# INFORMATION
# TECHNOLOGY JOURNAL

# Application of Smart Phone in Mobile Commerce and Development Tendency

[1]Yan Gao, [2]Linfan Li and [1]Yanmei Yang
[1]School of Science, Hebei United University, Xin Hua Street 46,
Tangshan, 063009, Hebei, Peoples Republic of China
[2]People's Armed College, Hebei University, No. 42 Ping'an South Avenue,
Shijiazhuang 050061, Hebei Province, China

**Abstract:** Twenty first century is age of digital, network and information globalization, Rapid development of Internet and wireless communication produced unprecedented influence on the world. Popularization of smart phone and PAD supply new technical support to electronic commerce, there for, mobile e-commerce has been improved. In this article, we review current situation of mobile commerce and the role of smart phone in mobile commerce. Then we figure out the deficiency of application of smart phone in mobile commerce at present. At last, we will give some suggestions for development of smart phone for mobile commerce.

**Key words:** Smart phone, mobile commerce, mobile application, 3 G

## INTRODUCTION

Electronic Commerce (Li *et al.*, 2011a) is business behaviors by electronic means, which can make the company internal, suppliers, customers and cooperation partners to the share information of electronic business, realize electronization of business process between enterprises.

International trade process (Yang, 2001) simplified working group of the United Nations defined electronic commerce as: carry out business activities by the electronic form, which included any electronic tools used in the suppliers, customers, governments and other between parties, such as EDI, Web technology, electronic mail and other unstructured business information shared and management and complete in business activities, management activities and consumption activities in various trade.

Electronic business (Li *et al.*, 2011b) covers a very wide scopes, it can generally be divided into four pattern: Business-to-Business (B2B), Business-to-Consumer (B2C), Consumer-to-Consumer (C2C) and Business-to-Government. With the increasing number of domestic Internet users (Min, 2008), the pattern of consumption that shopping through Internet network (Hu, 2006) and paying with bank has been getting more and more popular and the market share is growing rapidly, e-commerce sites also emerge in endlessly. The most common security mechanisms for Electronic commerce are SSL (secure sockets layer protocol) and SET (secure electronic transaction protocol) two.

Mobile commerce denotes (Qian, 2005) that business in wireless communication network, which is the natural extension of electronic commerce, is mainly to do B2B, B2C or C2C business by using mobile phone, PDA and palm-sized computer. It combine the Internet (Hu *et al.*, 2006), mobile communication technology and other information processing technology together very well, which make people carry on business, shopping and trading on any time and any place and we can also paying on line and relative comprehensive service. In commercial activity, Main distinction of mobile electronic commerce from electronic commerce reflected in using smartphone to take mobile electronic commerce.

In 1973, Matin Cooper invented the first telephone. In 1996, it is mentioned that in computational magazine, the portable computer pushed forward by CPQ COMPAQ in 1982 should be the earliest rudiment of portable computer. Concept of tablet PC is put forward by Microsoft Company, but because of Windows system, it didn't be popular until 2010 year. Appearance of the mobile terminal described above established foundation for the development of mobile electronic commerce.

Smart Phone is preferred to "Like personal computer, it has independent operating system, in which, users can install programs such as soft wares, games

**Corresponding Author:** Yan Gao, School of Science, Hebei United University, Xin Hua Street 46, Tangshan, 063009, Hebei, Peoples Republic of China

which are provided by the third party service company. We can expand the function of mobile phone by this kind of program. And we can realize the wireless network access to the kind of mobile phone through a communication network." With the wireless network connection, the users can carry out mobile payment, mobile banking and mobile office functions, smartphone also can provide mobile navigation, entertainment, shopping, trading and other services, namely the use of smartphone can carry on the electronic commercial activities.

Now the development of mobile commerce is still in its early stages, although many shopping website promote mobile phone shopping mode by various means of sales, but consumers are more tend to use computes to carry on trading and paying on line, which requires seller and website analyze reasons for the limitation development of mobile electronic commerce and puts forward the solution to the problems. Let's analyze the role of smartphone in mobile electronic commerce first.

## ROLE OF SMARTPHONE IN MOBILE ELECTRONIC COMMERCE

**Structure and application principle of intelligent mobile phone:** System structure of intelligent mobile phone (Li and Ding, 2009) is similar with computer, which includes hardware and software (Fig. 1). Hardware mainly includes CPU, input devices and output devices and software includes, web browser and application soft wares.

**Characteristics of mobile commerce:** The characteristics of mobile business (Wang, 2010) mainly include mobility,

timeliness and privacy of the information obtained. Now we analyze the characteristics and role of smart phones in which in details:

- **Mobility:** Compared with the traditional electronic commerce, the biggest advantage of mobile e-business is that the mobile users can get application software, services and entertainment information required at any time and any place. And smartphone just can meet the needs, people can quickly use smartphone to search, browse and purchase goods and services
- **Access to information timely:** Mobile users carrying out mobile electronic business can realize information access to in any place. This means that timeliness of obtaining information. Compared with the traditional electronic commerce, the user terminal has more specificity. At the same time, the user of the phone itself can represent as user identity and therefore, business information can be directly sent to the user terminal, the users receive information by themselves, which further enhance the mobile users getting information in timeliness
- **Privacy:** Mobile phone is generally used personally, not public. Thus users' private information can be protected well. At the same time, mobile computing environment can provide more dynamic information for mobile users. All above create the conditions for providing personalized service for users

So users can't realize above characteristics of mobile commerce unless by mobile terminal, so smartphones play the roles that cannot be replaced in the mobile business.

**Development of mobile commerce abroad:** With the arrival of 3 G era, the Internet and wireless communications tend
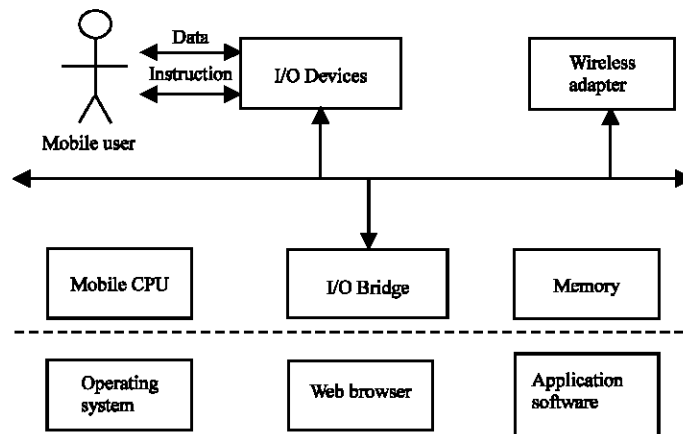


Fig. 1: Structure of intelligent mobile phone

to blend, mobile communication technology constantly updated, which promoted the rapid development of global mobile business market. The mobile business lie in a leading position in Europe and Japan, facing the needs of users, service content of mobile commerce also present diversification, competition between global mobile commerce market operators and manufacturer who building mobile business platform is becoming more and more fierce, mobile commerce have rapid development in almost all countries.

**Development mobile commerce in Europe:** Europe masters the latest technology of in mobile commerce and mobile Internet. They spend a huge investment in technology research and formulating standards. European users mainly pay attention to climate and traffic information in mobile business services.

**Development of mobile commerce in Finland:** In the late 1990 s, online shopping and paying bills and other electronic business service has been very popular in Finland. Since beginning of $21^{st}$ century, the mobile communication and electronic business combination of research and development and application become the world's leading in Finland because of high penetration in mobile phone. In Finland, people can also know flight information by mobile phone, refer to the cinema showing contents and tickets and can choose cinema seats according to phone's screen. People also can understand the stock market and trade stocks at any time anywhere through the phones.

**Development of mobile commerce in South Korea:** South Korea has pushed out mobile payment business as early as in 2001. As long as the mobile users put the mobile phone sim card with credit card function into the phone, then they can use mobile phones for settlement in the market, or in the built-in infrared port on the ATM machine to withdraw cash from a vending machine, buy drinks, they also can use mobile payment traffic cost, such as metro without carrying special credit card. In August 2004, SK put the mobile payment business together for the new brand "M - BANK". Users could use their cell phones to deal with all kinds of financial services by putting built-in intelligent chip in the mobile phone. Features of "M-BANK" lie on settlement information encrypted, thus has high security.

**Our country's development of mobile commerce:** The mobile operators have a lot of try in mobile business (Chang and Chen, 2005), such as E-moving mall and 3G life networks. Mobile operators and Google join hands

to provide mobile search service for "Monternet". Many sailor has also introduced a mobile shopping platform, so that users can recharge for their phone and buy game point cards. At the same time, users can search many goods, such as mobile phones, MP3, digital camera, notebook computer, books, music, cosmetics, etc.

From application development of mobile business in the international and domestic , we can see that the rapid development of mobile commerce depends on not only business platform provided by merchants, but also the mobile phone penetration, net citizen structure, speed of smart phones and 3G network is essential factors for mobile e-business development.

Since, mobile phone appears in our country, the mobile phone penetration is rising significantly year by year (Fig. 2).

In 2011 our country had 360 million net citizens, which accounted for 70.6% of the total number of Internet users, mobile phone net citizens is the main participants for mobile electronic business (Zhang, 2011a). 2011 smartphone users are 223 million, accounting for 22.8% of the total mobile phone users (Dong, 2007), in 2011 3G users reached 127 million. From 2010 to 2011, mobile scale of e-commerce market grew from 2.21 billion RMB to 15.67 billion RMB, increased more than 6 times. The user scale also from originally of 58 million increase to 92 million, nearly doubled increased.

E-Marketer experts predict (CNNIC-CR Nielsen, 2009), now the mobile business accounted for less than 1% in e-commerce, but in 2015, 8% of the electronic commerce in United States will be completed by the mobile platform, from which, we can see mobile electronic business will develop in the global scope rapid.

The development of smart phones is particularly important for mobile commerce, because smart mobile phone almost always accompanies beside you and you
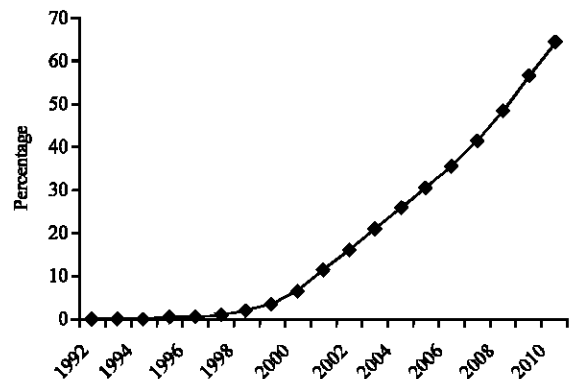


Fig. 2: Popular Rate of Mobil Phones in China from 1992 to 2010 Data from: National Bureau of Statistics of China

can do mobile business behavior anywhere and anytime. Therefore, the improvement of intelligent terminal technology is the essential condition for development of mobile commerce, then comparing to traditional mobile phone, which aspects has improved for the smart mobile?

## INFLUENCE OF IMPROVEMENT OF SMART PHONE TO MOBILE COMMERCE

**Change in display screen of mobile phone:** The display Screen is the main input/output devices mobile phone, is an important interface for mobile phones and users interaction. The traditional phone screen is small, color single, low resolution, the smart mobile phone widely used large size, high resolution, color is more clear liquid crystal display panel, the size of the screen in commonly 4 inches (1 inch = 2.54 cm). The users can not only read text more clearly, appreciate pictures, also can view high-definition mobile video smoothly.

In order to adapt the needs of the development of e-commerce, the mobile phone also increased other functions, such as watching video, playing games, in smart phones, the video is more smooth, game is more complex, vivid, while the traditional mobile phone can only play a few simple little games and now types and difficulty of games in mobile phone have improved, which can satisfy the requirement of people's entertainments.

**Change of cpu power, memory size and operating system:** Smart mobile phone which plays a leading role in the present market, most uses high basic frequency application processor (1 GHZ) large capacity memory (512 m above). Compared to traditional phone, these smart mobile phone application processor are integrated a powerful operation ability and rich multimedia function.

Operating system is the basis of phone software operation for smart mobile, at present, the main mobile phone operating systems include: traditional Microsoft windows mobile, Nokia league symbian, rim BlackBerry OS, the Palm of the Palm OS and the Apple i-Phone OS and Google's Android appeared in nearly two years. At present market share of the traditional Microsoft Windows mobile is low, Nokia league Symbian compatibility is poor, partial obsolete, but for Rim, the third party software for BlackBerry is not much to be selected, application is not very wide, Palm OS and Android operating system interface use touch type, the advantage is to support a broad range of wireless standards and high efficient battery energy management, rich application software, basically software used in the PC commonly can be used in this platform.

**Changes in application network environment and network access mode:** The first generation of analog phone (1G) can only carry on voice calls, commonly known as mobile telephone. The second generation of digital mobile phones (2G) such as GSM, CDMA have SMS, WAP functions, 3G mobile can realized broadband, it can deal with images, music, video streaming and provide many kinds of information service including surfing the web, telephone conference, e-commerce and so on.

Data transmission mode for traditional mobile phone mainly through SMS, mobile phone can't store huge amounts of data, which seriously hindered the development of mobile commerce. And the mobile business on smart mobile phone on needs a large number of data to support. With the use of 3G networks, the transmission speed of data increase and at the same time, the smart mobile phone basically has WiFi function, which can use the wireless nearby to access the network, so that we can reduce the cost of Internet service, more conducive to the development of mobile commerce.

**Development of mobile applications provides more convenient tools for mobile commerce:** Mobile application is a technique or system used in the mobile terminal equipment. In 2011 years, mobile applications won the explosive development driven by big mobile phone enterprise. The global mobile application download operating income was 6.8 billion dollars in 2011 and development service for mobile application scaled up to 20.5 billion dollars. Foreign market Research institutions ABI indicated that, in 2016, the global scope of the application of mobile application income is expected to be as much as 46 billion dollars.

In our country, number of mobile application users grew rapidly. Several big companies in terminal industry chain (Samsung, Lenovo, Apple, etc.), the largest three communication operators (China mobile, China telecom, China Unicom) and large network enterprises (Tencent, Grand, etc.) are all entered this field. All this indicated that mobile application is becoming an investment field sought after in communication industry.

Mobile application shop is a convenient and efficient software sales platform provided by the third party, at the same time, it provides software buying platform for cell phone users to download mobile phone application, which satisfy personalized software demand of the mobile phone users. Mobile application shop mainly sells all kinds of mobile phone applications (games, software, theme, etc.). In the big box of mobile application stores, developers enter, display and sell their works according to relevant rules, the users can select products according to need randomly.
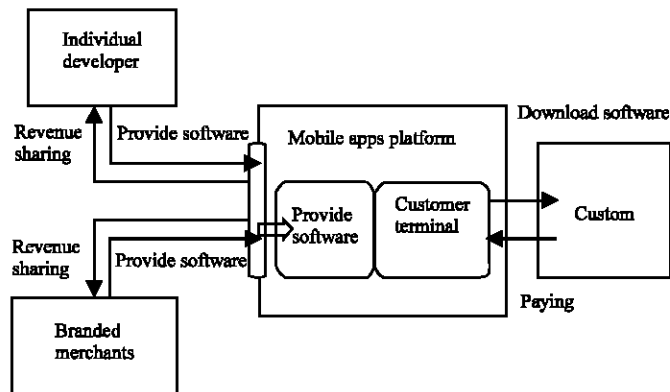
Fig. 3: Relationship of mobile application business participant

In July 2008, after apple APP store official online, applications Stores of Google, samsung, blackberry, Microsoft's windows sky market opened one after another. Success of the App Store and fat profit drive other manufacturers began to scramble to follow the example of apple and entered the field, thus it caused today's melee situation for many application stores, not only software developers, mobile phone terminal manufacturers begin to open application stores, operators also began to step into this field, such as china mobile "Mobile Market".

App store is based on software application store of apple and I Phone, they provide third party application software services to iPhone users, this is a new business model for apple in which mobile phone and networks are integrated.

"Mobile Market," is proposed by China Mobile, it is Mobile phone application online mall, we call "MM" for short. "MM" covers 6 types, including: soft wares, themes, games, music, video, reading, application and support OPhone, Nokia, Google, Samsung and SONY Ericsson mobile phone brand, etc.

Different from previous network application, "open" is the biggest characteristic for "MM". In value chain of the "MM", China mobile and application providers, terminal manufacturers and final users form the participants. In the mobile application platform (Zhan, 2010), individual developers and brand merchants show their mobile application software and mobile phone users download their favorite software in mobile application platform, in order that they can expand the functions of the mobile phone.

The relationship between them can be shown below (Fig. 3).

Trade of Mobile Application belongs to Mobile Commerce, application soft wares is the main transaction objects. There are many kinds of application soft wares, including security software which can guarantee the security of mobile commerce, the browser, input method, etc. make mobile commerce easier to be implemented. Mobile application plays an important role on the development of electronic commerce.

## SHORTAGE FOR APPLICATIONS OF MOBILE COMMERCE

**Shortage in smart phones:** Although smart phones has largely adapt to the requirements of mobile commerce and played a huge role in development of mobile commerce, but there are still many shortcomings (Ren, 2007), such as platform form of mobile e-business user terminal is not humanized, users' experience is insufficient, can't enjoy mobile business with smartphone as use the personal computer as freely.

At the same time, security of personal information and paying are the important factors restrict the development of mobile commerce, which requires the intelligent mobile phone manufacturer continue to try to improve technology, making the smart mobile phone better for mobile business services.

Mobile business is not only display traditional network simple in the small screen and carrying on business activities, the interactive way completely different, user experience is also unique. Nelson survey organization analyze, China's mobile business in 2009 lies in the same level as development of traditional network in 1997, so mobile business have the very big developing space. Mobile business still need further perfection and improvement, for improvement of smart phones and 3G network speed is the key to development of mobile commerce and therefore we mainly study the improvement suggestions on the two aspects.

**Reasons for problems in mobile application market:**

- Audit mechanism is not strict: In apple application store, each program code put forward access application will be reviewed, but the keys for audit is whether or not the program existence of the safety problems such as loopholes, trojans, the back door. If it has no problems above, then let in. the check for its legality is much loose. In addition, there are some applications program will download content until it is installed in phone by the user, the specific content is not after apple approval, this is also a major source of pirated content.
- In the open Android system (Bai, 2011), the situation is more complicated. In Google's official mobile application stores, the check is not artificial, just run once by programs, upload program will soon be able to let in. Meanwhile, mode of the application store attracted many participants, from operators to terminal manufacturers and independent third party, they have all set up their Android application stores. According to incomplete statistics, there are about 70 Android application shops in domestic, some of these stores have no ability to review each program and some just take easy attitude, don't review any program.
- Consumption mentality of "less money and do much" for domestic consumers (Zhang, 2011b): Consumers in order to covet petty gain, they want to download various free software, so they must go around apple application store to download the "crack" version or "prison break" version of the software. Developer shall not be entitled to read the users' bottom information, but the "prison break" actually opened the highest authority, which can get the users' information, so that the program downloaded can do any damage to mobile phones.
- Promotion of mobile application software illegally: It is not easy to round up a large number of users, Apple rely on "brush list" android rely on "flash", which has formed a "grey industrial chain". The so-called "brush list" denotes improve the position of the application list of programs through the improper ways in the apple store. "Flash" is the merchant will install all kinds of application software for you, flash price is very cheap, but after you do that, your phone will be placed on all kinds of program. Some program developed by team will be promoted in this way. No matter "brush list" or "flash", actually they belong to illegal behavior, so that the security of mobile phone will be threatened.

SunPei Lin, senior analyst of Analyses International, said that the current confusion in mobile application market is mainly caused by the grey industry chain.

**Shortage in mobile application:** For new things, in the initial period of development, they on one hand, has unlimited prospects, on the other hand, there are also many deficiencies. Immature of Mobile application market have a certain influence to development of mobile Commerce (Du and Zhang, 2012), all sorts of functions of are from the installation of the soft wares and it is mobile application that realize these functions for smartphones. As mobile applications flooded in, more and more problems appear.

Some application developers are good at using all sorts of tricks to cheat users' money and time. In mobile application, the users' activity is confined to proprietary software inside and trading has occurred in mobile shops such as Google Play, App store, which provide convenient conditions for all sorts of deceiving means. Some application developers also cheat flow by "buying users", "advertising" and "recommended" etc.

Problems existing in mobile application market will affect the development of mobile commerce directly, in which, a large number of suspected tort that literature, music, film and television are packaged as applications to appear in apple and Android mobile application stores, many kinds of pornography or violence also appear in mobile application stores. The more harmful is malicious programs which can steal the users' privacy and password account. At the same time, "grey industrial chain" driven by "running quantity" also hindered the normal development of the mobile applications market.

## IMPROVEMENT FOR SMART PHONES IN APPLICATIONS OF MOBILE COMMERCE

**Improvement in hard devices:** In order to support more new applications of mobile commerce, application processor performance of intelligent mobile phone will be required higher and higher In the future, for intelligent mobile phone, the application processor's developing trend is: First, it will widely support various multimedia formats; Secondly, the application processor will have many interfaces (Lu and Xu, 2006) and also can effectively deal with security for mobile business data trans missed, such as authentication, authorization and billing system etc. in mobile e-commerce. At last, the chip will consume energy at low level. The processor have high power to

manage circuits, it can close idle module, so that they can save electricity and prolong the working time of the battery.

Traditional mobile phone and intelligent mobile phone both use lithium battery, intelligent mobile phone have relatively longer time for standby and call, however, that still can't be able to adapt to the requirements for developing Mobile Commerce, mobile phone manufacturer should continue to carrying on technology research, prolong the phone's call and standby time, at the same time, they can also consider investing new mobile charging device, which should be small enough, so that long time mobile office operation outside can be satisfied.

At the same time, change for mobile phone's screen size will be important factors to influence Mobile Commerce, if the mobile phone's screen is too big, then it is no difference between it and tablet PC. But if the cell phone's screen is too small, it will influence mobile browsing, then, What size of screen is suitable for the mobile phone? At present, the largest mobile phone is 5 inches, for some people, it's just the right size, but for other people, maybe they will feel it is too big to use. So for these details, the answer is not absolute, it will be vary from person to person. This requires that cellphone manufacturers don't go for single size and shape, they should develop different kinds of intelligent mobile phone according to different people.

**4 G networks and corresponding mobile phone will appear:** In the near future, 4 G wireless network will cover a wide range, which will make wire speed faster. At the same time mobile phones for 4 G network system will also emerge as the times require, the Mobile customers can access the Internet to take shopping, playing online anytime and anywhere with their phones. Video call will be popular, video conference will become a common form.

**Securities for smartphones need to be further strengthened:** From considering safety, In order to make intelligent mobile phone participate more mobile commerce, mobile phone manufacturer and software vendors for the Internet security can consider to develop mobile user's specific characteristics identification system, such as fingerprint identification system, so that even if mobile phone is lost, that won't cause puzzle for the user and make recognition process more simple and quick.

**Guide the mobile applications market to develop healthily:**

- **Pay attention to software development:** From product level of mobile application software, how to improve

the users' viscosity, how to realize the profits, is the problems should be considered by developers. Striving for developers will be a big focus for future competition, the quality of the quality of the goods is decided by the quality of application developers, who are the important sources for development of application malls. So ensuring the developers' benefits plays a decisive role to development of the mall

- **Strengthen the supervision of market:** First, we must improve the competition threshold of application market and optimize the market structure, Secondly, the wireless marketing definition and control should be improved and specific punishment measures and standards should be established. For example, for programs providing content service, can "non-infringement margin" system should be considered to be established, the application developers is required to pay a certain percentage of the deposit in advance, or from sale incomes. If application is infringed, deposit will be directly instead of damages or liquidated damages

- **Improve the users' experience:** operators gradually osmosis the clients' terminal through mastering the mobile customers and thus they can run-up to the mobile application market. They have long-term good cooperation with developers, so that make mall rich in application which can attract users, cultivate viscous users and training users' paying habits through the application of high quality

- **Expand marketing channels:** The preferred sales channel for developers of course is application shop, but the application store blossom everywhere today, everybody's choice is more and more, including: application is preloaded in the mobile platform, although the cost is very high, but the preloaded application sales means is "very help party type" for application sell. Another effective way is to improve media exposure rate of the application of, especially they should choose those authoritative and special evaluation application of media and Internet advertising. They an also sell mobile application soft wares through such as Taobao and other network platform

- **Improve consumers' safety consciousness:** Improve the software users' safety consciousness through various means of publicity, pioneer the use of the original software

**CONCLUSION**

Design and application of all sorts of functions for intelligent mobile phone play a crucial role for mobile

commerce development. Along with the higher requirement of mobile commerce, in the whole society, mobile phone manufacturers, software developers and mobile operators all have a lot of opportunities and challenges, the mobile phone manufacturers need to consider how to develop intelligent mobile phone to adapt to the development of mobile commerce, software developers must consider how to invest suitable application software for the development of the intelligent mobile phone, intelligent mobile phone function more powerful, mobile operators should consider how to provide better network environment to ensure the behaviors of mobile commerce smoothly.

In a long period of time from now on, Mobile Commerce will gradually penetrated into People's Daily life, will eventually become indispensable part of everyday life; At the same time, some traditional industry enterprise will also accelerate the layout of mobile commerce and ultimately mobile Commerce will become an important part of Electronic Commerce.

Mobile commerce in our country is still an emerging industry, mobile commerce in China started late, the technology is still not perfect, receptance rate of users is low. But in the near future, with the development of smart phones, mobile business will play an irreplaceable role in E-commerce. In order to achieve this goal, network technology, security, service mode should be improved, development and improvement of intelligent mobile phone also should be carried on positively. Development of Mobile Commerce will be better and better.

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