card is not open. Besides, huge credit card risk and credit stains are obstacles to a good economic order.

Although more people are going to pay bills by using their mobile phones, they are also worried about the payment security. Mobile payment helps customers solve this problem. Mobile payment methods such as Apple Pay send a disposable digital marker to the payment system instead of the client's credit card information. Thus, this method protects the private information of customers. A credit card is the combination of traditional business and modern information and technology. It is a kind of new payment industry with rapid speed around the world. It requires high speed and technical support to lead credit card companies to mobile payment. Credit cards play a significant role in economic development. In the meanwhile, mobile payment gives customers a convenient way to buy things with credit cards. The change of payment
method promotes many more users of credit cards, which leads to increasing numbers of credit card owners. Many credit card companies have moved to mobile payment by changing their patterns in exploitation, managing, working flow, and regulation field, which not only confirms the new market, but also significantly increases business. Instead of being a threat, mobile payments are an opportunity for credit card companies to expand.

The credit card companies which support mobile payment are the winners in this field, the consumer wants to get more functions in their credit card, even though they would not use them.

**4.4 Hardware Manufactures**

Mobile payment seems to be profitable. However, hardware manufacturers, the key element of products entering into mobile payment market, are making an easy and safe payment circulation of currency. Mobile payment makes hardware manufacturers think more prudently in choosing appropriate partners and business models if they want to make a profit in the mobile payment field. With the development of mobile internet, pay with mobile terminals anywhere at any time becomes possible. In the face of this business opportunity, hardware manufacturers including BAT (Baidu, Alibaba, Tencent), Samsung, Google and Apple are a participant in this fierce competition. In China, the third-party mobile payment market share has a clear trend, which means the software manufacturers have more shares than hardware manufacturers, and software manufacturers share percentage increases. For example, in 2003, Lakala, a hardware manufacturer, took 25 percent in the whole market. In 2013 its percentage dropped to 7.49
percent. Alipay and Tenpay divide the market share. It happens that there is a similar case overseas. Even though the Apple Pay and Google Wallet are so popular, their market share is only 1 percent and 4 percent respectively. However, in the mobile payment market, hardware payment is also considered important. Some smartphone manufacturers are trying to promote their products to increase the mobile payment trends. For example, Apple added NFC to its latest iPhone, which is a convenient and safe payment method combined with the function of Touch ID. Within one month, the turnover of the five biggest retailers in the US from Apple Pay accounts rose from 0.1 percent to 1.6 percent [42].

However the best form of a mobile payment terminal must be the combination of hardware and software. Payment with QR code is the representative software payment method while Quickpay is standard in the hardware payment method. No matter QuickPay or payment with QR code, they reflect the software and hardware manufactures’ determination to occupy the mobile payment market. In the recent mobile payment market, WeChat Pay and Alipay have outstanding software, while Apple and Samsung have brilliant hardware which is touchable and more practical to consumers. Combining hardware and software with the customer habits of paying. For example, Meizu, a smartphone manufacturer, cooperated with Alipay. They developed a function which is similar to Apple Pay. Additionally, OPPO also worked with Alipay to reform bus card payment. NFC is an emerging force and these smartphone manufacturers will apply NFC in the payment process, which lets customers complete payment by putting their smartphones near the Quickpay area on POS without opening payment software [42].
According to an international market research agency, IHS Technology, the shipment of smartphones with NFC will be over 2.2 billion at the end of 2020 [43]. The combination of software and hardware in mobile payment provides an excellent experience for users, which cultivates loyalty to their product. For instance, WeChat Pay obtained a large number of users from the social communication function of WeChat. Until the first quarter of 2014, WeChat and Alipay-covered over 90 percent mobile payment market share [Fig 4], so any monopoly in the mobile payment field is meaningless because users will choose the most appropriate method for their purchasing aims.

In summary, there are no winner for hardware manufactures, the whole market is decreasing. And mobile payment app make trading without POS machine.

### 4.5 Businesses

Commercial activities are more and more frequent in modern society. The highly active daily businesses needs convenient, rapid and safe fund transactions. Traditional payment methods such as cash, bills, and credit cards, which people are very familiar with, do not fulfill the requirement of the increased commercial activities. Thus, the mobile payment emerged in the field of business. As related previously, mobile payment changes users’ consumption. Consumers tend to buy low-price items many times. Nowadays, smartphones are always online, which lets them become the most commonly used terminals. In 2014, the rate of users who bought online, used
mobile payment, and achieved fund transactions on online bank increased 63.5 percent, 73.2 percent, and 69.2 percent respectively [44]. The rate of apps using mobile payment is increasing rapidly. This huge number of users also brings changes to commercial activities. The most significant influence is that mobile payment can help companies reduce costs in business activities. From the view of enterprises, traditional POS methods in commercial activities need 1 percent commission of payment. Using cash in the payment process creates the risk of counterfeit currency and giving change. Mobile payment can solve these problems by using a system scanning QR code with a smartphone. Meanwhile, mobile payment always links to official accounts, coupons and group purchases, etc. Thus, after accomplishing the mobile payment process, the retailers can make a more efficient connection with their consumers, which can form a secondary marketing and cultivate returned customers. Also, the convenient and rapid payment method gives users an excellent consumption experience, especially in the situation of a consumer forgetting to bring his wallet or cash. The company always provides some unique offers to consumers paying with mobile payment methods. These all can reduce the cost and increase profit.

Another change in commercial activities is the personal financing business. In 2013, the rate of household deposit in China was over 50 percent, which is much higher than the average world level [45]. Due to some historical and cultural reasons, Chinese people tend to put more money in the bank. In the banking system, the bank is an agency which collects money from residents and lends it to companies with good credit. However, the emergence of mobile payment
challenges the bank’s position in commercial activities. There are over 500 million mobile 
netizens, and mobile internet promotes commercial efficiency, broadens the channels of 
commercial service and enriches the commercial patterns. Internet companies try to take the 
market share of the traditional commercial banks’ business which leads to a massive innovation 
in business mode.

The year 2013 witnessed various business models emerging, from WeChat’s online red packets, 
YuEBao of Alipay to P2P credit and microfinance. In 2013, Alipay pushed the Yu'EBao. It 
developed quickly and gained 295 million users due to its lower deposit rate and flexible pay 
method through 2016 [46]. The lower deposit rate of mobile payment leads to more and more 
high-risk business products relying on it. In the first half of 2015, funding companies’ right 
selling amount totalled over 1000 billion USD through the mobile payment method. A website 
named Tiantian Funding gained 610 billion USD turnover in the third quarter of 2015, which is 
equal to the traditional four major commercial banks’ total turnover [47]. Mobile payment 
changes the market financing structure. The fast speed of P2P development in China shocked the 
entire finance field. P2P financial companies help build the debtor-creditor relationship through 
the Internet, and the higher interest appeal to the users who prefer high-risk and high-payback. It 
is evident that the popularization of mobile payment pushes the commercial products into daily 
life. Ordinary people can participate in financial investments. In the past, people could only 
check their balance for several days at the bank counter. But nowadays, they can check their 
balance and even operate their account anytime and anyplace they want through mobile payment
methods. Mobile payment allows users to control of their business within daily life, but more and more non-financial institutions participating also raises some problems. Therefore, it is important to discuss the methods to prevent financial risk facing the situation of mobile payment.

Mobile payments is not only a payment methods, but also can help business increase its profit. Today, mobile payment app include the store or restaurant recommended, business on the mobile payment recommended list are the winners in this field.

4.6 Financial Institutions

The development of mobile payment relates closely to financial level. The high frequency of financial action stimulates people’s need for more efficient and more secure payment methods. It also leads to the update and development of mobile payment platforms. The emergence and popularity of mobile payment not only influences the service model of financial institutions, but challenges the payment methods and other business of financial institutions.

Financial institutions are another important player in the mobile payment market. They also adopted some measures in the new era when the Internet companies and smartphone manufacturers changed their development policy. For example, some financial institutions have released their apps to convince their clients to do fund transactions on their smartphones. They also set some public pages in WeChat and sent advertisements on the mobile app of Alipay. Thus, financial institutions have access to the mobile payment market quickly. For instance, the mobile
App of Industrial and Commercial Bank of China (ICBC) brings the function of QR code scanning and the mobile app of China Merchants Bank (CMB).

A report from a research institution analyzed that the dominant position of traditional financial institutions remains strong, although the competition among Internet companies is fierce. Financial institutions have a long history, and the number of their clients is significant. The customers of a financial institution are the stable base for them in such a transformation period. The mobile payment platform of financial institutions can also provide convenient and rapid services including transactions and business. Data showed that there are more than 34 million mobile app users of nine commercial banks who already developed online business in the first half of 2013. More than 70 percent of online bank users are mobile app users [Fig 7].
In recent years the mobile payment platform has been updated many times, which significantly affects financial institutions. First, it changes the cost of service. Research shows that a mobile payment platform decreases the bank’s operating expenses. Second, it changes the service mode. One example is an extension of the deposit companies and the popularity of smart cards. The mobile payment platform is helpful to the development of digital currency and its payment system, which decreases the transaction costs and broadens the deposit user’s scope. For example, the Quick Pay and NFC improved the circulation of smart cards. Banks have opportunities to increase the reach of their online business by integrating bills and payment systems, developing online loan business, and allowing users to transact funds through mobile
applications. The other change is the bank’s organization mode due to the popularity of virtual sites. The development of mobile payment technology makes bank businesses broaden in a practical way. In an extended period, the real location of the bank is still the core organization mode of banks. Yet, with the development of technology, the bank provides services in a more automotive and standard flow. The virtual terminals replace the real sites where clients deal with business face-to-face. Third, mobile payment platforms eliminate the barriers between different banks. Card holders link their debit cards or credit cards to one mobile application such as Alipay, or the same smartphone device which has the NFC function, such as Apple Pay. When they pay with their smartphone, whatever they choose, Alipay or Apple Pay, they can pay with cards from any bank, regardless of the issuing bank. The online bank, to some extent, eliminates the barrier between the business of banks. The disappearance of service barriers makes the cooperation of banks possible due to the change of payment platforms and financial policy. Fourth, the international business of the mobile payment platform links financial institutions to a global payment system including Visa and MasterCard. For example, the international fund transaction business of Alipay remits funds to offshore accounts directly. The higher level function and larger scope of the mobile payment application in international business improves the efficiency of the payment system, and makes the real-time fund transaction and payment possible, giving convenient service to their clients as well as bringing abundant commissions to themselves. Financial institutions also enhance cooperation and communication with offshore banks through developing international business on their mobile payment platform. Domestic
banks absorb the advanced fund management systems through the cooperation. In the meanwhile, the service quality to their clients improves.

The mobile payment application platform embodies the expansion and supplication of the banking business. The relationship between them is close and cooperative. This kind of relationship is a link between the bank and the client or users. On the one hand, the mobile payment application helps banks deal with the fund settlement and client service. On the other hand, it connects with customers. The third party payment platform in the meanwhile can provide other technology support and increment service for payment process, which is a service creation the traditional financial institutions do not have.

In conclusion, the third party payment platform is a challenge to traditional banking payment. Relying on banks and packaging payment business to clients simply is not the character of this time. The third party payment company provides more advantages on providing new payment business and service due to its flexible adaptability to market requirements. First, it changes the situation if the bank only had a settlement company. If other businesses provide business solutions for their clients conveniently at a lower price through smartphone or mobile Internet, the traditional banks are not in a dominant position. The other battlegrounds are in the payment market. Both financial institutions and the third payment companies aim to access the new personal financial business.
Mobile payment support is important for financial business; mobile payment can bring more clients and let business grow more famous. The small amount financial products are popularity, mobile payment is one of the best payment method for clients and financial business. In other words, the product which can catch smartphone users’ eyes is the winner in the market.

4.7 Mobile Telecommunication Operators

Although mobile telecommunications operators’ position in the mobile payment is not as dominate as before, they will be essential in NFC if they are able to grasp the opportunities and create a new product. Nowadays each person owns at least one mobile phone. Thus, mobile telecommunication operators manage over 10 million users, which should have made them the most powerful player in mobile payment market, but in the whole group of all the market players including smartphone manufacturers, Internet companies, and financial institutions, the telecommunication operators do not hold power in mobile payment. They are just a distribution channel of information and Internet, which may become a motivation for mobile telecommunication operators to develop a new business of NFC [48].

The mobile telecommunication operators maintain control in integrating mobile terminals to achieve the NFC function of smartphones. They provide a good mobile payment experience to smartphone users whether in small NFC payment or large fund transaction business. The mobile telecommunication operators provide the air channel of mobile payment. At the same time, they have many agents and offices all over the city to make users feel close. In their traditional views,
mobile telecommunication is authoritative, and the brand images become interiorized since they use smartphones every day.

But the mobile telecommunication operators are not financial institutions. They cannot develop new business in the mobile payment platform by using different economic and financial models. So there are no winners and losers.

4.8 The Users and Volume

4.8.1 Apple Pay

Apple launched Apple Pay in the United States first, in 2014. The second country to use the Apple Pay is the United Kingdom, and it was online in 2015. Apple Pay got relatively complete support in the United States and Britain. In addition to Britain and the United States, in November 2015, Apple Pay launched in other countries, such as Australia, Canada, and China, but only to support the American Express Bank (American Express). After that, according to foreign media reports, iGen, France were also likely to launch Apple Pay.

China is one of the biggest Apple markets in the world, and Apple sells most of its iPhones to China. According to media reports, the day after the Apple Pay release conference, the total number of cards bound to Apple Pay grew up to 30 million. If each person held an average of 2 cards to Apple Pay, then there are 15 million inhabitants who tied their card to Apple Pay.
According to the reports on the Internet, however, the sales of iPhone 6 and 6S in China were about 80 million units, and the rate of tied cards is about 18 percent [49].

However, the usage of Apple Pay continues to decrease in the United States. The network First Annapolis conducted a survey in February 2015. According to the survey’s result, in early 2015, 22 percent of Apple iPhone holders used Apple Pay at least once every month. However, by the end of 2015, only 22 percent of holders used Apple Pay at least once every month. Additionally, 19 percent of users said they used Apple Pay frequently among those who installed Apple Pay in early 2015, but the rate dropped to 15 percent by the end of 2015 [50].

![Apple Pay Usage](image)

**Fig 8. Apple Pay Usage**
According to figure 8, the Apple Pay usage may be the same in the United Kingdom. Early last year, the rate of Apple Pay eligible transactions was 4 percent. Although there were two growths respectively in May and September, the rate of transactions dropped to about 2.8 percent.

4.8.2 WeChat Pay

The WeChat application is the most popular chat application in China. Therefore, the most users live in China and also access the WeChat payment transaction.

In 2016 Q2, WeChat saw 806 million monthly active users, achieving significant growth compared with the end of March, 7.62 million. This amounts to more than 70 percent WeChat Pay user's transactions, more than 100 CNY by WeChat Pay monthly, which is about 15 US dollars, in 2016 [51]. The Tencent company will deal with at least 3 trillion and 600 billion CNY WeChat payment, about 550 billion dollars. The data was nearly two times of the total amount of US mobile payment, PayPal transactions, last year. The total transaction amount of PayPal was 282 billion US dollar in 2015 [52].

4.8.3 WeChat Pay

According to PayPal’s official report, in 2016 the total mobile payment volume was 102 billion US dollars, which is 55 percent higher than 2015. The total payment volume was 354 billion US dollars; mobile payment takes 28.8 percent of the share. The volume continues growing quickly.
There were 197 million active customer accounts in 2016 Q4, and the average transactions per account were 31, which means ten transactions per month on average.

PayPal is available in more than 200 markets, and can receive more than 100 currencies, allows withdrawal of money in 56 currencies, and holds up to 25 currencies in a PayPal account.

According to this, PayPal is one of the most international third-party payment tools [53].
5 Technology Component

Mobile payment significantly improved people’s payment experience, and it provides a new opportunity to promote the development of online shopping, financial institutions, and third-party payment. Throughout the elaboration of the global mobile payment industry, there exists rapid growth, and the fast and convenient mobile payment is the mainstream of future payment development.

In recent years, because of the increasing demand for mobile payment from the consumer and the rise and rapid development of e-commerce and mobile Internet, a high growth of mobile payment attracted more attention around the world wide. According to Gartner data, the quantity of global mobile payment users went up to 212 million at the end of 2012, which is three times of the volume of mobile payment users in 2009 of 70 million, and the compound annual growth rate is 44.73 percent. The growth rate of the quantity of mobile payment users increased for the next few years. In 2005, the number reached 384 million. Meanwhile, while the number of the users rises, the amount of global mobile payment transaction also grows. By the end of 2012, the number of global mobile payment transactions rose up to 1715.20 million dollars, while in 2009 the number of the global mobile payment transaction just reached 255.59 million dollars. Besides, in 2015, the quantity of global mobile payment transactions increased to 4728.05 million dollars, which means that the average amount of payment transaction of each mobile payment user is more than 1,000 million [54].
In China, the mobile payment also faces unprecedented opportunities for development, and the mobile payment industry in China shows rapid growth momentum. According to related data from the People's Bank of China, by the end of 2011, the number of mobile payment user in China rose to 145 million. Compared with the amount in 2010 of 90 million, the increase amounted to 55 million, with a rapid growth rate of 61.11 percent. With the rapid growth of the number of mobile payment customers, meanwhile, occurs a rapid increase of mobile payment service. The business amount of 247 million in the year 2011 rose to 109 percent within the last year [54].

Through an in-depth analysis of the status and development trend of the global and China’s mobile payment industry, a more proper development of payment business is gradually maturing around the world. The previous data highlights the enormous prospects for mobile payments. With the continued rise in mobile payments, many smartphone manufacturers, including Google, Apple, and Samsung, decided payment function is an important development direction in the future. Some popular mobile payment enterprises launched more excellent payment ways. A simple summary as following.

Square Mode: Users install a card-reading device in the interface of the earphone jack or the base of the mobile phone. Several existing applications include Square, VeriFone, inner fence, iZettle, Erply, and GoPayment. There are several such payment applications, such as Card.io and Jumio. Mobile payment based on Ultrasonic Technology: this utilizes ultrasonic waves to make the phone use its microphone and loudspeaker to complete a near field communication (NFC). It
does not rely on a dedicated chip, and the user experience remains consistent. Two mobile phones touch each other to complete the communication conveniently. Several such applications, such as Google Wallet and Alipay use this method. Mobile payment based on NFC (near field communication): NFC is now the most popular mobile payment technology. Several large mobile phone enterprises, such as Samsung, Microsoft, Apple, and Huawei, launched phones or solution supporting NFC. As of now, the NFC payment and QR-Code payments are becoming more popular around the world, as shown in next section.

5.1 NFC Payment

The number of NFC payment users is increasing rapidly, and Apple Pay proves one of the most popular NFC payment options. Apple Pay, Apple’s new production, launched in the fall of September 2014, at the iPhone 6 and Apple Watch launch conference. Apple Pay is a payment and electronic cash service based NFC. This technology provides users of iPhone 6 (Plus), and iPhone 6s (Plus) the use of a smartphone as the credit card for purchases in stores which support Apple Pay.

In stores, the Apple Pay makes the iPhone replace the physical credit card. When paying, customers just need to take out their iPhone and put their finger on the screen. The fingerprint was entered before, on the Touch ID. Then they hold the phones close to the supporting Apple Pay Pos machine. The payment can be completed within two seconds. Just touching the home key would work. Naturally, Apply Pay reduces the complex procedure, such as taking out the
card, giving to the clerk, swiping the card, entering the password, waiting for the bank receipt, printing ticket, and signing for confirmation. In this process, if entry proves entered incorrectly, that is an annoyance. The significance of Apple Pay is to change the situation. The fingerprint authentication and encryption technology make the whole process of credit card consumption more secure, to prevent the credit card from being fraudulent.

The technology of “NFC + Fingerprint” provides an unattended payment experience. Currently only Apple can do it. NFC technology replaces the original credit card magnetic strip and uses the fingerprint authentication instead a credit card payment signature. If the iPhone replaces the credit card, it just needs to cooperate with the card organization which issues credit cards. However, the iPhone records the credit card information and the security risk is high when losing the smartphone. The technical solution is as follows: the iPhone Apple Pay scheme does not directly store credit card information. The card organization issues an encryption for it, and the security chip separately stores the information, and can replace the magnetic strip. In other words, the token and credit card magnetic strip are equivalent. Only when the user passes the fingerprint authentication, would iPhone allow NFC to read out the token. If the token was leaked, it could not reverse the credit card information.
5.1.1 How it works

Fig 9. Payment Flow

Here is the flow chart of Apple Pay [Fig 9] for the purchase online, but the process is the same as the NFC method. First of all, the user sets up Apple Pay. If the user already is set up with Apple Pay, the screen displays the payment information. If it uses the NFC method, it will show the card information. Now, the system requires the users verify themselves by TouchID. When the users authorize the payment, the Apple Pay going to create an encrypted payment token to the merchant system (POS machine). The token will include the card information, payment
information. The token only has value once and invalidate quickly. The merchant system will decrypt the token and get the private key about the credit/debit card. The merchant system sent the key to the payment provider. If the key is valid, the payment provider finishes the requirement from merchant system, and sends the feedback to users. If the key shows as invalid, then user needs to try again this transaction.

5.1.2 How to Use

First of all, Apple Pay must tie to a bank card. The bank card binding operation of Apple Pay is very simple. If the iTunes account has associated with a bank card before, the user only needs to add the card in the Apple Pay application. Otherwise, if the user has no related card or wants to add another bank card, there would be three steps: take out a bank card and use the iSight to take a photo of the card; the bank checks the card validity. Users add the bank card to the “Wallet.”

Secondly, after adding a bank card, Apple Pay provides online and offline payment modes. For online payment, users choose goods in the virtual mall and uses the Apple Pay. The user presses the fingerprint (Touch ID) to complete the payment, and wait for delivery. Regarding offline payment, after finishing shopping in a physical mall, the user, at the cashier with the mobile phone, presses the fingerprint (Touch ID) near the Pos card machine to complete the payment.
Fig 10. Click “Wallet”

Fig 11. Click “+”

Fig 12. Agreement

Fig 13. Card details

Fig 14. Scan card

Fig 15. Terms and Conditions
Fig 16. Waiting

Fig 17. Verification

Fig 18. Verification

Fig 19. Card information

Fig 20. Card information

Fig 21. Pay by Apple Pay
The user does not need to enter a password during the whole process of Apple Pay, and also there is no need to open the application for offline payment or even light up the screen. There also can be a vibration or sound feedback after a successful payment. Both online and offline payment processes are simple: just use a fingerprint to complete payment. In other words, the payment experience, especially the experience of finishing payment offline, demonstrates that Apple Pay is indeed better than the NFC payment products.

5.2 QR-Code Payment

Quick-Response Payment is a new wireless payment system based on the accounting system. As with the QR-Code payment program, the business can collect and edit the information, such as account and prices, into a QR-Code, then print and release it in a variety of carriers, such as
newspaper, magazines, advertising, and books. The user can scan the QR-Code through their mobile phone, achieving payment completion to the WeChat Pay account of the business. Finally, according to the payment transaction information such as contact information and the receipt, the merchant carries out commodity distribution, completing the transaction.

QR-Code Payment has several programs, such as Alipay and WeChat Pay. As WeChat became a useful contact application, it also became one of the most popular payment programs recently. WeChat Client integrated WeChat which integrated with the payment function. The users rapidly complete the payment process through the mobile phone. WeChat payment is a quick payment based on binding the bank card, to provide safe, fast, and efficient payment services. At present, WeChat allows credit card payment, scan code payment, public number payment, and ap payment, and also provides new marketing tools such as corporate envelopes, vouchers, and minus deals to meet different payment scenarios for users and business.
5.2.1 How it works

**Fig 23. WeChat Pay Flowchart**

This figure displays how WeChat Pay works. The QR-Code which stores provide has order information. WeChat Pay users scan the QR-Code by WeChat Client. WeChat Client decrypts the QR-Code and visits the store address to require a payment order. The store creates the order and calls WeChat Pay Application Programming Interface (API). The WeChat Pay system creates a pre-payment order after it gets the call from the store. Then, the store creates a JSAPI page and signs it. Next, the store returns the prepayment information to WeChat client. Now the
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user is ready to pay. At the same time, the WeChat Client will ask the user to confirm the payment. When the user confirms, the WeChat client sends a JSAPI to require to pay. The system will check this requirement as valid or not. The WeChat Pay system returns the result and asks for authorizing, only if the system passing the check and the WeChat Client asks the user to authorize themselves. Now the user ready to pay.

To authorize, WeChat Pay user enters the password or uses a fingerprint, both can authorize the payment. Next, the WeChat Client sends the information to the system to verify the authorization. After the checks, the WeChat Pay System returns payment information to the store.-The system asks the order information from the store to show return to the user. In the end, the user reads the payment information and order information on WeChat Client.

5.2.2 How to use

There are several steps for the first time user of WeChat Payment since it needs to bind a bank card. First, open the wallet and click card at the right. Second, add a bank and set up the password. Third, fill in the name and card number of the bank card. Fourth, bind the phone number with the bank card and select the bank type. Fifth, read a message about the identification code sent to the phone, and fill in it. Finally, enter the password twice to ensure the password.
After that, just open the scan function to scan the QR-Code to get into the password; or use "pay QR-Code" to show the cashier. Otherwise, if the user needs to receive money from others, the user just opens their QR-Code for others to scan, and finally, the user enters the amount of money to complete the transaction.

![Fig 30. Main page](image)
![Fig 31. Select Scan QR Code](image)
![Fig 32. Scan](image)

### 5.3 Online Banking Payment

There is much online banking application, such as PayPal which is a famous and popular online banking application around the world. PayPal is an Internet service provider that allows using e-mail to identify the transfer of funds between users, avoiding the traditional way of sending a check or remittance. PayPal is also working with some e-commerce sites to become one of the ways to pay for a loan. However, when using PayPal, it needs a certain amount of commission.
5.3.1 How it work

Fig 33. What is PayPal

According to figure 33, PayPal is a third-party online banking system. The first concept of PayPal is to protect the buyer and the seller for online shopping. The buyer transfers the money to a PayPal account first. Next, PayPal will hold this money until the buyer confirms he has received the product. Then PayPal transfers money to the seller. In this process, PayPal has a security tool.

For mobile payment the process is the same. In offline shopping, customers transfer the money to PayPal. Then PayPal transfers payment to the store quickly, so offline shopping customers do not need to wait.

5.3.2 How to use
Using PayPal in the offline shop is different with shopping online. It has some limits, such as the shop agrees to accept PayPal and register on the PayPal store.

First of all, open the PayPal app, and click the "In Store." Second, select the store you want to pay. Show the code to checkout and confirm it. Then PayPal finishes the payment and shows the result and receipt on app.

### 5.4 E-Cash

Electronic cash (E-cash) is a currency in the form of data. It transfers the money into some binary sequence numbers, and these sequences can express the reality of the amount of currency. The user opens an account in the bank that carries out the electronic cash business, and stores money for purchase in shops which accept the electronic cash. When users enter into the online
Internet bank and use a password and personal identification code (PTN) to identify themselves, it downloads the electronic coin bag containing small cash directly from the account, and the electronic money can work. Users store electronic money on the hard drive until the user purchases goods from an online merchant.

5.5 NFC Credit Card

Fig 37. HSBC NFC Credit Card

Compared with other mobile payments, an NFC credit card payment is one of the most traditional payment models. Users just bind their credit cards with their smartphone and put the phone close to the Quick Pay logo POS to complete the payment. The NFC credit card function significantly improves the convenience and security to provide cardholders a faster payment experience. The Quick Pass using an NFC credit card is a terminal mode, which does not rely on operators. It has a non-contact online consumption function, and also a non-contact offline use.
5.6 Mobile Payment Component

Many mobile payment models developed in recent years, such as Apple Pay, WeChat Pay, and PayPal, and the payment modes are different. Here are some differences and comparisons of these payment methods methods.

The usage of Apple Pay does not require the Internet access to the mobile phone, does not need to click to enter the app, and even does not need to wake up the screen. Customers just need to put the mobile phone close to the UnionPay logo POS and put a finger on the HOME key to pass the fingerprint verification to complete the payment. Additionally, if the iPhone is in the black screen locked state, just click the HOME button two times to enter the wallet screen to quickly achieve payment. If the transaction machine shows that it needs to get into a password, the customers need to get into the bank card transaction password. There are just one or two seconds to complete the Apple Pay payment.

WeChat payment is a payment function allowing clients to quickly finish the payments. WeChat payment is a payment model based on binding the bank card to provide users with safe, efficient and convenient payment services. On 26 September 2014, Tencent Inc released the 5.1 version of WeChat to create mobile phone lock software for WeChat payment [55].

The 5.1 version creates a WeChat payment encryption function, providing protection for WeChat wallet. As for using the WeChat payment, customers just click and finish the authentication [56]. This version can take the mobile phone equipped with the WeChat app as a universal wallet.
Goods and service with cooperating merchants can be purchased. Users just need to enter a password of their smartphone when purchased, without any credit card steps to complete the payment, and the whole process is straightforward and smooth. At present, WeChat supports many payment functions, such as credit card payment, QR-Code payment, app payment and public payment, to provide users a different payment requirement.

PayPal is a company owned by eBay. The concept is providing users with a safe, simple and convenient online payment and collection. The PayPal account is the most secure network account launched by PayPal, which can reduce the occurrence of network fraud. The PayPal account integration of advanced management functions allows the users easy control of the details of each transaction.
6 Results

This session includes three results of this session comprises three results of the problems.

6.1 How the mobile payment change the trade and finance field?

Mobile payment clients could pay for most common goods and financial products. In order to be successful, mobile payment must support a commercial transactions at a multiple levels.

Examining the levels of commercial transactions gives a better understanding of requirements for mobile payment.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Apple Pay</th>
<th>WeChat Pay</th>
<th>Paypal</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Trading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2B</td>
<td>N/A</td>
<td>N/A</td>
<td>Support</td>
</tr>
<tr>
<td>B2C</td>
<td>N/A</td>
<td>Support</td>
<td>Highly support</td>
</tr>
<tr>
<td>C2C</td>
<td>N/A</td>
<td>Support</td>
<td>Highly support</td>
</tr>
<tr>
<td>Domestic Trading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2B</td>
<td>N/A</td>
<td>N/A</td>
<td>Support</td>
</tr>
<tr>
<td>B2C</td>
<td>Highly support</td>
<td>Highly support</td>
<td>Highly support</td>
</tr>
<tr>
<td>C2C</td>
<td>N/A</td>
<td>Highly support</td>
<td>Highly support</td>
</tr>
<tr>
<td>Finance Product</td>
<td>N/A</td>
<td>Highly support</td>
<td>Highly support</td>
</tr>
</tbody>
</table>

Table 1
6.1.1 Trading

Trading includes international trading and domestic trading, and each one includes B2B, B2C and C2C. The development of mobile payment brings the opportunity for B2C and C2C, in both international and domestic markets.

6.1.1.1 International Trading

There is no doubt that the major part of the international trading or global trading market is the B2B, or wholesale business. Traditional international trading was when a company in country A purchased products from one company in country B. Because of the high cost of shipping, and the risk of exchange rate fluctuations and transportations, the number of goods was large. To be cost effective necessitated the sale of many goods, which means wholesale. The payment for this trading is a letter of credit (LC) or wire transfer. Because the amount of money is huge, no mobile payment provider can handle it today.

However, the B2C and C2C are growing quickly today. For example, Amazon, Alibaba and eBay are all network trading platforms; they provide service for business and customers in the global market. Customers can purchase a British product in the Amazon.com in US dollar and the British company gets payment in British pounds. Amazon handles the exchange and wire transfer. In other words, if a mobile payment method can do the same features, it can support the international trading in B2C or C2C. PayPal is a provider that can handle this; PayPal supports
multiple currencies and makes the exchange for each currency. In summary, mobile payment can handle international trading on some level.

**6.1.1.2 Domestic Trading**

In the domestic trading market, mobile payment is compelling in the network trading platform. EBay and Tencent developed PayPal and WeChat for their online shopping platform, and Apple Pay also supports some online shopping websites and their app store. In other words, mobile payment works perfectly in online shopping. However, mobile payment also supports offline shopping. Through the NFC, QR-Code or online banking, mobile payment users check out at the retailer as a regular credit card, even though mobile payment has more benefits than the typical methods, such as electronic receipts and electronic coupons.

On the other hand, wholesale or B2B market, mobile payment has the same problem as the international market; it is hard to handle the money and makes it unnecessary to use mobile payment because the mobile payment works more on the customer side; mobile payment tries to replace credit cards.

**6.1.2 Finance**

Life application scenarios with active mobile Internet are the main challenge to build the mobile payment ecosystem. Tencent rapidly launches various life application scenarios through WeChat Pay, from shopping and travel to dinner. The establishment of WeChat Pay is the core for
Tencent to open up the online shopping industrial chain. In contrast, traditional bank card payments are just a convenient way to replace cash transactions, without the characteristics of the ecological chain.

User experience is the determination of success or failure of the Internet finance. The internet banking user experience is the most important issue for decision makers, which is entirely different from the traditional Internet IT. The success of Alipay and WeChat payment is held up by the user experience using powerful life scenarios applications. This is a complete subversion of the traditional commercial bank. Customer-centric regulation is the center of the mobile payment industry and other Internet financial sectors.

It is not simply a single function of mobile payment is becoming the core of the Internet financial expansion decisions. From Alipay to WeChat payment, features are more powerful. It is a clear trend that the traditional consumption function is gradually bonding with finance.

In summary, mobile payment can not only buy everything in the market, including products, dinners, flight tickets and financial products, but also, mobile payment can replace the bank and other traditional financial industries in some cases. For example, WeChat and PayPal allows users to keep a balance and deposit money into their account, and some mobile payment companies even include financial management feature or an almost free transaction between mobile payment accounts.
6.1.3 Summary

In summary, mobile payment is powerful, but also has restrictions, such as the difficulty for mobile payment deal with large amount transitions, so mobile payment not a good choice for B2B business. However, in B2C and C2C, mobile payment deals with all kind of businesses. On the customer's side, mobile payment is enough for daily life usage. In other words, the buyer can buy any products and services through mobile payment.

6.2 What are advantages of the mobile payment platforms?

There are three major payment methods right now: cash, credit/debit card and mobile payment. Because mobile payment has many more benefits than the others, could mobile payment entirely replace them?

<table>
<thead>
<tr>
<th>Method</th>
<th>Security</th>
<th>User cost</th>
<th>User experience</th>
<th>Business cost</th>
<th>Business experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>Low</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Magnetic bank card</td>
<td>Low</td>
<td>Annual fee</td>
<td>Medium</td>
<td>Charge fee POS machine</td>
<td>Medium</td>
</tr>
<tr>
<td>Chip bank card</td>
<td>Medium</td>
<td>Annual fee</td>
<td>Medium</td>
<td>Charge fee POS machine</td>
<td>Medium</td>
</tr>
<tr>
<td>NFC bank card</td>
<td>Medium</td>
<td>Annual fee</td>
<td>Medium</td>
<td>Charge fee POS machine</td>
<td>Medium</td>
</tr>
<tr>
<td>Apple Pay</td>
<td>High</td>
<td>Apple device</td>
<td>Medium</td>
<td>POS machine</td>
<td>Medium</td>
</tr>
<tr>
<td>WeChat Pay</td>
<td>High</td>
<td>Smartphone</td>
<td>High</td>
<td>(POS machine)</td>
<td>High</td>
</tr>
<tr>
<td>PayPal</td>
<td>High</td>
<td>Smartphone</td>
<td>Low</td>
<td>None</td>
<td>Low</td>
</tr>
</tbody>
</table>
6.2.1 Security

For any payment methods, security is the most important issue. The biggest problem for cash is counterfeit money. The customers and shopkeepers have difficulty identifying real cash or counterfeit; even the currency detector could make a mistake. However, credit/debit card and mobile payment can avoid this problem because when the money becomes digital currency, there is way to make it counterfeit.

The latest and most secure credit cards are NFC credit cards, and one of the major mobile payment methods is NFC mobile payment, which uses the same technology as the NFC credit card. These two payment methods provide convenience and efficiency. However, there may be still some security issues with these two payment ways.

For the NFC credit card, customers use smartphone application software like Apple Pay to simulate a chip card to achieve a band card transaction. Banks use advanced technology strength to build a cloud service to store massive bank card account information. When consumed, it uses the Token technology. The customer’s mobile app only stores Token as a replacement of the credit card. It does not display the true card information on the client side and issue an entity card. It completes the payment through the cloud server and customer mobile application software to achieve the card transaction, key download, and authentication.
Both the NFC credit card and mobile payment complete the payment through a Token, but the mobile device can receive feedback information immediately, with at least more two identification ways, such as PIN biometric authentication, unlike using the NFC credit card. Additionally, there are also many problems with the magnetic tape credit card, which can not guarantee the safety of the card. For example, if the customer put his cards, bank card, and id card in the wallet, other people may use the credit card after picking up the wallet in the streets. Therefore, the security of mobile payment may be better than the credit card.

6.2.2 User Experience

According to several studies and market surveys, more and more people prefer using mobile payment. There are some reasons for this. First of all, timeliness. There is no limit of time and place, and mobile payment can access information more efficiently. Users can check the account inquiries, transfer, and shop at any time, compared with a credit card without these appropriate functions. Second, it is the customization. With the advanced technology of communication and interface functions, customers are able to customize their shopping modes and personal services, which make the account transactions easier.

The identification information and process to apply for a credit card is complex; therefore, in China, mobile payment is more attractive. To encourage more citizens to use mobile payment, many merchants cooperate with mobile payment to provide customers an environment of shopping without a wallet. Besides, many retailers offer several discounts and benefits to
encourage customers to use mobile payment. At the same time, mobile payment requires multiple authentications before finishing the payment, but the response of the payments could return quickly.

6.2.3 Business Experience

The business experience is the same as the customer experience. In the last several years, before the beginning of mobile payment, the credit card was modern, with a small disadvantage to business, which was paying the service fee. When the mobile payment came to the world with no service fee, businesses and customers preferred to use mobile payment. Compared to the credit card, the service fee of mobile payment is nearly zero. Also, the payment transaction can finish immediately in the account, without waiting for the bank settlement and debts. This enables the merchant to directly use the money without waiting.

6.2.3.1 China

In China, nearly every person has a smartphone, and this means that everyone can complete payment through QR-Code payment. Since there is no need to get other equipment to support the smartphone completing the payment, most of the people prefer to use mobile payment. Just a smartphone and a QR-code picture can achieve a transaction, and both the user and the merchant can scan the QR-Code to pay or receive money, which is convenient and efficient. Alipay and WeChat payment are the two most popular QR-Code payment programs. The functions of these
two applications are nearly the same. However, people may choose them according to their consumption habit.

WeChat payment launched "No Cash Day" in 2015 as the world’s first mobile payment day, and it was scheduled to be held every year on August 8. The day encourages people to use mobile payment; use mobile payment as low-carbon and timely payment, as well as advocate a fashionable and intelligent life.

6.2.3.2 USA

Alipay and WeChat were launched firstly in China, and people in the United States may not use QR-Code payment because of the limitation of place and equipment. Therefore, Americans choose to use NFC Payment, which needs special equipment to complete payment and this equipment is an extra cost for merchants.

Although there is a need to pay the extra cost for a new machine, they still need to provide the NFC payment to maintain the business, since many Americans are accustomed to using credit cards and NFC payment for many years.

6.2.4 Summary
In summary, mobile payment can entirely replace other payment methods in most cases. Mobile payment has more benefits than credit/debit card and cash. For example, mobile payment usually has an additional discount or coupon, more security, and the prompt receipt feedback.

In China, mobile payment is replacing cash and credit/debit cards, and is enough for daily life. The reasons are that the cost of QR-Code payment methods is cheap; any smartphone can finish the payment without the credit card charge fee. The large companies can purchase the QR-Code scan machine to improve the user experience. In other words, mobile payment or QR-Code payment can replace credit/debit cards and cash in most B2C and C2C cases.

However, mobile payment in the United States is different from China. In most cases, mobile payment in the U.S. means NFC payment, which has hardware requirement for customers and retailers on both sides. The customers have to use a smartphone with NFC features, and retailers have to spend money on new machines. Therefore, mobile payment increases slowly in the United States. Today, mobile payment can replace the credit/debit cards, but is difficult to popularize.

### 6.3 What are advantages of the mobile payment platforms?

There are many mobile payment models in recent years, such as Apple Pay, WeChat Pay, and PayPal, and the payment modes are different. Here are some differences and comparisons of
these payment methods to decide which mobile payment is the best. Table 1 is the basic comparison of Apple Pay, WeChat Pay, and PayPal.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Apple Pay</th>
<th>WeChat Pay</th>
<th>PayPal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provider</td>
<td>Apple</td>
<td>Tencent</td>
<td>PayPal</td>
</tr>
<tr>
<td>Release Year</td>
<td>2014</td>
<td>2016</td>
<td>1998</td>
</tr>
<tr>
<td>Smartphone Requirement</td>
<td>iPhone 6/6p later</td>
<td>iPhone Android Phone Windows Phone</td>
<td>iPhone Android Phone Windows Phone</td>
</tr>
<tr>
<td>Method</td>
<td>NFC</td>
<td>QR-Code</td>
<td>Online Banking</td>
</tr>
<tr>
<td>B2C</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>C2C</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Own Balance</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Off-line Use</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3

According to Table 3, the three different mobile payments have similar features, but Apple Pay did not support C2C payment, and WeChat Pay and PayPal can not pay off-line, because they are an app-based mobile payment, and the app requires users to login first.

6.3.1 Security

Apple shows a series of credit card folding pictures, and indicates that the user can quickly add new cards. For safety, such images are stored, and businesses do not get the card number.

Otherwise, it uses a one-time dynamic security code. Meanwhile, users do not have to withdraw their bank cards if they lost mobile phones. They just open the Find my iPhone function to stop
payment orders. Additionally, the Apple company announced iTunes clients could store their bank card information in iTunes. Apple Pay is safer than putting all the cards in the wallet. All stored payment information in Apple Pay is encrypted. Eddy Cue said that Apple is not interested in building a business to collect user data. “Apple does not know what you bought or where you purchased it, and how much you paid for it.” Cue, in particular, emphasizes privacy, which is significantly different from Google [57].

There are five security payments of WeChat to provide users with safety and customer service. Technical support: there is Tencent’s big data supporting WeChat payment in the background. Massive data and cloud computing determines the risk of the user’s payment behavior promptly. The data protection, based on the full range of cloud computing, ensures the security of users’ transactions. Meanwhile, the WeChat security payment certification and reminder technically protects the safety of every aspect of the transaction. Customer service: the 24 hours customer service and service of WeChat customer timely solves problems for users. At the same time, the WeChat companies pay more attention to customer service channels to respond to the user’s questions and make a judgment. Format Alliance: smartphones based on WeChat based to pay, so some mobile phones security vendors, such as Tencent mobile housekeeper protect it during the payment. Security mechanism: WeChat payment takes consideration of the user experience of all aspects of the product experience, developing a complete set of security tools and means. These mechanisms and methods include hardware lock, payment password verification, terminal
anomaly judgment, real-time transaction monitoring, and transaction emergency freeze. Such set of mechanisms provides users with a full range of security protection.

As for PayPal, there is also some security technology. Data encryption technology: when the user logs in to the PayPal, the application verifies whether the user’s browser is running a Secure Sockets Layer 3.0 (SSL) or higher version. During the transmission, the encryption of key length of 168 bits of the SSL protection protects the information. Additionally, the server stores user information. This action protects both the server itself and electronic data. To further protect the users’ credit cards and bank accounts, PayPal can not directly connect to the network because of the protection of the firewall server.

6.3.2 User Experience

The most users did not care about the security of the mobile payment, or how they work. They most care about the ease of use. Because the user experience also important for mobile payment, here are the steps for each situation.

Larger retailer, chain store or restaurant:

Apple Pay:

Step 1: click "Wallet" or double tap home button during iPhone in sleep mode;

Step 2: scan the fingerprint;

Step 3: hold the iPhone near the machine;
The user can get the receipt quickly which includes the amount and time.

WeChat Pay:

Step 1: Open WeChat app;
Step 2: click "+;"
Step 3: click "Money;"
Step 4: draw the security picture;
Step 5: click "OK;"
Step 6: show the QR-Code to cashier;

done.

PayPal

Step 1: Open PayPal app;
Step 2: login to app by fingerprint or password;
Step 3: click "In Store;"
Step 4: select the store you want to pay;
Step 5: show the number at checkout;
Step 6: confirm the payment;

done.

The receipt returns quickly, and history store all receipts.
For the B2C market or the large shopping center, the Apple Pay or NFC pay is the easiest way to pay, only three steps. However in C2C or some small businesses, they did not have the NFC machine for NFC payment, so Apple Pay lost this market, and WeChat Pay and PayPal are good for it.

Small business or friends:

WeChat Pay:

Step 1: Open WeChat app;
Step 2: click "+;"
Step 3: click "Scan QR Code;"
Step 4: scan the QR-Code from small business or friend;
Step 5: confirm the payment by password or fingerprint;
done.
The history stores all payment history.

PayPal:

Step 1: Open PayPal app;
Step 2: login to app by fingerprint or password;
Step 3: click "Send Money;"
Step 4: enter friend or small business' phone number or email;
Step 5: select type "Friends and Family" or "Goods and Services;"
Step 6: enter amount and click "Next;"
The history stores all payment history.

In this case, WeChat Pay and PayPal are close, they are both excellent in this situation. However, WeChat is a social app; it stores a user's friend's accounts, and it is easy to select friends who want to pay. Also PayPal sends money to friends even though a friend does not have PayPal account; his friend can get the message or email with a link to receive the money.

### 6.3.3 Business Experience

Profit is the most important aspect for business. The reason to accept mobile payment is that mobile payment can bring more profit. For each mobile payment, exist different costs and benefits.

<table>
<thead>
<tr>
<th>Mobile Payment</th>
<th>Apple Pay</th>
<th>WeChat Pay</th>
<th>PayPal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large Business:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device Requirement</td>
<td>NFC POS machine</td>
<td>QR-Code POS machine</td>
<td>PayPal POS machine</td>
</tr>
<tr>
<td><strong>Small Business:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device Requirement</td>
<td>NFC POS machine</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Balance</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Charge fee</td>
<td>Depend on</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>bank</td>
<td>Withdraw fee</td>
<td>Other Benefit</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Every user has 1,000 CNY free quota, after that 0.1% fee by bank</td>
<td>Can do advertising on WeChat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Free in the U.S. Other countries 35 USD each time.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4

According to Table 4, PayPal seems better than the others for the cost, but WeChat offers other benefits for improving business. Apple Pay was not friendly for small business, the same as credit card payment for large business.

6.3.4 Summary

In summary, according to the Table 1 and Table 2, Apple Pay offers the best user experience, but is not helpful for small companies, and this payment method proves the most expensive. WeChat Pay seems similar to PayPal in user experience. However, there are just a few PayPal "In Store" stores, and most payment come through by phone and email, whereas WeChat Pay just needs a QR-Code. In businesses, PayPal showed the lowest cost, no withdrawal fee are huge benefits for business.

In other words, the best mobile payment should combine each mobile payment company’s benefits. Apple Pay's user experience with large businesses, small companies and customers is as friendly as same as WeChat Pay, and they charge like PayPal. The best possible plan is WeChat Pay which support NFC payment, and cancels the withdrawal fee.
7 Conclusions

People’s payment methods are various with technology development, which also changes people’s views of consumption. In the electric commerce period, the traditional payment methods cannot keep the pace of high-speed fund transaction. The emergence of mobile payment provides various services. As a new payment method, mobile payment guides a whole new payment concept and trend. Its high speed improves the quantity and quality of mobile business.

Mobile payment is famous all over the world, and there are different ways to make mobile payments. The mobile payment has several payment methods, like NFC, QR-code, and Online Bank. The NFC requires a basic hardware requirement; it enables devices to establish communication with each other when they place closely within 4 inches. Plus, those devices have to support NFC technology; most of them are portable like smartphones. The QR-code contains more meaningful information than the previous traditional bar codes. In other words, multiple media can present the QR-code. The online banking is an online payment system, and individuals can complete related financial transactions through his opening bank’s or financial institution’s website. E-cash is a simulation of cash in electronic form. E-cash tried to copy the characteristics of the money for online transactions in many aspects: available and low cost. Yet not all of the electronic cash systems can meet these characteristics; however most provide fast and convenient for small online transactions. E-cash and virtual currencies are a critical electronic payment system. They are almost the real money of the electronic or digital analog, in the form of digital information through the Internet.
Mobile payment significantly improved people’s payment experience, and provided a new opportunity to promote the development of online shopping, financial institutions, and third-party payment. Throughout the elaboration of the global mobile payment industry, there is rapid growth, and the fast and convenient mobile payment is the mainstream of future debt development.

Because of the design and the limitation of policy and technology, the usage amount of different mobile payment programs, such as Apple Pay, QR-Code Pay, and online banking, is different. For example, in the United States, most of the citizens prefer to use credit cards or an NFC credit card, which requires specialized equipment, since the user used this method for several years and wish to continue. However, on the other hand, in China, because of the complicated application process of obtaining a credit card and no limitation of extra cost and equipment, people prefer to use QR-Code to complete payment, and also the merchant chooses such a payment method. Additionally, the usage range and public advertises in different countries and areas are different. Importantly, all these mobile payment programs provide security protection for users, and the trend of using mobile payment is becoming popular.

In future, mobile payment will combine two aspects. As for the hardware, with only a small amount of money, people are eager to achieve completing payment through the mobile phone by NFC, or near field payment scan code to pay a real smartphone wallet. Regarding software, with the birth and emergence of Token, TEE, HCE, and other innovative technologies improves
security performance, and the mobile payment will further promote the healthy and orderly
development of mobile payments.

Mobile payment is open to all stakeholders, providing a significant number of innovative
business opportunities. Each business opportunity is different because of the various objective
factors, conditions, and equipment. No matter the consumers using mobile payment are living in
the city or residing in the countryside. Each market has a huge space for development,
encouraging the mobile payment providers to develop more and better ideas from the emphasis
with new technologies and new products.

That comfortable, convenient and safe management of your bank account has become popular
and attractive, creating the desire of consumers to use the smartphone for consuming and trade.
Most people carry mobile phones 24 hours a day. Because of mobile payment, the smartphone is
mobile banking equipment, contactless payment equipment or a simple mobile wallet. Such
convenient mobile payment devices can replace the traditional cash payment or bank card
payment.

Mobile payment can be the most efficient of integration of logistics, capital flow, and
information, and gradually becomes a mobile value-added service for people in daily life.
Therefore, the mobile payment is still in the golden period of development. Although this paper
reveals several current problems of the mobile payment industry, there are still several solutions.
First of all, integrate the value chain to enhance industry cooperation; secondly, provide more
mobile payment diversification to improve the attractiveness of the customer; thirdly, strengthen the security; finally, solve the industry standard problems.
8 Future Research

Electronic cash (E-cash) is a currency in the form of data. It transfers the cash into some numerical sequence numbers, and these sequences can express the reality of the various amount of currency. The user opens an account in the bank that carries out the electronic cash business, and stores money to back up purchase in shops which accept the electronic cash.

It is a simulation of cash in electronic form. E-cash tried to copy the characteristics of the money for online transactions in many aspects: availability and low cost. However not all electronic cash systems can meet these characteristics, most that can, provide fast and convenient for small online transactions. E-cash and virtual currencies are a vital electronic payment system. It is close to a real currency of the electronic or digital analog, in the form of digital information through the Internet. In its life cycle, after three processes of deposit, pay and draw, it involves with users, merchants and banks and other parties. E-cash is the ideal currency information, and E-cash contains the user's identity, password, amount, and other unique information. It uses the data to become digital currency which enable the user to use it for purchases.

There are some advantages of e-cash, such as anonymity, untraceability, saving transaction costs and transmission costs, and only a small holding risk. On contrast, there are also some disadvantages. Limited use: there are rare banks providing e-cash services and unique merchants accepting e-cash. High cost: hardware and software requirements are high, and the transaction and prevent consumption duplication need an extensive database to complete. Exchange problem:
to engage in international trade, it is necessary to use special software. Risk: if the user’s storage has problems, electronic cash will lose. Because of such disadvantages, there is a need to do more studies and researches about electronic money in the future.
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