

Business model innovation of smart healthcare platform company

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Abstract: In recent years, with the economic development and technological progress, the traditional medical service system has been unable to adapt to changes in demand. With the gradual advancement of science and technology, how medical institutions can build medical big data analysis capabilities, enhance medical big data analysis capabilities, create public benefits, and improve social welfare has become a concern of the medical community. Therefore, this study aims to explore the unique business model of online medical company and analyze how this emerging industry has changed the profitable business model. This study adopts a case study method and selects PING AN health cloud company as the case. Then the study explores how it can use the business model to innovate and succeed in cyclical profits. This study reveals that the operation of PING AN smart healthcare platform is divided into online services and offline services, which are composed of four roles, medical team (front-end users-platform cooperation team), health mall merchants (front-end users-platform partners), the platform itself (providing the platform for front and terminal use), and APP consumers (end users). Each role is a service/product provider and a beneficiary at the same time. The platform acts as an intermediary to activate the entire health industry. Some managerial implications can contribute to the overall smart medical industry.

Keywords: Smart healthcare, Intelligent online healthcare, Business model, innovation, Ping An company.

I. Introduction

According to statistics from the United Nations, the proportion of the global elderly population will rapidly grow from 11% in 2011 to 22% in 2050. In 2050, the global population of people over 60 years old will increase three times as fast as the average population, indicating that the global population is aging faster than in previous years. Among them, the elderly population in many emerging Asian countries in 2050 will need more attention than advanced countries. With the gradual aging of the population, the issue of health is gradually being paid attention. At the same time, the medical industry is also being promoted. In recent years, with economic development and technological progress, the traditional medical industry has undergone tremendous changes. From the past for the accessibility of the product quality stage, the demand for online services is more needed by people. With the individualized and differentiated characteristics of each customer, the traditional medical service system has been unable to adapt to changes in demand. Since the publication of "Big Data: Science in the PB Era" in "Science" magazine in 2008, the concept of "Big data" has been widely spread. By observing the results of diseases through artificial intelligence, accurately determining drug targets and enhancing disease prediction and prevention, health conditions can be improved (Khoury & Ioannidis, 2014). With the gradual advancement of science and technology, how medical institutions build medical big data analysis capabilities, enhance medical big data analysis capabilities, create public interests, and improve social welfare have become issues of concern to the medical community. With the advancement of medical software

and hardware, the demand for the calculation and transmission of medical data is increasing. The amount of data required for operation and storage in medical institutions is also increasing.

In China, due to the large population and uneven distribution, most hospitals and clinics are set up in first- and second-tier cities. For residents in the third- and fourth-tier rural towns, medical resources are difficult to obtain and expensive, and the distribution of resources is uneven. And although there is a medical grading system that distinguishes patients of different injury levels, the shortage of supply makes urban and rural residents dissatisfied with the "difficult and expensive medical treatment", resulting in increasingly serious inequality between supply and demand. And in terms of social culture, Chinese culture respects health preservation and attaches great importance to one's own health. Therefore, many people above the middle class and above with better financial ability often take up the emergency medical resource system for minor illnesses, which makes it impossible for patients who really need them to receive medical services immediately. China's medical service system currently has two shortcomings: the first is the insufficient supply of high-quality medical resources, and the second is the serious imbalance in the allocation of medical resources. However, the Chinese government has invested huge manpower, material resources, and financial resources in medical reform since 1978, but there has been no significant improvement. After the rise of the concept of big data and artificial intelligence, the Chinese government first used "big data" in the "Chinese Government Work Report" in 2014, and the "Promoting and Standardizing the Application of Big Data in Health Care" published in 2016 The "Guide to Development and Development" incorporates the application of healthcare big data into the national big data strategic layout.

In summary, many traditional medical companies in China have made changes in response to policy trends. Adding the application of big data and artificial intelligence to medical diagnosis in hospitals, accelerating the efficiency of diagnosis, and at the same time improving the accuracy of judgment, and the ability to analyze big data. It can enhance the information integration, analysis and application capabilities of medical institutions, and can also enhance the efficiency and effectiveness of medical resource utilization. On the other hand, there are also many mobile phone app developers who are aiming at the business opportunities of mobile devices, cooperating with professional medical companies, using mobile devices as a way to reach the public, and devoting themselves to the research and development of remote consultations. The rise of this industry has caused structural changes in China's medical industry and has made it no longer difficult for residents in remote rural areas to obtain medical resources. However, due to the rapid rise of this industry chain in the near future, there is no precedent to observe, so many businesses have not fully confirmed and grasped the application of business models in the course of operation. In the past research, most of them focused on big data. The application in the medical industry (Mounia & Habiba, 2015; Wang, Kung & Byrd, 2016) does not focus on the research of business model innovation in this industry. This study takes China's largest online medical platform: "Pin An smart healthcare platform" as an example. It based on statistics in 2019. It intends to explore the unique business models of online medical companies, hoping to contribute to the global big data medical industry.

II. Literature Review

2.1 The trend of big data telemedicine

Medical big data plays an extremely important role in the decision-making process of many medical institutions. The term "big data" can refer to information attributes with high capacity, high speed, high value and high diversity, which need to be processed in new ways to improve decision-making practices (Martin-Sanchez & Verspoor, 2014). These data are produced in different types and forms; that is, they are very diverse, unorganized, and complex. Therefore, it is extremely challenging for DBMS to deal with them effectively. Once the data is collected and used in the right way, the healthcare industry will be able to develop further, which leads to the need to enhance big data in the healthcare industry in the near future. Although powerful, it is a daunting task to integrate such tools into clinical workflows (Feldman, Davis, & Chawla, 2015), for example, patient privacy issues, insufficient preparation of the entire industry, lack of information system infrastructure and structure, and ownership Data etc. (Mounia & Habiba, 2015). Medical big data resources can be divided into the following categories (Raghupathi & Raghupathi, 2014): 1. Medical records: medical records, medical image data; 2. Medical research information: clinical results, test results, medical research databases, drug databases, new drug sales Forecast; 3. Diagnostic information: diagnosis records, medication records, cost analysis; 4. Consumer behavior: medication habits, buying habits, exercise records. With the advancement of medical software and hardware, the demand for the calculation and transmission of medical data is increasing. The amount of data required for operation and storage in medical institutions is also increasing. The big data life cycle can be divided into data collection, data cleaning, data classification, data modeling and data delivery

(Archenaa & Anita, 2015). In addition, it is essential that data storage, data integrity and data access control must be included in every stage of the big data life cycle (BDLC).

Telemedicine refers to the use of information and communication technology (ICT) to provide medical services from a distance and has been continuously developed in developing countries in recent decades. This technology is difficult to obtain because it overcomes geographical barriers and provides medical services for people living in remote areas (Ecken & Harbick, 1997). According to the research on telemedicine in China mentioned by Richard and other scholars in 2001, China provided technical and financial support for the initiation of telemedicine plans by several major medical universities in the mainland for the first time in 1996 at the Faculty of Medicine of the Chinese University of Hong Kong. Three main basic requirements for telemedicine are proposed: (a) appropriate community infrastructure for information technology; (b) professional and organizational infrastructure; and (c) adequate funding. In recent years, China has many innovative applications for telemedicine. One of them is the introduction of scientific foundations to Chinese Medicine (TCM). The Chinese, Japanese and American Colleges of Traditional Chinese Medicine discussed the concept of evidence-based diagnosis and treatment in Western medicine at telemedicine conferences (Hsieh et al, 2001). In recent years, the adoption of telemedicine industry and services has increased exponentially, and by 2025, the market size is expected to exceed USD 130 billion (Tania & Margot, 2019).

2.2 Business model

Amit and Zott (2012) defined a business model as the content of an organization's operation and the management of various transaction mechanisms. This organizational design can create value through the use of business opportunities. Michael Rappa (2003) believes that the business model, in its most basic sense, refers to the method of doing business, a model that a company depends on for survival, and a model that can bring benefits to the company. He believes that the business model shows how companies can make money by clarifying their position in the value chain. The business model clarifies what kind of activities a company carries out to create value, how to choose the position in the upstream and downstream partners in the value chain, and the types of arrangements that can be reached with customers to generate revenue. Johnson et al, (2008) believe that a successful business model has four complementary elements: customer value proposition, profit model, key processes and key resources. Osterwalder & Pigneur (2010) further subdivided the items. Proposed four modules of The Business Model Canvas, namely the creation and delivery of customer value, the use of the company and cooperative partner resource network, the stability of cost structure and revenue sources, and advocated that the business model should include nine Dimensions: Value Proposition, Target Customer Segments, Distribution Channels, Customer Relationships, Value Propositions, Core Capabilities, Cost Structure (Cost Structure), Revenue Model, Main Partner.

The research case of this study will use the business model architecture of Osterwalder and Pigneur (2010) to illustrate the concept of its business model, explore its widespread application in the big data medical industry, remote health industry systems and positioning services, and analyze its gains. Profit models and categorize them, hoping to contribute to the future industry.

III. Method

3.1 Analytical framework

This study takes the smart health industry as an example to discuss business model innovation. The first criterion "On the form of research questions" mainly discusses how the business model of the smart network medical industry operates and evolves, so it is a question of "how"; in the second criterion "Does it need to be manipulated in behavioral events?" Since the object of the research focuses on the business model and business behavior experienced by the research object, it is impossible to manipulate these events and can only be understood through observation and contact. Therefore, this research is suitable for the case study method (Yin, 1994). Since this research is aimed at China's smart network medical industry as the research object, this research adopts qualitative research method as the research strategy, and then according to the viewpoint of Yin (1994), the case orientation emphasizes the overall contextual analysis point of view, attaches importance to the research object, The relationship between the research theme and the overall environment; and the theory generated by the qualitative research method comes from the summary of the data and the findings of the research, and then reconstructs the historical phenomenon, and completely derives the key elements that affect the business model of the enterprise.

This research is an exploratory research. It uses internal and external data collection and environmental assessment of the research object to correlate with business models in different periods, emphasizes the overall contextual analysis perspective, attaches importance to research cases, and deeply understands the relationship between the research objectives and the overall environment. This research is structured on the nine elements of

the business model of Osterwalder and Pigneur (2010), which are defined as follows: 1. Customer Segments: The definition is a group of individuals or organizations that an enterprise locks as a target and wants to contact or serve. Such as: mass market, niche market, segmented market, diversified market, multilateral platform, etc., select the target audience. 2. Value Proposition: Value proposition refers to a set of products and services that can create value for a specific target audience. The value proposition provides a set of benefits for customers by solving customer problems or satisfying customer needs, allowing customers to choose their company instead of choosing another company. 3. Channels: Channels refer to how a company communicates and contacts with target audiences to convey its value proposition, which can help the company pass the value proposition to customers and provide customer after-sales service. 4. Customer Relationship Customer Relationships: It is defined as the type of relationship established between a company and a specific target audience. 5. Revenue Streams: refers to the cash generated by a company from each customer segment. The revenue stream must be deducted from the cost in order to get profits. The revenue stream can be generated from the sale of assets, usage fees for specific services, membership fees, rental fees, authorization fees, agency fees, etc. 6. Key Resources: The most important asset needed for a business model to operate can be owned by an enterprise or obtained from outside. 7. Key Activities: It is an important matter for the operation of the business model. Different types of business models require different key activities. 8. Key Partnerships: For a business model to work, a network of suppliers and partners is needed. 9. Cost Structure: All costs incurred when operating a business model. Osterwalder and Pigneur (2010) advocated that it can be divided into two major types of cost structures. The cost-driven cost structure focuses on minimizing any possible costs, and the value-driven cost structure focuses on value creation.

3.2 Case

In this research, apart from the researcher's own business model of the smart network medical industry, the research on its business model is discussed. Following the smart network medical industry, we can see that the smart network medical industry cannot be ignored in recent years. In recent years, related research has focused on the application of big data in the health industry (Cohen et al, 2015; Wang, Kung & Byrd, 2016), but there is little research focus on business models. Therefore, this research chooses the smart health industry as the research object and analyzed by case analysis. This research uses China's largest smart network medical industry- Pin An smart healthcare platform as a case to analyze and explore its business model. Pin An smart healthcare platform is an online health consultation and health management app launched by Ping An Health Internet Co., Ltd. It was established in August 2014 and is headquartered in Shanghai, China. With doctor resources as the core, it provides online real-time consultation and health management services through mobile devices, including one-on-one family doctor services, professional consultations with top three top doctors, and additional outpatient services. Pin An smart healthcare platform was selected as one of the Top 30 Business Cases in China by Times Influence in 2017. It also landed on the Hong Kong Stock Exchange in 2018, marking the largest IPO in Hong Kong stocks since 2018. In 2019, it was selected as the most innovative company in China by Forbes 2019. The cornerstone investors of Pin An smart healthcare platform's initial public offering include Blackrock, Capital Group, Singapore Government Investment Corporation (GIC), Canadian Pension Plan Investment Commission (Canadian Pension Plan Investment Council), and Malaysian National Sovereign funds Khazanah Nasional Berhad, Swiss Re and CP Group).

Pin An smart healthcare platform is China's leading one-stop medical and health ecological platform. As of 2019, its number of registered users reached 265 million, and the number of monthly active users at the end of the period reached 54.7 million. It is the mobile medical application with the largest coverage in China. Through its own medical team and external doctors assisted by AI, it provides users with one-stop services such as 24-hour online consultation, referral, registration, hospitalization arrangements, second diagnosis and treatment opinions, and 1-hour medicine delivery. Committed to let every family have a family doctor; let everyone have an electronic health file; let everyone have a health management plan. Four major commercial areas will be formed: family doctor services, consumer medical care, health mall, health management and health interaction.

3.3 Data Analysis

The data collection scope of this research is divided into two parts: the first part is the secondary information of the case, including the official website of the case and relevant public websites at home and abroad, as well as the relevant secondary information such as magazines and special books; the second part is the research The person observes the actual business operation mechanism of the case. Among them, in terms of secondary information, in addition to collecting the official website of the case, it is also searched through keywords under Google and Baidu browsers (such as: Ping An Good Doctor, Ping An Good Doctor online consultation, Ping An Good Doctor Health Mall, Pin An smart healthcare platform, etc.), and will use it The evaluation and process of the readers are included in the reference. Through the official website of the research

object, this study fully understands the development and operation mode, marketing strategy, and future prospects of the research case, and further understands the research object's business innovation, advantages and unsolved problems. The data collection and analysis of this research is conducted in a qualitative way. It will analyze, compare, synthesize and organize the data of the research subject's news media reports, research subject's official website, professional website, and research case user evaluation. To understand the development and current situation of the business model of the research case from the literature discussion.

IV. Results

This study analyzes the nine elements of the business model of Osterwalder and Pigneur (2010) and the network data and online platforms of the research case to find out its target customers, value propositions, major partners, key activities, key resources, and customer relationships. , Channels, cost structure and revenue sources, understand how this innovative platform uses nine elements to create and deliver value to customers, as shown in Table 1. The evolution of Pin An smart healthcare platform's development is divided into two stages: the first stage is online medical diagnosis by family doctors, where the patient's condition is stratified by artificial intelligence, and preliminary online consultations are carried out, and then the doctor will confirm the diagnosis. After diagnosis, medicines and medical supplies will be delivered to the patient's residence simultaneously, online and offline are integrated, reducing the inconvenience of customers going to the hospital in the past, and at the same time collecting data, enriching their own database, and improving artificial intelligence to identify diseases The accuracy rate. Through data collection and intelligent analysis, we have an electronic health file for each customer; at the same time, we will develop an individual health management plan for each customer. The second stage focuses on the health mall and health interaction. Users pay for online diagnosis and treatment after the previous stage and develop exclusive health plans, convert the amount spent or the amount of exercise planned in the health plan into shopping money, and conduct consumption activities in the health mall in the software, and interact while exercising to earn shopping money. In summary, the main purpose of the mobile health service platform for research cases is to provide online medical treatment and use a customized health plan to stimulate users to interact with the platform every day and earn dividends during exercise. Then go to the affiliated mall on the platform to purchase health products for consumption, to achieve the value proposition of multiple activities, at the same time to increase the platform's revenue, and create the maximum benefit of the platform as a whole.

Table 1 Business model architecture of Pin An smart healthcare platform

Customer Segments	Value Proposition	Channels	Customer Relationships	Key Partnerships	Key Activities
General public APP user	Multiple services Earn bonus Easy to move	APP Store Online page Physical promotion channel	General consumers: APP activity notification Online consultation Health Mall Merchants: Backstage management	Professional medical team (Doctor, pharmacist) Health Mall Merchant	Online consultation Customized health report Daily sports bonus Health mall consumption
Key Resources		Revenue Streams		Cost Structure	
Medical team data database User activity database Health Mall Merchant Database		Online consultation income Entity sending medicines as a rake income Health mall merchants' product rake income Online system backstage management income		APP and web design URL IP rent	

It can be seen from the above results that the business model of the research case contains a large user group. Through the further analysis of the above research results, this research organizes its business context as shown in Figure 1. Subdivides the entire business model of the research case into the main roles of the four parties: the medical team (Front-end users-platform cooperation team), health mall merchants (front-end users-platform partners), the platform itself (providing the platform for front and terminal use), APP users: consumers (end users). In this interactive model, the case serves as an intermediary role, allowing the entire health industry

to be active, and each role is both a service/product provider and a beneficiary, and the platform allows endless profits.

From the perspective of the medical team, online diagnosis and drug delivery after diagnosis are completed through the case platform faster and more convenient than the traditional complicated procedures. The engineering team of the case platform will also record the consultation. The information of individual cases is integrated into a database, which has made considerable contributions to medical research and drug management. From the perspective of health mall merchants in the platform, the platform provides a complete system that not only improves product exposure, but also follows platform activities and APP users' daily exercise/login to obtain bonuses, thereby increasing consumers' willingness to buy. It can also obtain consumer data management through the platform and carry out different advertisements and discounts for consumer groups. As far as terminal consumers (APP users) are concerned, it is more convenient to see a doctor. If it is only a minor medical consultation, there is no need for the complicated process of seeing a doctor in the past. As long as there is a mobile device, it can be immediately available anytime and anywhere. inquiry. If it is necessary to take medicines and other medical devices, the medical team will deliver them through the platform, which is more convenient for consumers living in remote and remote rural areas. After the consultation, the professional team provided a customized health report through the platform, in which the exercise recommendation plan became a way to earn daily dividends, allowing more discounts to be consumed in the health mall on the platform. From the perspective of the case platform, it has created a huge health industry chain, has its own diagnostic database, consumer database, and provides a diversified service platform. The source of profit includes collecting platform cooperation fees from professional medical teams. The membership fee and commission extraction of the health mall merchants, the consumer consultation fee extraction, and the vertical interconnection to maximize the profit of each role in the platform.

This research proposes a relationship structure for the business model innovation of the smart health industry through the business model of the case and explains how the originally unrelated parties in the industry can collaborate and cooperate, and while taking care of their own duties, they can also use the network platform and more extensive Mutual influence and profit in the platform business model system. This is a whole rather than an individual-based model, which highlights the connection between the internal and external roles of the platform. Through each other's abilities, they are organized into a case platform to promote the development of knowledge, creativity and innovation.

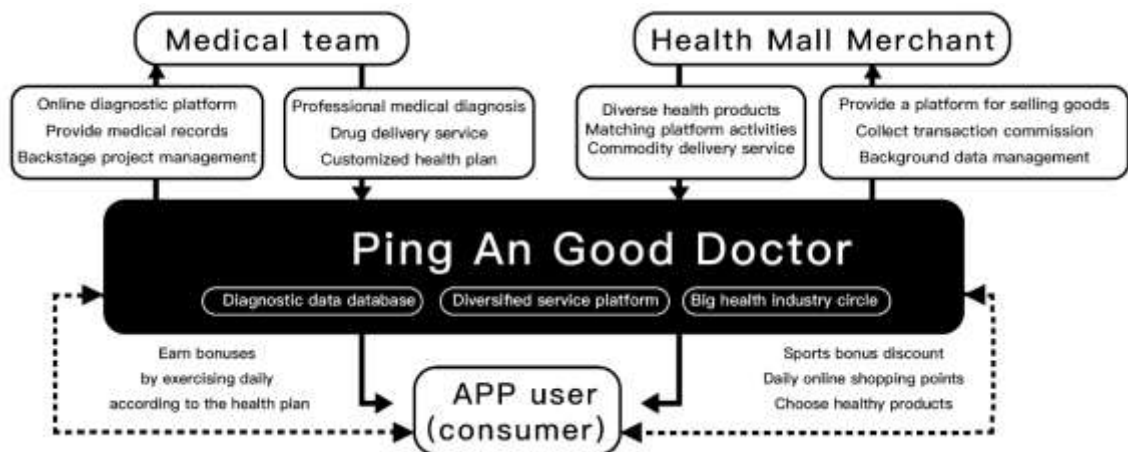


Figure 1 The circle of Pin An smart healthcare platform's health industry

V. Conclusion

The smart medical platform industry connects online and offline consumer experience through turnkey services and achieve a win-win situation with customers while expanding its database. Furthermore, how to get rid of the traditional one-time medical consumption model and achieve circular profit through innovative service models. Through this research, it is found that the smart medical network industry has insights into the current changes in social habits and policy trends. Cases provide online diagnosis, create customized and exclusive health planning services, set up shopping malls, use mobile devices, and wear device sports records, Exchange shopping money in the process of interacting with the App, and develop a series of coherent key processes with the changes of the enterprise, so as to assist customers in completing the important issues of their concern, and at the same time, the profit model can continue to cycle endlessly Profit. Through professional medical team

cooperation, various marketing activities focusing on medical care, internal planning processes, data collection and other services, we provide customers with the key resources required for value proposition.

In response to the classification of medical big data resources proposed by (Raghupathi & Raghupathi, 2014), Pin An smart healthcare platform collects customer medical records through online cuts, integrates medical image data, and uses medical research information and test results as a database for future predictions and diagnostic information And training artificial intelligence analysis, and finally recording consumer behavior (medicine habits, buying habits, exercise records, etc.), coupled with the innovation of the business model proposed by Osterwalder and Pigneur (2010), making customer value propositions innovate along the company's history With flexibility, recycling of profit models, diversification of key processes, and diversification of key resources, with the popularization of medical intelligence and information dissemination, the overall industry chain will be co-prosperous. However, the connection between the case and App users (end consumers) has not yet been established. By establishing a social group, the motivation of the group can increase consumers' willingness to perform daily exercise, thereby increasing the utilization rate of the App and making overall consumption more active.

To sum up, through the analysis and collation of this research, aiming at the business model innovation introduced by the smart medical network industry, we use a representative case to explore how to use the business model innovation of the health ecosystem to achieve continuous profit in reality. In the future, large-scale research across multiple cases can be conducted to test whether the business model loop proposed by this research can achieve wider applicability. At the same time, I hope to find other key success factors for the business model innovation of the smart health industry and give theoretical and practical suggestions for this emerging industry, effectively filling the gap in the research on the smart health industry business model of telemedicine and bringing the overall smart medical industry contribution.

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