Department of Political Science and Public Policy

The Development of Mobile Health-care in China

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ABSTRACT

The background for this dissertation is a preliminary discussion on the brief history and current status of China mobile health development, in order to provide reference for China future mobile healthcare. The main research object is the development of China Mobile health.

The main results of this study are mainly reflected in four aspects.

1. Through the research and analysis of a large amount of literature, we see that mobile health is in a period of rapid development, new production and service models are emerging, support policies are obvious, and market demand is huge.

2. It is concluded that mobile medicine represents a high proportion in the overall mobile medical products, it shows broad development prospects and prominent potential legal risks, so inquiry mobile medicine has a distinct representative position in the research of mobile medical legal issues.

3. The public is still used to choose the general hospital registration mode, and they do not fully understand the online consultation mode and also remain skeptical of its safety. Operators should vigorously promote the characteristics of their products, not only focusing on common projects, otherwise it will be difficult to win in the medical app industry which has a large base and strong competitiveness.

4. “Ping An good doctor" and the problems existing in the mobile medical market medical app homogenization are relatively serious, user personal information security problems need to be solved, user trust is unsatisfactory and there is a lack of standard foundation, capital management and business model are not mature, all of which make profit more difficult.

Keywords: China; Mobile health; Development; Ping An good doctor.

RESUMO

O quadro contextual desta dissertação é uma discussão preliminar relativa à breve história e o estado atual do desenvolvimento da oferta de serviços de saúde por telemóvel na China, na perspetiva da sua evolução futura. O objeto de investigação é o desenvolvimento a oferta de serviços de saúde por telemóvel na China.

Os principais resultados estão refletidos nos seguintes quatro pontos:

1.Percebeu-se que a indústria de oferta de serviços de saúde por telemóvel encontra-se num rápido desenvolvimento onde novas ofertas de produtos e serviços emergem, a sustentação de políticas públicas é óbvia e a procura é elevada;

2.O serviço de consulta médica por telemóvel representa uma elevada proporção no cômputo global de oferta de produtos médicos via telemóvel e há clara evidência na sua evolução como também em possíveis incumprimentos legais de modo que as questões de consultas médicas por telemóvel têm uma representatividade clara nos trabalhos de investigação nesta área.

3.O público continua a preferir o registo para consultas hospitalares via telemóvel e compreendem mal o modo de consulta online e têm dúvidas quanto à sua segurança. Os operadores devem promover vigorosamente as características dos seus novos produtos e não focar nos lugares comuns, caso contrário será difícil ter sucesso na indústria de serviços médicos por telemóveis.

4.O estudo de caso da empresa “Ping Na good doctor” revela os problemas existentes na indústria de serviços médicos por telemóvel, nomeadamente, na segurança de informação dos doentes, na confiança e na gestão de orçamentos de modo que torna difícil a criação de valor.

Palavras chave: China; Mobile health; Development; Ping An good doctor.

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GLOSSARY OF TERMS

DXY (Dingxiangyuan)

FDA (Food and Drug Administration)

HIMSS (Healthcare Information and Management Systems Society)

HI (Health industry)

HIS (Hospital information system)

ICT (Information and communications technology)

IT (Information Technology)

O2O (Online To Offline)

PC (Personal computer)

WHO (World Health Organization)

Chapter I: Introduction

1.1 Research background

With the rapid development of China economy and society and the increasing level of science and technology, China is at the forefront of a new scientific and technological revolution, especially in the recent years. The vigorous development and market popularization of cloud computing, the Internet of things, big data and other technologies, the new generation of Internet technology marked by "intelligence" are fully integrated into all aspects of current social life. For example, with the rapid popularization of mobile smart devices such as smartphones and tablet computers as carriers, new mobile communication technology has significantly changed modern social life, expanded the ways and channels for people to access consultation, social interaction, entertainment and leisure, and became an indispensable part of people's daily lives. Even some experts and scholars worry that it will become a new kind of "Social disease" as derived social phenomena such as "mobile phone anxiety", "bow party", "social crisis" have appeared, which shows the depth and distance of its impact on people's lives (Zhao, 2011).

Especially in the medical and health industry, the arrival of the fourth generation (4G) mobile communication technology era has provided more convenient and efficient and relatively cheap mobile Internet services for the majority of mobile terminal users, which gives the medical and health industry new development channels and space in addition to the traditional medical institutions, and people start to gradually accept and agree with this new medical and health service mode (Meng et al., 2013).

The continuous innovation and development of mobile Internet technology, the emergence of Internet of things, big data, cloud computing and other emerging technologies provide a new way for the development of medical service industry. Mobile medicine emerged as a necessity of the times and has been showing an explosive growth trend. Professor Robert Istepanian of Imperial College first proposed the concept of mobile medicine in 2005 (Courreges et al. 2005). It is defined as a new mobile communication and network technology in the medical and health

industry.

The Internet plus launched by Premier Li Keqiang in the 2015 government work report set off an upsurge of convergence between Internet and the traditional industries. The healthcare industry is also looking to develop its own way with Internet plus (The Government Work Report, 2015).

At the same time, the international economic community generally believes that the health industry (HI) will be the main growth point influencing and leading the development of the world economy after the Information Technology (IT) revolution. It is the next industry with a trillion dollar scale. It is known as "the fifth wave of wealth" by Paul Pierser, a famous American economist (Wu et al.,2015).

Many countries in the world regard the health industry as the "sunrise industry" of economy, which can be called "green economy". According to China's development plan, the health industry has entered the era of blue ocean. By 2020, the output value of health industry will reach more than 8 trillion yuan (Chai & Gao, 2013).

Under the influence of the above mentioned social, scientific and economic factors, the rapid development of mobile medical industry, through the mobile interaction platform and a series of user terminals, has built a green channel and a convenient platform for the supply and demand side of medical and health services, breaking the traditional medical and health services regional limitation making the dream of "boundless medical and health service" accessible (Liu, 2015).

To sum up, at present, mobile medicine is leading the "subversive change" of medical and health mode and will certainly become an important force in driving the development of the world medical and health industry.

1.2 Research purpose

Mobile health is a new industry, which has the characteristics of cross-border integration. In the recent years, the global market scale of mobile healthcare has shown characteristics of explosive growth. The main drivers of global mobile medical development are China and the

United States. The next few years will potentially show rapid growth. From the stage of mobile health development, China mobile health is in the starting stage of development, facing problems such as mobile health product positioning and business model determination. Affected by the mobile health market, the choice behavior of mobile health subjects will lead to different performances. The development of mobile health will also have a certain impact on social medical benefits.

At present, there are few studies on mobile health, especially from the perspective of a specific case to sort out the behavior of mobile medical subjects and their impact.

This dissertation intends to collect and sort out the relevant literature on mobile health, sort out the development history of mobile health, define the application scope of mobile health, and define the main body of the mobile health market, while using a simple case study of mobile medical application business model, to bring enlightenment to the development of China's mobile medicine.

1.3 Research significance

1.3.1 Theoretical significance

The existing literature research on mobile health focuses more on supporting technology and a single case, but less on the overall research on mobile health. Starting from the development history and current situation of mobile health, this dissertation defines the application scope of mobile health, analyses the business model of mobile health, and then studies the impact of mobile health promotion on social medical care.

1.3.2 Practical significance

As an important cause closely related to the vital interests of the whole nation, health care is seeking new development under the framework of "Internet plus".

Mobile medicine is considered to be one of the solutions to the current problems in China's medical industry. Its development has been of high interest for people from all social classes.

In terms of financial investment, as a new blue ocean of the Internet industry, mobile medicine has attracted venture capital, Internet enterprise capital and cross-border industrial capital.

The development of mobile medicine involves many participants, including not only medical institutions, doctors and medical insurance institutions in the traditional medical market, but also mobile medical product suppliers and mobile medical investors. In the field of mobile medicine, the behavior of various subjects is affected by the structure of the mobile medical market, and the subjects will also affect each other, and these interactions will have a certain impact on the development of mobile health and healthcare services.

Research on the development of China Mobile Healthcare will help to grasp China Mobile Healthcare as a whole system. The case analysis will attempt to identify the future development direction of China Mobile Medicine.

1.4 Research methods

This dissertation adopts qualitative research method. Qualitative research is often known for the purpose of gaining insight into people's beliefs, perspectives, and experiences (Brikci & Green, 2007). Ask qualitatively how and why things happen in some way. It describes the process and meaning (Cooper & Schindler 2013, 144). Qualitative research finds out why people do something, not just what they do (Saunders et al. 2008).

In order to collect data from the perspective of users, the data collection method used is survey method, and a questionnaire is prepared accordingly. In order to investigate consumer behavior and purchase decision, a quantitative method is used to analyze the results of the survey. This method reflects how we view the world and describes it in the form of feedback. It also helps to identify research methods through the collection and analysis of information. Positivism is a philosophy that provides natural science methods for research. Neither the researchers nor the subjects had any bias on the study, and the data could be collected independently of the values and feelings of the researchers. This research is guided by positivist philosophy.

1.4.1 Survey method

Surveys include any activity that collects information about characteristics of interest in an organized and methodical manner, which can come from several or all units of the population, with the help of well-defined concepts, procedures and methods. It also includes compiling the collected information into a meaningful and useful summary form. Surveys usually take place when information is needed in the absence or insufficiency of data. Sometimes that need comes from the statistical agencies themselves, others an external customer (another government agency or department, or private organization) may need this information (Sanders et al., 2009).

The survey comprehends several interrelated steps, including: determination of objectives, selection of survey framework, determination of sample design, questionnaire design, data collection and processing, analysis and dissemination of survey data and documents.

Generally speaking, the characteristics of a group are studied by statistical institutions or customers, a database for analysis is established, or a hypothesis is tested.

The questionnaire is compiled, self-managed and electronically released on the Internet. Due to the nature of the questionnaire, it can effectively reach a large number of people, so the Internet mediated questionnaire takes this further, it is a way to contact even more respondents. After assembling the questions, the questionnaire was submitted to three participants for examination before distribution. A test was provided to accept respondents' proposals to enhance the questionnaire.

1.4.2 Case analysis method

The Case Analysis Method, also known as the Case Study Method, was developed by Harvard University in 1880 and later used by Harvard Business School to educate senior managers and management elites. It gradually developed into today's "Case Analysis Method", a specific object in the research is identified by the case study method, and through investigation and analysis, the characteristics of the specific object and its formation process are clarified (Huang & Ma, 2013). In this study, in order to better understand the characteristics of the mobile medical consultation and provide a realistic basis for the subsequent analysis of legal risks, we

conducted a key case analysis of the main mobile medical products in the market.

Chapter II：Literature Review

2.1 Definition of related concepts

2.1.1 Traditional medical treatment and mobile health treatment

"Contact medical treatment" and "non-contact medical treatment", are actually relative concepts concerning mobile medical treatment, mainly reflecting the connection and difference between modern medical treatment or existing, daily medical treatment and mobile medical treatment. In ancient China, the medicine mode was defined as "looking forward to hearing and asking questions". The modern health mode has experienced significant extension and development from the medicine mode of spiritualism, the medical mode of natural philosophy, the medical mode of mechanism, the biomedical mode, the biological psychological social medical mode, the "4P" medical mode (Huang, 2006). The daily medical service process has gradually consolidated into a unified system number, examination, treatment, rehabilitation and other steps, but regardless of the medical method, western medicine or traditional Chinese medicine, all the diagnosis and treatment steps or processes are based on a basic premise: the "contact" between doctors and patients. In a narrow sense, this contact is often reflected in the meeting between doctors and patients, that is, patients go to the hospital or doctors go to the patients for consultation; in a broad sense, it represents the full information connection and contact between doctors and patients. This information not only includes the patient's more detailed complaints, the doctor's more comprehensive and full understanding of the patient's condition through face-to-face observation, the examination of the disease through auxiliary technical means and treatment information, but also includes the patient's perception of the medical institution, the doctor's qualification examination and judgment, the social information from both sides, and the doctor-patient trust. Therefore, this study believes that the current medical method can be called "contact medical treatment". In contrast, mobile medicine can be called "non-contact medicine", that is, because of its Internet characteristics, with convenient technical means, both doctors and patients are no longer limited by the location, time and other factors, and both doctors and patients may not need to meet to carry out medical and health

actions anytime and anywhere. However, compared to the traditional contact medicine, due to its information communication channels the total amount of information, the depth of communication, and the accuracy of information in mobile medicine are often limited, resulting in a series of unexpected risks.

2.1.2 Telehealth, telemedicine and mobile health

In a broad sense, telehealth refers to the establishment of a remote interaction platform through communication technology and computers, so as to facilitate the communication of medical information or health services between medical institutions or between doctors and patients at a long distance and without meeting in person, including remote consultation, medical teaching and surgery. Almost all medical related actions such as guidance, assisting diagnosis, medical information service (Bian, 2003; Xie, 2015).

Modern society's early understanding of telehealth originated in the United States in the 1950s. Wittson took the lead in using two-way television system in medical activities. (Wittson & Benschoter, 1972**)** Then people tried to use a communication interaction platform and electronic information technology to carry out a series of medical activities, leading to the appearance of "telehealth". Alvin Toffler, a world-famous futurist, once predicted that "in the future, doctors will carry out a series of diagnosis and treatment activities based on the patient information displayed by computer transmission" (Mao, 2007). At present, this prediction has gradually become a reality (Qu, 2003). Among all the medical actions covered by telehealth, telemedicine is an important field, that is, to carry out the process of medical action including consultation, diagnosis, treatment and monitoring in a remote way.

The main role of telemedicine is to fully exploit the unique advantages of high-quality medical resources through the interactive platform of telemedicine. More convenient and qualified medical and healthcare services are provided to patients in other less resourceful medical institutions.

Compared to more than 40 years of development and research and practical use history abroad, China started late in the field of telemedicine due to limited technical conditions and

other reasons but has achieved considerable development in recent years (Yan & He,1998). Development and application of telemedicine. Journal of Biomedical Engineering (04), 429-432). In September 2014, the National Health and Family Planning Commission issued the Opinions Regarding Promoting Medical Institutions' Telemedicine Services, strongly strengthening the construction of telemedicine and promoting the development of related industries. However, in the Opinion, it was clearly pointed out that telemedicine must be carried out among medical institutions, and medical personnel should only carry out telemedicine activities in their registered medical institutions (Souhu, 2014). However, mobile medical service is not covered by this limitation. Both ends of its service chain, organizers and operators are not limited to the medical institutions. Similarly, the location of mobile medical and health services are more virtual, not limited by region, time and space.

2.1.3 The Definition of Mobile Health

Mobile health is developed from telehealth and telemedicine which rose in 1960s. According to the Healthcare Information and Management Systems Society (HIMSS), mobile health is defined as the provision of medical services and information through the use of handheld computers, mobile phones and satellite communication mobile technology. Specifically, in the field of mobile Internet, it refers to the execution of medical and health services based on mobile medical applications under Android or IOS platform. The specific service mode is shown in Chart 2.1 (Deng, 2015; Kong et al, 2014), which defines mobile health as "using software programs on mobile platforms, or web software designed and used specifically for mobile platforms" (Yang, 2012). In addition to the international standardized definition, domestic scholars have interpreted and interpreted the concept of mobile medicine from different perspectives. For example, some scholars think that mobile medicine is a new medical and health care model, further emphasizing and highlighting the role of information technology in the transformation of traditional medical model. They consider mobile medicine as an extension and supplement of medical and health technology and services (Meng, 2013). Most scholars believe that mobile health care is the result from the impact of the Internet on traditional health care, which has also provided new ideas for the transformation of health care industry. It is a good remedy for the many practical challenges

and contradictions the traditional industry is facing, as it can help solve and resolve the problems in the current medical and health services, and set a new habitat for the originally limited industry. Summarizing, mobile health has effectively improved human health and quality of life, and it is the landmark and representative application of modern science and technology in the field of medical and health care.

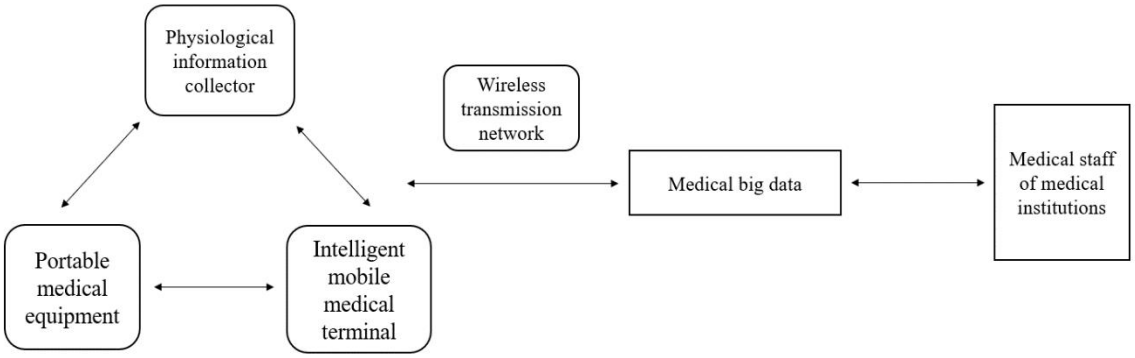

Chart 2.1 Basic operation mode of mobile health

Source: Ge Xiaoxiang. (0). Legal risk analysis and prevention and control strategy of inquiry mobile medical system

2.2 Classification of mobile health products

Mobile health applications are widely used, including not only mobile medical applications for medical institutions, but also mobile medical service products for the public. The application of mobile medical service for medical institutions includes appointment registration, network call, doctor mobile ward rounds, nurse mobile nursing, bedside information collection service, drug management and distribution, barcode patient identification tape and other applications.

Mobile medical service products for the public are mainly divided into two categories: mobile medical services for patients and for the general public.

Mobile medical services used by patients before and after treatment, such as mobile phone appointment registration or light consultation app, in which providing daily monitoring, reminding and other functions for patients is also an important part.

The other is the health management mobile healthcare service products that serve the general public. Mobile medical services are growing rapidly all over the world. According to data released by the World Health Organization (WHO) in 2011 from 112 member countries participating in the survey, 59% of member countries use the mobile medical application of health call center / medical hotline. 55% of them use free emergency telephone services, 54% of them use emergency services, and 49% use mobile telemedicine services. Among them, health call center / health helpline is the most common mobile medical application in all countries.

The functions of a relatively high proportion in low- and middle-income countries are health surveys and disease surveillance. The appointment reminder function is frequently used in high-income countries. Foreign researches on mobile medicine focus on the application analysis of mobile medicine in a certain field. Laura P. Edgerley, Yasser Y. El-Sayed and other scholars studied the application of mobile medicine in early prenatal care (Edgerley et al. 2007). Titir Santra studied the use of mobile medicine in the field of patient monitoring. (Titir, 2010) Domestic related literature mainly focuses on the application technology and development of mobile medical system in the field of mobile medicine, and some literature discusses the current situation, the development trend and application cases of the mobile medical industry. The United States accounts for more than half of the global mobile medical applications, mainly including information/communication, monitoring and diagnosis. The mobile medical model in China is to implant mobile functions into the hospital information system (HIS), mainly including electronic medical record, wireless ward rounds, mobile nursing work station application. In recent years, community health management, special health care app, wearable devices. have become more active projects in the mobile medical industry. Some literature compares and analyze the business model, technology and information security of mobile medical service in different countries. The classification of mobile medical applications in this work can be seen in the following Table 2.2:

Table 2.2 Classification of mobile medical applications

Table 2 classification of mobile medical applications

Category	Function
Health management	Provide users with health management services, including fitness, menstrual management, pregnancy management, chronic disease management, etc. the service content is mainly data recording, health reminder, knowledge dissemination.
Medical consultation	Users can make self consultation or online consultation through such applications, and communicate with doctors at home.
Medical Association platform	Through such applications, users can enjoy online registration, advance appointment, check test sheet and other services, so as to speed up the efficiency of medical treatment and avoid unnecessary waiting time in line.
Doctor tools	To provide doctors and other professionals with drug information, clinical guidelines, medical information and other services to improve the efficiency of medical workers and reduce errors.
Medical e-commerce	Users can purchase drugs, query drug information and search nearby drugstores through such software.

Source: Dai & Hou (2018)

2.3 Related subjects involved in mobile medical treatment

The traditional medical model mainly involves patients, medical institutions (such as hospitals and sanatoriums), drug/equipment suppliers, pharmacies, insurance institutions, among which a medical service industry chain is formed through funds, medical products and services.

Using the original industrial chain as foundation, a main body with mobile Internet characteristics is added, including open mobile health application developers, system software and hardware suppliers, wearable device suppliers and mobile operators.

The development of mobile medicine connects the medical industry and other industries, such as computer technology, cloud technology, communication and enriches the original industrial chain providing new service forms, increasing the digitalization of medical services,

and pushing medical services to develop towards digitalization, diversification and personalization (Dai & Hou, 2018).

Chapter III：Brief History of China's Mobile Medical Development

3.1 Embryonic stage: information sharing under portal thinking (1990s-2010)

3.1.1 Market Overview

From 1996 to 1998, when the medical information platform was established, China's Internet entered an unprecedented active period, with rapid application development. In October 1997, China achieved the interconnection of four main networks. The basic Internet infrastructure for Chinese web pages has been basically completed. Around 1998, the main domestic portal websites were established and put into operation, which gained great recognition in capital and market (Zheng & Liu, 2016).

In the aspect of medical treatment, as an important supporting point for informatization of medical treatment, internet medical treatment has become a key industry supported by the government.

Since 2000, The number of Internet users has increased rapidly in China.

By the end of 2003, the number of domain names had exceeded 1 million for the first time, with nearly 600 000 websites and more than 79.5 million Internet users (Information, 2004)

The Internet has begun to interact with the industry and produce results, forming a vertical subdivision with industrial characteristics, of which Internet health care is one of the important directions.

3.1.2 Technology development: from medical treatment informatization to internet medical treatment

The rapid development of the Internet and the emergence of medical insurance are all contributing factors to the medical treatment informatization, and internet medicine has become a key industry supported by the government.

After 2000, China's Internet commercialization process accelerated, and Internet health care has gradually developed into an important field of Internet economic development.

3.1.3 Business model: information aggregation and sharing

With the initial success of medical information hardware construction and the rapid development of Internet technology, start-up internet medical enterprises began to enter the market.

During this period, internet medical enterprises mainly focused on medical and health portals and Personal computer (PC) business as the center, using information aggregation to attract the market, attempting to build health consultation, clinical inquiry, medicinal product inquiry, doctor and healthcare institutions information database and simple doctor-patient communication platform. The representative enterprises include the medical seeking and drug seeking network established in 2001, Dingxiangyuan (DXY) established in 2003, and Good doctor online established in 2006.

3.2 Exploration period: a hundred flowers bloom and a hundred schools of thought contend (2010-2013)

3.2.1 Develop online light medical services

Under the background of the development of the 3G mobile Internet, the technology of Internet industry is changing with each passing day, the commercialization of mobile Internet is on the rise, and the real mobile medical service is being explored.

From the beginning of information aggregation, after 2010, the development of mobile medical industry began to combine with medical services, online consulting services emerged, and gradually gained a certain market awareness. In addition, with the issuance of "Internet drug transaction service qualification certificate" in 2009, the first batch of pharmaceutical e-commerce businesses entered the mobile medical market and grew a solid foundation in it. At present, the main mobile medical businesses in the market were also basically established at this

time. In 2010, 1 drug network, Qi Le Kang, Kang Ai Duo and other pharmaceutical e-commerce established and launched mobile applications successively;(Zhou, 2016). In March 2011, Good doctor released the mobile version of the application; in 2013, it launched the inpatient direct bus business; in spring 2011, the palmtop doctor was launched: in 2013, the free pricing function is launched; in 2012, service products for the doctor such as apricot forest and mobile medical products aimed at a single department began to appear; in 2013, DingXiangYuan accelerated its expansion, increased its investment in human resources and mobile Internet, and planned to launch a number of medical apps; in 2013, micro medicine (the original registration network) launched mobile client terminal, and through mobile Internet implemented the registration service of nearly 100 hospitals (Jiang, 2017).

In 2013, the number of internet medical businesses gradually began to scale up, and manufacturers formed an ecological matrix; the four main industrial sectors of the mobile medical industry were basically formed, including mobile consultation, mobile registration, doctor service and medical e-commerce. Mobile Internet technology has been increasingly improved and widely used. This phenomenon has laid a solid foundation for the development of mobile medical market. During this period, the mobile medical market began to explore business models and products with value for payment of service (Zhang, 2016).

3.2.2 Technology development: the rise of mobile medicine

The growing maturity and wide application of mobile Internet technology, as well as the exponential growth of the number of Chinese Internet users, have laid a solid foundation for the rapid development of the mobile medical market.

The position of the largest importer and exporter of information and communications technology (ICT) products in the world has been taken away by China. Therefore, China gained an increasingly important voice in the global supply chain of ICT products.

In 2012, the number of Internet users in China was 564 million, and the number of mobile Internet users was 420 million, both ranking first in the world. The former far surpasses the United States, which ranks second (Huang, 2013).

The Internet wave has brought the explosive growth of e-commerce. In 2012, the scale of online shopping transactions exceeded trillion yuan, reaching 1.38 trillion yuan. In the world online shopping market, China rose to the second place, after the United States which took first place. (Yang,2013) On this basis, the exploration of mobile medical service is launched in full scale.

3.2.3 Business model: multi-party exploration of profit model

China's mobile medical system mainly aims at various "pain" points of patients' medical treatment, such as self-consultation platform and consultation platform for those requiring self-consultation, registration platform and appointment platform to target registration and appointment services, various medical and health software for examination and consultation, as well as various medical guidance platforms for the drug purchase step.

Businesses explore their own mobile medical profit model (see Figure 3.1, mobile medicine penetration rate of Chinese registered doctors in 2017). Taking Chunyu doctor as an example, it started with general consultation, launched services such as private doctors, established a product ecosystem of integrated medical and health management, and made great efforts to dig big data on health. Chunyu doctor was founded in 2011. As one of the earliest mobile medical enterprises in China, Chunyu doctor launched the palmtop doctor app at the time of its establishment, which is committed to use the mobile Internet to close the distance between patients and doctors and achieve effective health management of patients. In 2012, Chunyu doctor launched doctor's clinic consulting service, provided online free pricing system for doctors, to explore a profit model.

In 2013, Chunyu launched the parenting doctor app, which is involved in the field of maternal and infant health. At the same time, the new version of Chunyu palmtop doctor app opened a membership service and started its C-terminal profit model. In 2014, Chunyu palmtop doctor renamed Chunyu doctor, joined the service function of "air clinic", and cooperated with JD cloud to provide data interpretation service for wearable devices; meanwhile, Chunyu doctor completed round C for ten million dollars in financing. In 2015, doctor Chunyu cooperated with offline pharmacies to open offline clinics, which achieved a breakthrough in business layout; the cooperative hospital was responsible for the facilities, medical equipment and medical insurance

qualification, and doctor Chunyu was responsible for formulating standards and management processes, and allocating doctor resources through the network (Fang, 2016). All in all, Chunyu doctor has built a product ecosystem with integrated consultation platform as the main part, vertical population and vertical service segmentation as auxiliary, and medical and health management as integration.

Enterprise	Number of doctors on the platform	Doctor end permeability	Main business type
Doctor Chunyu	490 thousand	19.52%	Interrogation
Seek medical advice	1 million 604 thousand and 500	17.92%	Register
Dr.almond	410 thousand	16.33%	Interrogation
Medical Association	400 thousand	15.93%	Doctor community
Light medicine	300 thousand	11.95%	Doctor community
Sunshine doctor	130 thousand	5.17%	Interrogation
Good docror online	130 thousand	5.17%	Interrogation
A call to the doctor	100 thousand	4.38%	Register

Figure 3.1 mobile medical penetration rate of Chinese registered doctors in 2017

Date source: Yiguan Think Tank (2017)

3.3 Growth period: accelerated development of the industry (2014-2015)

3.3.1 Market overview: expand business area around demand

With the increasing accumulation of mobile medical development, the discussion about which direction to serve doctors, hospitals and patients is also increasing in depth. Different from other Internet industries, traditional medical institutions are independent and closed, doctors are deeply bound by medical institutions, and become the core of resource allocation in the practical process; and patients are deeply dependent on doctors due to several reasons namely the requirement to become a medical doctor, so the industry consensus that mobile medical market service should take the doctor service as the core is gradually formed in the market.

In the aspect of human resource market, the problem on doctor's work caused by the system development has greatly restricted the market development efficiency of the medical industry.

First, doctors and hospitals are deeply bound, and doctors' transparent income is limited. Secondly, the highly concentrated distribution of high-level hospitals in our country leads to the concentration of patients, and high work intensity of doctors in high-level hospitals. According to the data in 2015, the annual number of medical practitioners reached 7.6 billion, of which 69.2% worked more than 50 hours a week, and 19.1% slept less than 6 hours. (Andrew et al. 2009). Finally, the social public opinion and the blocked communication channels between doctors and patients led to the relatively tense relationship between doctors and patients.

In order to solve the above doctor market demand, mobile medical businesses interact with the hospital system, equipment and services while also interact with medical e-commerce, medical insurance, medical inspection and other paid services by serving doctors. In addition, enterprises also communicate with patients when serving doctors. On one hand, they help doctors to build their own brand, on the other hand, they also build brand influence on mobile medical enterprises through the doctor brand. In 2015, the number of registered doctors in China exceeded 2.52 million.(Wang, Liu &Wang, 2017) According to incomplete statistics, among the mobile medical platforms that have announced their number of doctors, there have been five manufacturers with penetration rate of more than 10%, among which Chunyu doctors have reached 20%. Based on the needs of doctors, mobile medicine has developed an effective service solution. The real identity doctor users of the medical platform is starting to scale up, and the penetration rate is up to nearly 20%. Mobile medical doctor service has gained initial recognition (Chen, 2015).

3.3.2 Business model: with the rapid development of doctors' services, the industrial chain continues to extend.

Meanwhile, mobile medical business attempts for specific diseases are also widely occurring in the market, among which the maternal and infant market and chronic disease market serving high-frequency medical demand are typical representatives.

One group that plays an important role in the development of the Internet is women, they have a key position especially in e-commerce market.

The mobile medical products developed for women also have the innate characteristics of high frequency and high adherence, extending from women medical market to infant medical market. This market segmentation has become an important direction of market development since 2014. Among them, Meiyou, Baby tree, Yangguang women and children, Education park and other businesses are the representatives. Since 2014, the gradual rise of the intelligent wearable device market has made the continuous monitoring and mobile development of chronic disease management possible. Products for hypertension, diabetes and health management market constitute the core of chronic disease management system. Intelligent wearable equipment, medical consumables and doctor follow-up payment has become the main cash channel of chronic disease management market. Among them, palm sugar coating, Kangkang blood pressure, Neusoft Xikang and other enterprises are the representatives (Wang, 2017).

In 2016, the adherence of mobile medical app use generally showed an upward trend, with a compound growth rate of 15.9% in the market of per capita one-day use in the consulting field. (Mobile medical developer Survey, 2016) In addition, adherence in medical academic field leads other fields.

According to Analyses, in the context of the disappearance of APP dividend, on one hand, the number of active users has declined, and people who really need mobile medical services have been screened out to promote adherence; on the other hand, medical consultation, doctor service and other direct approaches on medical difficulties and information asymmetry in the medical field, and doctors are in urgent need of self-improvement and brand building. It is popular in the market (see in Chart 3.2 Statistics of per capita daily use time of six major businesses in mobile medical field in 2016).

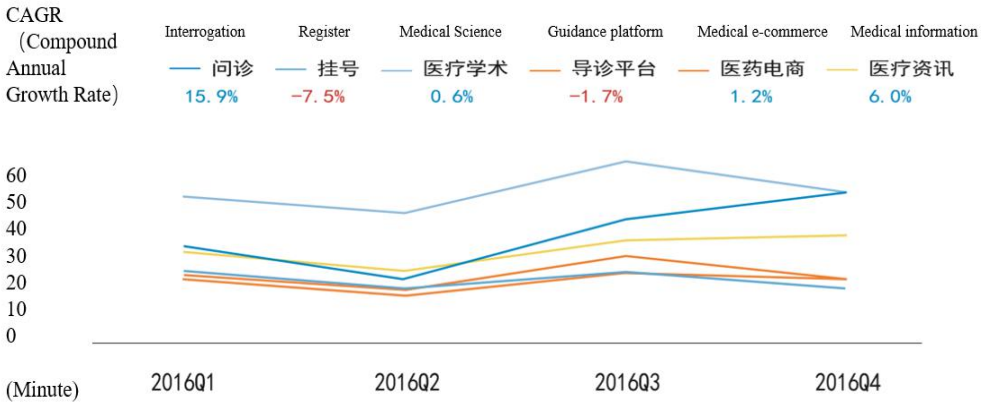

Chart 3.2 Statistics of per capita daily use time of six major businesses in mobile medical field in 2016
Data source: Yiguan Think Tank (2016)

3.3.3 Supervision trend: multi-point practice invigorates physician resources

The national policy has become the core driving force to promote the development of Internet health care, among which, multi-point practice facilitates doctors resources, promotes innovation in the mobile medical industry and extension of the industrial chain.

In 2009, the State Council issued the opinions of the CPC Central Committee and the State Council on deepening the reform of the medical and health system (Zhang, 2012).

In this regulation, to "steadily promote the reasonable flow of medical personnel, promote the vertical and horizontal exchange of talents between different medical institutions, and study and explore the multi-point practice of registered doctors" was proposed. In 2009, the notice on issues related to multi point practice of doctors was published by the Ministry of health.

From March 2011, Beijing began to implement the "management measures for multi-point practice of doctors in Beijing (Trial)". (Liao, 2011) After registration, qualified practitioners with intermediate and higher professional titles can carry out diagnosis and treatment activities in 2 to 3 medical institutions within the administrative region of Beijing according to the law.

In December 2014, Professor Deng Kaibo established a studio in Beijing Cicheng Medical Co., Ltd. For the first time, he tried "doctor multi-point practice" causing a stir in the industry

(Xu, 2020).

Since then, multi-point practice has gradually become a common work behavior of practitioners with intermediate and higher titles in China's first tier cities.

3.4. Maturity period: connect offline service resources and look forward to the future (2016 to now)

3.4.1 Market overview: redistribution of technology enabling resources

In October 2014, Youde medical and the second people's Hospital of Guangdong Province jointly established Guangdong Provincial Network Hospital, becoming the first Internet hospital in China. In December 2015, Tongxiang municipal government of Zhejiang Province officially announced the launch of the first Internet hospital in China. (Luo, 2017) After that, Guizhou and Sichuan Province incorporated telemedicine service into the payment scope of basic insurance fund and promoted the development of mobile medicine through policy guarantee.

3.4.2 Business model: Internet hospital outbreak

Since 2016, through deeper integration with the traditional medical industry, internet medical businesses have begun to attempt to enter steps other than consultation and registration (see Figure 3.3 Statistics on the number of investment events in the field of health care in 2013-2016).

Internet hospital is an online diagnosis and treatment platform that provides online medical services and remote consultation services. It provides services such as appointment, follow-up consultation, remote consultation, electronic prescription, online doctor's recommendations, home delivery. The core business is online diagnosis and treatment between doctors and patients and remote joint consultation between doctors and doctors. The core value is to allocate high-quality medical resources to the base levels, so as to improve the overall medical service capacity of the grass-roots level.

From the end of 2016 to the beginning of 2017, Internet hospitals represented by Wuzhen

Internet hospital broke out in a concentrated way. (Luo, 2017) In December 2016, 34 Internet hospitals were established in China, including 21 Internet hospitals led by internet medical enterprises, with an outbreak trend; In March 2017, Yinchuan signed 15 Internet hospitals, including Good doctor online and Chunyu doctors. A number of policy documents have also been issued by Yinchuan municipal government, such as Internet hospital work system, supervision system, doctor access, hospital management, medical insurance docking. (Zhang, 2017)

The Internet goes further into the traditional medical industry promoting the transfer of medical treatment window from the hospital system to the mobile phone client, promoting the balanced allocation of medical resources, and proposing solutions for the isolation problems of the hospital as an information island. (Wang et al. 2016) In addition, mobile medical enterprises represented by Chunyu doctor and PingAn good doctor continue to expand their resource advantages. Chunyu doctor obtains more patient resources through the open consultation platform and creates a mobile medical flow portal. PingAn good doctor opens the "medical + drug + insurance" service system through investment and cooperation to help its business model innovation.

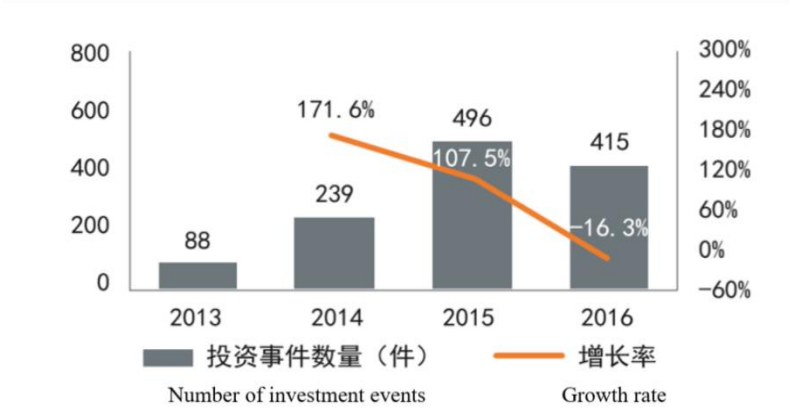

Figure 3.3 Statistics on the number of investment events in the field of health care in 2013-2016

Data source: Yiguan Think Tank (2016)

3.4.3 Technical development

On the basis of algorithm science and data economy infrastructure, the application of artificial intelligence in mobile medical field starts to appear. In 2016, the application of artificial intelligence, which aims at image recognition, assisted diagnosis and treatment and health management, may take several forms to boost the efficiency of medical services. Especially in medical imaging, technology is helping early cancer screening, helping patients improve the survival rate. (Dong & Wang, 2017)

Although there is little market space for single disease at present, it is believed that mobile medicine based on medical artificial intelligence will become an important part of the industrial chain in the coming new round of technological innovation.

3.4.4 Supervision trends

Internet medical services are regulated by the National Health and Family Planning Commission. In 2017, "Administrative Measures for Internet Diagnosis and Treatment (Trial) (Consultation Draft)" and "Opinions on Promoting the Development of Internet Medical Services (Consultation Draft)" were successively issued by the General Office of the National Health and Family Planning Commission, which gave clear norms to internet medical treatment with light inquiry as the main diagnosis and treatment mode. (Heng & Mei, 2018) It is clear that the Internet diagnosis and treatment activities should be filed in the health sector, and it is clearly stated in the medical institution practice license that it is the same as other diagnosis and treatment subjects.

These two regulations have a profound impact on the development of Internet health care and at present, the control power of the policy for Internet hospitals is emerging, and the development has entered the adjustment period.

3.5 Mobile medical treatment will step into rapid development

3.5.1 Favorable policies, medical system reform and market expansion

In January 2015, the national health and Family Planning Commission issued a notice

regarding some opinions on print, distribution, promotion and standardization of doctors' multi-point practice, which formally made clear that multi-point practice of doctors does not need to obtain a "written consent" from the medical institutions in the first place of practice. By relaxing conditions, simplifying procedures and optimizing policy environment, the reasonable flow of doctors was promoted, which effectively increased the richness of mobile medical resources.

In October 2016, the notice on promoting the pilot work of hierarchical diagnosis and treatment was put forward and 270 cities were planned to carry out the pilot. (Dong, 2016) With the promotion of hierarchical diagnosis and the sinking of medical resources, mobile medical enterprises will play an important role in connecting decentralized primary medical institutions.

3.5.2 Large platform enterprises formed, and there remains a large space in the vertical field

Since 2014, after rapid development and integration, mobile medicine has emerged a leading business with the advantages of user volume and resource capital. In the future, with the decline of APP dividend, the advantages of platform enterprises with most traffic will be further reflected, and a pattern of the strong becoming stronger will appear.(Luo, 2015) At the same time, there is still a large market space in the vertical subdivisions such as chronic disease management, genetic testing, elderly health care, overseas medical care. For newcomers of mobile medical services, differentiated medical services and the attention to user experience will become the main direction of the business.

3.5.3 The profit model is becoming clear day by day, and getting through commercial insurance will become the future trend

At this stage, the mobile medical market is mainly divided into three mainstream profit models: providing medical value-added services for patients, providing advertising services for enterprises, and medicinal product guidance for medical e-commerce and private hospitals. At the same time, mobile medical enterprises are actively exploring the cooperation with commercial insurance.

In the future, with the development of medical big data and the acceleration of medical marketization, commercial insurance will become the core fee control and payer for mobile medical market. Based on the continuous innovation of product service and business model, the internet medical market has achieved a revolutionary change. The enterprises with rich resources and innovative models will stand out and become the leaders in different segments gradually shaping a new pattern of market competition.

Chapter IV: Development Status of Mobile Medicine in China

4.1 Development status of mobile medical

The rich and comprehensive data system of mobile medical system can provide the functions of appointment registration, waiting guidance, expert information, medical information query, examination and test report query for a vast number of patients, saving a lot of waiting time for patients. Some medical app systems also recommend appropriate hospitals or doctors according to the specific situation of patients, which solves the problem that some patients do not know how to choose among multiple hospitals. Not only that, patients can interact with each other, exchange treatment experience, and encourage each other to gain confidence. Therefore, because of the above factors, mobile medicine has become very popular in modern days.

The use of mobile medicine brings more and more convenience to both doctors and patients, and also benefits operators, medical equipment manufacturers and industries. At the same time, the security, privacy and future development of mobile medicine is being questioned (Li, 2015). This dissertation will analyze the user needs through the user survey of the current popular mobile medical app and put forward corresponding measures and suggestions.

4.2 Demand analysis of mobile medical users

4.2.1 Preparation and distribution of questionnaires

This questionnaire is an online questionnaire. The respondents are anonymous, and it does not involve privacy issues. From September to December 2019, the research group sent the link to the questionnaire through QQ, Wechat and paper at the same time. 220 questionnaires were issued through three channels, 175 valid questionnaires were recovered, the recovery rate was 79.5%. The dissertation questionnaire used EPI data software to input information, and the online questionnaire were directly downloaded, which were combined with the paper data to form the final data. The questionnaire includes four parts: project introduction, investigation purpose,

basic personal information of the respondents, use of mobile medical app and suggestions for its development.

4.2.2 Sorting and analysis of survey data

The results show that among the respondents who have used mobile medical app, Baidu doctor, Chunyu doctor and Ping An good doctor account for a relatively high proportion (40%), followed by Ali health (30%).

There are also medical applications, which lack strong advocacy, were not used by the respondents. In a summary, of the reasons for not using the medical application (Figure 4.1), 54.55% of the respondents went to the hospital for face-to-face consultation because of their habits; in addition, 27.27% worried that online consultation is not scientific enough, This shows that the current development of medical app is not perfect, the user habits are difficult to change in an instant, and people lack sufficient trust in the diagnosis and treatment process and the results of the app.

Among the investigated population, the most frequently used functions are still seeking medical consultation (70%), symptom self consultation (50%) and checking the efficacy or usage of drugs (50%) (Figure 4.2).

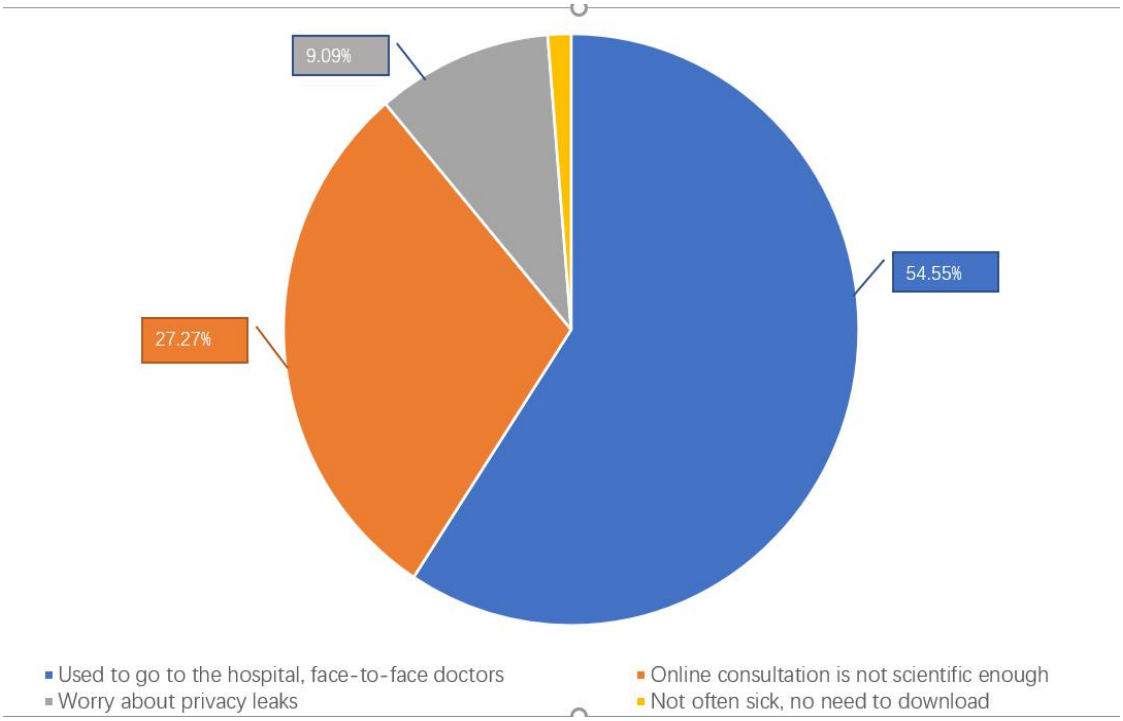

Figure 4.1 Reasons for not using medical App

Source: Cheng & Liu, 2017

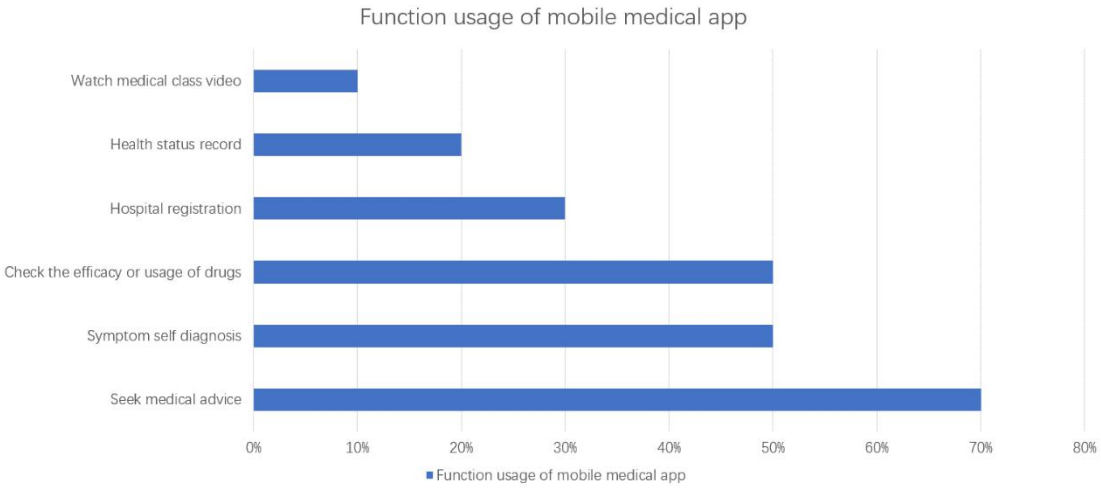

Figure 4.2 Function usage of mobile medical App

Source: (Cheng & Liu, 2017)

These conventional modules are common to almost every medical app product, while the smallest proportion of them is watching the special columns of the APP such as medicine class. The effectiveness of the development of these special apps and its relevance to the main functions need to be strengthened.

As conclusion, the results of the questionnaire show that 52.38% of the respondents did not use an app to carry out activities such as consultation or registration. Combined with the interview during the questionnaire, it is found that the respondents are still used to choose the ordinary hospital registration and treatment mode, they do not fully understand the online consultation mode, and they are skeptical of its safety. On the other hand, operators should vigorously promote the characteristics of their products, not only focusing on ordinary modules, otherwise it will be difficult to win in the medical app industry that has a large base and strong competitiveness.

This dissertation takes a representative mobile medical app brand "Ping An good doctor" with a relatively high proportion of use as an example, analyzes the problems existing in the mobile medical app and puts forward countermeasures and suggestions.

4.3 Development status of "Ping An good doctors"

4.3.1 Introduction to "Ping An good doctor"

Ping'An good doctor integrates six characteristic services of "family doctor, renowned doctor consultation, health community, health assessment, health habits and health archives", and provides one-stop health consultation and health management services for users. After being online for 100 days, the number of registered users of the APP has exceeded one million. In the middle of January 2015, the APP was officially renamed as "Ping An good doctor" (Phoenix.com, 2015). Ping An good doctor takes doctor resources as the core, and uses mobile Internet platform to conduct real-time communication between doctors and patients, including pre diagnosis services such as prevention and health care, primary diagnosis, appointment and registration, as

well as post diagnosis services such as follow-up, rehabilitation guidance, chronic disease management, medication reminder.

4.3.2 Environmental analysis of "Ping An good doctor"

At present, there are more than 3000 medical apps in the market. As a member of the medical app world with a significant base, Ping An good doctor is not only facing great pressure from the competition among other industries, but also the strict requirements of the government. As an important industry closely related to human life, the medical industry has a high standard of management and inspection by the state, and the industry requirement is correspondingly high (Yang & Guo, 2015). At present, the policy clearly indicates that doctors can only provide health consulting services on mobile medical app, and are not allowed to treat or prescribe, which to some extent limits the future innovation and development of mobile medical app (Wei, 2015).

The internal environment of "Ping An good doctor" can be analyzed from two aspects. First, as a medical app launched by Ping An group of China, Ping An Group has its own advantages over other medical apps. As a senior enterprise in the medical insurance industry, Ping An Group has long-term experience in dealing with the medical industry, and has many hospital and doctor resources and government resources (Wei, 2015). The main problem it faces is the lack of technical support. There is still a big difference between the medical insurance industry and the medical industry. Some core technologies need to be purchased from abroad (Deng et al. 2016). There are few experiences that can be used for reference in domestic medical apps, and there are certain unknown risks in investment.

4.4 "Ping An good doctor" and problems in mobile health market

4.4.1 The homogeneity of medical app is serious

According to the relevant data of mobile medicine, the number of mobile medical app has exceeded 3000, which alleviates the problem of medical resource shortage to a certain extent (Chang, 2015). But the homogenization of mobile medical app is more and more serious (Xu & Zhao, 2015). All major operators have taken a fancy to this rising "new star", and many capitals

have crowded this medical market segment. As a result, many APP software turned into a general service software, not only providing medical information through medical consultation and registration, but also adding a functional module with entertainment, which makes the positioning of the products no longer clear (Zhang & Zhao, 2016). Like most other mobile medical apps, "Ping An good doctor" has routine functions such as seeking doctors and asking for medicine, self-service registration and so on, but it does not reflect its own characteristics and advantages, and it does not form effective differential needs for users, so it is difficult to form customer loyalty (Niu, 2014).

4.4.2 The content of medical information is complex

In the era of rapid development of information, mobile medicine, as a new industry, will become another development point of information dissemination. Many users of the "Ping An good doctor" app have given feedback that every day they will receive a large number of health care and treatment information as well as some small advertisements, which are huge in quantity and vary in quality, so it is difficult for ordinary users to judge and choose. Some patients even rush to the doctor in a hurry as they believe in the "knowledge" conveyed by some health channels, resulting in the wrong perception of the disease, so the gain is not worth the loss. (Yang, 2016; Lin & Qiao, 2010; Zhong et al. 2016; Wang et al. 2015).

4.4.3 User personal information security issues

When many app clients register and log in after downloading, they need to provide basic personal information. Medical app needs to know the patient's physical condition through their personal information. At present, with the proliferation of information technology, the privacy problems of medical app patients are likely to be disclosed in this step, which is a fraud opportunity for some criminals, potentially posing a threat to the lives of the patients to a certain extent (Lin & Qiao, 2010). In order to earn huge profits, operators even sell users' personal information without permission, which will cause huge losses to the credibility of the mobile medical industry (Wang et al. 2015).

4.4.4 The user's trust is not enough and lacks the standard basis

According to the survey results of this paper, "Ping An good doctor" has a good response in the market at present, but there are obvious medical security risks in this mode. It is easy to be misdiagnosed only through photos and patients' descriptions of this remote diagnosis. Once there is a medical dispute, it is difficult to define the legal responsibilities of both sides (Wang, 2015). Some of the non-standard medical and health app's medical related information comes from various Q &A platforms and search results, whose authenticity needs to be tested, the standard of doctors' answers cannot be reasonably judged, and it is easy to mislead immature patients (Wang, 2015).

4.4.5 Capital operation

At the beginning of the "Ping An Good Doctor" plan, they adopted a heavy asset management model. Full-time doctors are employed from various top level three A grade hospitals. Online and offline clinics are established through the use of large amounts of funds.

According to the industry report, mobile medical app has always been on the promotion stage with large investment, enterprises rely heavily on capital, and the business model of sustainable profit is not clear (Zhong et al. 2016).

Drug manufacturers, doctors, hospitals and users are the main sources of foreign mobile medicine profits. At present, most of the profits of domestic mobile medical enterprises come from advertising traffic and sharing traffic, and offline resources have not been fully developed (Zhong et al. 2016). At the same time, customers are also diverted by a large number of homogeneous medical apps making it harder to make a profit.

4.5 Case analysis of Ping An good doctor

Business model is the basic mechanism for creating value and the basic business model of an enterprise. It is the basic logic of the whole input-output operation process of an enterprise, and it is the basis and blueprint for the enterprise to organize its business activities systematically. Business model is the focus of management field, and also the focus of entrepreneurs and entrepreneurs. In the era where business model competition is becoming a trend, it seems that it

has become the instinct of entrepreneurs to find a suitable business model. The business model referred to in this section mainly refers to the source of profit of the enterprise (Sun & Chen, 2011).

Mobile medical business model refers to the profit source of mobile medical product suppliers, that is, which module is charged in the mobile medical market. In the mobile medical market, mobile medical product providers need to consider the distribution of medical resources and the structure of medical market in a country or region when providing products or services. Investors will also comprehensively investigate the behavior of each subject and the profit sources of existing mobile medical products in the market. China mobile medicine model mainly charges patients, general user and hospitals. Mobile medical services for doctors are basically free of charge or transfer payment. Below, Ping An good doctor is used as an example for analysis.

4.5.1 Innovation of Ping An Good doctor

In 2015, the scale of China's health care market was 4 trillion yuan, and it is expected to reach 10 trillion yuan in 2025. In the new wave of Internet plus healthcare as the China Mobile medical giant, the main O2O health management and medical service safe good doctor successfully completed the $500 million A round of financing in May this year, with a valuation of $3 billion, becoming the largest Unicorn company in mobile medical service in China.

Ping An health, a subsidiary wholly-owned by Ping An group of China, was established in August 2014 with a registered capital of 350 million yuan. It is an important member of the Internet business sector of Ping An group. As the core product of Ping'An health, Ping'An good doctor app was officially launched in April 2015, providing online health information consulting services. Taking the online diagnosis and treatment services of family doctors and specialists as the entry point, it cooperates with big data mining, analysis and application, and provides customers with various forms and rich contents of personalized medical and health care through the combination of online and offline health management services.

As the platform category entry of Ping'An health and medical service, Ping'An good doctor

brings the double innovation of "service content + service mode" in health management business, integrating online the scattered offline medical resources. It matches the medical consultation needs of users online with the corresponding medical services, implements the trinity of "medical network", "drug network" and "information network", and builds a comprehensive O2O closed loop medical supply chain service (see Figure 4.3).

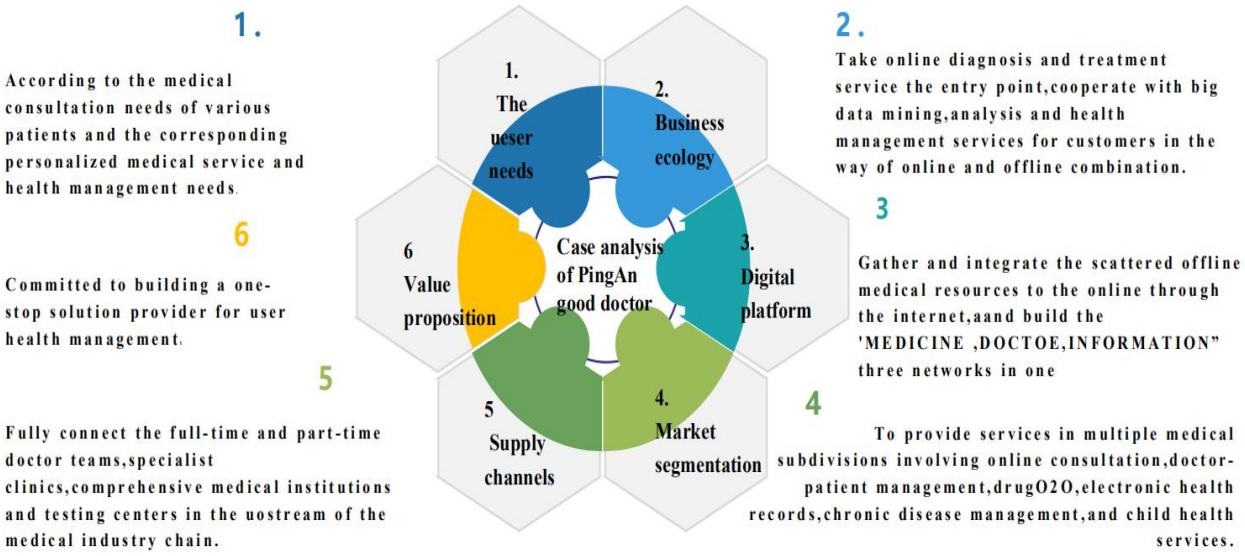

Figure 4.3 Understanding the business model innovation of Ping'An good doctor
source: PingAn good doctor official website, PINTU think tank analysis

In the field of Internet healthcare, light assets are the mainstream mode for start-up companies, which is no exception in the Internet plus medical field. A large number of Internet Medical start-up companies set up consultation platforms for patients to guide doctors to provide consultation services for patients online, and then the platform makes profits by extracting a commission.

Ping'An good doctor has taken a completely different development path, creating three "circle" full-time doctor team service system.

Circle 1: a full-time doctor team with more than 1000 employees, as the core service circle, provides users 7x24-hour online consultation of pictures and videos with auxiliary diagnosis, rehabilitation guidance and medication suggestions;

Circle 2: it has signed contracts with more than 50000 doctors in society from 3000 offline designated hospitals as the sub outer ring layer to provide users with follow-up triage and referral, offline first visit and follow-up service;

Circle 3: establish the appointment system for renowned doctors, gather more than 5000 top-level doctors, and provide users with one click call service for nationally renowned doctors.

Ping'An group focuses on health management, commercial insurance, medical insurance and information, and builds a "medical network, drug network and information network" in one. It provides online health consultation and offline medical services, including health management, drug and devices, electronic health records, medical insurance, and payment for commercial insurance. The core of Ping'An health strategic planning is the simultaneous development of both online and offline channels. The online service is mainly provided by Ping'An good doctor. The offline clinic location, customer triage, and operation system have the coordinated development of tens of thousands of medical services, so as to comprehensively create the industrial ecosystem for Internet health with online and offline linkage development.

As the platform category traffic entry of online health and medical services, Ping'An good doctor has arranged a medical resource network including full-time and part-time doctor teams, specialist clinics, comprehensive medical institutions and testing centers through self-construction and integration of social resources by means of online health management services linkage with offline physical hospitals. At the same time, efforts have been made to break through the link of drug circulation to form a platform for drug network collaboration. In addition, it is committed to integrating personalized data such as user's personal health and behavior habits, forming a large-scale information network.

Ping An good doctor provides mobile medical services such as quick consultation, health plan, health mall, health community and door-to-door delivery of medicine. It is the only provider of the entire health and medical services process in China. The online medical service mode of

"Ping An Good Doctor" can solve the most common health problems of users on one hand, and establish a "health cloud" platform for data collection and health management on the other hand, so as to expand the service field based on big data analysis. As of June 2016, the number of registered users of Ping'An good doctor has exceeded 80 million, with a daily consultation volume of 250 000 times, ranking the top 50 of China's most active apps and the top 3 of mobile medical app downloads.

4.5.2 Disadvantages of Ping An Good Doctor

"Ping An Good Doctor" uses the capital and business advantages of Ping An Group to build its own full-time doctor team, investing heavily in hiring full-time doctors, and establishing a comprehensive consultation platform. The number of downloads, the number of users and the number of daily consultations are all ranked in the forefront of the industry. Online consultation is the core function of Ping An Good Doctor. After the image and text consultation function is launched, Ping An Good Doctor will launch the video consultation function. Through real-time video communication between full-time doctors and user patients, Ping An Good Doctor helps users analyze their conditions and provide medication suggestion. Users can purchase the required medication online on the Internet service platform according to the medical advice of online doctors, and enjoy the follow-up service of delivering the medication to their door. "Ping An Good Doctor" dared to burn money to form a team of full-time doctors, and solved the problem of lack of management in quality and time of consultation with online part-time doctors. Although the hiring of full-time doctors has improved the response speed and consultation experience, the core network consultation function has not solved its inherent limitations. On one hand, the expansion of core doctor resources takes a long time, and there are also insufficient clinical rigor, limited data accumulation, insufficient types of diseases that can be treated, questions about medical legality. The user scenario is still very monotonous, and only relying on consultations cannot help it build enough landmarks to resist competitors.

Regarding the question of whether online consultation can replace hospital consultation, doctors in some medical institutions are skeptical or even negative (Pei, 2017). They believe that

doctors' consultations require doctors and patients to be face-to-face, to observe the patient's condition, and inquire in detail about the patient's disease development process, whether there is a family history of the disease, the history of the onset, and the medication used in the earlier stage of the disease, and then cooperate with modern medical testing equipment to conduct specialized testing for diseases, and to treat patients with care and medication based on the test results. However, the current mobile Internet online medical treatment can only use the patient's statement and simple data as an indicator to judge the patient's health status, and it may be uncertain whether the client has a certain disease. This will easily lead to low diagnosis and treatment quality and efficiency. If doctors need to go through professional testing to make an accurate diagnosis on patients, then online consultations only serve the functions of appointment registration and pathological initial analysis, for this, the corresponding products of online consultations lack sufficient practicality.

Online consultations that rely solely on graphic descriptions and video consultations are generally based on appointment consultations. Letting high-paid full-time doctors do it is not a waste of medical resources, but how to realize the value of doctors themselves? In addition, with the advancement of medical artificial intelligence, a huge team of full-time doctors will change from an asset to a burden.

Chapter V：Conclusion and Considerations

5.1 Conclusion

At present, the development of mobile medicine is imperative, and the development momentum has been growing.

The current situation of unbalanced geographical distribution of medical resources and access and affordability of user healthcare will be improved by mobile medical treatment; To simplify the process of medical treatment, improve the accuracy of diagnosis, improve the efficiency and quality of medical services; to help collect, process, analyze and store medical data, and realize medical big data. In China's mobile medical market, there are two main categories of mobile medical products: one is to provide special system platform development services for hospitals; the other is non-medical diagnosis personal health data management app. In the product structure of mobile medicine, the existing products are in two opposite poles, and there is no medical big data application and other products or services. The essence of mobile health care should be the sharing of medical information, full data analysis, and information transfer cost reduction. The development of such functional products is not only the main direction but also the main bottleneck of China's mobile medical development. How to break through the restrictions, deepen the application of mobile medicine and combine it with China's medical reform will be the main issues for China's mobile health care.

Due to the limitation of data, the research of this thesis is not deep and complete.

The author thinks that the future research can be carried out in the following aspects:

1) We can improve the data and cases, collect the results of mobile medical application data, and verify the impact of mobile medicine on medical benefits in society through an empirical model. Quantitatively analyze the benefits of mobile medical intervention in the medical service market so as to achieve better research results.

2) From the perspective of the industrial chain, we can analyze the relationship between the

existing participants in the mobile medical industry. Combined with data, this work analyzes the relationship between the existing mobile medical product providers, such as application developers, wearable device providers.

Because of the lack of mathematical model related knowledge, this thesis uses a relatively simple method to analyze the current situation of mobile medical development.

In the future, the research can further explore the relationship between the main body of the mobile medical market and build a closer model for it by using a mathematical model.

5.2 Considerations

As far as the current situation is concerned, the supervision of a third party in the field of medical services should be completed as soon as possible - the most appropriate one is the stakeholders (medical insurance institutions). We can also learn from the experience of mobile medical development abroad. The development of mobile healthcare in the United States is at the forefront of the world, and medical big data products and services has emerged in this market. There are also FDA regulations on mobile medical products. Medical insurance institutions that control medical service projects objectively promote the development and promotion of general mobile medical products. China’s future development can learn from the United States and combine with its own actual situation.

The development of mobile medicine is a double-edged sword. Taking the use of special mobile medical products in hospitals as an example, the use of an hospital APP connected to the hospital's internal information system has the advantages of efficiency improvement, and it can also alleviate the information asymmetry to a large extent. Patients can enter the APP to check the progress of diagnosis and treatment, and understand the relevant information such as an examination. But at the same time, in the process of using the app connected with the hospital, there may also be a lock in effect. In other words, information island phenomenon between hospitals still exist due to the hospital's self-interest in the product selection, being difficult to get through. The lock-in effect on patients is not conducive to the development of open mobile medical products based on the Internet. In the development of mobile healthcare, it needs the

joint promotion of the government, enterprises and other parties. At present, one of the main contents of China medical reform is that a complete hierarchical diagnosis and treatment system has been established. At the same time, social medical insurance needs more participation in the medical service market. However, the existing hierarchical diagnosis and treatment system is broken, the sharing of medical information is not realized, the connection between referral hospitals is not close enough, and the attitude of the public towards medical services has not been changed. These are the problems that need to be solved in the medical reform, and the solution for these problems will eventually clear some obstacles in the medical system for the in-depth development of mobile health. Similarly, the development of mobile health will also provide technical possibilities and new directions for medical reform.

Chapter VI: Bibliography

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