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Instituto Universitário de Lisboa

Factors Influencing Information Service Quality of the Information Platform of Wenzhou Municipal People's Hospital

JIAO Lei

Thesis submitted as partial requirement for the conferral of the degree of

Doctor of Management

Supervisors:

Prof. Rui Menezes, Full Professor, ISCTE University Institute of Lisbon

Prof. Sonia Bentes, Assistant Professor, ISCAL-IPL, Lisbon

May, 2017

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Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: *[signature]*　　　　　　　　Date: 2017.5.16

Name: Jiao Lei

作者申明

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Abstract

Along with the global trend of informatization, Internet has become a new mainstream media form following such forms as print media, television and broadcast media, via which people can access information services. As a country with the largest number of netizens around the world, China enjoys improving social information services based on the Internet. With such a large quantity of network users, it is inevitable for China's hospitals at various levels to provide patients and the public with information services by setting up their own official websites. This research investigates the factors affecting the information service quality of Wenzhou People's Hospital (WZPH) and by means of Delphi method, statistical analysis and other research methods, formulates the Evaluation Indicator System for the Information Service Quality of WZPH's Information Platform. The research applies this system to the empirical research on the information service quality of the hospital's website and then makes a comparative analysis between the research results and traffic data of the websites of other hospitals over the same period. Next, the research identifies the factors affecting the information service quality of WZPH's website and finds out how the hospital may increase its website users and traffic through improving its service quality.

This research starts with the determination of the objectives, significance, research problems, framework, contents and methods of the research. In the following literature review, the research sorts out papers on hospital websites and theories on service quality, users' information needs and customer satisfaction in a systematic way. Based on the literature review as well as expert consultations and theoretical review, the research determines the approach to examining the information service quality of WZPH's information platform and works out the initial set of evaluation dimensions and indicators of the information service function and quality of the hospital's website. Then, via two rounds of expert consultations, the research figures out the weights of

these indicators and further assigns values to each of them. On this basis, the research establishes a research framework and a comprehensive evaluation model for the information service quality of WZPH's information platform.

In the end, the research conducts two surveys respectively on the information service quality of WZPH's information platform before and after its overall revision by using *Hospital Website Information Service Evaluation Form* and *Virtual User Questionnaire*, and makes a correlation analysis based on the survey results and the flow data of other hospitals' websites over the same period. The analysis draws a conclusion that the website of WZPH, as the information platform of the hospital, is the only carrier to deliver information service, thus playing a vital role in WZPH's overall service quality. In other words, the website of WZPH affects the hospital's overall service quality to a large extent. The comprehensive service function of WZPH's website are important to the quality improvement of the hospital's information service and directly affect the information service quality, the number of users as well as utilization rate of the website.

Keywords: information platform of China's hospitals, information service quality, evaluation system

JEL: I12; C81.

Resumo

Juntamente com a tendência global de informatização, a Internet tem-se tornado na nova forma convencional de meio de comunicação, em substituição da imprensa escrita, televisãoe rádio, através dos quais as pessoas podem ter acesso a serviços de informação. Enquanto país com o maior número de cidadãos no mundo, a China goza de serviços de informação social gradualmente melhorados, baseados na Internet. Com tão larga quantidade de utilizadores da rede, é inevitável que os hospitais da China,a vários níveis, forneçam aos pacientes e ao público em geral serviços de informação, estabelecendo os seus próprios websites oficiais. Este estudo investiga os fatores que afetam a qualidade dos serviços de informação do Hospital Popular de Wenzhou (WZPH) e formula, através do Método Delphi, análise estatística e outros métodos de pesquisa, o sistema indicativo de avaliação daQualidade do Serviço da Plataforma de Informação do WZPH. O estudo aplica este sistema à análise empírica da qualidade do serviço de informação do website do hospital, prosseguindo com uma análise comparativa dos resultados da investigação com os dados de tráfego dos websites de outros hospitais no mesmo período. Em seguida, a investigação identifica os fatores que afetam a qualidade do serviço de informação do website do WZPH e procura encontrar de que maneira o hospital pode aumentar o número de utilizadores e tráfego do seu website, através da melhoria da qualidade do serviço.

Este estudo começa com a identificação dos objetivos, significância, problemas da pesquisa, enquadramento, conteúdos e métodos da investigação. Na revisão de literatura apresentada em seguida, o estudo separa, de forma sistemática, os artigos sobre websites de hospitais dos artigos sobre qualidade do serviço, necessidades de informação dos utilizadores e satisfação do cliente. Baseado na revisão da literatura, bem como na opinião de especialistas e na revisão teórica, o estudo determina a abordagem para examinar a qualidade do serviço de informação da plataforma de informação do WZPH e desenvolve o conjunto inicial de dimensões em avaliação e

de indicadores das funções e da qualidade do serviço de informação do website do hospital. Em seguida, através de dois rounds de entrevistas com especialistas, o estudo identifica os pesos desses indicadores e atribui valores a cada um. Com base neste procedimento, estabelece-se um enquadramento do estudo e um modelo compreensivo de avaliação da qualidade do serviço de informação da plataforma de informação do WZPH.

A finalizar, o estudo realiza dois inquéritos sobre a qualidade do serviço de informação da plataforma de informação do WZPH,respetivamenteantes e depois da sua revisão, usando o *Questionário de Avaliação do Website do Serviço de Informação do Hospital pelos Utilizadores Virtuais*.O estudo apresenta ainda uma análise de correlação baseada nos resultados do inquérito e no fluxo de dados dos websites de outros hospitais durante o mesmo período. A análise permite concluir que o website do WZPH, como plataforma de informação, é o único meio utilizado para fornecer serviços de informação do hospital, desempenhando assim um papel vital na qualidade do serviço global do WZPH. Por outras palavras, o website do WZPH afeta em larga medida a qualidade do serviço global do hospital. As funções do serviço compreendidas pelo website do WZPH são importantes para a melhoria da qualidade do serviço de informação do hospital e afetam diretamente a qualidade do serviço de informação, o número de utilizadores e a taxa de utilização do website.

Palavras-chave: plataforma de informação dos hospitais da China, qualidade do serviço de informação, sistema de avaliação

JEL: I12; C81.

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Chapter 1: Introduction

1.1 Background

The Internet originated from the ARPA net developed by the Defense Advanced Research Projects Agency (DARPA), United States Department of Defense in the late 1950s. In 1993, based on the ARPA net technology, the National Center for Supercomputing Applications (NCSA), a unit of the University of Illinois, developed the world's first Web browser, Mosaic, which opened the page of Web applications. After that, Web applications developed gradually and replaced many traditional media (such as print media, television and broadcast), turning to be one of the most widespread mainstream media forms in the 21st century.

According to statistics of China Internet Network Information Center (CNNIC), the number of Chinese netizens, including Internet users on mobile phones, has reached 1.159 billion, which is the largest number in the world, and this number has been increasing year by year (http://www.cnnic.net.cn/hlwfzyj/jcsj/). Therefore, the Internet has already been the main approach for the public to acquire information in China. In the meanwhile, medical institutions that provide services for the public are also carrying through the informatization reform. The hospital information platforms thus become the main representative in this reform.

In the Guideline of the Tenth Five-year Plan for National Economic and Social Development released in 2001, the National People's Congress of China proposed "to meet the people's growing demands for health services, the government will carry out the policy to promote economic and social informatization, and accelerate the development of health informatization to fit the health reform and health development. To do this, it is required to integrate development of informatization into the overall planning of health development, that is, use informatization to promote health development by virtue of overall planning, step-by-step implementation, multi-use of

a network and resource sharing. In the "11th Five-Year" Guideline, the Chinese government attached greater importance to accelerating the informatization of public health, improving the level of medical services and building digital hospital. National Health and Family Planning Commission of the PRC has repeatedly stressed that "all China's grade A third-level hospitals (note by the translator: The third-level is the highest level in the three-tiered hospital management system in China). After ten years of informatization, as of 2015, the average rate of third-level hospitals launching information platforms in each province of China has reached 87.69%. See more information in Table 1-1 (Provinces listed below are randomly selected from east, middle and west China) (Shen, 2016).

Table 1-1 Rate of Third-level Hospitals Launching Information Platform in Each Province

Three economic zones	Province	Number of third-level hospitals	Number of medical websites	Rate of launching information platforms (%)
East of China	Tianjin	43	40	93.02
	Shanghai	42	38	90.48
	Hainan	9	7	77.78
Middle of China	Anhui	32	27	84.38
	Jiangxi	36	34	94.44
	Hunan	45	42	93.33
West of China	Chongqing	25	21	84.00
	Guizhou	13	8	61.54
	Inner Mongolia	23	18	78.26
Total		268	235	87.69

Source: Zhang (2015)

From Table 1-1, it can be seen that most third-level hospitals in China have already built their own websites. In other words, it is a major trend for hospitals to launch their own online information platforms (Yu, 2015). In some major cities such as Beijing, the rate of third-level hospitals launching information platforms has reached 100% (Shen, 2016).

Hospital information platforms use the online network to provide information service for the public as well as the hospital staff, which increases business opportunities for hospitals and extends the service time for patients. They are an effective extension of healthcare service of hospitals, through which the hospital and the patient can communicate better with each other. Therefore, considering the unique conditions of China that healthcare resources are relatively insufficient, hospital information platforms will assume more important responsibilities. However, for a lack of research on information service in hospitals, hospital information platforms in China are all confronted with the problem of poor quality in information service. What kind of information service should hospitals provide? What factors will affect the quality of information service? How to evaluate the quality of information service? These are the main problems that hinder the development of the informatization of Chinese hospitals.

In fact, China's research on the information service quality in hospital information platforms has just started. Though the informatization of China's hospitals has put more emphasis on the establishment of information platforms, there is no study targeted to a specific hospital in the light of the specific conditions of China. Besides, theories about the factors influencing the service quality of hospital information platform remain blank.

Taking the hospital studied in this thesis as an example: Wenzhou Municipal People's Hospital (WZPH) is a grade A third-level general hospital that integrates medical treatment, education, scientific research, rehabilitation, disease prevention and healthcare. The hospital consists of 22 categories of wards, 35 departments in different medical specialization, and 11 medical laboratories, and has opened 860 beds for patients. Established in 1913, WZPH was first known as a missionary hospital built by the Catholic Charity. It was named as Wenzhou Third People's Hospital in 1966 and became the first hospital in Wenzhou City with the honor of "baby-friendly hospital" from the WHO. It started to build an obstetrical and gynecological hospital with the approval of municipal government in 2000 and established the Third Clinical College of Wenzhou Medical University in 2008. In

2012, it passed the hospital accreditation as a grade A third-level hospital and was named as Wenzhou Municipal People's Hospital in June in the same year (http://www.wzsrmyy.com/web/yy/yygk.aspx).

Medical service is part of the service industry. It is essential to improve medical service quality so as to upgrade the overall hospital medical level. The information service at hospital websites is an important link concerning the medical service quality. Amid the fierce competition in the medical market, WZPH has lagged behind in providing quality information service and improving information technology. With changes of medical service market and increased demands from patients for information service, improving information service of the hospital website has been a significant approach for the hospital to speeding up the pace of information construction and improving service quality. The question is how to define factors that influence information service quality of hospital website in light of the status quo of the hospital so as to improve its information service quality and provide quality information service to patients. With high quality information service, patients' satisfaction, loyalty and evaluation of the hospital can also be improved. As a result, it will decrease patient dissatisfaction, meet patient needs, and attract more patients to the hospital.

To achieve the above goals, hospitals have to identify the factors that influence information service quality of the hospital website, and then make changes on these factors to improve information service quality. The service quality theory can be used to achieve the goal. Thus, the goal of this thesis is to carry out research on factors influencing information service quality of hospital websites based on the service quality theory and ultimately improve the information service quality of hospital websites.

1.2 Research Purpose and Significance

Through investigating and studying the information platform of WZPH from the perspective of management, the thesis intends to identify factors influencing the

information service quality of hospital information platforms, so as to figure out factors affecting the information service quality of the information platform of WZPH and the interaction among these factors. In this thesis, the information service items provided on the information platform of WZPH are collected and categorized to formulate a comprehensive map of the website's information service function. To that end, the research seeks to:

(1) Identify the dimensions of the information service function offered by the information platform of WZPH. As hospital information platforms are multi-dimensional, the thesis, drawing on previous research and relevant theories, investigates the information platform of WZPH to make clear the dimensions of hospital information platforms.

(2) Analyze factors that affect the information service quality of the information platform of WZPH after the dimensions of information service function are determined, and based on the analysis, work out the evaluation system for the information service function and quality of WZPH Information Platform.

(3) Determine the weight of each indicator of the evaluation system for the information service of WZPH Information Platform, the information service function of the platform and the weight of each dimension of the information service function, and then decide the weights of all indicators on the basis of expert consultations and discussions.

(4) Quantify the indicators of the appraisal system by deploying different methods of quantitation and valuation. The thesis uses the composite grade method to design the appraisal system of information service function and quality of hospital information platforms.

The research is significant both in theory and practice.

(i) From the theoretical perspective, the examination of the factors affecting the information service quality of WZPH Information Platform will enrich the theoretical research on hospitals' medical information services in China. Currently in China, a lot of research gaps still exist in this field, and present theoretical research lacks an in-depth investigation into the information service quality of a single hospital, let alone

relevant theoretical results. In addition, as most of these theoretical studies are still stagnating in an early stage, none of them conduct an in-depth systematic research on the website of a certain hospital in Chinese mainland. Therefore, this thesis fills the research gap in this aspect. And through the qualitative analysis methods such as expert consultation and statistical analysis; the thesis systematically investigates factors influencing the information service quality of hospital websites, adding new content to the research fruits in this field.

(ii) From the practical perspective, the investigation of hospital websites can enable hospital management practitioners to understand better the integration of medical informatization, the Internet, and medical care, and to realize what they ought to improve in their management. In addition, the research on factors influencing the information service quality of hospitals can effectively enhance the efficiency of hospital resource utilization, allocating limited resources to most efficient areas and leveling up the information service quality of hospitals to the largest extent. Therefore, the research is of practical significance in improving the information service quality and efficiency of China's hospitals and in the end, raising patient satisfaction.

In conclusion, drawing on advanced theories and experience of hospital management in various countries, research on factors influencing the information platforms of Chinese hospitals not only meets the demands of the public and medical practitioners, but also plays an important role in bettering information platform management mechanism of China's hospitals and helping them to improve their efficiency of establishing information platforms.

1.3 Research Problem

Hospitals usually provide more than just medical treatments to patients. They also offer other services including information service, consultation service, and psychological service. Among them, using hospital information platform is one of the important approaches for a hospital to provide information service to patients.

In China's mainland, when patients have medical needs and choose hospitals

online, they tend to choose a hospital that has high quality information service on the hospital website. They gain information service on the website and proceed with subsequent medical service accordingly. They usually recommend the website providing good experience of online information service to their families or friends in need of medical service. It can be seen that an advanced hospital information platform with high quality information service can not only bring profits to the hospital but also establish the hospital reputation, and more importantly patients can enjoy high quality information service. Therefore, it is of importance to study factors influencing information service quality of hospital information platforms so as to improve their information service quality.

Currently, systematic research on factors influencing information service quality of hospital information platforms is insufficient in China's mainland. The existing research in this filed mainly focuses on the application of IT technologies to the layout and features of hospital websites. The study of factors influencing information service quality of hospital information platforms is still in its initial stage, and most administrators of the information platform only consider features and interface appearance when they evaluate the platform content and design. What these administrators usually do to improve website's information service quality is merely: adding new features, beautifying the website look, and updating the website. However, studies have found that adding new features and improving the look of the website are not effective ways to promote information service quality. Therefore, how to define factors influencing information service quality of hospital information platform is a question that hospital managers put emphasis on.

What are the factors influencing information service quality of hospital information platform?

How to improve information service quality through making changes on these factors?

What is the correlation between different influencing factors?

It is shown in many research that according to the SERVQUAL scale (Zhang, 2013), the information service quality of the website is related to five dimensions

including tangibles, reliability, assurance, responsiveness, and empathy, yet under each dimension the assessment indicators are different in each research. This research believes that due to the particularity of medical industry, especially the online medical information service, the evaluation system of hospital's online information service should be distinct from the traditional one, and therefore SERVQUAL scale cannot be copied for use. It is evident that there is complexity in the factors influencing online information service quality. Then what are exactly these influencing factors?

The purpose of this research is to find out the influencing factors and analyze the correlation between these influencing factors and online information service quality of hospital information platform, then work out solutions to improve information service quality. The results of the research will not only help improve hospitals' online information service quality that can facilitate the hospital's long-term development, but also provide reference for the application of service quality management theories in the field of medical industry as well as improvement of information service quality of hospital information platforms likewise.

1.4 Theoretical Background

Previous studies on evaluation of information service quality varied dramatically in theory frameworks, research methods as well as perspectives. From the perspective of information users within and outside hospitals, this study will discuss information service quality of hospital information platforms in two aspects—the essence of the information service of hospital information platforms and perception of information service. Then an evaluation system will be established and verified.

Here is the research framework and technical route (Figure 1-1):

(1) Summarize relevant research results through literature review and analyze the content of hospital information platforms; hold a discussion with experts in hospital information technologies on how to build a research framework for evaluating information service quality of hospital information platforms, and then establish evaluation dimension structure and an indicator set from the perspective of users of

the hospital information platforms within and outside hospitals.

(2) Consult around 10 experts in management, information science, hospital IT and corporate website design via emails, letters, phone calls or face-to-face interviews. The content of consultation includes: whether the initial evaluation dimensions and indicator set fit with each other; whether the names of dimensions and indicators are appropriate; and is there anything missing?

(3) Hold the second round of expert consultation, the depth of which depends on the importance of each dimension and indicator, consulting approach and the condition of last consultation. In this round, experts are invited to choose from four initial weight distribution schemes provided. If all the four schemes are denied, another four alternatives will be provided instead of asking the experts to come up with their schemes. In the end, the scheme supported by most experts becomes the final indicator and weighting scheme.

(4) After the evaluation indicator system is decided, the values of all indicators are assigned to ensure that the evaluation system is scientific and comparable, and the data collection methods of each indicator are determined. Furthermore, a comprehensive evaluation system is built through a synthetic assessment method, and at the same time, a theoretical platform to study the information service quality of WZPH Information Platform will be framed as a result of the theoretical research.

(5) Carry out an empirical study on the WZPH Information Platform based on the established information service and quality evaluation system; in the meanwhile, conduct a correlation analysis on the total traffic, PV (page view) and UV (unique visitor) of the platform.

Figure 1-1 Research Framework and Roadmap
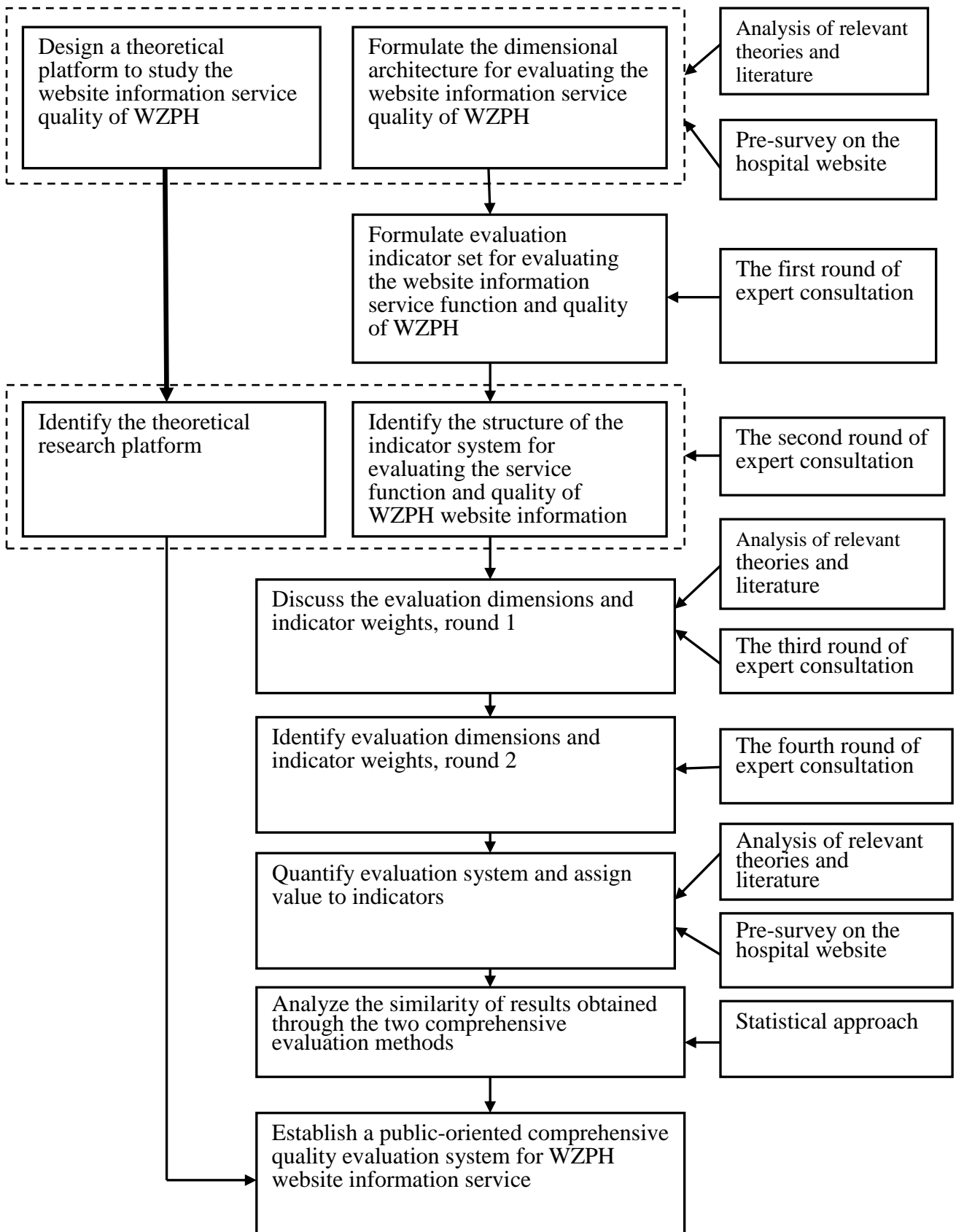
Source: the author.

1.5 Research Method

1.5.1 Literature Research

In this research, we systematically investigate and collect relevant literature worldwide on the Internet about medical information service evaluation. We have read books on users' information needs, electronic resources communication theory, digital resources service, and service quality evaluation theory as well as searched the Internet for journals, academic dissertations and Internet articles to collect background data related to the research project. Literature is reviewed to understand the status quo and future development of this research to get knowledge of the already solved problems and problems to be further studied, and identify the value as well as the breakthrough point of the research. This method helps improve the design and operation of the research.

1.5.2 Case Study Method

Case study method was first introduced in 1870 by Christopher C. Langdell, Dean of Harvard Law School (HLS). At that time, legal education was facing enormous pressure for two reasons: On the one hand, traditional ways of teaching encountered strong opposition; on the other hand, legal documents increased dramatically. Langdell believed that, "The meaning of laws had been expanded for cases emerged over past several centuries, and the general process of the development can be traced back by a series of cases" (As cited in Li, 2002). Since then, the case study method was recognized. After the success of the method in legal and medical education, it was also adopted by business education. When Harvard Business School was founded in 1908, Abbott Lawrence Lowell recommended learning the case study method from HLS, one of the most successful professional schools. A number of scholars made outstanding contributions to the scientification and standardization of the case study method and their methodologies were widely applauded in various

literatures studying the method, such asgrounded theory (Glaser & Anselm, 1967; Strauss & Corbin, 1998), qualitative data analysis (Miles & Huberman, 1994), and case study method (Eisenhardt, 1989; Yin, 1994).

Yin's (1994) systematic study on the method was significant for its development. He clearly defined the scope of the method and pointed out that the method has the function of describing, explaining and exploring at the same time. More importantly, like quantitative study which has strict steps and procedures, different types of case study have to follow its standardized procedures from research design, data collection, data analysis and research report composition, and each of these procedures can be accomplished by various means. Yin (1994) believed that although case study method cannot arrive at general conclusions of statistical significance, it can draw out general conclusions though analysis. Following the case study method, this study's object is set within a certain range in order to perform in-depth and comprehensive analysis through dynamic follow-up investigation into them. This study selects the WZPH Information Platform as the object of the case study. Through study design, data collection, data analysis, and study report draft, factors influencing information are sought out as reference for the improvement of service quality of hospital information platforms in China.

1.5.3 Delphi Method

In 1940s, in an American government-subsidized project named Delphi, Olaf Helmer, Norman Dalkey, Nicholas Rescher of Rand Corporation invented the Delphi method. Delphi was the name of a place in ancient Greece. According to the ancient Greek mythology, Apollo, the sun-god, after strangling a serpent at Delphi, became the master of the place and built the Apollo temple, which was a holy place able to predict the future. Therefore, people named the method after this place.

In the mid-twentieth century, the Rand Corporation submitted a report predicting America' s doomed defeat in the Korean War by means of Delphi method. Since then, the method has been well-accepted. Back then, for the American government insisted on starting the war, the Rand Corporation submitted anther report predicting the

doomed defeat. However, the report was ignored again, and America was defeated. When carrying out the method, first, the investigator will send questions to various experts respectively to seek their advice which then will be sorted out after being collected; second, the synthesized advice along with more predicted questions will be sent back to experts to seek their opinions for a second time. Based on the opinions recollected this time, the investigator will modify the original version and conclude another one. Thus, through numerous times of modification, unanimous solutions will be arrived at in the end (Harold & Murray, 1975).

Delphi method, also called expert interview, is a research method in which research-related information is collected through face-to-face conversations and discussions with experts (Green, 2007). In this study, experts in this field are consulted to discuss how to determine or quantify indicators of various dimensions, indicator weights of medical information service quality of information platforms in Chinese hospitals so as to help finish the study.

1.5.4 Questionnaire

Questionnaire is also known as "written survey method" or "form-filling method". It is a method in which a written form is used to collect research materials in an indirect way (Green, 2007). In this method, the subjects are given brief forms and asked to offer suggestions or file complaints on certain issues so as to collect information. Based on literature research and experts' views, a questionnaire is designed for the front-line hospital staff and patients. The questionnaire consists of hospital staff investigation, patient investigation and expert investigation. Every investigation will be carried out two times, and there are two rounds for all the investigations. The first investigation is on the dimension structure of evaluation system for medical information service function and quality of WZPH Information Platform, and the second one is on evaluation system index coefficient of medical information service function and quality of WZPH Information Platform.

1.5.5 Statistical Analysis

In this study, Excel is used for data-entry of information in the expert consultation, and SPSS is used for statistical analysis of data in the questionnaire so as to examine the consistency and logic of the data and to ensure the correctness of the data.

Chapter 2: Literature Review on Related Basic Theories

2.1 Research Background

2.1.1 New Requirements Due to External Changes

As China has the largest number of netizens in the world, there is a huge demand for online medical information service in this country. A great number of people hope to get medical instructions through the high-quality information service provided by online information platforms of medical institutions. Along with the advancement of Chinese medical reform, patients in China have been changing their views on treatment. With a large number of medical institutions available for choices, they tend to choose hospitals and doctors with quality information services for their treatment. At present, a hospital's information platform has been a significant channel for the public to gain healthcare information. A survey on Peking University First Hospital in 2010 shows that 27.7% people learn medical service information through its information platform; 26.2% learn medical experts' information online, and 14.4% gain department information through hospital information platforms (Zhang, 2014). The Internet has changed the behavior pattern and communication model of information disseminator and information receiver. Getting information through online medical consultancy and remote diagnosis has become more and more popular (Hu & Jin, 2008). With ever more fierce competition, if a hospital can establish a solid information platform that can provide quality information service to meet the demands of patients, it could not only improve and enhance hospital reputation but also make it more convenient for patients to get treatment. More importantly, it will become a critical method for the hospital to outperform others in the fierce competition, to improve medical services, and to influence the public decision on which hospital to choose.

2.1.2 New Subject of Self-Development

Although many hospitals have set up their own websites and information platforms, the existing hospital websites and information platforms in China are faced with such problems as content mainly focusing on administrative system and introduction of medical procedures, lacking in holistic plan on information service and problematic quality of online information service. For example, a research institution for maternal and child health in Milan, Italy, has investigated the accuracy of the website health information on how to deal with fever in children at home. They found that less than 50% of the websites are presenting complete and correct information. Therefore, performance of hospital websites is uneven and consumers may be confused about whether the health information they search out is reliable or not (Zhu et al., 2012).

At present, China has not laid down practical guidelines and evaluation criteria on health information platforms for the public, which makes it difficult to improve the overall quality of healthcare information dissemination on the Internet. Therefore, in order to ensure that quality, convenient and credible information is provided for online medical information seekers, an effective quality control system for medical online information tailored to China's actual conditions is in need to help improve the information service quality of hospital information platforms.

Hospitals have to identify the factors that influence information service quality of their information platforms, and then make changes on these factors to improve information service quality. The service quality theory can be used to achieve the goal. Thus, it is of significance to carry out research on factors influencing information service quality of hospital information platforms.

2.2 Research on Medical Websites of Hospitals

2.2.1 Characteristics of Medical Websites

The Internet era changes the relationship between the doctor and the patient. The patient is able to change the information asymmetry between the doctor and the patient through the information service provided on websites. On the one hand, information service websites improve the healthcare service quality. On the other hand, however, we should notice that the healthcare information released on those websites has varying quality, which may mislead the public and becomes an obstacle for the communication between the doctor and the patient. Therefore, as a main channel for the public to access to healthcare information on the Internet, the medical websites must provide information that are correct, useful, and meeting the needs of patients.

Apart from the ability to provide correct and desirable healthcare information to the public, medical websites also should make full use of the characteristics and advantages of the Internet to expand service range and quality, and act as a bridge between medical organizations and patients. The public can understand a medical organization through its website, while a medical organization can win over public confidence and trust in it through online communication and build a good image. It is estimated that there were over 100,000 healthcare websites around the world in 2015 with an expansion rate of 100 per day (Shen, 2016).

Characteristics of Medical Websites:

Apart from the same function of releasing information as other common websites, medical websites are also characterized by providing medical service. This thesis summarizes the characteristics of medical websites as follows:

(1) Patient-oriented human design in line with the medical mode

Each user who browses a medical website is likely to be a potential patient. A user attempts to find reliable and professional information service when he/she

browses a medical website. Therefore, the design of medical websites should start from the user's needs, making the patient able to acquire excellent medical information service before, during or after seeing the doctor. In this way, the problems of patients during their doctor consultation and recovery can be solved, such as their needs for information to prevent disease, information of special doctors, treatment information, charging information and rehabilitation guidance. In this way, a patient who has questions is able to not only call to or communicate face-to-face with the relevant department and doctors through inquiry through the website, but also have remote consultation through the interactive platform of the website. All in all, medical websites must concentrate on the patient and then form integral medical information service.

(2) Reliable and professional information sources easily accessible for users

If a medical website wants to provide users with high-quality medical information service, it must have a wealth of information resources, advanced management and technology wherein rich information resources are fundamental to information service quality of medical websites. The high-quality medical information sources on the medical website shall be verified by professional medical personnel in order to ensure their reliability and accuracy. In the meanwhile, the columns and structure of a website should be clear, distinctly classified, supporting information retrieval and providing quick links to online medical resources and institutions.

(3) Having the function to provide consultation service through an interactive platform

A medical website should establish an interactive platform and information feedback system. Medical inquiries and problems proposed by users should be reported quickly to relevant medical personnel and website managers in order to solve their problems immediately.

(4) Creating a complete information service platform for a website

A website should have multi-functions such as keeping electronic medical records, being a health records center and providing remote medical services, so as to integrate a website into a center for medical information interaction rather than just a

publishing platform for hospital information.

2.2.2 Information Service Programs of a Medical Website

At the beginning of building a website, purposes of launching the website, audience, services provided, economic costs and other factors should be taken into consideration. Therefore, service programs at different medical websites vary. In this thesis, functions and content of medical websites on the Internet available are summarized as below:

When planning its website programs, a hospital should consider the following five aspects:

(1) Consideration from the perspective of management: Since the Internet technology may be involved with various disciplines, the original staff in a hospital may not be qualified with such knowledge and ability; therefore, the hospital should provide appropriate training opportunities, or set up a new department and positions to recruit professional personnel needed.

(2) Consideration from the perspective of strategy: The hospital should regard the establishment and maintenance of the website as an indispensable part of the overall operation strategy plan. Especially, the establishing purposes and input of resources should be planned discreetly.

(3) Consideration from the perspective of finance: The establishment and maintenance of a good medical website of a hospital should be put into a lot of managerial and operational costs. When evaluating the cost/benefit of the website, the hospital should consider the possible efficiency brought by it as much as possible, such as helping the user to seek wanted medical service information which may save costs of hospital personnel and service.

(4) Consideration from the perspective of privacy: The development of the Internet technology makes the website administrator easy to collect, store and further analyze and employ the public behaviors shown on the Internet. In fact, legitimacy of such technology is doubtful for it may be a misuse or invasion of privacy. Personal health information possesses high privacy. Hence, a hospital website should be more

sensitive to the privacy issue, especially in terms of morality and responsibility.

(5) Consideration from the perspective of application: The hospital has not established or operated for a long time, thus the influences of the Internet on the market are not fully perceived. Subsequently, the medical institution should continuously improve and develop its medical website.

The literature overview shows that service programs provided by the hospital websites for users and applied research can be broadly divided into the following categories (Yan & Lin, 2003):

(i) Introduction of hospital and medical treatment flow: A hospital website generally will present its own introduction as a reference for the public to seek or choose the hospital, including treatment programs, opening hours in outpatient department, department and physician profiles, address and contact information, hospital news, department layout, and treatment guidelines.

(ii) Online medical advisory services: Some websites offer online real-time advisory services with doctors or professionals to answer the public's medical and health issues one-to-one, which is the most convenient and quickest way for the public.

(iii) E-mail advisory: Some websites offer non-real-time e-mail consulting service. A user may send their questions by e-mail to maintenance staff of the website or a doctor's email address, and then the doctor will reply to the user on the website or by e-mail.

(iv) Healthcare common knowledge: This is the most common service provided by hospital websites. The diversified content includes healthcare information, FAQ sections, and introduction of health examinations, eugenic healthcare, various materials of sanitary education and all kinds of medical common sense, such as medication, first aid and gynecological diseases.

(v) E-books and e-journals: These publications are free resources. For instance, some hospital websites will introduce electronic readings related to healthcare; some will regularly release electronic versions of published hospital journals (or newspaper) for public subscription, or even voluntarily push healthcare information into people's

e-mails; some will put electronic versions of their doctors' personal works on the website.

(vi) Resource service for medical personnel: Mainly provide professional knowledge intended for medical professionals, service including case discussion and online professional journals. Besides, some websites set up forums for members to exchange ideas.

(vii) Query retrieval services: Some websites provide retrieval services to query doctors in each department, including queries for the results of biochemical tests, queries for the medical prices and common medicines. However, the number of websites that are able to provide such service is limited.

(viii) Message board service: This kind of message board doesn't provide medical advice, but rather as a channel for the hospital to communicate with the public, allowing users to put forward comments or questions in term of the usage of the website.

2.2.3 Research on Information Service Quality of Medical Websites

With the popularization of the Internet, the public can acquire profound healthcare information in a more convenient way through online information service. However, unlike other online information service, medicine is a special knowledge field closely related to people's life. Wrong information may cause delayed treatment, drug misusage and even the loss of lives. Therefore, in order to avoid false healthcare knowledge and protect the interests of information users, it is necessary to have a thorough understanding of the evaluation norms of the medical websites' quality and establish quality evaluation standards on medical websites. To ensure the public accessible to high-quality healthcare information is a top priority.

Evaluation Dimensions and Indicators of Medical Websites

Although currently Chinese government has a corresponding quality certification standard (GMP) for medicine and food, it has no complete certification system and standards for medical websites quality management. Therefore, the public often see some specious or even incorrect healthcare information on hospital websites.

Fortunately, the academic community outside China has already paid attention to this issue and some scholars and governmental institutions have been sparing no efforts to conduct research on quality management evaluation for medical websites. Although it is difficult to identify indicators to evaluate quality management of medical websites, some specific certification and evaluation system for medical websites are put forward gradually in recent years.

Wyatt (1997) proposed that the evaluation of medical websites should start from the aspects like content, structure, functions and attraction. In addition, Sandvik (1997) suggested to assess medical websites from two aspects — the quality of common information and the quality of professional information. The evaluation on common information quality includes the names and qualification of the website administrators, the sources of healthcare information, references, website links, the interactive exchanges between the website and the user, the updating date of the website resources, the balanced report of the positive and negative information; while the evaluation on professional information quality includes 14 professional indicators on the basis of medical professional knowledge, covering the type of diseases, treatment modes, drug use, rehabilitation and nursing. Sandvik (1999) found that among the common information quality Indicators, the identity of the author, information sources and the updating date of information get the worst comments. At last, Sandvik (1999) concluded that "the accuracy of information", "research on information service quality of information platforms at hospital websites" and other indicators should be added into the quality evaluation system for medical websites to realize the integration of the evaluation indicators.

Geiger (1998) and other scholars constructed two sets of information service quality evaluation standards for hospital medical websites - qualitative standards and quantitative standards.

Evaluation standards for hospital medical websites is shown in Table 2-1.

Table 2-1 Quantitative Standards for Evaluating Medical Websites

Evaluation standards for medical websites	Evaluation standards for the content of medical websites
Information of a hospital	Name of the hospital, the hospital logo, the hospital's mission, information of outpatient and inpatient data, donation information, contact information, introduction of departments, medical research, sanitary education information, hospital bulletins, hospital news, impatient information, introduction of doctors, contact information of doctors, the hospital journal, volunteer information
Design of a hospital website	User interface, navigation and norms of information
Technological information	Copyright, date of publication, updating, disclaimer, traffic statistics, site search engine
Service contact mode	On the basis of technological contact, the public perceiving the service quality through exchanges on the website and remote support
Relevant links	Related medical resources, institutional links, network information navigation
Interactive mechanism	E-mail, online surveys, online consultation, message board, contact information of hospital

Source: the author.

Kim (1999) and other scholars found through investigation the most commonly used seven standards when evaluating medical websites. See evaluation standards for medical websites in Table 2-2.

Table 2-2 Evaluation Standards of Medical Websites

Evaluation standards of medical websites	Evaluation standards of the content of medical websites
The content of websites	Quality, reliability, accuracy, scope, depth
Design and aesthetics	Design and presentation: whether multimedia and animations are used; having interaction or not
Website administrators and information providers	Including description of the purpose of launching the website, the nature of website administrative unit or the support organization, description of the identity of the information provider and his/her sources
Availability and usefulness of the information	Including whether the medical website facilitates the public's acquiring and browsing information or not; the accuracy and quality of information
Information Retrieval and navigation	Sorting and summarizing all the content of website information; having inter-linkages within or among the themes
Authority of information	Including the reputation and the credibility of information sources
information updating	Including the updating frequency of information, and regular maintenance of the website

Source: Kim (1999)

Eysenbach and Kohler (2002) used the method of in-depth interview and the method of focus groups interview to investigate the quality evaluation standards of medical websites opening to the public and found that the most important standards are: the authority of information sources, the presentation mode of medical information, the legibility of medical information, the medical advertisements, the website links, the e-mail communication provided or not, the real-time updating of a website information, the certification and qualification of a website, the third-party authentication of a website.

National Cancer Medical Resources Institute of the U.S. (2009) has proposed the following evaluation elements targeted at the healthcare information publicized on the Internet. See the evaluation elements of medical websites in Table 2-3.

Table 2-3 Evaluation Elements of Medical Websites

Evaluation elements of medical websites	Evaluation elements of the content of medical websites
Website management	Understand who is in charge of the website and the information he/she provided
Operational support of websites	To operate a website needs funds. Therefore, the sources of funds should be clearly stated.
Purposes of establishing a website	The reason for a website's establishment can help the public assess the reliability of the information.
Information sources of a website	If the information doesn't originate from the website, the website should clearly mark the information sources.
Accuracy and authenticity of website information	The website should provide solid medical evidence of healthcare information on the website.
Review of website information	To ensure the accuracy of the information, the website should know whether the information of the website has been appraised or not? By who? Whether the information of the website has been peer reviewed or not?
Website information updating	The information should be updated regularly, especially the healthcare information. Even if the information has no change, the website administrator should also conduct regular examinations to see whether the information is still valid.
Regulation on website links	Some conservative medical websites refuse to link to other websites; some provide links to paid websites, and some provide links to websites up to certain standards. Different websites have different link strategies.
Websites' protection of individual privacy	A website has the obligation to guarantee the individual privacy of the user. If the website attempts to use personal information, the website should expressly indicate its usage.
Interactive communication of a website	The website should provide online discussion board and online chat rooms and establish information feedback mechanism.

Source: National Cancer Medical Resources Institute (2009)

By sorting, screening and discussing, the Office of Disease Prevention and Health Promotion of the U.S. has finally established 22 standards composing 466 evaluation indicators, among which the most important are: the content of websites, the design of webpage, the identity of information authors, the institutor, the financial sponsors, data updating (frequency, real-time relevance, website maintenance), data sources, legibility, usefulness. The Office further defined the precise connotation and measurement of these indicators to develop valid indicators to monitor the quality of medical websites in a long term (National Cancer Institute, 2016).

Overall, the quality evaluation indicators of medical websites are basically composed of two levels. See more details about quality evaluation indicator composition of medical websites in Table 2-4.

Table 2-4 Composition of Quality Evaluation Indicator of Medical Websites

Evaluative levels	Evaluation dimensions	Evaluation description
Information level	Accuracy of information	Evaluate the accuracy of information, mainly the reliability of information contents. The elements should be taken into consideration: information provider, the bibliography, the published date and name of bibliography; review whether the content has spelling mistakes and illegible writing, whether the information provided has been certified and whether the content is involved with commercial advertisements.
	Objectiveness of information	The content of medical information is true, without exaggeration; is written with an objective outlook, without prejudice; is able to provide both positive and negative information, without subjective arguments.
	Completeness of information	When evaluating the completeness of medical website information, the following elements should be considered: the medical website should clearly state the setting purposes; the website can provide medical or healthcare information with reference value; the fact or information presented should cover the content related to its theme; the website should evaluate the consistence of the information with same theme yet different sources.
System level	Authority of information	The medical website should provide the academic status of some healthcare information in its field; provide related background, experience, research or published theses of information providers (institutions or individuals), for this information is able to reflect the depth and scope of the website content and exert influences on information quality. The evaluation content includes: whether the website administrators are stated; whether the specialty, educational background, service agency of the information provider are informed; whether the contact information of information providers is presented.

Moral norms of information	Whether the medical treatment conforms to several standards such as the HON standards including the statement that the website information cannot substitute the doctor's diagnosis and the medical advice that the webpage information cannot diagnose specific patients. Besides, personal health condition is of high privacy; therefore, the medical website should be more sensitive to the public's privacy, especially in terms of morality and responsibility.
Construction of information	This element emphasizes the information organization of the website evaluated, including the overall structure, the design of the user interface, the consistence of the website design, the classification and navigation of website information.
Interaction and management	The medical website should provide an interactive mechanism between the website and the user: online medical consultation, submission of consultation form, e-mail reply, health BBS, online investigation, message board and contact information of the website. All this is conducive to exchanging ideas and medical information with the public.
Usability of websites	It refers to the convenience of the website, which mainly includes as follows: the interface, column setting of the home page, and font. The background design of a webpage should not influence reading. The website should use pictures to support the content and the size of pictures and images should be appropriate.
Technical support	It means that the medical website should take technical measures to facilitate the public's browsing and using the website service, including the opening time of home page, the multimedia technology, the backstage database structure, and types of available explorers.

Source: National Cancer Institute (2014)

2.2.4 Information Service Quality of Hospital Information Platforms

Currently, systematic research specific to the information service quality of hospital information platforms is scarce. Most literature pays more attention to the research of patient satisfaction, main theoretical basis of which is the customer satisfaction theory and the theory of market relationship. A research literature review is as follows:

Outside China, research on information service quality of hospital information platforms is firstly carried out on information service quality of hospital information system, such as the measurement of effectiveness of the information system (George & Jonathan, 1999) and the study on SERVQUAL scale that is used to measure the service quality of information system (Jeon & Jeong,2017).Then, with the popularity of computers and networks as well as the increase in web browsing, the academic community pays more attention to the research on the service quality of the information system of webpages since 2000. Tan (2003) studied the service quality frame of the information system. Pinho (2011) studied the influences of network service quality on the network usage. Baldwin (2014) studied the relationship between the rating of patients' satisfaction and the quality of hospital information platforms and measures.

However, China's research on information service quality of hospital information platforms has just started. The major contributions have been made mainly by some scholars in Taiwan and coastal universities in China's mainland. For example, Liang (2009) conducted a research on the influences of the quality of information platforms on the performance of an organization's relationship with customers. Pei and Wang (2009) researched on the evaluation system of information service quality of user-oriented information platforms. Zhu and Xiong (2012) studied the evaluation criteria on information service quality of medical information platforms.

2.2.5 Survey Methods on Information Service Quality of Hospital Information Platforms

There are mainly two methods for the research on the service quality of medical websites: content analysis and questionnaire survey.

Content analysis is a specific method to conduct quantitative information analysis in an objective and systematic manner with the intent to clarify or examine the essential fact and trend of tested samples, in order to further predict the development of an event by revealing the hidden information content they contain. As for medical websites, it is conducted in following procedures: First, we browse and use the information and service of the sample websites one by one, including the columns of the medical website, the quality of information contents, the quality of online service. Then, we analyze and summarize what he/she has recorded. Therefore, the content analysis for the research on service quality of medical websites is mainly characterized by the investigation and analysis of objective data.

Questionnaire survey is an investigative approach to collect research materials indirectly in a written form. Firstly, the researchers should divide the evaluation indicators into specific investigative questions. These questions had better use multiple choices to develop a piece of questionnaire. Then, we send the questionnaire to the respondents and ask them to mark the answers. At the end, we collect the questionnaires and have statistical analysis to acquire the evaluation opinions of respondents. It is worth mentioning that, although the respondents have already picked their answers, the quality of their answers would affect the accuracy of the research results. The most common scenario worrying we is that the respondents are likely to have recall bias, which may lead to difference between the information acquired by the research and the real status. At that time, we consider using content analysis instead of questionnaire survey to conduct objective observation and record, thus solving part of problems caused by recall bias.

In addition, as mentioned before, the Internet is a virtual world. So we can use a virtual identity to study the quality of interactive services provided by hospital

medical websites such as online consultation and e-mail queries. Hence, the approach to create virtual identity and collect research materials by e-mail, message board, forum and other instruments is a feasible trend for the future research on online information service quality.

2.3 Service Quality Theory

2.3.1 Origin of Service Quality

The research on service began to gain attention in the 1970s. Many scholars have shown keen interest on the study of service, yet there is no consensus on the definition of service. In the 21st century, scholars further defined the content and extension of the concept of service, and even redefined it on strategic level of core competency of enterprise.

The American Society for Quality has a new definition of quality based on customer orientation: the characteristics of a product or service that bears on its ability to satisfy stated or implied needs (Liang, 2004). Internationally, the research on service quality evaluation and methods started to be taken seriously in the 1980s. Representative scholars include Parasuraman, Berry and Zeithama who studied the service quality evaluation from the perspective of user perception in the whole service process. In 1988, they put forward SERVQUAL theory and methods (Parasuraman et al., 1988). Later, many scholars applied SERVQUAL into multiple industries including healthcare, catering, information system, and library for the measurement and evaluation of the service quality. These studies further testified the validity and applicability of SERVQUAL.

Service quality is the performance of service delivered to the users, including two parts of content: first, the service the users receive from the service provider; second, the way the service provider delivers their service. The American marketing masters Parasuraman, Zeithaml and Berry (1985) put forward three issues before giving definition to service quality: first, it is more difficult for users to evaluate

service quality than product quality; second, the perception of service quality comes from the comparison of the service delivery with customer expectations; third, the evaluation of service quality should take into consideration not only the service delivery model but also the process of service delivery.

Parasuraman et al. (1988) defined the perception of service quality as a comprehensive evaluation and attitude of service performance. In the service quality theory (Oliver, 1980), there is a hypothesis that if the customer expectations are greater than the perception of received service, the customers would deem the service quality low. When the service quality outruns customer expectations, their evaluation on the service quality would go higher. Customer evaluation of service quality is based on customer expectations, and therefore when the service quality is higher, customer satisfaction will be increased and customers' tendency of using the service again will also be enhanced. (Oliver, 1980) Since then, service quality issues have aroused interests of many scholars to carry out research on the topic. Lewis & Booms believe that service quality measurement is an instrument to evaluate how well a delivered service conforms to the customer expectations (Lewis & Booms, 1983). Gronroos (1983) put forward the concept of Customer Perceived Service Quality, believing that service quality falls into a subjective category and that it is determined by the comparison of the customer's expectations of the service quality with the perceived service quality. Therefore, Gronroos (1989) emphasized that managers should study the construction of service quality from customers' point of view so as to better meet their expectations. Parasuraman et al. (1985) categorized Quality into entity quality, interaction quality, and company quality. The entity quality refers to entity support to both the product itself as well as the whole service process; interaction quality involves the interaction process between customers and company employees; company quality means the quality of company image. Parasuraman et al. (1988) deems service quality as the gap between expected service and experienced service. Carman (1990) thinks that only the customer's perceived service quality during the service process matters. From the perspective of company development goal, Vogels et al. (1989) believes that understanding of the customer's expectations

of service quality is needed so as to know their true opinions and demands of service quality.

2.3.2 Definition and Characteristics of Service Quality

Starting from the 1980s, service quality issue has been a focal point of scholars in this field. At the early stage, scholars tried to distinguish the definition of service quality from the definition of product quality. Normann (1991) compared service quality with product quality and found that it is very difficult for the enterprise to standardize service quality. The difficulty comes from the technical aspect in the service management as well as the interaction between customers and service providers (Bateson, 2001). This means one type of service quality management is driven by technology and the other type is driven by customer needs. There is also emphasis that only the customer's perceived service quality matters the most (Gronroos, 1990). Service quality involves not only the outcome of the service but also the way of service delivery. The intangibility, non-storability, and customer involvement of the service will also affect service quality (Sasser, Olsen & Wyckoff, 1978). Bitner (1990a) believes that service quality reflects the attitude of the customer as whether they want to use the service a second time and presents the gap between the customer's expected service performance and the perception of actual service performance. Such a gap should be used to measure service quality (Parasuraman et al., 1985).

2.3.3 Special Features of Service (Parasuraman et al., 1985)

(1) Intangibility of service

Service cannot be displayed to show customers like the tangible products. Before selling the service product, no test can be carried out to guarantee its quality. Therefore, customers are not able to tell the service quality before they decide to use it.

(2) Inseparability of service

The service and consumption usually occur at the same time. Due to the

inseparability of service, there needs to be presence of service providers and all the needed equipment at the same place. Therefore, the interactive relationship among customers, service personnel, and site environment has become a determinant factor of service quality.

(3) Heterogeneity of service

The service varies due to different service personnel or service time, place, and environment. Therefore, there will be different service outcomes, causing the instability of service quality, especially for the services based on person-to-person contact.

(4) Perishability of service

Not like entity products that can be stored and sold afterwards, service cannot be stored to adjust the balance of supply and demand. In order to maintain service quality, the management of service productivity must be different from that of the entity products. Because of the different features of intangible service, the measurement of service quality is more difficult than that of entity quality.

2.3.4 Definition of Service Quality

Because of the four special features of service, it is not easy to measure and control service quality. As there is involvement of consumer in the service process, perception and opinions of consumers need to be taken into consideration to measure and control service quality. Therefore, it is more difficult to evaluate service quality objectively than product quality. Then there comes the question as how to define service quality. Scholars put forward various definitions of service quality based on their research purposes and perspectives. These definitions reflect the development of service quality research and serve as theoretical basis for this research. Table 2-5 lists some major definitions.

Table 2-5 Definitions of Service Quality

Researcher and Time	Definition of Service Quality
Zeithaml (1981)	Service quality can be divided into search quality, which determines product quality before purchase) experience quality, which determines product quality during or after consumption, and credit quality, which is unable to determine quality even after consumption.
Gronroos (1982)	Service quality is a comparison between customers' expectation of service and their perception after receiving the service.
Lewis and Booms (1983)	Service quality measures how the service delivery process meets customers' expectation.
Parasuraman et al. (1985)	The good and bad of service can be evaluated by service quality. The most appropriate way to evaluate service quality is the customers' expectation of service and their perception of service after receiving the service. Service quality is perceived after customers compare the expectation and perception.
Parasuraman et al. (1988)	They added new points to the former viewpoints, believing that service quality represents level of service generated in the process of service delivery as well as interaction between service providers and customers.
Bitner (1990b)	Service quality is an overall attitude of customers after they receive the service and it determines whether they will buy the service again.
Bolton and Drew (1991)	Service quality is an overall attitude about whether customers are willing to buy the service again after consumption.
Cronin (1992)	Service quality should be measured by service performance rather than by comparison with expectation (service quality equals actually perceived service quality).
Dabholkar et al. (1996) found	Service quality is made up of tangible equipment, reliability, inter-personal interactions and problem-solving policies.
Ko et al. (1998) found	Service quality is made up of interaction quality, physical environment quality and output quality.
Parasuraman (1998)	Service quality is a combination of personnel quality, process quality, result quality, physical quality, interaction quality and image quality.
Stewart (1999)	Service quality includes three elements of service products, service delivery and service environment.
Albert et al. (2000) found	Service quality is customers' overall evaluation of things.
Morrison (2004)	Service quality includes program quality, interaction quality, result quality and physical environment quality.

Gallardo and Reynaldos (2014)	Perceived service quality from service perception.
Xu et al. (2013) found	The relationship between the 3Q model and the quality of service (SQ), and the quality of the system (SySQ) and information quality (IQ) is proposed.
Triggle (2013)	Patient satisfaction constitutes health service quality.
Howat and Assaker (2013)	Factors affecting perceived quality and the relationships among service quality, value, satisfaction and loyalty.
Gallardo and Reynaldos (2014)	Service quality comes from service perception.
Piercy (2014)	The content and process analyses of online service quality are put forward.
Hatem (2015)	The relationship between hospital service quality and patients' satisfaction was proposed.
Thawesaengskulthai, Wongrukmit and Dahlgaard (2015)	The definition of and the measurement model for hospital service quality.
Ismail and Yunan (2016)	The definition of service quality in healthcare organizations and its correlation with customer satisfaction and with customer loyalty.
Dalaeen (2016)	Service quality is a customer's judgment about an entity's overall excellence or superiority. It is a form of attitude and results from a comparison of expectations with perceptions of performance received.
Jha, Sahay and Charan (2016)	The definition of service quality in the healthcare sector.
Tseng (2016)	The definition of service quality in customer relationship management, the capability of knowledge management and the relationship between customer relationship management and service quality.
Gajewska and Piskrzyńska (2016)	The measurement of service quality on the basis of SERVQUAL and the concept of service quality in health service.
Ludwiczak (2016)	The definition of service quality based on customer requirements and the quality improvement of healthcare service.
Hemsley and Alanwas (2017)	The definition of service quality and its relationship with brand loyalty (brand passion, brand affection and self-brand connection).
Mirela et al. (2017) found	The definition of service quality and its relationship with overall quality management.

Source: the author.

The above table shows that definitions of service quality are complicated and diverse, and satisfaction of the general public when receiving service is critical to service quality. Therefore, it can be said that service quality is determined by perception of the general public.

2.3.5 Evaluation Dimensions of Service Quality

The composition and evaluation of service quality has been a popular topic in the marketing field. (Vandyke et al., 1997) Based on the various definitions, service quality in this study is defined as multi-structural, multi-layered and procedural perceived quality.

Single-level and multi-factor structure:

Unlike tangible products, particularity of service determines that service quality is an abstract, complex aggregated concept. Service quality is subjective as it is determined by customers' perception of service, so service quality should not be measured only by the single indicator of service. Instead, multiple factors constituting service quality should be measured. In research on single-level and multi-factor service quality, there are mainly several viewpoints as follows.

Gronroos (1984) proposed the three-dimensional model of "perceived service quality", contending that the overall service quality is composed of corporate image, technical quality and functional quality. In 1984, Gronroos revised the three-dimensional model and proposed two-dimensional model of perceived quality, arguing that the overall service quality includes users' service expectation and service experience (Figure 2-1).

Figure 2-1 Gronroos's Two-dimensional Model of Perceived Quality
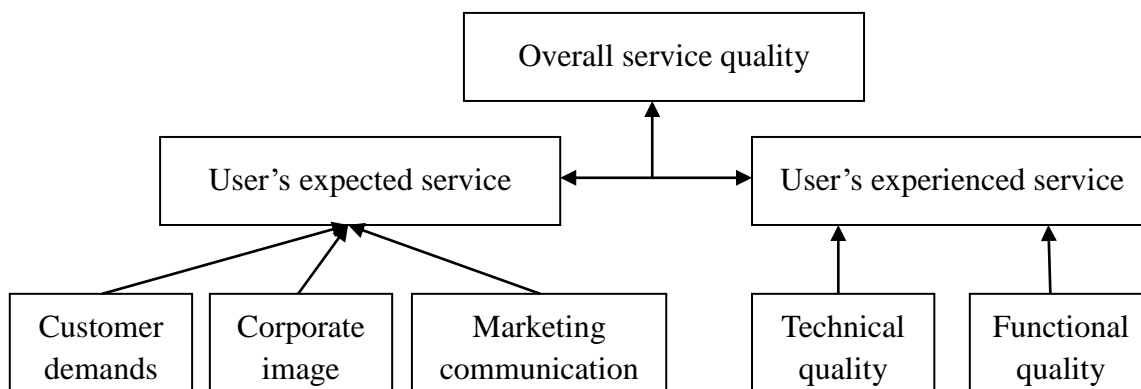
Source: Gronroos (1984)

In 1985, based on the viewpoint of customer perceived service quality, the PZB group chose four industries of banking, credit card companies, securities and maintenance plants to carry out exploratory research and proposed that service quality is composed of ten dimensions: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding the customer and tangibles. The ten dimensions determine the customers expected service and perceived service, and other factors affecting the expected service include public praise, personal needs, communication and past experience. In this way, the determinants of customers' perceived service can be identified (Figure 2-2).

Figure 2-2 Determinants of Customers' Perceived Service Quality
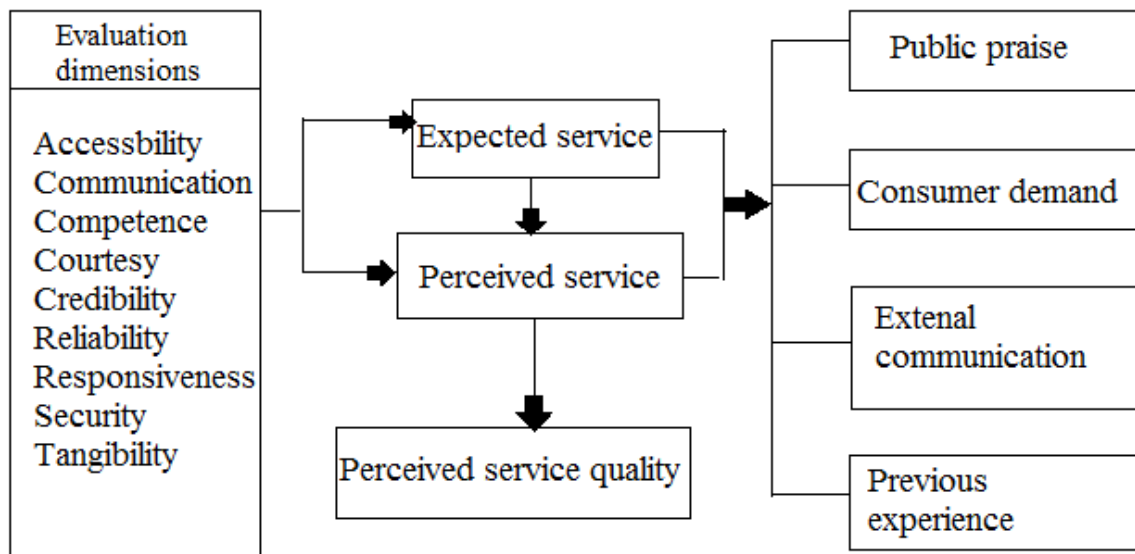
Source: Parasurajnan et al. (1985)

In 1988, the PZB group summarized the ten service quality dimensions into five: tangibles, reliability, assurance, responsiveness and empathy (Figure 2-3).

Figure 2-3 SERVQUAL Model of PZB Group
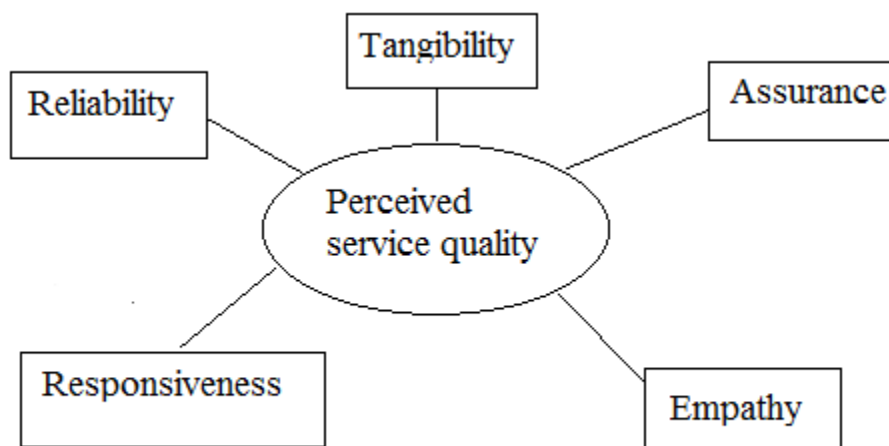
Source: Parasurajnan et al. (1988)

2.3.6 Evaluation Indicator System of Service Quality

Evaluation indicators of service quality (service quality dimensions) refer to factors influencing customers' service expectation and perceived performance. As for evaluation of service quality, the scheme of the PZB group is the most representative one. It includes five categories and 22 items of indicators, which is shown in Table 2-6 (Parasurajnan et al., 1988).

Table 2-6 The Evaluation Indicator System of PZB Group

Evaluation Dimensions	Evaluation Indicators
A. Tangibles	A1 Modernized service facilities
	A2 Attractive service facilities
	A3 Tidy garment and appearance of employees
	A4 Consistency of company facilities and the service it offers
B. Reliability	B1 The company can fulfill its promise to customers.
	B2 The company can take care of customers and is willing to help them out of difficulty.
	B3 The company is reliable.
	B4 The company can offer services on time.
	B5 The company can keep record of services it offers.
C. Assurance	Cl The employees are trustworthy.
	C2 The customers feel assured while receiving service.
	C3 The employees show courtesy to customers.
	C4 The employees can get support from the company.
D. Responsiveness	D1 Do not rely on employees to tell customers when to offer service.
	D2 It is unrealistic to expect employees to offer service in time.
	D3 Employees are unwilling to help customers.
	D4 Employees ignore requests of customers because of busy work.
E. Empathy	El The company does not offer individualized service.
	E2 Employees will not give special care to a certain customer.
	E3 Do not expect employees to understand customer demands.
	E4 The company cannot take customer interests as the priority
	E5 The company's service time cannot meet customer needs

Note: Indicators in evaluation dimensions of D and E are contrary indicators.

Source: Parasurajnan et al. (1988)

The indicator system in Table 2-6 is named SERVQUAL (SERVice QUALity) by the PZB group. Since SERVQUAL is designed to evaluate service quality in the marketing industry, many scholars believe that due to particularity of different industries, the five dimensional factors of SERVQUAL scale are not stable. And they must be adjusted according to characteristics of different industry before being applied to other industries (Carman, 1990).

It is also believed in this study that due to the particularity of the medical industry, especially the Internet medical information service, the evaluation system of hospital website information service is different from that of traditional industries, so the SERVQUAL scale cannot be applied mechanically. Therefore, the SERVQUAL scale is taken as part of the theoretical foundation of hospital website information service evaluation system, which is combined with characteristics of the medical service industry and Internet service to develop a new evaluation indicator system that suits this study.

2.3.7 Definition of Internet-based Service Quality

(1) Definition of Internet Service Quality

Parasuraman et al. (1985) defined electronic service quality (E-SQ) as the degree of facilitating the customers to efficiently and effectively buy and deliver products or services on the Internet. Cai and Jun (2003) believe that online service quality (OSQ) is the difference between the perceived and expected service of customers. Jeon and Jeong (2017) defined Webqual (Web Quality) as the quality of operations of Internet technology.

Although scholars have different definitions and titles of Internet service quality, in the final analysis, it is because the type of Internet service discussed by every scholar and their viewpoints are different. However, they all measure Internet-based service quality.

It is believed in this study that for the users of hospital websites, high-quality electronic information service quality standards are a guarantee to provide them with potential interests or make the technology into practice. Therefore, service quality in

the Internet environment refers to users' evaluation and judgment of the superiority and quality of services offered by the service providers. The research subject in this thesis is the quality of medical information service offered by hospital websites.

(2) Service Quality Dimensions of the Internet

Although the service quality in the Internet environment has attracted attention of international academic community, a final conclusion about the dimensional composition of the evaluation system of online service quality and the measurement items of each dimension has not been reached. Furthermore, scholars in the China's mainland have not conducted any research in this area.

Professor Che Yimin of Yang-ming University in Taiwan researched on the quality of online search service, and holds that the five dimensions of SERVQUAL scale are not fully applicable to network service. Hence and Che adjusted SERVQUAL scale in line with the industrial characteristics of medicine and established a dimension scale as Table 2-7 to measure online service quality (Che, 2001).

Table 2-7 Dimension Scale of Online Service Quality

	Original meaning of the dimension in SERVQUAL scale	Meaning of the dimension in terms of online service quality
Reliability	The ability to provide agreed service	Adjusting e-mail system and webpage to provide correct information and excellent Service
Assurance	Services provided with courtesy and professionalism	Providing reliable Internet services for the customer
Empathy	Providing human and individualized services to the customer	Providing human and individualized services to the customer through proper setting of e-mail system and webpage
Tangibility	Providing service hardware such as service place, service equipment and service personnel	Including appropriate basic configuration of hardware and software
Responsiveness	Providing helpful services customers quickly	The online service able to reply a customer's requirements immediately
Information quality		The e-mail and webpage presenting the attributes of all the information

Source: Che (2001)

On the basis of SERVQUAL scale and the evaluation elements of websites proposed by other scholars, Kaynama and Black (2000) proposed the E-QUAL scale. A comparison between the seven dimensions of E-QUAL scale and the five dimensions of SERVQUAL scale are shown in Table 2-8.

Table 2-8 Dimensions of SERVQUAL Scale and E-QUAL

	E-QUAL
Reliability	Contents, goal, accessibility
Tangibility	Navigation function, design and view
Responsiveness	Reaction capacity
Assurance	Background
Empathy	humanization

Source: the author.

From the results of research on evaluation of the Internet services, it can be concluded that some scholars emphasize the interpretation of specific aspects of information technology, the behaviors accepted by the online users and the perceptual knowledge of online service quality. Their research is conducted from the perspective of the designer and developer of online system with the intent to provide certain criteria for the designer and developer of online system. The key point is to study the elements of online system. Some other scholars in academic community regard online service as a derivative type of commercial service and they concentrate on the research of the commercial process of online service and the customer's needs, which are defined as the elements for the evaluation of online service quality.

In the empirical study of this thesis, we form a comprehensive evaluation model on the basis of ten dimensions of service evaluation proposed by PZB and the SER QUAL model. In the light of Chinese conditions and surfing habits of Chinese, we form a system applicable to multiple layers and multiple influential factors by adjusting PZB's evaluation dimensions.

2.4 User Information Needs Quality

Initiated in the 1920s, research on information needs gradually increased and reached a peak in the mid-1960s. According to incomplete statistics, from the Second World War to the early 1990s, there were about 1,500 articles on information needs published in the international academia. Since the 1960s, a series of research reports have been published in *Annual Review on Information Science and Technology*, in which there were 11 reviews on information needs and usage. Particularly there were reviews published every year from 1966 to 1972 (Ma, 2004).

Research on user information needs can be divided into three stages (Jeon & Jeong, 2017), namely, information-system-oriented information needs research, user-cognition-oriented information needs research and Internet user information needs research. This research focuses on the third stage, which, to be specific, is research on information needs of hospital website users.

There have been considerable studies on the hierarchy of user information needs, the most notable of which includes the hierarchy theories of Taylor, Kochen and Line.

(1) Taylor's Four-level Information Needs Theory

According to the British scholar Taylor (1968), the formation of user problems usually goes through four stages.

S1: the internal needs — the real but inexpressible information needs of users. S2: the perceived needs — needs that can be perceived by the users, but the concept is still vague and the definition and description of problems are not yet clarified. S3: the expressed needs — the users can give a somewhat specific description of the problem and seek help from webmasters. S4: the compromised needs — the users fix the problem according to the information content structure or information retrieval system, so as to get connected with the website information system.

User needs at Sl, S2, S3 are covert ones, while needs at S4 are overt ones, and overt needs are easy to be met. In addition, with the advancement of users' cognitive ability, the user information needs demonstrate a unidirectional closed-circulation relationship from S1 to S2, S3, S4 and then to S1 again. Many users are unable to notice the new needs upon their appearance. However, as the user information activities go further, new needs will gradually appear in the mind of users in a conscious manner. The user will try to formalize information needs in the head by certain type of symbols and after several times of revision, the user will enter the fourth stage. That is to say, the needs will become overt through standard query and retrieval and will be submitted to the information system. If the information systems can meet the needs of users, the users' cognitive ability is improved, and they will have new needs. A good information system can not only meet the overt needs of users, but motivate and spur users to transfer covert needs to overt ones (Taylor, 1968).

(2) Kochen's Hierarchy Theory of Information Needs

According to KaiKristen and Lays (2006), information scientist Kochen divides user information needs into three levels.

First, information needs at the objective-status level. Information needs at this level do not change according to users' subjective will; instead, they are determined

by objective conditions such as the users' social background, working environment and occupational nature. This type of information needs is beyond the real information needs of subjects and is the most covert type of information needs.

Second, information needs at the cognition level. Information needs at this level refer to needs perceived by users when spurred by job stress and social pressure. This type of needs is transferred from information needs at the objective-status level and is mainly affected by factors such as the users' knowledge structure, information literacy, psychological tendency and degree of information service activeness.

Third, information needs at the expression level. Information needs at this level refer to needs expressed by users after consultation and inspiration. This type of needs is transferred from information needs at the cognition level, and is mainly affected by factors such as users' cognitive ability, logical organization ability, expression abilities and information service work.

Usually information needs at the expression level are called overt information needs, while information needs at cognition level and objective-status level are called covert information needs. The hierarchy feature of user information needs determines the difficulty degree of the information service work. As for information needs at the expression level, the form of information service of this type is simple, and the efficacy is obvious. Traditional information service mainly falls into this category. As for information needs at the cognition level and the objective-status level, hierarchy of needs theory is needed to analyze the process of expression and utilization of users' information needs and then "apply medicine according to indications", which means to build individualized information environment to meet users' information needs.

(3) Line's Hierarchy Theory of User Information Needs

According to KaiKristen and Lays (2010), British information scientist Line divides users' information needs into four conditions.

First, need. It refers to information needs of users to realize goals of their research or development work. The scope and extent of this type of needs should be in correspondence with those of the goals. However, this type of needs is only covert ones. The users may be totally unconscious of it or temporarily unconscious of it. It is

often gradually "wakened" as people's cognition goes further with the advancement of research.

Second, requirement. It refers to possible needs of users, or information needs that have been realized by users. This type of needs is more detailed and realistic than the aforementioned covert needs. The latter is the foundation of the former one, but the former is not the whole of the latter.

Third, questioning. It refers to users' inquiry and information needs as well as needs that are wanted by users but may not necessarily be transformed into reality. There are many influencing factors here. For example, some needs are wanted by users, but cannot be met by the library and the information center, or some users think that their time is insufficient, their foreign language capacity and understanding ability are limited, so there is no need to ask questions formally; and it may be inconvenient for some other users to reveal all of their requirements in order to keep secrets.

Fourth, usage. It refers to information actually used by users.

The four conditions of user needs are different from each other. Covert needs are not necessarily converted to overt questions. In addition, part of the information collected from questioning is not used by users. In the above-mentioned conversions, there may be distortions caused by the subjective and objective limitation of users. It will be one-sided if the actually-utilized information of users is seen as their whole information needs. In that way, information service work will be passive and will lose the function of guidance, inspiration, expansion and provision of active service (KaiKristen & Lays, 2010).

Based on viewpoints of the above-mentioned scholars, information needs can be divided into objective information needs, perceived information needs, expressed information needs (retrieval queries). The information needs model is shown in Figure 2-4.

Figure 2-4 Model of Information Needs Expression

Hierarchy of information needs   Stages of information needs expression   Implicit information needs

Objective-status level

Cognition level

Expression level

Explicit needs

Explicitness of implicit value

Actual existent unconsciousness

Formalized expression of conscious information needs

Compromised information needs

Unconscious

Conscious not expressed

Difficulty in expression

Not clarified

Individualized information environment

Information service institutions

Source: the author.

2.5 Customer Satisfaction Theory

According to Fomell et al. (1996), customer satisfaction (CS) refers to a customer's feeling of satisfaction when his requirement (need or expectation that is explicit, implicit or must be fulfilled) is met. The concept of customer satisfaction first appeared in the academic article of marketing in the 1960s. In 1965, Cardozo introduced the concept of customer satisfaction into the field of marketing for the first time (Anderson & Fornell, 2012). Howard and Sheth (1969) believe that satisfaction is a feeling that measures whether what one pays is in proportion to what he or she gets (KaiKristen & Lays, 2010).

(1) KaiKristen and Lays (2010) believe that satisfaction is a process generated from examination and assessment.

(2) In 1985, American scholars first proposed the theory of customer satisfaction, which was then widely applied in other developed countries. In 1989, Sweden constructed the world's first national customer satisfaction index. Afterwards, more than 20 countries and regions including German, France and the US also established national or regional customer satisfaction index evaluation, making the theory a new and popular type of corporate culture and management philosophy in the international business circle (Fomell et al.,1996).

(3) The world's marketing authority Kotler (1992) believes that satisfaction is a feeling formed after a person compares the perceived effect of a product or service with his expectations. Research on customer satisfaction dates back to more than 40 years ago, and customer satisfaction has developed from a simple business slogan and business goal to a mature business and management model (Anderson & Fornell, 2012).

(4) Since the 1990s, research on customer satisfaction has become connected with customer value. However, there is still no consensus on the definition of customer satisfaction theory. Generally speaking, influences of customer satisfaction include two aspects: first, customer satisfaction can impose a positive influence on a company as an added intangible asset, that is, customer satisfaction can reduce a company's operating costs and bring a prospective future for the business (Anderson & Fornell, 2012). A very satisfied customer tends to introduce the services he or she enjoys to other customers; second, customer satisfaction can reduce customers' sensitivity to prices, which means that they are more willing to pay higher prices for products attractive to them (Fomell et al., 1996).

Research on customer satisfaction can be categorized into three aspects: a. definition of customer satisfaction; b. customer satisfaction model; c. evaluation methods of customer satisfaction.

2.5.1 Definition of Customer Satisfaction

Scholars worldwide began to research on customer satisfaction theory in the 1930s. Among them, Hoppe and German American psychologist Lewin (1930) were

the first ones to carry out studies in this field; while Cardozo was the first who proposed that evaluation on products should be included in customer satisfaction. Table 2-9 lists some major definitions of customer satisfaction.

Table 2-9 Definitions of Customer Satisfaction

Researcher and year	Definition of customer satisfaction
Cardozo (1992)	Customer satisfaction should be involved in evaluation on products.
Westbrook (1991)	Mentally, customer satisfaction is derived from a customer's subjective judgments on products.
Engel (1995)	Customer satisfaction with a product comes when a customer compares evaluation before and after consumption.
Parasuraman, Zeithaml and Berry (1994)	Customer satisfaction is a function demonstrating the relationship between price and quality of services or products.
Ostrom and Iacobucci (1995)	The level of customer satisfaction is not exclusively determined by the quality of services or products, gains of customer and purchase costs.
Kotler (1997)	Customer satisfaction comes from a customer's comparison between expectation and actual perception of products or services.
Oliver (1994)	Customer satisfaction refers to a customer's judgment on products and services.
Bodet (2008)	Customer satisfaction and customer loyalty are a concept measured in two perspectives, and customer satisfaction is an antecedent to customer loyalty.
Churchill (2009)	Customer satisfaction is the adaptability of products and services to customer requirements.
Veljković and Marinković (2010)	Customer satisfaction originates from the demand for products and services with higher quality as a result of the ferocious competition among consumers and their high requirements.
Falkenreck and Wagner (2011)	Perceived innovativeness is an important component and characteristic of customer satisfaction.
Rajic and Dado (2013)	Customer satisfaction reflects service quality and customer behavioral intention.

Jeonghoon and Hansuk (2013)	Brand loyalty results from customer satisfaction. The concept of customer satisfaction covers customers' satisfaction with a brand.
Keiningham, Gupta, Aksoy and Buoye (2014)	Customer satisfaction includes customer loyalty, consumption habits, market shares, and customer satisfaction at companies that provide services for niche markets.
Erjavec and Slovenia (2015)	Customer satisfaction comes from customer loyalty.
Pinto (2015)	The source of customer satisfaction is the publicity of social media and service quality.
Mandeep and Nitasha (2015)	The definition of customer satisfaction in an information environment originates from the six dimensions of electronic service quality: information, design, customization, safety, ease of use and reliability.
Pulles (2016)	Satisfaction with service providers and appeal to customers form the primary components of customer satisfaction.
Makanyeza, Macheyo and Toit (2016)	Customer satisfaction is the adaptability of products and services to customer requirements.

Source: the author.

2.5.2 Customer Satisfaction Model

(1) Kano Model

Noriaki Kano, professor at Tokyo University of Science, published an article in 1979 *Motivator and Hygiene Factor in Quality*, in which he introduced the standards on satisfaction and dissatisfaction into quality control for the first time. He read out the research thesis *Attractive Quality and Must-be Quality* at the 12th annual meeting of Japanese Society for Quality Control (JSQC). The thesis was officially published in the 14th issue of JSQC magazine *Quality*, marking the establishment of the Kano model and the maturity of the Theory of Attractive Quality (Shu & Ya, 2011).

Kano model classifies three categories of customer needs: basic needs, performance needs and excitement needs. Meanwhile, it puts product and service quality into three corresponding categories, which are must-be quality, performance

quality and attractive quality.

Must-be quality refers to the attribute or function that the product or service customers think "must have". When must-be quality is insufficient and cannot meet the basic needs of customers, customers will be dissatisfied; and when must-be quality is sufficient and meet the basic needs of customers, they hardly notice and won't be more satisfied.

Performance quality means that products or services provided meet customers' performance needs. However, performance quality does not belong to "must-be" attributes. In some circumstances, customers themselves are not clear about what performance quality meets their performance needs; still, they expect to be fulfilled. When surveyed, customers usually talk about performance needs. When these needs are well met, customers are satisfied; otherwise, they become dissatisfied. Attractive quality is an attribute of products or services that customers have never expected and therefore surprises them. If this attribute is not so significant and special enough, customers will not care; and if unexpected services are presented, customers will be very happy, and thereby their loyalty will increase. The Kano model is usually used to categorize customer needs and quality attributes (Luor et al., 2015).

(2) SERVQUAL Model

The SERVQUAL model was developed by three American scholars, Parasuraman, Zeithaml and Berry. The model serves for measuring customer satisfaction with five elements of service quality—assurance, responsiveness, reliability, tangibles and empathy. A questionnaire is designed to measure both customers' perception of products and their expectation on services quality, and the gap between the two becomes the score of service quality. Moreover, this model is based on the difference between perception and expectation rather than an all-round measurement of satisfaction (Parasuraman et al., 1985).

(3) Four-quadrant Diagram

Four-quadrant diagram, also called matrix model, is suitable for qualitative research and frequently used in China for its simplicity. Not requiring complicated analysis with mathematical tools, this model is convenient for users to compare

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satisfaction and importance directly (Zhang, 2013).

The items indicating corporate performance of all products and services are listed in the four-quadrant diagram with two attributes: importance and satisfaction. After all items are rated by customers in terms of importance and satisfaction, these items influencing satisfaction are put into four quadrants, and then be dealt with in categorizes. However, in the four-quadrant diagram, since customer satisfaction is the weighted average of scores of all items without practical errors in consideration, the customer satisfaction calculated is not definitely accurate. Furthermore, due to the utilization of specific performance indexes in four-quadrant diagram, the possibility of a cross-industrial or cross-sectoral comparison of customer satisfaction is greatly reduced (Zhang, 2013).

2.5.3 Methods of Measuring Customer Satisfaction

Since 2000, researchers have developed new methods to measure customer satisfaction. They started using quasi-experiment to evaluate customer satisfaction by quantifying it. There are three major methods to measure customer satisfaction: customer satisfaction rate, weighted score of hierarchical variables and Structure Equation Modeling (SEM), all of which have their own advantages and disadvantages.

The method of customer satisfaction rate: customer satisfaction rate is calculated simply by measuring the percentage of two polarized indicators: satisfaction and dissatisfaction. However, satisfaction and dissatisfaction are two extremes, between which there is much room for varying degrees of satisfaction or dissatisfaction. Therefore, customer satisfaction rate is defective for inaccuracy.

The method of weighted score of hierarchical variables: when measuring, indicators of customer satisfaction are divided into various hierarchies according to the customer satisfaction evaluating indicator system — primary indicators, secondary indicators and tertiary indicators, and each level has its corresponding weight. After the establishment of the indicator system, satisfaction scores of the targeted customers are determined through simple linear weighting of the data. However, this method does not consider the non-linear relationship between variables.

Structure Equation Modeling (SEM) is a comprehensive statistical method developed by Jöreskog and Moustaki (2001) based on traditional ones. It applies the improved versions of confirmatory factor analysis, path analysis, multiple regression, and analysis of variance. The first generation of such statistics only explains the correlation between dependent variables and independent variables at one level, whereas SEM can make a model for the correlation between dependent variables and independent variables at the same time. When analyzing satisfaction index by SEM, Partial Least Square (PLS) and Linear Structural Relationships (LISREL) are two approaches usually used for parameter estimation.

Customer Satisfaction Index (CSI) has become the most popular model to evaluate customer satisfaction. It makes customer satisfaction the center of its basic theory and constructs variables affecting customer satisfaction into a network. Based on the consumption process of a certain product or service, CSI constructs a logical structure model to comprehensively measure types and aspects of customer satisfaction.

Models for evaluating customer satisfaction worldwide

The history of evaluation models for customer satisfaction went through four stages, and Sweden (Fornell, 1992), the United States (Fornell & Johnson, 1996; Eklof & Westlund, 1998) and US Public Sector CSI (ASCI) took the lead in these stages. In each of these four stages, new customer satisfaction models were developed and data validation was carried out.

(1) Sweden Customer Satisfaction Barometer

Sweden Customer Satisfaction Barometer (SCSB), built by Fornell at Michigan University in 1992, was the first national CSI model in the world. Based on factor analysis model of customer satisfaction he collected data from 130 corporations in several representative industries in Sweden to validate the Barometer. See Figure 2-5.

Figure 2-5 Framework of Sweden Customer Satisfaction Barometer
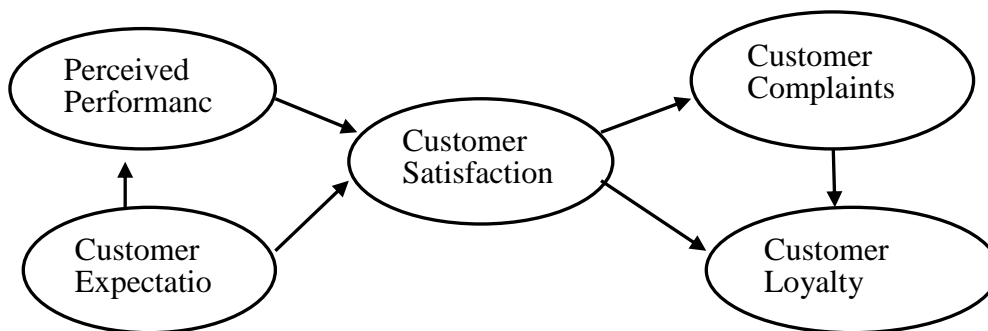
Source: Fornell (1992)

(2) American Customer Satisfaction Index

In 1996, Fornell, Johnson, Anderson, Jaesung and Bryant produced American Customer Satisfaction Index (ACSI) (Figure 2-6) to measure customer satisfaction in US based on the Swedish CSI model SCSB.

Figure 2-6 Framework of American Customer Satisfaction Index
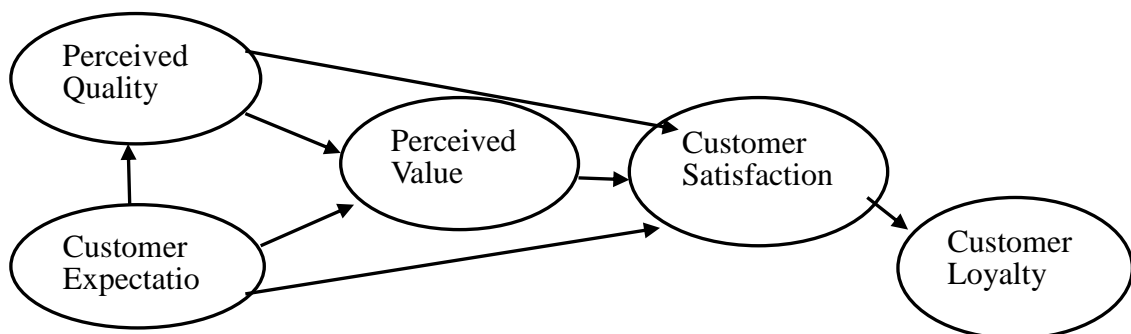
Source: Fornell & Johnson (1996)

(3) European Customer Satisfaction Index

European Customer Satisfaction Index (ECSI) was developed by Eklof and Westlund in 1998 based on the ACSI (Figure 2-7).

Figure 2-7 Framework of European Customer Satisfaction Index
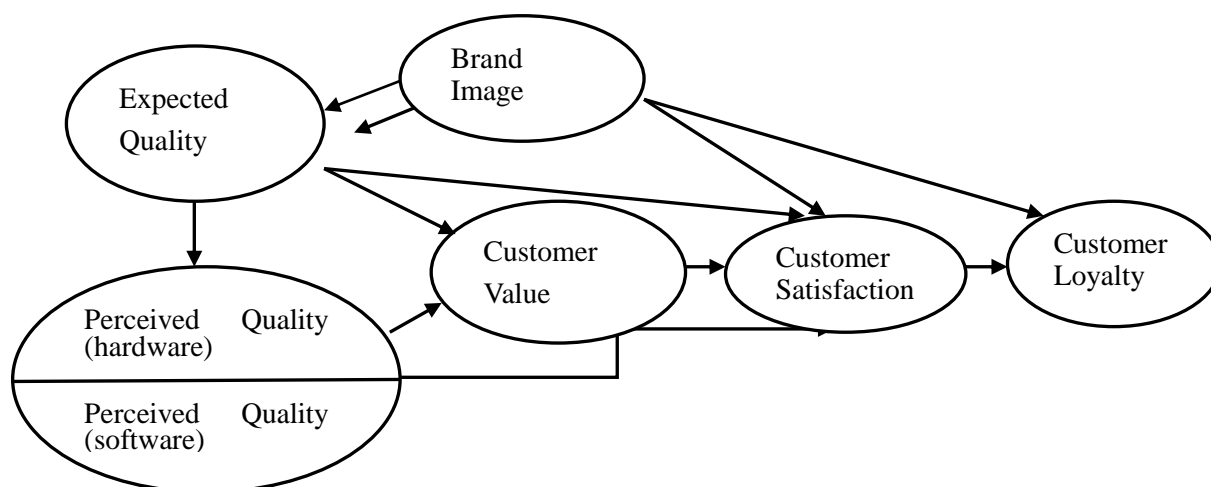
Source: Eklof & Westlund (1998)

(4) ASGI for US Public Sector

After the New Public Management Movement in the 1980s, the customer-oriented concept was identified in the US and relevant policies and laws were further developed, which promoted a national application of ACSI in all US public sectors and the US Public Sector CSI was established (Wingo, 1985; Fierman & Carvell, 1995). See Figure 2-8 (Claes, 1984).

Figure 2-8 Framework of US Public Sector CSI
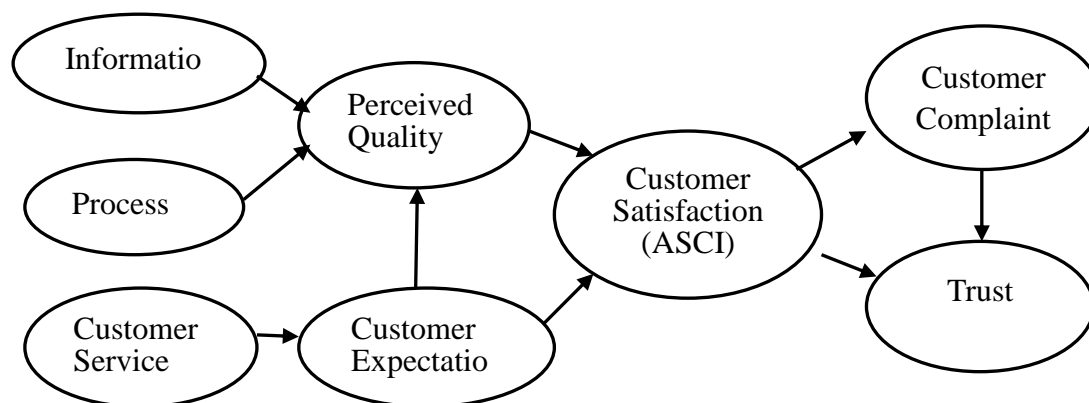
Source: Claes (1984)

(5) Chinese Customer Satisfaction Index Model

Chinese Customer Satisfaction Index (CCSI) was built by the Center for Chinese

Entrepreneur Studies at Tsinghua University on the basis of above mentioned CSI models according to China's national conditions and characteristics of Chinese consumers. The CCSI Model introduced by the School of Economics and Management at Tsinghua University is the most representative one (Figure 2-9) (Wang & Shen, 2010; Li, 2010).

Figure 2-9 Framework of Chinese Customer Satisfaction Index
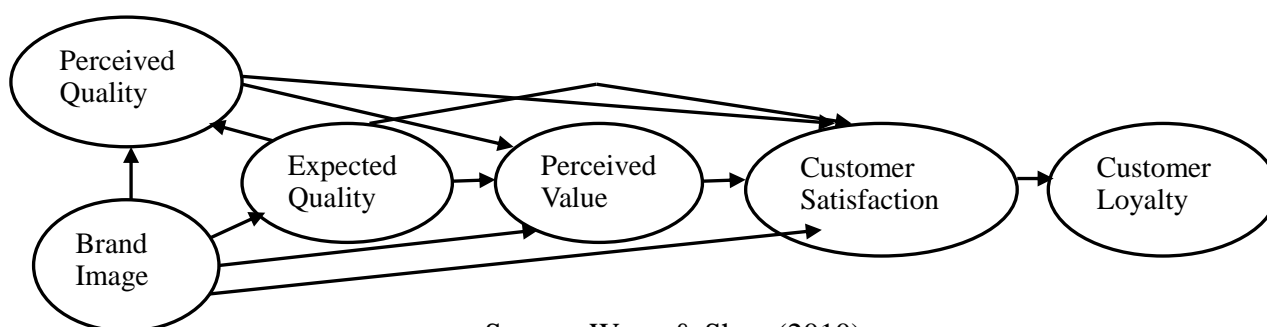
Source: Wang & Shen (2010)

2.6 Summary

In this chapter, we review the concepts of service quality and the information service quality of hospitals' information platforms, define the two concepts, and summarize previous theoretical research on service quality, research on the information service quality of hospitals' information platforms and research on the service quality of Internet-based service providers, providing a theoretical foundation for the following research.

First of all, we sort studies on service quality evaluation and summarize the development of relevant theories. The investigation on service quality of different dimensions, such as the information service quality of medical websites and the information service of hospitals' information platforms, and of various service providers, for example, Internet-based providers, shows that theories on service quality evolve with the development of social informatization. As there are a growing number of Internet-based service providers, evaluating the information services of Internet-based service providers, especially hospitals' information platforms, in terms

of their information service quality, is of great significance both in theory and practice.

Then we sort theories on user information needs and find that the research in this respect goes through three stages. This research rests on the third stage, Internet user information needs, which is still in its infancy in China.

In the end, we review theories on customer satisfaction which are closely related to the research on the information service quality of hospitals' information platforms and summarize these theories in combination with related concepts and research results.

Chapter 3: The Indicator System Evaluating the Information Service of the WZPH Information Platform

3.1 Construction Basis of the Indicator System

3.1.1 Definition of the Indicator System

Indicator, as a hybrid concept, is the unit and means to measure the object. An indicator consists of a name and value (Pealer & Dorman, 1997).

An indicator shows the following features:

(1) Measurable:

The value of an indicator can be measured and calculated. An indicator is measurable and calculable.

(2) Systematic:

Indicators present the features of the phenomenon with measured numbers, which can tell the overall scale and features of the phenomenon.

(3) Concrete:

Indicators reflect the actual status of the phenomenon with specific numbers and scopes rather than abstract evaluation.

3.1.2 Categories of the Indicator System

The indicator system can be categorized into different groups from different perspectives. For example, in terms of the unit expression of indicators, there are monetized indicator and indicator in kind. Also, in terms of the structure of the evaluation modules, there are vertical indicator system, paralleled indicator system and mixed indicator system.

In this thesis, a paralleled indicator system is adopted. In such a system, indicators are grouped into several sub-systems for the measurement of different

questions. Different indicators are chosen for different sub-systems. Thus, under such a system, the structure of the indicator system evaluating the information service of the WZPH Information Platform becomes very clear and the evaluation process also is more definite and logical.

3.1.3 Principles for the Construction of the Indicator System

Establishing a scientific indicator system is an essential premise and basis for evaluating information service quality. Hospital information platforms, as professional websites, have unique industrial characteristics, which should be taken into account when constructing an evaluation indicator system. Whether the indicator system is appropriate? Does it conform to the characters of the information platform used by a hospital? Can people acquire scientific and accurate understanding of the information service of hospital information platform through it? These questions determine the validity of the evaluation of an indicator system. Therefore, when constructing an evaluation indicator system, the following principles should be observed:

(1) Goal-oriented Principle

An indicator system provides objective description on the object evaluated to serve the evaluation purpose. Goal-oriented principle is the start point of its formulation. The important criterion to estimate whether an indicator system can reflect the reality objectively is to see whether it meets the evaluation purpose.

(2) Comprehensive Principle

An indicator system based on the evaluation purpose should describe the service recipients of hospital information platform wholly. An incomplete evaluation indicator system results in partial description of the object evaluated. Naturally, the evaluation results based on such an indicator system cannot describe the object evaluated faithfully. However, it doesn't mean that the more the indicators, the better. Instead, indicators should be designed according to the evaluation purpose.

(3) Objective Principle

The objectivity of an evaluation system is the basic criterion to guarantee valid evaluation results. To meet this principle, an evaluation system should be formulated

based on objective and appropriate methods, authentic data and scientific analysis approach. Besides, interference factors and constraints should be excluded. In a word, an indicator system should be formulated with an overall perspective.

(4) Practical and Operational Principle

Evaluating an information platform is rather practical work. To construct an indicator system, when an indicator operational or not in reality should be pondered upon. An indicator system should fit the evaluation method, and the cost of time and money should also be considered. In addition, an indicator system should be easily understood and employed by the user.

(5) Overlap-free Principle

Every indicator in an indicator system must be unique. Overlaps and inclusion should be avoided. However, in case that complete independence of each indicator cannot be achieved for evaluation necessity, some indicators can be designed for mutual verification from different perspectives. Problems of overlapping among indicators can also be resolved by lowering the weight of certain indicators.

(6) Guiding Principle

The guiding role of indicators is obvious. An indicator system should be formulated to guide hospital to improve information service quality and optimize information service system.

(7) Advance Principle

The information service of hospital information platform is proactive service that meets the future development of a hospital based on the current situation. Subsequently, the design of an evaluation indicator should fully consider the application of computers and new Internet technologies. With the development of IT, users' requirements on information services are also changing, and the settings of indicators should mirror these changes.

3.1.4 Methods for the Construction of the Indicator System

Methods for initial selection of indicators are various. Cross method, analysis method and synthetic method are three examples. The most common one is the

analysis method which divides the object or target to be measured by the indicator system into many different sub-systems according to clear gradations until each system can be measured by specific indicators.

The analysis method is mainly carried out in four steps: first, proper explanation and description of the connotation and denotation of the evaluation object by clarifying the structure of concepts to define stage and final goals; second, dissecting each stage in detail; third, repetition of the second step until goals of each stage can be reflected with one or more indicators; fourth, designing indicators for each stage, including quantifying and qualifying indicators. In this thesis, the analysis method is adopted to construct the indicator system.

3.2 Designing the Indicator Scheme by Delphi Method

3.2.1 Definition of Delphi Method

Delphi method, also called expert consultation, is a research method to collect various experts' opinions in an anonymous way. That is, according to systematic procedures, experts are invited to give opinions anonymously. After several times of communication and feedbacks, experts will arrive at unanimous opinions. Based on the final and comprehensive opinions, object will be evaluated with both qualitative and quantitative approaches.

3.2.2 Steps of Delphi Method

(1) Questionnaires for Expert Consultation

Work out questionnaires for expert consultation: write instructions according to the evaluation contents and indicators; formulate the questionnaires.

(2) Four Rounds of Expert Consultation

In the first found, send out each questionnaire to corresponding experts as planned; ask them to fill the questionnaires based on their knowledge and the questions. Then, classify the information received in the questionnaires and work out

new questionnaires; send them out to experts again.

The second round, understand the reasons for their prediction on events: ask experts to write their own forecasts, estimates and reasons based on events listed in questionnaires. After collecting the questionnaires, classify experts' advice and form new questionnaires based on cleaned comments and updated data; give them out to experts again.

In the third round, experts comment on the latest questionnaires and make some improvement.

In the fourth round, experts modify or retain their opinions and data in the first three rounds.

(3) Result

Usually, the general opinions of experts are presented by an average score. Figure 3-1 shown the Flow of Delphi Method.

Figure 3-1 Flow of Delphi Method
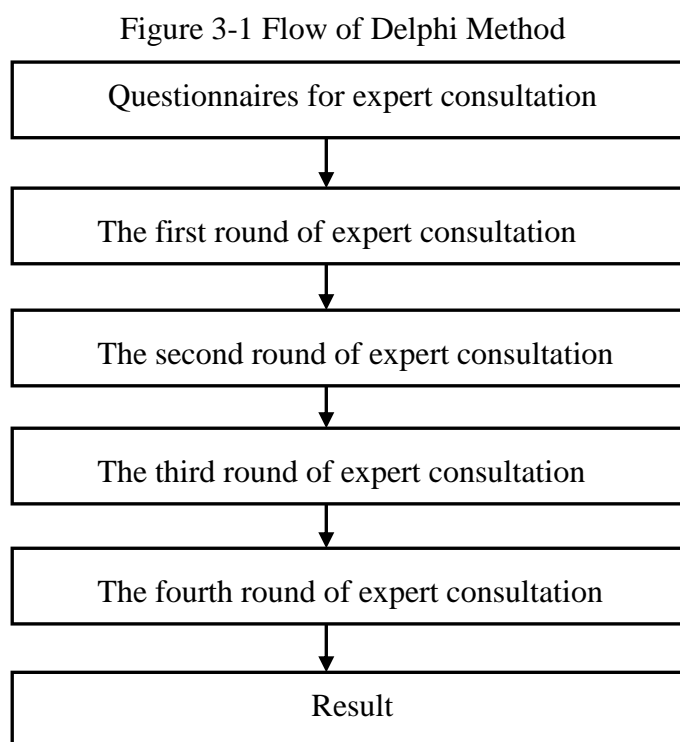
Source: the author.

3.2.3 Advantages and Disadvantages of Delphi Method

Delphi method is commonly used in management studies for it is simple, practical, and can avoid the impact of subjective opinions. At the same time, it also

has drawbacks and limitations. For example, to reduce mutual influence of human factors, experts should reach a consensus without discussion and communicate with each other. Furthermore, it cannot remove thoughts lacking in profound thinking or careful reasoning or opinions irrelevant to required fields. Additionally, the accuracy of results may be affected when experts are too busy with their everyday work or do not pay enough attention to this activity during expert consultation.

This study adopted an improved version of Delphi method to overcome its drawbacks and enhance the efficiency. Group discussion of experts and expert consultation are combined to form a new approach.

(1) Improve the quality of expert consultation by full discussion with experts and review of literature related before making the questionnaires.

(2) Before selecting consultants, understand experts' research background, work experience, published theses through a variety of ways; select seasoned practitioners and experts in the field to participate in the consultation

(3) Communicate with the experts to confirm that they have enough time and energy to finish the consultation before sending out questionnaires so as to improve the quality and accuracy of the consultation.

3.2.4 Designing the Indicator Scheme by Delphi Method

To begin with, draft a dimension structure and indicator set for evaluating the information service quality and function of WZPH Information Platform by communicating with experts from hospital information technology sectors and in reference to the literature review and reality of hospital websites worldwide. Next, send the initial dimension indicator set to about 20 experts via mobile phones, letters and emails for at least two rounds of consultation to settle the names, categories, quantity and structure of the evaluation system's dimension indicators. Experts to be consulted are composed of professionals in management field with titles of deputy senior and above, experts in hospital informatization, and professionals in IT website design companies. The content of consultation includes: whether the dimensions and indicators in the initial indicator set fit with each other; whether the names of

dimensions and indicators are appropriate; and is there anything missing? The consultation form is made up of four parts: Part 1, profile of experts. Carry out statistical analysis on experts' basic information; let experts judge the familiarity of the initial settings and design of various dimensions and make them choose the reasons for their judgments to guarantee the accuracy of the expert consultation. See Table 3-1. Part 2, giving scores to the evaluation dimension indicators. Experts choose a score for each of the indicators based on their professional judgment. There are five choices for them: 5-absolutely agree, 4-stronglyagree, 3-agree, 2-stronglydisagree, 1-absolutely disagree. Besides, if they find certain items need to be deleted or improved, they can write down their opinions on the blank space of the consultation form. See Table 3-2. Part 3, drafting a diagram to illustrate the structure of the system of evaluation dimension indicators. See Table 3-2. Part 4, defining and illustrating various dimension indicators. See Table 3-3.

Table 3-1 Personal Information of Experts

Work Unit	Title	Major	Working Years

Source: the author.

Table 3-2 Evaluation Attribute and Dimension

	Familiarity ABCDEF	Theoretical Basis 12345	Experiential Basis 12345	Literature Basis 12345	Intuitive Basis 12345
Attribute 1					
Dimension 1.1					
Dimension 1.2					
Dimension 1.3					
...					
Attribute 2					
Attribute 2.1					
Attribute 2.2					
Attribute 2.3					
...					

Notes: the ABCDEF in the familiarity column stands for: A-very unfamiliar, B-unfamiliar, C-know something, D-know, E- familiar, F- very familiar.

Source: the author.

The 12345 in the basis columns stands for: 1-almost none, 2-a little, 3-some, 4-most, 5-almost all.

After the first round of consultation, indicators with a calculated average score below 3 are omitted. At the same time the original indicator set are modified according to the experts' suggestions on the indicators to form a new version of the indicator set.

The second round of consultation is similar to the first round but the indicator set in the second round is the version modified and filtered in the first round. In the second round, experts give scores to the indicator set but need not to revise it. After statistical analysis of the scores given by the experts, the dimension indicators with the highest scores are selected as part of the final evaluation indicator system.

All the attributes, dimensions and weight of indicators are modified and determined with the method of two-round expert consultation showed in the above two rounds of consultation.

3.3 Structure of the Indicator System Evaluating the Information Service of the WZPH Information Platform

3.3.1 Indicators of the Information Service Function of the Hospital Information Platform

The various information service programs related to medical information service provided on a website by a hospital information platform are called hospital information platform service programs, which include introduction of information service, online communication and service, and extended Internet services. Based on the research results in 2.2 of this thesis, the initial indicator set evaluating the information service function of the hospital information platform and the correspond explanation of each indicator are concluded. See Table 3-3.

Table 3-3 The Initial Indicator Set Evaluating the Information Service Function of WZPH Information Platform

and the Corresponding Explanation for Each Indicator

Initial Indicator Set	Explanation
Visual Identity Symbol System of a Hospital	Include visual symbols: logo, flag, motto, text style of the hospital name.
Hospital Profile	Include the hospital's history, chronicle of major events, culture, honors, leading team, organization chart, mission, ideology, features, and development plan.
Hospital Scale	Include the number of personnel, ward beds, outpatients, patients, campuses and branches.
Introduction of Hospital Experts	Include well-known experts' personal information such as specialty and departments.
Chronicle of Hospital Events	Include its major events till now.
News and Bulletin	Include its various news, public notices and announcements of research events and other activities.
Contact Information	List various means and information to contact the hospital: address, postcode, electronic map, traffic route, customer service phone, telephone number of departments, fax and email.
Introduction of Departments	Include introduction of its clinic departments, department of medical technology and administrative department; introduction of medical service programs, business information, and doctor information of departments.
Emergency Service and Outpatient Service Hour	List the emergency service hour of the hospital and doctors' consulting hour in each department.

Layout of Departments	Include the location such as building number of each department.
Treatment Guideline	Include the timetable of the outpatient service and emergency treatment; introduction of the registration ways, procedures, and charges; symptoms of major diseases attended in the clinic department and major diseases treated in other departments.
Schedule of Experts	Include experts' outpatient hours and places.
Charging Standard Notes	Include details about charges on outpatient service, hospitalization, medicine, operations and medical examinations.
Device Introduction	Include functions and names of medical devices in the hospital.
Hospitalization and Discharge Process	Include hospitalization preparation, charges, services, ward rules and all the discharge steps.
Introduction of Physical Examination	Include various physical examination programs, charges, procedures and attentions.
Accompanying Service	Include non-medical accompanying services in a hospital: service recipients, charges, procedures and management mechanisms of ward accompanying, relative and friend accompanying and matron accompanying.
Handy Service	Include the convenient service programs provided by a hospital such as medical guiding service, daily healthcare advisory service, and others (water dispenser, wheelchair, medical record printing, electronic queue number taking and parking guide).
Examination Guidelines	Provide explanation on the figures in the various test results of examination programs as well as measures to deal with dangerous abnormal figures.

Medical Insurance Information	Themed-introduction about related medical insurance information.
FAQ	Provide answers to questions frequently-asked by patients.
Signing in Service	A patient signing in on the website with patient ID, social security number and telephone number can inquiry his or her health information and appointment with doctors on the website.
Appointments and Registration by Phone	Provide service to allow patients to make appointments and registration on phone.
Online Appointments and Registering	Provide service to allow patients to make appointments and register online.
Email Advisory	Provide a specific e-mail address to answer the public's questions about the hospital.
Online Advisory	Answer patient's medical questions and interact with them online.
Text Message Advisory	Provide a public number for patients to consult medical service personnel via short text messages.
Service Query	Provide information about doctors and drugs for patients to inquiry.
Examination Results Query	Patients can inquiry test results or physical examination reports with their names and social security accounts.
Online Complaint	Submit complaints to a hospital through online communication.

Online Medical Service	Patients send the electronic versions of their information such as examination results and medical records to hospital websites. After receiving the information, the doctors of hospitals reply to patients via telephone or e-mail, or they can conduct medical service face-to-face via online video.
Virtual Hospital	Publicize a hospital's geographical location and internal layout to website users via videos or 3D animations.
BBS	Provide online discussion rooms for website users.
Online Message Board	Website users can put forward suggestions and opinions to make communication easier between website managers and users.
Academic Exchanges	Provide online space for clinical research personnel at the hospital to discuss with each other and download academic resources.
Website Investigation	While users chose among items provided by the website according to their own interest, real-time statistic results of various programs can be collected.
Online Communication	Create an online message board open to users. They can leave messages about problems of the hospital, share experience of treatment in the hospital and their evaluation on the treatment.
Director's Mailbox	Provide an email address for the communication between the hospital and patients
Disease Knowledge	Provide a special information query page for users to have an overall understanding on diseases, including how to prevent, diagnose and cure a disease.
Popular Science	Provide a dedicated page to popularize health knowledge to the users.
Multimedia Video	Provide all kinds of videos, ppts, audio records about healthcare.
Medical Policy	Provide a page for users to view and query medical policies and laws.

Medical Education	Provide free and open online courses for continuing education.
Drug Usage	Provide introduction on the usage of common drugs including most of the prescription medicine.
Academic Database	Provide online query service for online databases of medical journals and thesis.
Related Web Links	Provide links to other trustworthy hospitals or medical health websites.
Hospital E-journal	Provide service for users to view and download e-version of self-made journals of the hospital.
E-book	Provide service for users to view and download various medical e-books on the Internet.
Library	Provide introduction to the library and list of the electronic resources of the library in categories.
Software Download	Provide website download service for various softwares.
Talent Recruitment	Provide recruitment information of medical personnel.
Advertisement and Activities	Publish various static and dynamic advertisements and activity information.
Tender Information	Put up the hospital's acquirement information for drugs and medical equipment.
Information Publication	Release internal and public information on the website.
Scientific Research and Teaching	Release information about undergraduate and graduate teaching, and research information of hospital laboratories.

Source: the author.

3.3.2 Medical Information Service Quality Indicators of Hospital Information Platforms

In recent years, there are many studies on the website information service, most of which are about determining the dimensions and attribute tables of information service quality of website information platforms. The studies on the medical information service quality indicators of hospital information platforms are presented. These studies not only make contributions to the information service quality attributes and dimensions, but also provide further studies with theoretical basis and cases. For instance, some scholars can discuss website information platforms in hospitals that render both information resource service and general online service. We uncover the medical information service quality indicators of hospital information platforms from the following studies. See Table 3-4 and Table 3-5.

Table 3-4 Evaluation Dimensions of Information Service Quality of Website

Information Platforms

Researcher and Time	Research Direction	Research Dimension
Xie and Goh (1998)	Online information service	Reliability, convenience, communication effectiveness, tangibles, reliability, timely responsiveness and consistency
Kolesar and Glbraith (2000)	Online shopping service	Tangibles, reliability, responsiveness and convenience
Zeithaml, Parasuraman and Malhotra (2002)	Electronic service	Efficiency, reliability, fulfillment, privacy, responsiveness and contact
Wolfinbarger and Gilly (2003)	Electronic retail service	Website design, reliability, service security
Hung (2004)	Overall website quality	Information quality and service quality
Harold and Linda (2004)	Website service quality	Website design, credibility, service reliability and communication
Sweeney and Lapp (2004)	Website service quality	System quality, service quality and information quality
Parasuraman, Zeithaml and Malhotra (2005)	Portal service	Information quality, availability, humanization, information quantification and privacy and security of online information service
Ancarani (2005)	Public service website	Website performance, accessibility, security, perception and information
Chua, Goh and Lee (2012)	Network service and applications	Tangibles, responsiveness and competence, consistency, reliability, security and assurance
Castañeda (2011)	Website service	Specific content, quality, appearance and tech-suitability
O'Cass and Carlson (2012)	Website service quality	Website design, functionality, security and information quality
Lo and Chai (2012)	Service quality model and Web applications	Information, customization, reliability, responsiveness and security
Hong, Chan, Thong, Chasalow and Dhillon (2014)	Professional service quality	Security, thoughtfulness and image
Sun, Wang, Yang and Zhang (2015)	Portal service	Availability, communication efficiency, tech-suitability, information quality, system validity, privacy and responsiveness
Bucur (2015)	Online banking service	Accessibility, interface, credibility, empathy, reliability, responsiveness, availability and courtesy

Source: the author.

Table 3-5 Initial Evaluation Indicators of Information Service Quality of WZPH

Information Platform

Initial Indicator	Illustration
Readability	Can the information on the website be understood easily?
Accuracy	Is there any grammatical or expression mistake on the website? Is the information accurate?
Credibility	Can the website provide users with complete reference, clear statement of source for cited data, peer review of source and marks of reviewer and editor in charge?
Completeness	Does the information presented cover contents related to the theme of website?
Information source	Is the information reviewed? Is the article reprinted with permission and source? Is there any reference link or explanation?
Copyright	Is there any unit or department that takes charge of copyright administration on the website information platform?
Qualification licenses for website operation	Whether the website has relevant licenses such as License for Internet Medical and Healthcare Information Service, License for Internet Drug Information Service (for Profit), Network Administrative Examination of Healthcare Information Service by Ministry of Health, Internet Drug Information Service Qualification and Internet Culture Operation License?
Author's identity	The author's personal information such as name, workplace and professional title should be marked.
Title marking	When the information service is provided, the responsibilities and exemption should be marked.
Accessibility of resources	There are no dead links, invalid links or unavailable pages.
Release date	The update time of information should be marked.
Information classification	The information on the website is classified according to the theme and the information with the same theme is included in one column. Such classification provides readers with clear, distinct and straightaway information.
Information stratification	The information with the same theme can be stratified into different levels and connected with hyperlinks. There are three to five levels under each theme.

Navigation mark	The navigation system is used for presenting the browsing interface and transferring users to different pages. It can offer users efficient and accurate information via the display of icon and route. It sets several function keys that can go to the previous or next page/level, or home page in each column and the whole website.
Website map	Website map shows all the columns and themes as a tree view, thus the user can access the information via hyperlinks.
Format specification	The words, pictures, colors and format in each column should remain consistent so that the overall website style can be integral.
Specification of domain name	Is the domain name of hospital website easy to remember and understand? Is the domain name of hospital in English or Chinese Pinyin?
Content retrieval	The user can retrieve word, title and keyword on the website.
Language	Besides simplified Chinese, the website provides the user with other languages.
Time taken to open home page	How much time will it take to open the home page when the user types in the domain name?
Independent domain name	Is there an independent domain name?
Digital multimedia function	The content on the website can be presented in video and audio.
Background data	The information resources are stored and released on the website via background database.
Count of URL access	The website has functions such as content access and count of URL access.
Privacy protection	The user's personal information should not be shared publicly so as to protect individual privacy.

Source: the author.

3.3.3 Theoretical Research Platform of Medical Information Service Quality of Hospital Information Platforms

The theoretical research platform (tentative) of this study is constructed based on the initial evaluation indicator set mentioned previously after reviewing related

theories such as the two-dimensional model of perceived quality, the model of customers' perceived service quality, SERVOUAL model, E-SQ, and OSQ. As shown in Figure 3-2, the medical information service quality of hospital information platform is jointly determined by perceived service quality and the evaluated quality of platform information. Interaction, online medical service, platform information construction, and platform information quality are four dimensions used for evaluating perceived quality of medical information service of the hospital information platform. In this study customer's expected service quality is the full score, whose gap with the actual service quality are the score of perceived service quality. The six dimensions below are for the evaluation of information quality of information platform. The overall quality of medical information service of hospital website is determined by the service quality perceived in the website and evaluated information quality.

Figure 3-2 Theoretical Research Platform of Medical Information Service

Quality of WZPH Information Platform (Tentative)
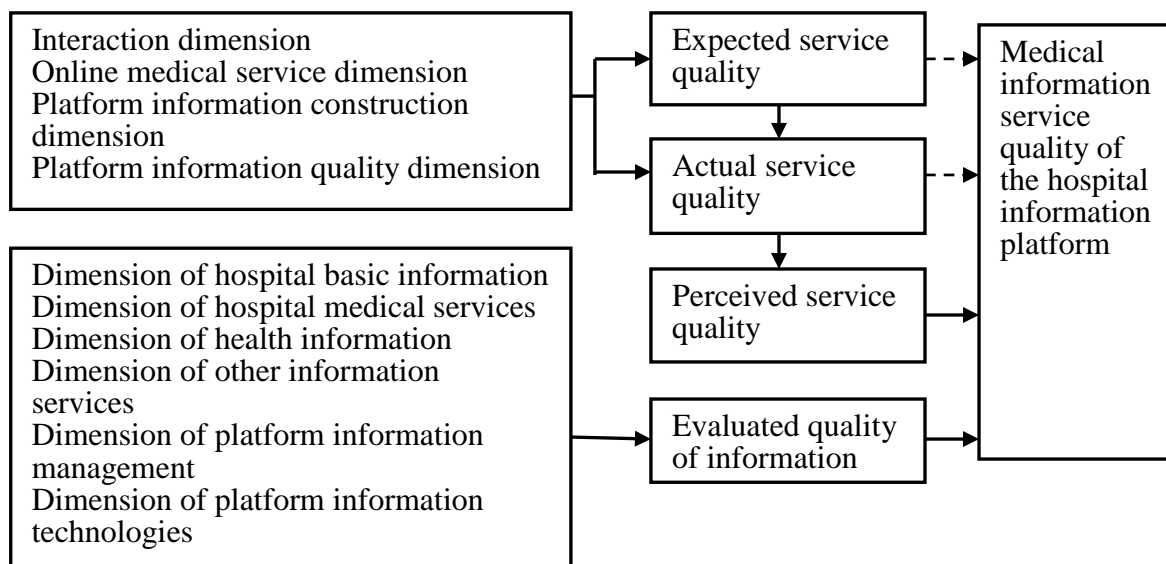
Source: the author.

3.4 System Construction of Information Service Quality Indicators of WZPH Information Platform

3.4.1 Initial Set of Evaluation Indicators and Dimensions

On the basis of relevant literature and research on medical information service quality of hospital information platforms in China and other countries, the thesis sorts out initial set of evaluation indicators and dimensions for information service quality of WZPH Information Platform to shed light on the status quo in China. In May 2016, we conducted random pre-survey on 20 public Grade-A Third-level Hospitals in China. By modifying the set, in line with the pre-survey, we form the initial set of evaluation indicators and dimensions for discussion. See Table 3-6.

Table 3-6 Initial Set of Evaluation Attributes, Dimensions and Indicators of Medical Information Service System of WZPH Information Platform

Attribute of Information Service	Dimension	Indicator
Functional quality attribute of information service	Dimension of general hospital information	Logo of visual identity system, hospital profile, hospital scale, expert introduction, chronicle of events, news center and bulletin, contact way and introduction of hospital departments and doctors
	Dimension of tangible medical information service	Opening hours in out-patient and emergency departments, department layout, treatment guidelines, expert schedule and fees;
		Device introduction, hospitalization and discharge procedures, physical examination, companion service, handy service and examination guideline;
		Health insurance information and FAQ (frequently asked questions)
	Dimension of online medical information service	Registration service, telephone appointment, online appointment, E-mail/online/text message consulting, service enquiry, check result enquiry and online complaint;
		Online medical service and virtual hospital
	Dimension of online interactive information	Online forum, message board, academic exchange, survey on the website, online communication, president's mailbox, knowledge about disease, common science and medication, multimedia video, medical laws and regulations, medical education, medication knowledge, academic database and relevant website links

	Dimension of healthcare information	Hospital electronic journals, hospital library and research and education
	Dimension of other information service	Personnel recruitment, software download, advertisement, information of activities and biddings and information disclosure
Resource content attribute of information service	Dimension of resource quality of information service	Readability, accuracy, credibility, comprehensiveness and source of information
	Dimension of resource administration of information service	Copyright, qualification license for operation of website, author's identity, title, accessibility of resource and release time of information
Technology attribute of information service	Dimension of information construction	Information classification and stratification; Navigation mark, website map, format specification, specification of domain name, content retrieval and language
	Dimension of information platform capability	Time taken to open the home page, independent domain name, digital multimedia function, background data and access count

Source: the author.

3.4.2 Evaluation Method and Modification of Evaluation Indicators and Dimensions

In accordance with the principle of combining authority with representativeness, experts to be consulted are composed of professionals in management field with titles of deputy senior and above, experts in hospital informatization, and professionals in IT website design companies so as to better the system structure of information service quality indicators and dimensions of WZPH Information Platform. A two-round questionnaire is carried out to evaluate the system structure of information service quality indicators and dimensions of WZPH Information Platform. In each round, the standard deviations and variances evaluated by experts in the last round are provided so that experts can modify their opinions and system structure. For accuracy, the thesis has conducted data collection to experts' personal information such as name, work unit, professional title, major and working years and analyzed the active coefficient, authority, concordance and difference degree of consultant experts.

(1) Expert Active Coefficient K

The active coefficient refers to the experts' participation. The higher the participation indicated by a higher active coefficient is, the more credible the research is. The coefficient is demonstrated by the collecting rate of expert consultation. The collecting rate of 50% is the minimum number of analyzable questionnaires, 60% acceptable and 80% great (Su, 2014). Calculation equation of expert active coefficient

$$K = \frac{m_i}{m} \tag{3.1}$$

In the equation, k refers to the expert active coefficient, m_i the number of experts participating the evaluation and m the total of experts participating the evaluation.

(2) Expert Authority Degree C^R

The expert authority is of great importance to the reliability of this research; thus, the judgment and processing of results are affected significantly by it. It consists of

two elements: experts' familiarity with the objects; the reason for experts' judgment.

The reason for judgment is composed of such factors as theoretical basis, experiential basis, intuitive basis and peer acquaintance. If the sum of factors is 1, it indicates that it has great influence on experts' judgment, 0.8, moderate influence, 0.6, less influence and 0, no influence. The experts' familiarity degree varies from very familiar 0.9, familiar 0.7, know 0.5, know something 0.3, unfamiliar 0.1 to very unfamiliar 0 (Boulkedid, 2011). Calculation equation of expert familiarity degree:

$$C^R = \frac{C_a + C_b + C_c}{3} \tag{3.2}$$

In the equation, C^R refers to the expert authority degree, C_a the reason for judgment, C_b the expert familiarity with questionnaire and C_c the academic level of the expert.

(3) Expert Concordance Coefficient w

Concordance coefficient indicates experts' consistency on indicators, which reflects the reliability of consulting results. Generally, the more commonly recognized a thing is, the more reliable it is. Therefore, in the value interval of 0 to 1, the higher the concordance coefficient is, the higher the expert coordination and credibility is, but not vice versa (Gallego & Bueno, 2014). Calculation equation:

$$w = \frac{12}{m^2(n^3 - n) - m\sum_{i=1}^{m} T_i} \sum_{j=1}^{n} d_j^2 \tag{3.3}$$

In equation 3.3, m refers to the sum of experts, n the sum of indicators, d_j the means' difference between the sum of grades for indicator j evaluated by all the experts and the sum of the evaluation grades for all the indicators, T_i correction coefficient of grades, T_i calculation equation:

$$T_i = \sum_{i=1}^{L} (t_i^3 - t_i) \tag{3.4}$$

(4) Expert Difference Coefficient Q

The expert difference coefficient Q indicates the difference of expert opinion. This variable coefficient demonstrates different degree of expert recognition of the evaluated indicators. The smaller the variable coefficient is, the less the difference of expert opinion is. Calculation equation of variable coefficient:

$$Q_i = \frac{s_i}{v_i} \qquad\qquad (3.5)$$

In the equation, Q_i refers to the variable coefficient of indicator i, s_i standard deviation and v_i weighted arithmetic mean.

3.4.3 First Round Result of Expert Consultation

The first round of expert consultation was held in August 2016. See details in Appendix "Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform: First-round of Expert Consultation". Twenty questionnaires were given out in the first round and all of them were collected as valid questionnaires. All the data of questionnaires were recorded into SPSS so as to figure out the arithmetic average and standard deviation.

After summarizing statistics about expert opinions and scores, the following results were obtained:

(1) According to the expert opinions and overlapping content, "three Technology attributes of information service" are combined with "two Resource content attributes of information service". Their respective arithmetic averages are less than 3, which does not reach the predetermined indicator of consistency.

(2) In the"1 Functional quality attribute of information service", "1.1 Dimension of hospital general information", "1.2 Dimension of tangible medical service", "1.3 Dimension of online medical service", "1.4 Dimension of online interactive information", "2.1 Dimension of resource quality of information service", "2.2 Dimension of resource administration of information service" and "3.1 Dimension of

information construction", the arithmetic averages all exceed 3 and there is no combination or deletion in expert opinions, thus meeting the requirement of consistency.

(3) 30 indicators including 1.1.1 and 1.1.3 with scores less than 3 are deleted due to overlapping. See details in Table 3-7.

(4) For clearness, experts advise to rearrange and modify some dimensions.

Table 3-7 Statistical Summary of First Round of Attributes or Dimensions

Attributes or dimensions	Arithmetic average	Standard deviation	Attributes or dimensions	Arithmetic average	Standard deviation
1	3.55	0.51	1.4.10 delete	2.95	0.69
1.1	3.55	0.51	1.4.11	3.3	0.66
1.1.1 delete	2.15	0.93	1.4.12	3.25	0.55
1.1.2	3.9	0.45	1.4.13	3.5	0.61
1.1.3 delete	1.85	0.93	1.4.14	3.7	0.47
1.1.4	3.65	0.49	1.5 delete	2.85	0.37
1.1.5 delete	1.8	0.95	1.5.1 delete	2.7	0.47
1.1.6	3.8	0.52	1.5.2 delete	2.75	0.55
1.1.7	3.9	0.45	1.5.3 delete	2.8	0.41
1.1.8 delete	2	0.85	1.5.4 delete	2.95	0.39
1.2	3.35	0.59	1.6 delete	2.2	0.41
1.2.1	3.85	0.37	1.6.1 delete	2.9	0.91
1.2.2 delete	2.55	0.95	1.6.2 delete	2.85	0.93
1.2.3 delete	2.05	0.89	1.6.3 delete	2.85	0.67
1.2.4 delete	2.2	0.95	1.6.4 delete	2.95	0.69
1.2.5 delete	2.85	0.86	1.6.5	3.3	0.57
1.2.6 delete	2.95	0.83	2 combine	2.1	0.91
1.2.7 delete	2.75	0.91	2.1	3.25	0.44
1.2.8 delete	2.85	0.67	2.1.1	3.35	0.49
1.2.9	3.15	0.49	2.1.2	3.35	0.49
1.2.10	3.4	0.5	2.1.3	3.4	0.5
1.2.11delete	2.85	0.81	2.1.4	3.3	0.47
1.2.12	3.4	0.6	2.1.5	3.5	0.61
1.2.13 delete	2.9	0.85	2.2	3.15	0.49

1.3	3.45	0.83	2.2.1	3.6	0.5
1.3.1	3.8	0.41	2.2.2 delete	2.8	0.83
1.3.2	3.95	0.39	2.2.3	3.2	0.7
1.3.3	3.95	0.39	2.2.4	3.15	0.59
1.3.4	3.55	0.83	2.2.5	3.25	0.55
1.3.5	3.6	0.5	2.2.6	3.5	0.51
1.3.6	3	0.65	3 combine	2.15	0.93
1.3.7 delete	2.8	0.95	3.1	3.1	0.45
1.3.8 delete	2.95	0.51	3.1.1	3.25	0.55
1.3.9	3.7	0.57	3.1.2	2.9	0.45
1.3.10	3.55	0.51	3.1.3	3.15	0.49
1.3.11	3.35	0.67	3.1.4	3.35	0.59
1.4	3.25	0.55	3.1.5	3.25	0.55
1.4.1	3.25	0.55	3.1.6	3.4	0.68
1.4.2	3.3	0.57	3.1.7	3.7	0.47
1.4.3	3.25	0.55	3.1.8	4	0
1.4.4	3.35	0.59	3.2 delete	2.95	0.51
1.4.5	3.45	0.51	3.2.1 delete	2.9	0.55
1.4.6	4	0.32	3.2.2	3.2	0.52
1.4.7	3.4	0.6	3.2.3 delete	2.8	0.62
1.4.8	3.3	0.57	3.2.4	3.05	0.6
1.4.9	3	0.46			

Source: the author.

In accordance with expert opinion of first round, this thesis has modified the dimensions and indicators and sorted out Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform (Second Edition)—see in Figure 3-2 and Second-round of Expert Consultation—see in Appendix 2.

Figure 3-3 Dimension Structure of Information Service Quality Indicator System

of WZPH Information Platform (Second Edition)
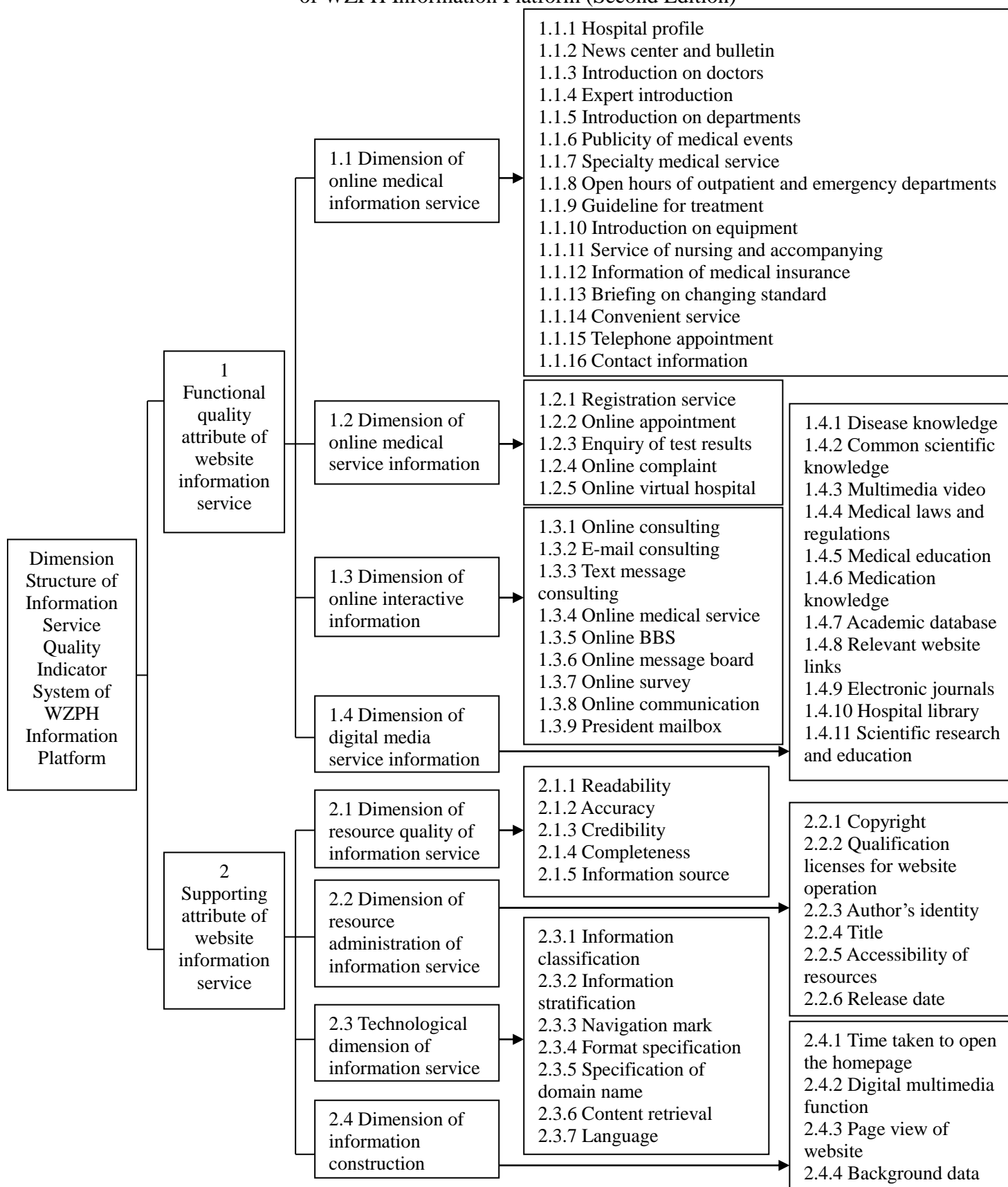
Source: the author.

3.4.4 Second Round Result of Expert Consultation

The second round of expert consultation was arranged in November 2016, and the consultation table is shown in Appendix 2. In the second round, 23 questionnaires were issued, and 20 valid responses were received. All the questionnaires were summed up and analyzed with the SPSS software for the arithmetic average and standard deviation of the items.

Figure 3-4 is the final version of Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform, in which the nine indicators of 1.1.4, 1.3.6, 1.3.8, 1.3.9, 1.4.8, 1.4.10, 1.4.11, 2.1.3 and 2.3.6 are deleted because their arithmetic averages did not exceed the pre-set consistency index of three. For the reason of expert opinion and content overlapping, 1.4.5 is renamed. The arithmetic averages of the remaining dimensions are all bigger than three and experts did not suggest merging or deleting them; therefore, they have reached the consistency standard and been kept in Table 3-8.

Table 3-8 Statistical Summary of Second Round of Attributes or Dimensions

Attributes or dimensions	Arithmetic average	Standard deviation	Attributes or dimensions	Arithmetic average	Standard deviation
1	4.95	0.22	1.4.3	4.95	0.22
1.1	4.85	0.37	1.4.4	4.90	0.31
1.1.1	5.00	0	1.4.5 rename	4.80	0.41
1.1.2	5.00	0	1.4.6	4.80	0.41
1.1.3	4.90	0.31	1.4.7	5.00	0
1.1.4 delete	2.70	0.47	1.4.8 delete	2.75	0.55
1.1.5	4.85	0.37	1.4.9	4.75	0.44
1.1.6	4.95	0.22	1.4.10 delete	2.80	0.52
1.1.7	4.95	0.22	1.4.11 delete	2.80	0.62
1.1.8	4.95	0.22	2	4.95	0.22
1.1.9	4.95	0.22	2.1	4.95	0.22
1.1.10	4.85	0.37	2.1.1	4.85	0.37
1.1.11	4.85	0.37	2.1.2	4.85	0.37

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1.1.12	4.90	0.31	2.1.3 delete	2.60	0.75
1.1.13	4.95	0.22	2.1.4	4.90	0.31
1.1.14	5.00	0	2.1.5	5.00	0
1.1.15	5.00	0	2.2	4.95	0.22
1.1.16	5.00	0	2.2.1	4.90	0.31
1.2	4.95	0.22	2.2.2	4.85	0.37
1.2.1	4.95	0.22	2.2.3	4.95	0.22
1.2.2	4.90	0.31	2.2.4	4.75	0.44
1.2.3	4.90	0.31	2.2.5	4.90	0.31
1.2.4	4.95	0.22	2.2.6	4.95	0.22
1.2.5	4.90	0.31	2.3	4.90	0.31
1.3	4.90	0.31	2.3.1	4.95	0.22
1.3.1	4.90	0.31	2.3.2	5.00	0
1.3.2	4.95	0.22	2.3.3	4.85	0.37
1.3.3	4.80	0.41	2.3.4	4.95	0.22
1.3.4	4.95	0.22	2.3.5	4.85	0.37
1.3.5	4.95	0.22	2.3.6 delete	2.55	0.61
1.3.6 delete	2.70	0.57	2.3.7	4.85	0.37
1.3.7	4.85	0.37	2.4	4.90	0.31
1.3.8 delete	2.55	0.51	2.4.1	4.90	0.31
1.3.9 delete	2.45	0.51	2.4.2	4.85	0.37
1.4	4.85	0.37	2.4.3	4.85	0.37
1.4.1	4.85	0.37	2.4.4	4.85	0.37
1.4.2	4.95	0.22			

Source: the author.

In accordance with expert opinions of the second round, this thesis has modified the dimensions and indicators and mapped out the final version of the Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform — see in Figure 3-4.

Figure 3-4 Dimension Structure of Information Service Quality Indicator System

of WZPH Information Platform (Final Version)

Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform	1 Functional quality attribute of website information service	1.1 Dimension of online medical service

1.1.1 Hospital profile
1.1.2 News center and bulletin
1.1.3 Doctors introduction
1.1.4 Department introduction
1.1.5 Matter disclosure
1.1.6 Features treatment
1.1.7 Opening hours of outpatient and emergency departments
1.1.8 Treatment guideline
1.1.9 Device introduction
1.1.10 Companion service
1.1.11 Health insurance information
1.1.12 Fees and charges
1.1.13 Handy service
1.1.14 Telephone appointment
1.1.15 Contact information

1.2 Dimension of online medical service information

1.2.1 Registration service
1.2.2 Online appointment
1.2.3 Test result enquiry
1.2.4 Online complaint
1.2.5 Virtual hospital

1.3 Dimension of online interactive information

1.3.1 Online consulting
1.3.2 E-mail consulting
1.3.3 Text message consulting
1.3.4 Online medical service
1.3.5 Online forum
1.3.6 Website survey

1.4 Dimension of digital media service

1.4.1 Disease knowledge
1.4.2 Common scientific knowledge
1.4.3 Multimedia video
1.4.4 Medical laws and regulations
1.4.5 Website resource download
1.4.6 Medication knowledge
1.4.7 Academic database
1.4.8 Electronic journals

2 Supporting attribute of website information service

2.1 Dimension of resource quality of information service

2.1.1 Readability
2.1.2 Accuracy
2.1.3 Completeness
2.1.4 Information source

2.2 Dimension of resource administration of information service

2.2.1 Copyright
2.2.2 Qualification licenses for website operation
2.2.3 Author's identity
2.2.4 Title
2.2.5 Accessibility of resources
2.2.6 Release date

2.3 Dimension of information service

2.3.1 Information classification
2.3.2 Information stratification
2.3.3 Navigation mark
2.3.4 Format specification
2.3.5 Specification of domain name
2.3.6 Language

2.4 Dimension of information construction

2.4.1 Time taken to open the homepage
2.4.2 Digital multimedia function
2.4.3 Page view of website
2.4.4 Background data

Source: the author.

After two rounds of expert consultation, the attributes, dimensions and indicators of the information service evaluation system of WZPH Information Platform have been identified. Based on the above indicators, this thesis has modified Figure 3-2 and developed it into Figure 3-5 the formal version.

Figure 3-5 Theoretical Research Platform of Information Service Quality of WZPH Information Platform (Formal Version)

Functional attribute of online information service	Supportive attribute of online information service		Medical Information Service Quality of the Hospital Information Platform
Dimension of information interaction	Information construction dimension	Expected service quality	
	Resource quality dimension	Actual service quality	
Dimension of medical information service	Dimension of resource management	Perceived service quality	
Dimension of digital media service	Dimension of information service technologies	Evaluated quality of information	
Dimension of medical service information			

Source: the author.

In the platform, the interaction dimension, information construction dimension and resource quality dimension are mainly made up of evaluative indicators, while dimension of digital media service information, dimension of online medical service information, resource management dimension and dimension of information service technologies are mainly comprised of descriptive indicators.

3.4.5 Analysis on Consulting Basis

Through retrieving a galaxy of literature, it is concluded that at least 15 experts are needed when conducting the Delphi Method (Boulkedid, 2011). As a matter of fact, in the literature most scholars hold that the number of consulting experts should range from 15 to 20 (Meyrick, 2003). In this study, the duration of questionnaire release is from August to November 2016 via E-mail and telephone. There are 20 valid consultation forms collected from experts out of 22 in total in the first round, and 20 from 23 in the second round, both conforming to the requirements stipulated in the Delphi Method that the number of experts shall not be less than 15. In order to ensure the randomness and scientificity in choosing experts and make the dimension structure of information service quality indicator system of WZPH Information Platform more reasonable, this study has randomly chosen 101 experts across China to put into the expert bank of consultation object, ranging from professors in management or other disciplines with deputy senior or above titles to information technology experts at hospitals and professional technicians at information technology web design companies. Experts chosen as consultation objects are specialized in multiple fields with inter-disciplinarity such as management, hospital management, public health and information technology, with 75% of them having work experience of more than 10 years. Each round of consultation randomly chooses experts among the 101 consultation objects to send consultation forms.

(1) Status of Experts

Working units, profession, professional titles and working years of consultation experts who participate in this round of consultation are collected in Table 3-9.

Table 3-9 Statistics of Status of Consultation Experts

Statistical dimension	Statistical item	First round of expert consultation		Second round of expert consultation	
		Number of persons	Proportion	Number of persons	Proportion
Working unit	University	16	80%	16	80%
	Web design company	2	10%	2	10%
	Hospital	2	10%	2	10%
Professional title	Professor	10	50%	13	65%
	Associate professor	6	30%	3	15%
	Senior engineer	2	10%	4	20%
	Engineer	2	10%	0	0%
Profession	Hospital management	5	25%	6	30%
	Information management	5	25%	6	30%
	Information technology	5	25%	4	20%
	Electronic business	1	5%	2	10%
	Quality management	2	10%	1	5%
	Public health	2	10%	1	5%
Working years	<10 years	5	25%	4	20%
	≥10 years and <20 years	8	40%	9	45%
	≥20 years	7	35%	7	35%

Source: the author.

(2) Expert Active Coefficient

22 consultation forms have been sent to experts in the first round of expert consultation and 20 valid feedbacks are collected, and in the second round, 23 forms

were sent out and 20 valid feedbacks are collected. As per Equation 3.1, it is concluded that the effective rate of consultation in the first round is 90%, and that in the second round is 86%, both higher than 60%, the minimum theoretical requirements of the return rate of expert consultation form (Boulkedid, 2011; Patrícia et al., 2014).

(3) Expert Authority Degree

Expert authority degree refers to the comprehensive factors considered by an expert when judging indicators in this consultation, which is calculated with data filled in by experts and data from Table 3-10, 3-11, 3-12 and 3-13.

Table 3-10 Expert Academic Level Scale

Weight of academic level	Quantified number	Expert number in the first round	Expert number in the second round
Professor	1	10	13
Associate professor	0.9	6	3
Other senior titles	0.7	0	0
Other associate senior titles	0.5	2	4
Others	0.3	2	0

Source: the author.

Table 3-11 Influential Degree Scale of Expert Judgment Basis

Expert judgment basis	Influence on the experts				
	Almost no	Small part	Some part	Most part	Almost all
Theoretical basis	0	0.075	0.15	0.225	0.3
Experience basis	0	0.125	0.25	0.375	0.5
Literature basis	0	0.1	0.1	0.1	0.1
Intuition basis	0	0.1	0.1	0.1	0.1
Total	0	0.4	0.6	0.8	1

Source: the author.

Table 3-12 Expert Familiarity with Consultation Question

Item	Scale of familiarity					
	Very unfamiliar	Unfamiliar	Know a little	Neither familiar nor unfamiliar	Familiar	Very familiar
Dimension of each attribute	0	0.1	0.3	0.5	0.7	0.9

Source: the author.

Table 3-13 Scale of C_b (Expert Familiarity with Question) and C_a (Judgment Reason)

in the First Round of Consultation

Experts in the first round				Experts in the second round			
No.	Name	C_b	Ca	No.	Name	C_b	Ca
1	Zhang Weibin	0.653	0.798	1	Zhuang Yaru	0.78	0.9525
2	Weng Chongxiong	0.73	0.861	2	Liu Peng	0.78	0.96
3	Liu Zongzhe	0.684	0.788	3	Zhou Zijun	0.82	0.935
4	Guo Xitong	0.7	0.851	4	Liu Shan	0.84	0.9275
5	Liu Jinlan	0.73	0.748	5	Jia Suling	0.84	0.9525
6	Ma Jie	0.7	0.821	6	Zhang Pengzhu	0.86	0.9475
7	Han Lichuan	0.715	0.876	7	Feng Qinchao	0.86	0.9725
8	Jiang Yizhen	0.7	0.834	8	Liu Rong	0.86	0.9525
9	Chen Xi	0.7	0.892	9	Wang Xiaomin	0.82	0.965
10	Chen Qizheng	0.7	0.898	10	Wu Qiang	0.86	0.9475
11	Li Tong	0.623	0.8	11	Fan Hong	0.82	0.9525
12	Huang Yanwen	0.79	0.907	12	Wang Yanzhang	0.88	0.98
13	Che Jianguo	0.73	0.85	13	Cheng Fanyin	0.86	0.96
14	Dai Ningjie	0.715	0.875	14	Han Xuemei	0.84	0.9775
15	Yang Yage	0.776	0.84	15	Liu Fan	0.88	0.98
16	Lang Yiqing	0.776	0.88	16	Ma Jingxiang	0.82	0.9725
17	He Caiqin	0.638	0.898	17	Huang Zhizhong	0.82	0.98
18	Zhuang Yuru	0.715	0.767	18	Wang Zhongyi	0.86	0.96
19	Zhang Zehong	0.792	0.763	19	Liu Li	0.86	0.9675
20	Wang Ying	0.7	0.767	20	Wang Zhaoxin	0.76	0.9725
Total		0.71335	0.8357	Total		0.836	0.96075

Source: the author.

As per the data of expert consultation questionnaires in the first round and the data from Table 3-10, 3-11and 3-12, the value of C_a is 0.836; the value of C_b is 0.713, and the value of C_c, expert academic level, is 0.85. According to aforesaid Equation 3.2, C^R, the value of expert authority degree, is 0.799.

As per the data of expert consultation questionnaires in the second round and the data from Table 3-10, 3-11and 3-12, the value of C_a is 0.961; the value of C_b is 0.836, and the value of C_c, expert academic level, is 0.885. According to aforesaid Equation 3.2, C^R, the value of expert authority degree, is 0.894.

According to the above date the expert authority degree is 0.846. In the Delphi Method, when the expert authority degree > 0.7 (Su, 2014; Patrícia et al., 2016), it can be seen as relatively high (Gallego & Bueno, 2014). Hence, the expert authority degree in this round of expert consultation is quite good.

(4) Expert Concordance Coefficient

Expert concordance coefficient is the indicator of reliability of expert consultation. Expert concordance degree refers to the quantified indicator about the expert consistency. According to the research results of Delphi Method worldwide, after 2-3 rounds of expert consultation, the concordance coefficient may fluctuate around 0.5 most likely (Su, 2014; Doshi & McDonald, 2012). After calculating all dimensions as per Equation 3.3 and 3.4, the concordance coefficients of the first and second round of consultation, are 0.42 and 0.44 respectively. Their difference tests are both P<0.01, which shows that the concordance of expert opinions in the two rounds is quite well.

(5) Expert Difference Coefficient

Expert difference coefficient Qi indicates the concordance degree of experts' opinions on the significance of indicators. The higher the concordance is, the smaller the Qi. In the Delphi Method, Qi≥0.25 indicates the difference among expert opinions on a dimensional indicator coefficient is huge (Gous-Kemp, 2014; Doshi & McDonald, 2012). 18 dimensional indicators' difference coefficients in the first round are over 0.25, and all these 18 dimensions have been adjusted accordingly; while the difference coefficients of 73 dimensional indicators are all between 0.08-0.24 (less than 0.25). In the second round, only one dimension's difference coefficient is bigger

than 0.25, which has been modified, and the difference coefficients of 72 dimensional indicators are all between 0-0.24 (less than 0.25).

In summary, experts have given positive responses to the dimension structure of the indicator system in this thesis quite unanimously, which demonstrates that both the first and second round of research have been recognized by consultation experts as scientific and rational.

3.5 Weight Determination of Information Service Quality Indicators of WZPH Information Platform

3.5.1 Methods for the Construction of Weights

The information service evaluation system of WZPH Information Platform reflects the characteristics and current situation of the information service quality of the platform. The influence of the numerical change of each dimensional indicator on the final evaluation system indicates the importance of the dimensional indicator, viz., its weight in this thesis. Different weight values represent different degrees of influence. The weight values have an unusual effect on the information service evaluation system, and thus to determine and distribute these values is a critical step in studying the evaluation system of hospital information service and plays a key role in the evaluation system's scientific and objective reflection of information service quality of the hospital information platform.

There are two methods to construct the weights:

(1) Mathematical Calculation

The method of mathematical calculation refers to the use of mathematical statistics or mathematical design to conduct weighting. Common sorts of such method include Delphi, analytic hierarchy process (AHP), statistical weighting and key survey, among which researchers can choose any of them according to their own needs and the characteristics of the research subject. Although there are many sorts of such method, they have their uniform principle, namely, from high to low, which means

when studying any dimensional indicator set, a researcher should first determine the weights of the primary indicators and then the weights of secondary indicators. For example, if the weight value of the study object is 10, then the sum of weights of next level should be 10, and they play less influence on the final weight values as the indictor level drops.

(2) Judgment through Comprehensive Experience

The method of judgment through comprehensive experience is to judge the weight values of dimensional indicators by experts or professionals with rich experience in related academic research or industry. Though featuring fast speed, simple process and convenience, the method is based on subjective judgment, which makes it possible to affect the accuracy and objectivity of the values. Hence, this method seldom serves as the major one in weight study.

Delphi, also known as method of expert consultation, generally refers to a way in which experts of a discipline or professionals of an industry make evaluation anonymously. The researcher collects, sorts out and calculates the evaluation, gives feedback to the consultants as a basis for representing his own view and asking a small number of experts who disagree greatly with the other experts to give explanation. After several rounds of the procedure, when most of the consultants hold the same view, the weight values of all indicators are set. For its advantages of authority, scientificity, objectivity, accuracy and convenience, the Delphi method can effectively avoid interference factors such as academic authority and personal relationship in group discussion, so that a consultant in weight research can quickly express or change his view without scruples, and other consultants involved are more receptive to the view. Finally, the results have authority, objectivity, scientificity and accuracy. In order to make the weight research authoritative, objective, accurate and scientific, this study adopts the improved Delphi method to study the weight of information service evaluation system of the hospital information platform.

3.5.2 Methods and Process for Weight Research

Through the Delphi method, this thesis conducts two rounds of expert consultation and discussion according to the importance of the dimensional indicators of information service evaluation system of WZPH Information Platform. The consultation form is basically the same as the one constructed in the information service evaluation system in the hospital information platform. The difference lies in that the consulting content is changed into the 4 initial weight schemes and the experts can either choose a scheme from the above four schemes or propose their own ones. If the experts do not have a unified opinion after the first round of consultation, the author can merge and sort out the four schemes and the schemes put forward by experts in the first round.

(1) In the first round, include the four schemes on weights into the questionnaire, and then rank the schemes in accordance with the number of experts who agree with them. The two schemes with the highest support rates are directly encompassed into the next round of consultation.

(2) Compare the initial scheme with the third highest support rate with the weight scheme given in "Your Scheme". If the support rate of the previous one is higher than the one elected through "Your Scheme", then the initial scheme is chosen as the third option in the second round of consultation. If the support rate of the latter one is higher, then it is included in the second round.

(3) Calculate the average values of the four initial schemes in the first round of weight distribution and the weight scheme given in "Your Scheme", and use the calculated results as the fourth alternative in the second round. Carry out the second round of consultation according to the four options obtained above. If there is no "Your Scheme" among indicators at the level, include the four initial schemes into the second round.

(4) After the weight distribution consultation in the second round, the four schemes and the one proposed in " ""Your Scheme" are used to conduct an average calculation and questionnaire consultation, in which the consultants include experts in

the first and second rounds. The expert support rates of all schemes in the second round (including support rates in the first round) are calculated, and the one with the highest support rate in the first and second rounds and the rate is higher than 0.5 in the second round are the final weight scheme of information service evaluation system of WZPH Information Platform.

3.5.3 First Round Result of Expert Consultation on Weight Distribution

In January 2017, the author conducted the first round of weight distribution consultation, with experts who participated in the first round of consultation on the dimensional structure of the evaluation indicator system. In the consultation, the author sent 20 forms for opinions on the set schemes and 20 forms for proposed schemes (Your Scheme), and collected 40 effective replies. Then the author summarized the experts' suggestions and opinions on the 4 initial schemes and their own schemes, as is shown in Table 3-14 and Table 3-15.

Table 3-14 Data in First Round of Weight Statistics

(Consultation Form for Expert Opinion)

Indicator	No.	Evaluation Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
Primary	1	1-2	2		**6**	**12**	
Secondary	3	1.1-1.4		**9**	2	**7**	2
	4	2.1-2.4	**5**	**14**		1	
	5	1.1.1-1.1.15	**12**	**7**	1		
	6	1.2.1-1.2.5			**9**	**11**	
	7	1.3.1-1.3.6		1	**9**	**10**	
Tertiary	8	1.4.1-1.4.8		**6**	**12**	2	
	9	2.1.1-2.1.4	2	**9**		**9**	
	10	2.2.1-2.2.6	1	4	**7**	**8**	
	11	2.3.1-2.3.6	1	1	**9**	**9**	
	12	2.4.1-2.4.4	5	**6**		**9**	

Numbers in bold with underline are the two schemes with the highest support rates

Source: the author.

Table 3-15 Data in the First Round of Weight Statistics

(Consultation Form for Expert Scheme)

Indicator	No.	Evaluation Indicator	Your Scheme 1	Your Scheme 2
Secondary	1	1.1-1.4	4	9

Source: the author.

3.5.4 Second Round Result of Expert Consultation on Weight Distribution

Because the support rates of most schemes in the first round did not exceed 0.5, the author carried out in February 2017 the second round of weight distribution consultation, with experts who had participated in the second round of consultation on the dimensional structure and the first round of consultation on weight distribution (experts' schemes). 20 consultation forms for opinions on weight distribution and 80 consultation forms for experts' own schemes (Your Scheme) were sent out, and 100 effective replies were received. The author summarized experts' suggestions and support about the 4 initial schemes in the second round and their own schemes, as is shown in Table 3-16. For that the support rates of each dimensional indicators are higher than 0.5, we will not conduct a third round of consultation, but just calculates the experts' proposed schemes put forward in the second round, as is shown in Table 3-17. The scheme with the highest support rate added in the two rounds is chosen as the final scheme of weight distribution for information service evaluation system of WZPH Information Platform, as is shown in Table 3-18.

Table 3-16 Data in Second Round of Weight Statistics

(Consultation Form for Expert Opinion)

Indicator	No.	Evaluation Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
Primary	1	1-2	1		4	**15**	
Secondary	2	1.1-1.4		1	**15**	4	
	3	2.1-2.4		**15**		5	
Tertiary	4	1.1.1-1.1.15	**13**	4	1		2
	5	1.2.1-1.2.5	1	1	5	**13**	
	6	1.3.1-1.3.6			5	**15**	
	7	1.4.1-1.4.8		**15**	3	2	
	8	2.1.1-2.1.4	2	**17**	1		
	9	2.2.1-2.2.6			5	**15**	
	10	2.3.1-2.3.6			**16**	4	
	11	2.4.1-2.4.4	5			**15**	

Numbers in bold with underline are the two schemes with the highest support rates

Source: the author.

Table 3-17 Data in Second Round of Weight Statistics

(Consultation Form for Expert Scheme)

Indicator	No.	Evaluation Indicator	Your Scheme 1	Your Scheme 2
Tertiary	1	1.1.1-1.1.15	4	3

Source: the author.

Table 3-18 Added Data in First and Second Round of Weight Statistics

Indicator	No.	Evaluation Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4
Primary	1	1-2	3		10	**27**
Secondary	2	1.1-1.4	9	8	**24**	4
			Original First-round Scheme 2	Original First-round Scheme 4	Original First-round My Scheme 2	Original First-round Scheme Average
	3	2.1-2.4	5	**29**		6
Tertiary	4	1.1.1-1.1.15	**25**	11	2	
	5	1.2.1-1.2.5	1	1	14	**24**
	6	1.3.1-1.3.6		1	14	**25**
	7	1.4.1-1.4.8		**21**	15	4
	8	2.1.1-2.1.4	4	**26**	1	9
	9	2.2.1-2.2.6	1	4	12	**23**
	10	2.3.1-2.3.6	1	1	**25**	13
	11	2.4.1-2.4.4	10	6		**24**

Numbers in bold with underline are the two schemes with the highest support rates

Source: the author.

Through the first and second rounds of expert consultation, the final weight distribution scheme is determined. The combined weight values of secondary and tertiary indicators are obtained through multiplication. The combined weight values of the secondary indicators are obtained by Equation 3.6, while those of tertiary indicators are got by Equation 3.7.

$$S_{wi} = S_{1i} \times S_{2i} \tag{3.6}$$

S_{wi} is the combined weight value of the secondary indicators, S_{1i} refers to the weight of primary indicator corresponding to indicator i, and S_{2i} the weight of secondary indicator corresponding to indicator i. See Table 3-19.

$$S_{wi} = S_{1i} \times S_{2i} \times S_{3i} \tag{3.7}$$

S_{wi} is the combined weight value of the tertiary indicators, S_{1i} refers to the weight of primary indicator corresponding to indicator i, S_{2i} the weight of secondary indicator corresponding to indicator i, and S_{3i} the weight of tertiary indicator corresponding to indicator i. See Table 3-19.

Table 3-19 Indicator Combined Weight Values of Information Service Evaluation
System of WZPH Information Platform

(1) Distribution Scheme of Primary Indicators

No.	Evaluation Indicator	Scheme 4	Weight Value
1	Functional quality attribute of website information service	70	0.7
2	Supporting attribute of website information service	30	0.3
Total			1

(2) Distribution Scheme of Secondary Indicators

No.	Evaluation Indicator	Scheme 3 Original First-round My Scheme 2)	Combined Weight Value
1.1	Dimension of online medical information services	35	0.245
1.2	Dimension of online medical service information	30	0.21
1.3	Dimension of online interactive information	20	0.14
1.4	Dimension of digital media service information	15	0.105
No.	Evaluation Indicator	Scheme 2	Combined Weight Value
2.1	Dimension of resource quality of information service	40	0.12
2.2	Dimension of resource administration of information service	30	0.09
2.3	Dimension of information service technology	15	0.045
2.4	Dimension of information construction	15	0.045
Total			1

(3) Distribution Scheme of Tertiary Indicators

No.	Evaluation Indicator	Scheme 1	Combined Weight Value
1.1.1	Hospital Profile	10	0.0245
1.1.2	News and Bulletin	7	0.01715
1.1.3	Introduction of Hospital Experts	7	0.01715
1.1.4	Introduction of Departments	5	0.01225
1.1.5	Publicity of Medical Events	5	0.01225
1.1.6	Special Medical Treatment	5	0.01225
1.1.7	Emergency Service and Outpatient Service Hour	10	0.0245
1.1.8	Treatment Guidelines	10	0.0245
1.1.9	Device Introduction	10	0.0245
1.1.10	Accompanying Services	4	0.0098
1.1.11	Medical Insurance Information	5	0.01225
1.1.12	Charging Standard Notes	5	0.01225
1.1.13	Handy Services	5	0.01225
1.1.14	Appointments and Registration by Phone	6	0.0147
1.1.15	Contact Information	6	0.0147

No.	Evaluation Indicator	Scheme 4	Combined Weight Value
1.2.1	Signing in Service	25	0.0525
1.2.2	Online Appointment and Registering	35	0.0735
1.2.3	Examination Results Query	25	0.0525
1.2.4	Online Complaint	10	0.021
1.2.5	Virtual Hospital	5	0.0105

No.	Evaluation Indicator	Scheme 4	Combined Weight Value
1.3.1	Online Advisory	30	0.042
1.3.2	E-mail Advisory	10	0.014
1.3.3	Text Message Advisory	10	0.014
1.3.4	Online Medical Service	30	0.042
1.3.5	BBS	15	0.021
1.3.6	Online Message Board	5	0.007

No.	Evaluation Indicator	Scheme 2	Combined Weight Value
1.4.1	Disease Knowledge	15	0.01575
1.4.2	Popular Science	15	0.01575
1.4.3	Multimedia Video	7.5	0.007875
1.4.4	Medical Policy	15	0.01575
1.4.5	Medical Education	7.5	0.007875
1.4.6	Drug Usage	15	0.01575

Factors Influencing Information Service Quality
of the Information Platform of Wenzhou Municipal People's Hospital

No.	Evaluation Indicator	Scheme	Combined Weight Value
1.4.7	Academic Database	12.5	0.013125
1.4.8	Hospital E-journal	12.5	0.013125
No.	Evaluation Indicator	Scheme 2	Combined Weight Value
2.1.1	Readability	20	0.024
2.1.2	Accuracy	30	0.036
2.1.3	Completeness	20	0.024
2.1.4	Information Source	30	0.036
No.	Evaluation Indicator	Scheme 4	Combined Weight Value
2.2.1	Copyright	35	0.0315
2.2.2	Qualification Licenses for Website Operation	25	0.0225
2.2.3	Author's Identity	10	0.009
2.2.4	Title Marking	10	0.009
2.2.5	Accessibility of Resource	10	0.009
2.2.6	Release Date	10	0.009
No.	Evaluation Indicator	Scheme 3	Combined Weight Value
2.3.1	Information Classification	25	0.01125
2.3.2	Information Stratification	10	0.0045
2.3.3	Navigation Mark	20	0.009
2.3.4	Format Specification	20	0.009
2.3.5	Specification of Domain Name	10	0.0045
2.3.6	Language	15	0.00675
No.	Evaluation Indicator	Scheme 4	Combined Weight Value
2.4.1	Time Taken to Open the Homepage	30	0.0135
2.4.2	Digital Multimedia Function	20	0.009
2.4.3	Website Page view	20	0.009
2.4.4	Background Data	30	0.0135
Total			1

Source: the author.

Chapter 4: Comprehensive Evaluation System for Medical Information Service of WZPH Information Platform

4.1 Indicator Quantification of Evaluation System and Assignment Standard

After determining the structure and weight of the comprehensive evaluation system, to improve it and strengthen its operability, there is still need to take different quantitative assignment methods in accordance with the characteristics of each indicator. Since the assignment interval of all the indicators in the comprehensive evaluation system is set within [0, 1], the total interval is also in [0, 1]. According to the characteristics of each indicator, different grades and quantified assignments are divided, and the quantitative scores of all the indicators are calculated. The quantification and assignment of all the indicators are shown in Table 4-1 to Table 4-8.

Table 4-1 Quantification and Assignment Standard of Dimension of Comprehensive Evaluation System for Medical Information Service of WZPH Information Platform

No.	Evaluation Indicator	Quantified Assignment
1.1.1	Hospital profile	
1.1.2	News and Bulletin	
1.1.3	Introduction of Doctors	
1.1.4	Introduction of Departments	
1.1.5	Publicity of Medical Events	
1.1.6	Special Medical Treatment	
1.1.7	Emergency Service and Outpatient Service Hour	See Table 4-9 for explanation
1.1.8	Treatment Guidelines	
1.1.9	Device Introduction	
1.1.10	Accompanying Service	
1.1.11	Medical Insurance Information	
1.1.12	Charging Standard Notes	
1.1.13	Hand Service	
1.1.14	Appointments and Registration by Phone	0 0.34 0.67 1
1.1.15	Contact Information	See Table 4-9 for explanation

Source: the author.

Table 4-2 Quantification and Assignment Standard of Dimension of Online Medical

Service Information

No.	Evaluation Indicator	Quantified Assignment			
1.2.1	Signing in Service	0	0.34	0.67	1
1.2.2	Online Appointments and Registering		1	0	
1.2.3	Examination Results Query		1	0	
1.2.4	Online Complaint		1	0	
1.2.5	Virtual Hospital	See Table 4-9 for explanation			

Source: the author.

Table 4-3 Quantification and Assignment Standard of Dimension of Online

Interactive Information

No.	Evaluation Indicator	Quantified Assignment			
1.3.1	Online Advisory				
1.3.2	E-mail Advisory	See Table 4-9 for			
1.3.3	Text message Advisory	explanation			
1.3.4	Online Medical Service	0	0.5	1	
1.3.5	BBS	0	0.34	0.67	1
1.3.6	Online Message Board		1	0	

Source: the author.

Table 4-4 Quantification and Assignment Standard of Dimension of Digital Media

Service Information

No.	Evaluation Indicator	Quantified Assignment			
1.4.1	Disease Knowledge	0	0.34	0.67	1
1.4.2	Popular Science	0	0.34	0.67	1
1.4.3	Multimedia Video	0	0.34	0.67	1
1.4.4	Medical Policy		1	0	
1.4.5	Medical Education	0	0.34	0.67	1
1.4.6	Drug Usage		0	1	
1.4.7	Academic Database	0	0.5	1	
1.4.8	Hospital E-journal	0	0.34	0.67	1

Source: the author.

Table 4-5 Quantification and Assignment Standard of Dimension of Resource Quality

of Information Service

No.	Evaluation Indicator	Quantified Assignment			
2.1.1	Readability	0	0.34	0.67	1
2.1.2	Accuracy	0	0.34	0.67	1
2.1.3	Completeness	0	0.34	0.67	1
2.1.4	Information Source	See Table 4-9 for explanation			

Source: the author.

Table 4-6 Quantification and Assignment Standard of Dimension of Resource

Administration of Information Service

No.	Evaluation Indicator	Quantified Assignment			
2.2.1	Copyright	1		0	
2.2.2	Qualification Licenses for Website Operation	See Table 4-9 for explanation			
2.2.3	Author's Identity	See Table 4-9 for explanation			
2.2.4	Title Marking	0	0.34	0.67	1
2.2.5	Accessibility of Resource	0	0.34	0.67	1
2.2.6	Release Date	0	0.5		1

Source: the author.

Table 4-7 Quantification and Assignment Standard of Technological Dimension of

Information Service

No.	Evaluation Indicator	Quantified Assignment			
2.3.1	Information Classification	See Table 4-9 for explanation			
2.3.2	Information Stratification	0	0.34	0.67	1
2.3.3	Navigation Mark	See Table 4-9 for explanation			
2.3.4	Format Specification	See Table 4-9 for explanation			
2.3.5	Specification of Domain Name	0	0.5		1
2.3.6	Language	0	0.34	0.67	1

Source: the author.

Table 4-8 Quantification and Assignment Standard of Dimension of Information

Construction

No.	Evaluation Indicator	Quantified Assignment			
2.4.1	Time Taken to Open the Homepage	0	0.34	0.67	1
2.4.2	Digital Multimedia Function	See Table 4-9 for explanation			
2.4.3	Website Pageview	1		0	
2.4.4	Background Data	0	0.34	0.67	1

Source: the author.

4.2 Explanation of Evaluation Indicator Assignment

The quantitative assignment of all standards in the comprehensive evaluation system in the research can be divided into two types: "Established" and "To be established". "Established" means that a specific function is available on the hospital website, with a corresponding page or section to ensure users' access to it. "To be established" refers to that a specific function is not yet available nor has no corresponding pages or sections to ensure its use. Even though some functions are available and have corresponding pages or sections, when users click the function and a dialog box reading "Being established" pops up, those functions are also categorized as the "To be established". For details about the quantitative assignment of all standards in the comprehensive evaluation system, see Table 4-9.

Table 4-9 The Quantification and Assignment Standards of the Dimensions of Online Medical Information Services

No.	Evaluation Standards	Description of Quantitative Assignment
Quantitative assignment of the dimensions of online medical information services		
1.1.1	Hospital Profile	The Hospital Profile item includes ten sub-items: (Introduction, Logo, History, Leadership, Culture, Qualification, Honor, Environment, Words by the President and Video of the hospital.) Each of these items has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: $$\frac{1}{n}\sum_{i=1}^{n}W_i$$ "n" is the number of the sub-items and equals 10. W_1 is the specific value of the i sub-item.
1.1.2	News and Bulletin	The News and Announcement include two sub-items: News and Announcement, respectively valued 0.7 and 0.3. According to the updating frequency, the sub-item News falls into four categories, no updating, updating every one month and over, updating every week and updating every two days, which are valued respectively 0, 0.34, 0.67 and 1. The sub-item Announcement has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: $$0.7\times W_1+0.3\times W_2$$ $W_1$is the value of News and W_2 is that of Announcement.
1.1.3	Introduction of Hospital Experts	The Introduction of Hospital Experts includes five sub-items: (Personal Introduction, Expertise, Honor and Academic Achievements, Positions and Contacts.) This item has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: $$\frac{1}{n}\sum_{i=1}^{n}W_i$$ "n" is the number of the sub-items and equals 5. W_i is the specific value of the i sub-item.

| 1.1.4 | Introduction of Departments | The item Introduction of Departments includes five sub-items: (Departments Introduction, Expertise, Medical Teams, Honor and Contacts.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 5.
W_i is the specific value of the i sub-item.

| 1.1.5 | Publicity of Medical Events | The Publicity of Medical Events includes five sub-items: (Clinical Service Management, Nursing Management, Hospital Regulations, Academic Research and Medical Education.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 5.
W_i is the specific value of the i sub-item.

| 1.1.6 | Special Medical Treatment | The Special Medical Treatment includes three sub-items: Programs, Introduction and Effects. It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 3.
W_i is the specific value of the i sub-item.

| 1.1.7 | Emergency Service and | The Emergency Service and Outpatient Service Hour include two sub-items: Time and Doctors. It has two levels: |

	Outpatient Service Hour	"Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is:

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 2.
W_i is the specific value of the i sub-item.

1.1.8	Treatment Guidelines	The Treatment Guidelines include eight sub-items: (Transportation Guides, Hospital Indoor Navigation, Outpatient Information, Registration Information, Emergency Information, Medical Test Information, Inpatient Treatment and Discharge Guidelines.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is:

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 8.
W_i is the specific value of the i sub-item.

1.1.9	Device Introduction	The Device Introduction includes five sub-items: (Types, Names, Functions, Distribution and Numbers.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is:

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 5.
W_i is the specific value of the i sub-item.

| 1.1.10 | Accompanying Service | The Accompanying Service includes five sub-items: (Home Care, Inpatient Care, Postpartum Care, Pregnancy Care and Others.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 5.
W_i is the specific value of the i sub-item.

| 1.1.11 | Medical Insurance Information | The Medical Insurance Information includes four sub-items: (News, Policies, Guidelines, and Organizations.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 4.
W_i is the specific value of the i sub-item.

| 1.1.12 | Charging Standard Notes | The Charging Standard Notes include six sub-items: (Outpatient, Emergency and Comprehensive Medical Services, Traditional Chinese and Folk Medicine, Medical Technologies, Clinical Treatment, Special Medical Treatment Services and Pharmaceutical Drugs.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 6.
W_i is the specific value of the i sub-item.

| 1.1.13 | Handy Service | The item Handy Services includes ten sub-items: (Guiding Services, Drinking Water, Body Temperature Measurement, Presbyopic Glasses, Wheelchairs and Stretchers, Medical Record Copying, Free Magazines, Parking Guides, Testing Report Post Service and Others.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n} W_i$$

"n" is the number of the sub-items and equals 10.
W_i is the specific value of the i sub-item.

| 1.1.14 | Appointments and Registration by Phone | According to its functions, the item Appointments and Registration by Phone has four levels: |

(1)   No telephone appointment service is provided on the website, which is valued 0.
(2)   The website offers telephone number for appointment but it is not accessible. The value is 0.34.
(3)   The website has accessible telephone number but users cannot make appointment through it. The value is 0.67.
(4)   The website provides telephone appointment service and users can make an appointment successfully, which is valued 1.

The state that the website provides telephone appointment service and users can make an appointment successfully is: when researchers acting as patients make an appointment over the telephone, operators answer the phone promptly, make a registration in appropriate departments for the patients according to the symptoms described by the researchers, record the patients' information and thus finish all the registration procedures.

| 1.1.15 | Contact Information | The Contact Information includes ten sub-items for contacting the hospitals: (Hospital Switchboard, Phone Numbers of Departments, Discipline Inspection Phone Number, E-mail Address, Hospital Address, Location, Traffic, Digital Map, President's Mail-box and Others.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is: |

$$\frac{1}{n}\sum_{i=1}^{n} W_i$$

"n" is the number of the sub-items and equals 10.

W_i is the specific value of the i sub-item.

Online medical service information

1.2.1 Signing in Service

According to its functions, The Signing in Service has four levels:
(1) The hospital website does not provide registration service. The value is 0.
(2) The website provides registration service but users cannot finish the registration. The value is 0.34.
(3) The website has registration service and users can register successfully. The value is 0.67.
(4) The website has registration service and users can register successfully and use the registered accounts to use website's functions. The value is 1.

1.2.2 Online Appointments and Registering

The Online Appointments and Registering has two levels: "Established" valued 1 and "To be established" valued 0.

1.2.3 Examination Results Query

According to patients' names and medical service numbers, the Examination Results Query has two levels: "Established" valued 1 and "To be established" valued 0.

1.2.4 Online Complaint

The Online Complaint item has two levels: "Established" valued 1 and "To be established" valued 0.

1.2.5 Virtual Hospital

The Virtual Hospital includes six sub-items:
(Medical Service Appointment, Guidelines, Specialist Clinic, Hospital Indoor Navigation, Online Test and 3D Virtual Hospital.) It has two levels: "Established" valued 1 and "To be established" valued 0. The calculation of the value of the quantitative standard is:

$$\frac{1}{n}\sum_{i=1}^{n}W_i$$

"n" is the number of the sub-items and equals 6.
W_i is the specific value of the i sub-item.

Online interactive information

1.3.1	Online Advisory	Standards of this kind include two parts:
		Service Functions valued 0.6 and Service Quality valued 0.4. The Service Functions has two levels: "Established" valued 1 and "To be established" valued 0. In terms of the value of Service Functions, researchers acting as users send
1.3.2	E-mail Advisory	consultation to designated e-mail address or phone number. According to the time period before the consultation is answered and the accuracy of the answers, the Service Function has four levels: half a month and over, valued 0, in half a month, valued 0.34, in a week, valued 0.67, and in three days, valued 1. The calculation of the value of the quantitative
1.3.3	Text Message Advisory	standard is:

$$0.6 \times W_1 + 0.4 \times W_2$$

W_1 is the value of the Service Functions and W_2 is that of the Service Quality.

1.3.4	Online Medical Service	According to its functions, the Online Medical Service has three levels:

(1) Researchers acting as users try the medical services provided on the hospital website to assign the value of the item. If the website does not provide online medical services, the value is 0.

(2) If the website provides online medical services but users cannot register and further access these services, the value is 0.5.

(3) If the website provides online medical services and these services are accessible for users, the value is 1.

1.3.5	BBS	The BBS item has four levels:

(1) If the website does not provide the function of online forum, the value is 0.

(2) If the website provides this function and users can register and log in to use it, the value is 0.34.

(3) If the website has an online forum and users can register, log in and search for information by categories, but the number of posts is relatively small (less than 100), the value is 0.67.

(4) If the website has an online forum with various functions, users can register, log in and search for information by categories, and the number of posts is relatively large (more than 100), the value is 1.

1.3.6	Online Message Board	This item has two levels: "Established" valued 1 and "To be established" valued 0.

Digital media service information

1.4.1	Disease Knowledge	According to the amount of its contents, the Disease Knowledge has four levels:

(1) If the website does not provide this function, the value is 0.
(2) If the website has this function and the number of knowledge items is no more than 50, the value is 0.34.
(3) If the website provides knowledge about diseases and categorizes these knowledge, and the number of knowledge items is between 50 and 100 (100 included), the value is 0.67.
(4) If the website provides knowledge about diseases and categorizes these knowledge, and the number of knowledge items is over 100, the value is 1.

1.4.2	Popular Science	According to the amount of its contents, the Popular Science has four levels:

(1) If the website does not provide this function, the value is 0.
(2) If the website has this function and the number of knowledge items is no more than 50, the value is 0.34.
(3) If the website provides knowledge about science and categorizes these knowledge, and the number of knowledge items is between 50 (50 included) and 100, the value is 0.67.
(4) If the website provides knowledge about science and categorizes these knowledge, and the number of knowledge items is over 100 (100 included), the value is 1.

1.4.3	Multimedia Video	According to the amount of its contents, the Multimedia Video has four levels:

(1) If the website does not provide this function, the value is 0.
(2) If the website has this function and the number of videos is less than 10, the value is 0.34.
(3) If the website provides multimedia videos and the number of videos is between 10 (10 included) and 50, the value is 0.67.
(4) If the website provides multimedia videos and categorizes videos, and the number of videos is 50 and over, the value is 1.

1.4.4	Medical Policy	The Medical Policy has two levels: "Established" valued 1 and "To be established" valued 0.

1.4.5	Medical Education	According to the amount of its contents, the Medical Education has four levels:

(1) If the website does not provide this function, the value is 0.

(2) If the website has this function and the number of resources for downloading is no more than 10 (10 included), the value is 0.34.

(3) If the website provides resources for downloading and the number is over 10, the value is 0.67.

(4) If the website provides resources for downloading and categorized these resources, and the number is over 50, the value is 1.

1.4.6	Drug Usage	The Drug Usage has two levels: "Established" valued 1 and "To be established" valued 0.
1.4.7	Academic Database	The Academic Database has three levels: an academic database with owned academic resources, an academic database and To be established, which valued respectively 1, 0.5 and 0.
1.4.8	Hospital E-journal	According to its function and contents, the Hospital E-journal has four levels:

(1) If the website does not provide this function, the value is 0.

(2) If the website provides this function, and the number of e-journals is no more than 5 (5 included), the value is 0.34.

(3) If the website has this function, and the number of e-journals is between 5 and 10 (10 included), the value is 0.67.

(4) If the website has e-journals and provides the function of categorization and searching, and the number of the e-journals is over 10, the value is 1.

The resource quality of information service

2.1.1	Readability	According to whether the contents on the hospital website are easy to be understood by users, Readability has four levels valued respectively 0, 0.34, 0.67 and 1.
2.1.2	Accuracy	The Accuracy concerns with the accuracy of information published on the website, pronunciation and grammar. According to this accuracy, the item has four levels valued respectively 0, 0.34, 0.67 and 1.
2.1.3	Completeness	The Completeness is whether the information released by the website covers a sufficiently wide range of topics. According to this Completeness, the item has four levels valued respectively 0, 0.34, 0.67 and 1.

| 2.1.4 | Information Source | The Information Source has five sub-items: (Source of the article, Reprint Mark, Reprint Review, Online Reference Links and Reminding.) It has two levels: "Established" valued 1 and "To be established" valued 0. The total score is 3. The calculation of the value of the quantitative standard is: |

$$\frac{1}{3}\left(\min\left(3, \sum_{i=1}^{n} W_i\right)\right)$$

"n" is the number of the sub-items and equals 5.
W_i is the specific value of the i sub-item.
The "min" function is used to find the smallest value in the given parameter list.

Information service resources management

| 2.2.1 | Copyright | The Copyright has two levels: "Established" valued 1 and "To be established" valued 0. |

| 2.2.2 | Qualification Licenses for Website Operation | The Qualification Licenses for Website Operation includes ten sub-items: (Internet Drug Information Service License, MOH Health Information Service Network Management Review, Internet Medical and Health Information Service License, Internet Education Information Service License, Internet Domain Name Accreditation, Internet Publishing License, Internet Broadcasting Program License, Internet Payment License, Value Added Telecommunication Business license and Others.) It has two levels: "Established" valued 1 and "To be established" valued 0. The total score is 5. The calculation of the value of the quantitative standard is: |

$$\frac{1}{5}\left(\min\left(5, \sum_{i=1}^{n} W_i\right)\right)$$

"n" is the number of the sub-items and equals 10.
W_i is the specific value of the i sub-item.
The "min" function is used to find the smallest value in the given parameter list.

| 2.2.3 | Author's Identity | The Author's Identity includes six sub-items: (Name, Education, Title, Organization, Contact and Others.) It has two levels: "Established" valued 1 and "To be established" valued 0. The total score is 4. The calculation of the value of the quantitative standard is: |

$$\frac{1}{4}\left(\min\left(4, \sum_{i=1}^{n} W_i\right)\right)$$

"n" is the number of the sub-items and equals 6.

W_i is the specific value of the i sub-item.

The "min" function is used to find the smallest value in the given parameter list.

| 2.2.4 | Title Marking | The Title Marking item has four levels: |

(1) If the website does not mark any titles, the value is 0.

(2) If the homepage or a certain web page has a marked title, the value is 0.34.

(3) If the homepage and other pages all have marked titles, the value is 0.67.

(4) If the homepage and other pages have different title marks, the value is 1.

The level of the sub-item is figured out through the random examination of 20 page titles of the hospital's website.

| 2.2.5 | Accessibility of Resources | According to the number of the website's invalid links, the Accessibility of Resources has four levels: |

(1) If the number of invalid links is no less than 10 (10 included), the value is 0.

(2) If the number of invalid links is between 5 and 10, the value is 0.34.

(3) If the number of invalid links is less than 5 (5 included), the value is 0.67.

(4) If the website has no invalid links, the value is 1.

The number of invalid links is figured out through the random examination of 20 internal links of the website.

| 2.2.6 | Release Date | The Release Date has four levels: |

(1) If the publishing time or date is not marked, the value is 0.

(2) If the time or date is marked, the value is 0.5.

(3) If the time and date are both marked, the value is 1.

Information service technology

2.3.1	Information Classification	The Information Classification includes five sub-items:

The Information Classification includes five sub-items:

(1)   The layout of pages on the website.

(2)   The homepage has information classification.

(3)   The information classification is reasonable.

(4)   The information classification meets users' demands.

(5)   The names of classified information are easy to understand.

The above five sub-items have four levels: excellent, good, general and bad, valued respectively 0, 0.34, 0.67 and 1. The calculation of the value of this item is:

$$0.2 \times (w_1 + w_2 + w_3 + w_4 + w_5)$$

w_1, w_2, w_3, w_4 and w_5 are respectively the values of the five sub-items.

2.3.2   Information Stratification

According to the number of the grades of information classification, the item has four levels:

(1)   If the number of the grades is no less than 10, the value is 0.

(2)   If the number of the grades is between 5 and 10, the value is 0.34.

(3)   If the number of the grades is between 4 (4 included) and 5 (5 included), the value is 0.67.

(4)   If the number of the grades is less than 4, the value is 1.

2.3.3   Navigation Mark

The Navigation Mark includes five items:

(A back link to the last page, a back link to the homepage, a back link to the information classification page, a link to homepage prompt message and a navigation map for the website.) It has two levels: "Established" valued 1 and "To be established" valued 0. The total score is 3. The calculation of the value of the quantitative standard is:

$$\frac{1}{3}\left(\min\left(3, \sum_{i=1}^{n} W_i\right)\right)$$

"*n*" is the number of the sub-items and equals 5.

W$_i$ is the specific value of the *i* sub-item.

The level of the sub-item is figured out through the random examination of 20 page titles of the hospital's website.

The "min" function is used to find the smallest value in the given parameter list.

2.3.4	Format Specification	The Format Specification includes eight sub-items:

The Format Specification includes eight sub-items:

(Well-designed pages, user-friendly font size, uniform page layout, appropriate page margin, pagination on long pages, a horizontal scroll bar on large pages, zoom-in and zoom-out function, all browsers supported.) It has two levels: "Established" valued 1 and "To be established" valued 0. The total score is 7. The calculation of the value of the quantitative standard is:

$$\frac{1}{4}\left(\min\left(4, \sum_{i=1}^{n} W_i\right)\right)$$

"n" is the number of the sub-items and equals 8.

Wi is the specific value of the i sub-item.

The level of the sub-items is figured out through the random examination of 20 pages of the hospital's website.

The "min" function is used to find the smallest value in the given parameter list.

2.3.5 Specification of Domain Name

The Specification of Domain Name is whether the URL of the hospital website is composed of the hospital's English name or Chinese pinyin initials, whether it has multiple corresponding domain names and whether users find it easy to remember and use. This item has three levels:

(1) If the domain name is not composed of the hospital's English name or Chinese pinyin initials, and it does not have multiple corresponding domain names, the value is 0.

(2) If the domain name is composed of the hospital's English name or Chinese pinyin initials, while it does not have multiple corresponding domain names, the value is 0.5.

(3) If the domain name is composed of the hospital's English name or Chinese pinyin initials, and it has multiple corresponding domain names formed by the hospital's English name and Chinese pinyin initials, the value is 1.

2.3.6 Language

If the website only has simple Chinese version, the value is 0.5; if it has two or more language versions including Chinese, the value is 1.

Information architecture

2.4.1	Time Taken to Open the Homepage	According to the time users need to open the hospital website's homepage, the Time Taken to Open the Homepage (before flashes and videos are played) has four levels: (1) If the homepage open time exceeds 10 seconds, the value is 0. (2) If the homepage open time is between 8 and 10 (10 included) seconds, the value is 0.34. (3) If the homepage open time is between 4 and 8 (8 included) seconds, the value is 0.67. (4) If the homepage open time is no more than 4 seconds, the value is 1.
2.4.2	Digital Multimedia Function	The Digital Multimedia Function refers to dynamic forms of information services provided by the hospital website, including pictures, sounds, videos, flashes, dynamic pages and 3D interaction programs. Each of the above six sub-items has two levels: "Established" valued 1 and "To be established" valued 0. The total score is 4. In case that advertisement appears in the forms of dialog boxes and float bars on the website, 1 point is deducted. The calculation of the value of the quantitative standard is: $$\frac{1}{4}(\min(4, \sum_{i=1}^{n} Wi) - R)$$ "n" is the number of the sub-items and equals 6. W_i is the specific value of the i sub-item. R is the case that incurs any point deduction. The level of the sub-items is figured out through the random examination of 20 pages of the hospital's website. The "min" function is used to find the smallest value in the given parameter list.
2.4.3	Website Pageview	The Website Page view is the function to calculate the number of visitors to the hospital website. According to its function, the item has two levels: "Established" valued 1 and "To be established" valued 0.
2.4.4	Background Data	The Background Data refers to that the information service resources on the website are posted in the format and form of background data. It has four sub-items: (1) If the resources are not in the format and form of background data, the value is 0. (2) If part of the contents on the website is in the format and form of background data, the value is 0.34. (3) If half or more of the contents of the website are in the format and form of background data, the value is 0.67. (4) If all the contents of the website are in the format and form of background data, the value is 1.

Source: the author.

In the following empirical research on the comprehensive system for evaluating the information services provided by the information platform, an information service evaluation form for WZPH information platform is designed based on the quantification and assignment standards of the dimensions of online medical information services. This form is used in this research on the information services of WZPH information platform, as well as other research and evaluation on the information services of hospitals' information platform.

4.3 Construction of Comprehensive Evaluation Model

By weighting the dimensions of the system and assigning values in a quantitative way, the author establishes a comprehensive evaluation model for the information service of the WZPH information platform according to the weight of its information service and the quantitative value assignment standards. For the total weighted score of the comprehensive indicators, see Equation 4.1.

$$R = \sum_{i=1}^{m} \sum_{j=1}^{n_i} W_{ij} R_{ij} \times 100 \qquad \textbf{(4.1)}$$

R representing the total score is in the range between 0 and 100, R_{ij} is the value of the j indicator in the i dimension, and W_{ij} is the combined weight of the j indicator in the i dimension. i is 1 to m, j is 1 to n_i, n_i is the number of indicators covered by the i dimension, m is the number of the dimensions and equals 8, and S is the number of indicators in the tertiary level and equals 54.

The author first collects data by using the *Hospital Website Information Service Evaluation Form*, then processes the data, assigns values in a quantitative way according to the evaluation of indicators at each level, and in the end, uses the equation of the comprehensive evaluation model to calculate the comprehensive score of the information service of the WZPH information platform.

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Chapter 5: Empirical Research on the Comprehensive Evaluation System for Medical Information Service of WZPH Information Platform

5.1 Research Object

Since the website of WZPH is the only channel for the hospital's information platform to deliver information services, the author sets the website of WZPH as the object of the empirical research. In other words, this empirical research will investigate and analyze the website of WZPH. Established on June 19, 2013, the website of WZPH is redesigning its overall pages as the empirical research goes on. Thanks to this crucial opportunity, the author conducted two rounds of empirical investigation and data collection before and after the revision, for the purpose of enhancing the comparability and objectivity of the research results. Therefore, the author sets both the pre-revised website and the post-revised website as the object of the empirical research.

5.2 Composition of Participants

Participants of the empirical research are selected according to the principles of randomness, feasibility and objectivity. Stratified random sampling is adopted to select participants, and in accordance with the sampling indicators, these participants are classified into four groups: out-patients, in -patients, hospital employees, and the public and professionals (including random users, management majors, professors and website designers). For the composition of participants, see Table 5-1.

Table 5-1 The Composition of Participants in the Empirical Research on the Comprehensive Evaluation System

For the Medical Information Service of WZPH Information platform

Period	Pre-revision					Post-revision					Total
Date	2016/12/20	2017/1/5				2016/12/20	2017/1/5				
Dimension	Item	Number	Percentage	Number	Percentage	Total	Number	Percentage	Number	Percentage	Total
Users	Out-patient	2	25%	2	25%	25%	2	25%	2	25%	25%	37.500%
	In-patient	2	25%	2	25%	25%	2	25%	2	25%	25%	37.500%
	Hospital employee	2	25%	2	25%	25%	2	25%	2	25%	25%	37.500%
	The public and professionals	2	25%	2	25%	25%	2	25%	2	25%	25%	37.500%
Gender	Male	6	75%	4	50%	62.5%	4	50%	2	25%	37.50%	81.250%
	Female	2	25%	4	50%	37.5%	4	50%	6	75%	62.50%	68.750%
Age	16-21	0	0%	2	25%	12.5%	4	50%	1	12.5%	31.25%	28.125%
	22-27	2	25%	0	0%	12.5%	2	25%	1	12.5%	18.75%	21.875%
	28-33	4	50%	2	25%	37.5%	2	25%	2	25%	25%	50.000%
	Over 34	2	25%	4	50%	37.5%	0	0%	4	50%	25%	50.000%
Education	College	2	25%	2	25%	25.0%	2	25%	3	37.5%	31.25%	40.625%
	Bachelor	5	62.5%	2	25%	43.75%	4	50%	0	0%	25.00%	56.250%
	Master or above	1	12.5%	3	37.5%	25.0%	2	25%	3	37.5%	31.25%	40.625%
	High school or lower	0	0%	1	12.5%	6.25%	0	0%	2	25%	12.50%	12.500%

Factors Influencing Information Service Quality
of the Information Platform of Wenzhou Municipal People's Hospital

Initial log-in time	Between 2013 and 2015	0	0%	2	25%	12.5%	2	25%	2	25%	25%	25.000%
	Between 2015 and 2016	2	25%	4	50%	37.5%	2	25%	0	0%	12.5%	43.750%
	Between 2016 and 2017	4	50%	2	25%	37.5%	4	50%	4	50%	50%	62.500%
	Initial log-in time	2	25%	0	0%	12.5%	0	0%	2	25%	12.5%	18.750%
Log-in times within one year	Less than 2 years	2	25%	0	0%	12.5%	0	0%	2	25%	12.5%	18.750%
	2 to 6 times	0	0%	0	0%	0%	2	25%	2	25%	25%	12.500%
	6 to 12 times	2	25%	0	0%	12.5%	0	0%	0	0%	0%	12.500%
	12 to 24 times	0	0%	4	50%	25%	2	25%	0	0%	12.5%	31.250%
	Over 24 times	4	50%	4	50%	50%	4	50%	4	50%	50%	75.000%

Source: the author.

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5.3 Research Tools

5.3.1 Hospital Website Information Service Evaluation Form

Formulated on the basis of the Comprehensive Evaluation Model for the Information Service of WZPH Information Platform, the *WZPH Website Information Service Evaluation Form* is an online data collection form for the evaluation of hospitals' website information service. According to the quantification and assignment standard of the dimensions of medical information service, the form includes 54 surveying items, 34 requiring a single choice and 20 requiring multiple choices. For details of the form, see Appendix 7.

5.3.2 Virtual User Questionnaire

In the empirical research, virtual user survey is used to investigate online interactive information, a dimension of the information service of WZPH's website. Specific procedures of the survey are as follows:

First, create a user account on WZPH's website and send questions directly via the website or email to the hospital. Then, evaluate the dimension of online interactive information of the hospital's website information service according to the response time and the contents of the answers. Questions in the Virtual User Questionnaire should be suitable for the hospital's website and patients and also reflect the concerns of most patients. In the empirical research, the author works out two sets of questions. One of them is about "the hospital's transportation", including:

(1) Where is the hospital?

(2) How many divisions does the hospital have? How many departments does each division have?

(3) How to get to the hospital by public transport?

(4) How to drive to the hospital?

(5) How is the traffic around the hospital? Are there any parking lots?

(6) Does the hospital have a hotline?

The other set of questions is about "the hospital's out-patient services", including:

(i) In what ways can I schedule an outpatient appointment?

(ii) What are the procedures of scheduling an outpatient appointment?

(iii) How to get a serial number as an outpatient?

(iv) What departments are there in the hospital?

(v) Are there any precautions before going to hospital?

(vi) What is the process of seeing a doctor?

(vii) Does the hospital have a hotline for outpatient services?

The author uses Excel for data collection and SPSS for statistical analysis. For the contents of the Virtual User Questionnaire for WZPH Website Information Service Evaluation, see Appendix 8.

5.4 Survey Methods

In the empirical research, we ask the participants to log in the website of WZPH simultaneously and then fill out the WZPH Website Information Service Evaluation Form to evaluate the eight dimensions: online medical information service, online medical service information, online interactive information, digital media service information, the resource quality of information service, information service resources management, information service technology and information architecture. The form has both objective quantitative evaluation items and subjective ones. As the dimension of online interactive information is unique in its online characteristics, i.e., interactive, real-time and anonymous, the author uses a Virtual User Questionnaire to make full use of these characteristics which allows participants to evaluate this dimension of WZPH's website information service from the perspectives of response time and contents. This kind of survey method based on the network has the following advantages:

(1) Low cost: the web-based survey saves labor; and only a computer connected

to the Internet is needed to complete the survey, which saves other expenses in traditional survey methods, such as text printing and human resources.

(2) Short time and real-time interaction: as the web-based survey is a real-time online activity, participants can get real-time responses from the hospital's website after merely inputting data according to the evaluation standards, which significantly shortens the survey cycle by saving time needed for preparing surveys and getting feedbacks in traditional surveys.

(3) No limits in time, space and regions: as the web-based survey is conducted online, the research participants are not subject to time, space, regional restrictions and can finish the survey at any time and places.

(4) High reliability and autonomy: the participants are autonomous in the web-based survey in that they can autonomously obtain the data, which increases the reliability of the survey and reduces of the chances of human errors which may occur in traditional surveys.

5.5 Preliminary Investigation and Data Collection

5.5.1 Preliminary Investigation

The preliminary investigation in the empirical research aims to verify whether the questionnaire is reasonable and scientific and serves as the foundation for later data collection. Participants in the preliminary investigation comprise the author and another eight participants (two outpatients, two inpatients, two hospital employees and two professionals). They logged in WZHP's website at the same time and discussed over different available sub-items and related questions in the questionnaire of the online survey. After multiple rounds of discussions, participants had no doubt about the contents and principles of the Hospital Website Information Service Evaluation Form. Instead, they only put forward suggestions for revising some expressions and rhetoric in the form. After the revision of these expressions and rhetoric, the author and the eight participants reached a consensus.

5.5.2 Data Collection

From December, 2016 to February, 2017, 32 participants falling into four groups of eight used Internet Explorer 11 as the uniform browser and logged in WZPH's website in four periods: 2016/12/20, 2017/15, 2017/1/20 and 2017/2/6 to evaluate the contents and quality of the website's information services respectively from eight dimensions in the WZPH Website Information Service Evaluation Form. When participants failed to open pages of the website for technical reasons (such as failure of the server, page updating, no password) or one of the participants could not open one of the website's pages, a second investigation was arranged. When the inaccessible page or pages could not be opened in the second investigation, the page or pages were excluded from the statistical data. The investigation aims at making a systemic and unified evaluation of the information service quality of WZPH's website, so it does not cover the websites of the hospital's subordinate departments, associations and subsidiaries that are independently established or are not managed under the hospital's domain name. The investigation of online interactive information involves the time participants spend in sending and receiving messages as well as the contents of the messages as listed in the Virtual User Questionnaire, so if participants give different scores for evaluations of these two items, a mean value is adopted as the final score.

5.6 Research Results

Through the empirical research, we get the comprehensive evaluations of the information service of WZPH's information platform (see Table 5-2). Data in Table 5-2 show that after the overall revision, the website of WZPH gets clearly higher comprehensive evaluations for its information service.

Table 5-2 Comprehensive Evaluations of the Information Service of WZPH's Information Platform

No.	Period	Date	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	Total	Total score
1	Pre-revision	2016/12/20	0.088	0	0	0.003	0.048	0.025	0.021	0.025	0.21	21
2	Pre-revision	2016/12/20	0.088	0	0	0.003	0.04	0.025	0.02	0.025	0.201	20.1
3	Pre-revision	2016/12/20	0.088	0	0	0.003	0.04	0.025	0.021	0.025	0.202	20.2
4	Pre-revision	2016/12/20	0.088	0	0	0.003	0.028	0.025	0.02	0.025	0.189	18.9
5	Pre-revision	2016/12/20	0.088	0	0	0.003	0.028	0.025	0.021	0.025	0.19	19
6	Pre-revision	2016/12/20	0.088	0	0	0.003	0.028	0.025	0.021	0.025	0.19	19
7	Pre-revision	2016/12/20	0.088	0	0	0.003	0.028	0.025	0.02	0.025	0.189	18.9
8	Pre-revision	2016/12/20	0.088	0	0	0.003	0.02	0.025	0.02	0.025	0.181	18.1
	Total average		0.088	0	0	0.003	0.0325	0.025	0.0205	0.025	0.194	19.4
9	Pre-revision	2017/1/5	0.088	0	0	0.003	0.04	0.025	0.021	0.025	0.202	20.2
10	Pre-revision	2017/1/5	0.088	0	0	0.003	0.048	0.025	0.021	0.025	0.21	21
11	Pre-revision	2017/1/5	0.088	0	0	0.003	0.04	0.025	0.021	0.025	0.202	20.2
12	Pre-revision	2017/1/5	0.088	0	0	0.003	0.048	0.025	0.021	0.025	0.21	21
13	Pre-revision	2017/1/5	0.088	0	0	0.003	0.048	0.025	0.02	0.025	0.209	20.9
14	Pre-revision	2017/1/5	0.088	0	0	0.003	0.04	0.025	0.021	0.025	0.202	20.2
15	Pre-revision	2017/1/5	0.088	0	0	0.003	0.04	0.025	0.021	0.025	0.202	20.2
16	Pre-revision	2017/1/5	0.088	0	0	0.003	0.032	0.025	0.021	0.025	0.194	19.4
	Total average		0.088	0	0	0.003	0.042	0.025	0.02088	0.025	0.20388	20.3875

No.	Period	Date	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	Total	Total score
17	Post-revision	2017/1/20	0.151	0.205	0.083	0.051	0.08	0.071	0.03	0.043	0.714	71.4
18	Post-revision	2017/1/20	0.151	0.205	0.091	0.051	0.096	0.071	0.033	0.043	0.741	74.1
19	Post-revision	2017/1/20	0.151	0.205	0.085	0.051	0.1	0.071	0.032	0.043	0.738	73.8
20	Post-revision	2017/1/20	0.151	0.205	0.085	0.051	0.096	0.071	0.033	0.043	0.735	73.5
21	Post-revision	2017/1/20	0.151	0.205	0.091	0.051	0.09	0.071	0.033	0.043	0.735	73.5
22	Post-revision	2017/1/20	0.151	0.205	0.083	0.051	0.108	0.071	0.033	0.043	0.745	74.5
23	Post-revision	2017/1/20	0.151	0.205	0.083	0.051	0.09	0.071	0.033	0.043	0.727	72.7
24	Post-revision	2017/1/20	0.151	0.205	0.083	0.051	0.108	0.071	0.033	0.043	0.745	74.5
	Total average		0.151	0.205	0.0855	0.051	0.096	0.071	0.0325	0.043	0.735	73.5
25	Post-revision	2017/2/6	0.151	0.205	0.085	0.051	0.08	0.071	0.033	0.043	0.719	71.9
26	Post-revision	2017/2/6	0.151	0.205	0.085	0.051	0.108	0.071	0.033	0.043	0.747	74.7
27	Post-revision	2017/2/6	0.151	0.205	0.083	0.051	0.08	0.071	0.033	0.043	0.717	71.7
28	Post-revision	2017/2/6	0.151	0.205	0.091	0.051	0.108	0.071	0.033	0.043	0.753	75.3
29	Post-revision	2017/2/6	0.151	0.205	0.091	0.051	0.108	0.071	0.033	0.043	0.753	75.3
30	Post-revision	2017/2/6	0.151	0.205	0.091	0.051	0.108	0.071	0.033	0.043	0.753	75.3
31	Post-revision	2017/2/6	0.151	0.205	0.091	0.051	0.108	0.071	0.033	0.043	0.753	75.3
32	Post-revision	2017/2/6	0.151	0.205	0.091	0.051	0.108	0.071	0.033	0.043	0.753	75.3
	Total average		0.151	0.205	0.0885	0.051	0.101	0.071	0.033	0.043	0.7435	74.35

Source: the author.

Column 1.1 is the online medical information service dimension, Column 1.2 stands for online medical service information, Column 1.3 online interactive information, Column 1.4 digital media service information, Column 2.1 the resource quality of information service, Column 2.2 information service resources management, Column 2.3 information service technology, and Column 2.3 information architecture

5.7 Empirical Research Findings and Correlation Analysis of Website Traffic

5.7.1 Website Traffic

PV (page view), also called views of a web page, is the most important index in the Internet field for measuring a website or a subordinate page of a website. It is also one of the important indexes for measuring the traffic data of a website. Changes in page views of a website indicate changes in the website's traffic. Pages not only represent html, but also include those html contents generated by php and jsp. Every html request that users send through their browsers is a PV, while the page views of a page is the total number of PV, i.e., the accumulated html requests sent by users' browsers.

UV (unique visitor), or the number of independent visitors of a website, refers to the number of visitors of a website or a page. UV is the number of distinct visitors accessing a website for the first time in a day, leaving out the number of the same visitors repeatedly accessing a website with the same IP addresses in a day. The number of unique visitors indicates the number of users of a website in a given period and therefore is another important index for measuring the traffic of a website.

In short, PV and UV of a website are positively correlated. The number of PV is larger than that of UV, i.e., PV ≥ UV. For the calculation of the traffic of a specific website, see Equation 5.1.

$$R=PV+UV \tag{5.1}$$

R represents the total value of the traffic, PV is the page views and UV is the unique visitors.

See the traffic data of WZPH's website in Table 5-3. The table shows that after the overall revision of the website, the traffic has a significant increase.

Table 5-3 Traffic of Wenzhou Municipal People's Hospital website

No.	Period	Data	PV (Page View)	UV (Unique Visitor)	Total traffic
1	Pre-revision	2016/12/20	960	243	1203
2	Pre-revision	2017/1/5	1080	271	1351
3	Post-revision	2017/1/20	4510	925	5435
4	Post-revision	2017/2/6	4690	939	5629

Source: the author.

5.7.2 Empirical Research findings and Correlation Analysis of Website Traffic

Correlation analysis is a statistic method for identifying whether there is any association among phenomena and further probe into interactions among different variables. By means of the Bivariate Correlation in SPSS, the author carried out a correlation analysis of the comprehensive evaluations of the information service of WZPH's information platform and the traffic data of WZPH website, including the total traffic, PV and UV. For details of the analysis results, see Table 5-4.

Table 5-4 Correlation Analysis of Comprehensive Evaluations of the Information

Service of WZPH's Information Platform and the Traffic of WZPH's Website

Correlation analysis object	Pearson Correlation	Sig (2 - tailed)	Correlation	N
Research findings and total traffic	1.000	0	Correlation is significant at the 0.01 level	8
Research findings and PV	1.000	0	Correlation is significant at the 0.01 level	8
Research findings and UV	1.000	0	Correlation is significant at the 0.01 level	8

Source: the author.

Table 5-4 indicates that the correlation coefficient among the three objects is 1, a significant correlation. It also suggests that the comprehensive evaluations of the information service of WZPH's information platform and the traffic of WZPH's website are positively correlated. That is to say, the traffic of WZPH's website will vary to the changes in the comprehensive evaluations of the information service of WZPH's information platform (for details, see Figure 5-1, 5-2 and 5-3).

Figure 5-1 Line Chart of the Correlation Analysis of the Comprehensive Evaluations of the Information Service of WZPH's Information Platform and the Traffic of WZPH's Website (traffic value = traffic/100)

Source: the author.

Figure 5-2 Line Chart of the Correlation Analysis of the Comprehensive

Evaluations of the Information Service of WZPH's Information Platform and the UV

of WZPH's Website (UV value = UV/100)
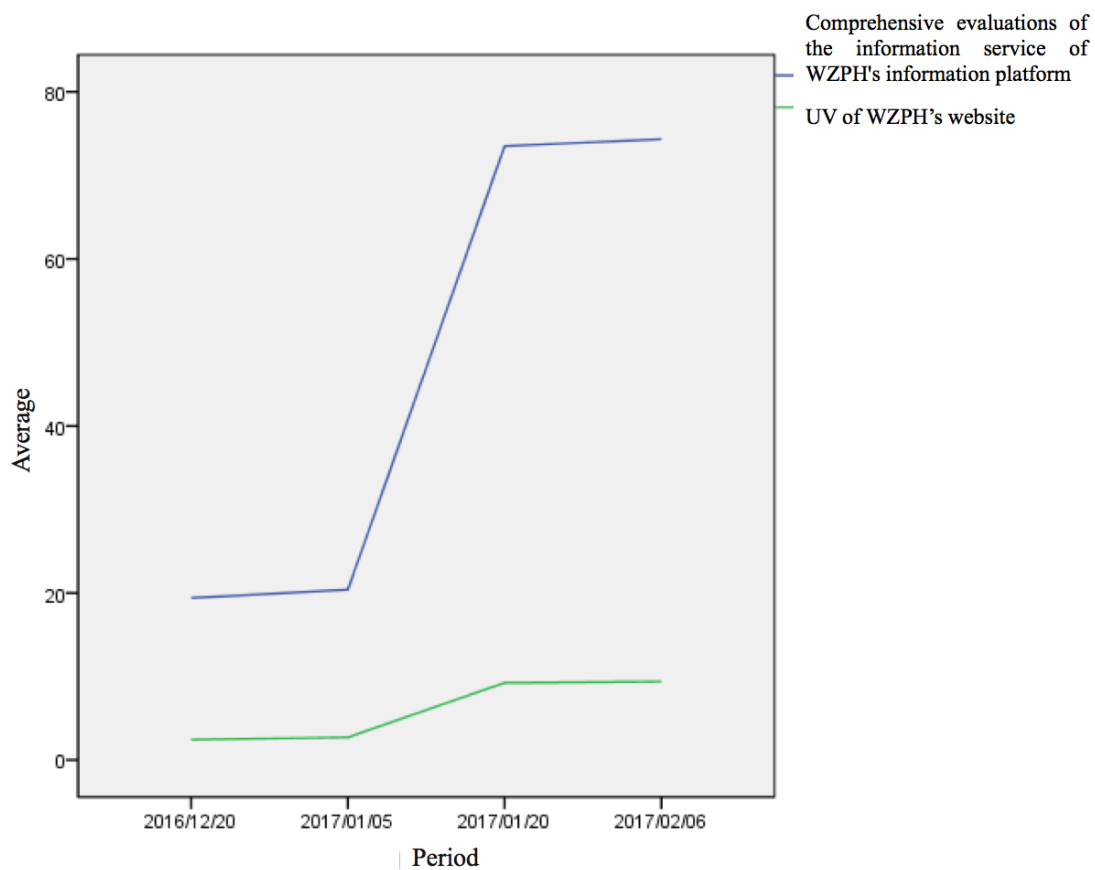
Source: the author.

Figure 5-3 Line Chart of the Correlation Analysis of the Comprehensive

Evaluations of the Information Service of WZPH's Information Platform and the PV

of WZPH's Website (PV value = PV/100)
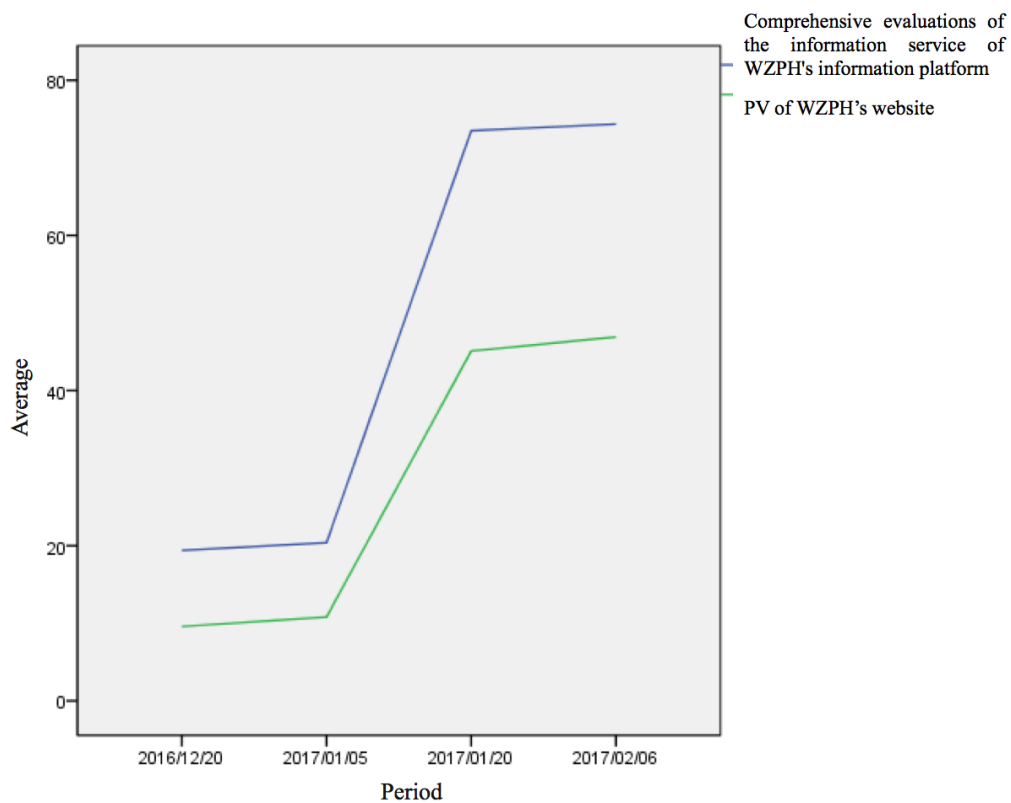
Source: the author.

Chapter 6: Conclusions, Suggestions and Limitations

6.1 Conclusions and Suggestions

6.1.1 Conclusions

The information service quality of WZPH's website is an important component of the hospital's overall service quality. This research on the information service quality of WZPH's website covers the website's service functions, service quality, resources and the front-end and back-end technology systems. Based on the research, the Comprehensive Evaluation Model for Medical Information Service of WZPH Information Platform formulated on the basis of the research will be of significant value for future theoretical research and practical applications.

(1) Through the analysis of worldwide literature and research methods as well as the research on websites of hospitals, the author proposes the collection of primary indicators for evaluating the information service function of the hospital information platform and primary dimensions for evaluating the information service quality of the platform. With these indicators and dimensions, the author conducts two rounds of expert consultations. Analyzing the consultation enables the author to determine the weights of the indicators for evaluating the information service of the WZPH information platform and establish the Indicator System Evaluating the Information Service of the WZPH Information Platform. The system includes two first-level indicators (functional quality and supporting attributes of website information service), eight second-level indicators (online medical information service, online medical service information, online interactive information, digital media service information, the resource quality of information service, information service resources management, information service technology and information architecture) and 54 third-level indicators.

(2) The author has established a theoretical research platform for the medical information service quality of hospital information platforms. This platform differs from the traditional PZB service quality theories as the former integrates theories with data collected from the empirical research. It provides a new method for researching the website service quality of a certain industry.

(3) The information service quality of hospital websites is a complicated variable involving multiple related factors. In order to evaluate the information service quality of hospital websites, it is necessary to consider the influences of all these factors. Therefore, the evaluation of the information service quality of hospital websites is a complex process in which multiple factors interact with one another. For the sake of determining the weights of these factors, the author invited experts to evaluate the indicators to determine their weights, and formulated an evaluating model to assign values to these indicators. On account of that, the author established the Comprehensive Evaluation Model for the Information Service of the WZPH Information Platform.

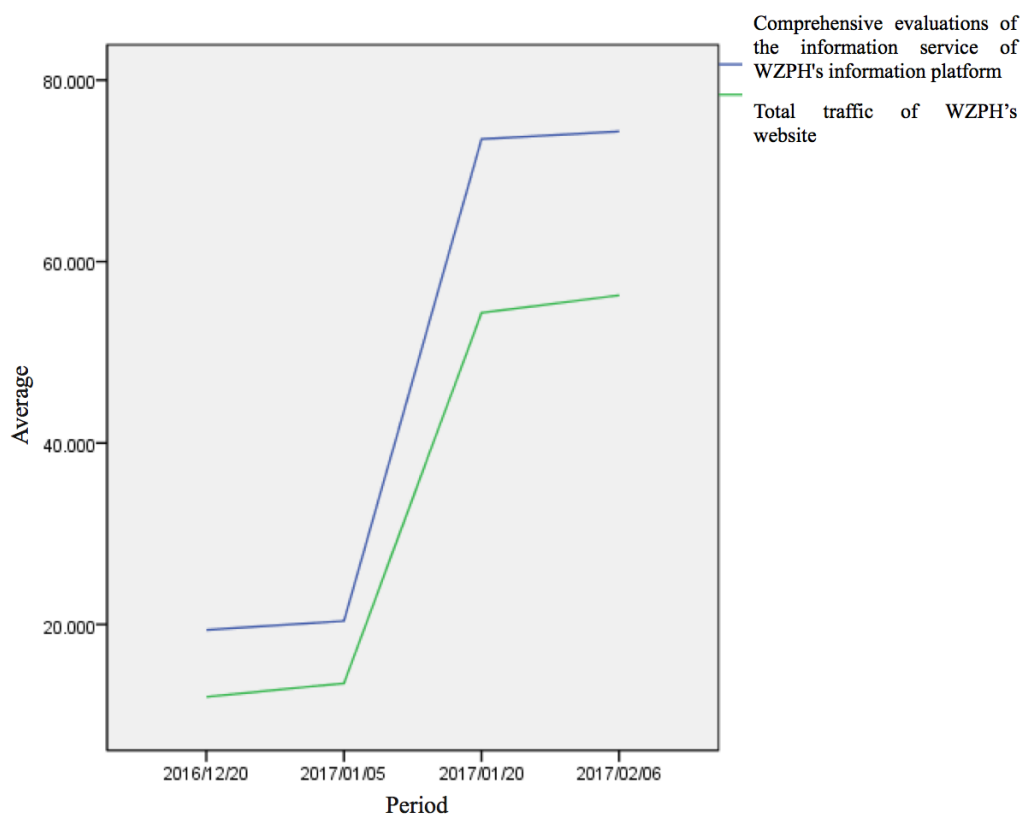(4) The author makes a comparison and a correlation analysis of the investigation results of the comprehensive evaluations of the information service of WZPH's information platform and the traffic of WZPH's website, and finds that the two are positively correlated. This finding indicates that the Comprehensive Evaluation Model for the Information Service of the WZPH Information Platform is objective and scientific and therefore is also applicable to the websites of other hospitals of the same type.

6.1.2 Suggestions

The results of the empirical research show that the website of WZPH is the only carrier for the information platform of the hospital to deliver information service. Enriching the information service functions plays an important role for hospitals to improve the information service quality of their websites and their website usage (see Table 6-1). As shown in Table 6-1, the weight of the functional quality attribute of website information service is 0.7, significantly higher than that of the supporting

attribute (see Table 3-19). In addition, the second-level indicators of the functional quality attribute are the dimensional indicators for measuring the functions of hospital websites, while in the evaluation on February 6, 2017, the evaluation score of the functional quality attribute is 70.786, suggesting a large room for improving.

Table 6-1 The Evaluation of the Functional Quality Attribute of Website Information Service

No.	Indicator Level	Evaluating indicator	Weight	Weight value	2016/12/20 Evaluation score	2017/1/5 Evaluation score	2017/1/5 Evaluation score	2017/2/6 Evaluation score
1	First-level indicator	Functional quality attribute of website information service	70	0.7	0.091	0.13	0.4925	0.4955
1.1	Second-level indicator	Online medical information service	35	0.245	0.088	0.088	0.151	0.151
1.2	Second-level indicator	Online medical service information	30	0.21	0	0	0.205	0.205
1.3	Second-level indicator	Online interactive information	20	0.14	0	0	0.0855	0.0885
1.4	Second-level indicator	Digital media service information	15	0.105	0.003	0.042	0.051	0.051
Evaluation score of the functional quality attribute of website information service					13	18.571	70.357	70.786

Source: the author.

In all, the information service quality of WZPH's website is still to be improved and the functions of its information services are to be enriched. Therefore, it can be concluded and suggested that under the current circumstance, perfecting the functions of WZPH's website plays a decisive role in improving the information service quality of the hospital. As the evaluation of the functional quality attribute of website information service shows a large room for improvement, perfecting the information service function of WZPH's website is the key task that the hospital should do to enhance its information service. In addition, it can be inferred that after the information service function of WZPH's website is improved or the evaluation of the functional quality attribute of website information service scores higher, the supporting attribute of website information service will be the next key task for the hospital in enhancing its information service quality.

6.2 Major Innovations

The author conducts in-depth study and learns from previous research on information service quality, especially the research results and theories of information service based on the Internet, and, in line with these results and theories, makes theoretical summaries and innovations on comprehensive evaluation for information service of WZPH Information Platform.

(1) This study is the first one in China that applies both the Delphi method and composite grade method to construct the model of comprehensive evaluation system of hospital information service. The construction of a model of the comprehensive evaluation system on the information service of WZPH Information Platform has pointed out a new direction in China's research in this field, filled the domestic research blank on comprehensive evaluation of hospital information service, and narrowed China's gap with international advanced countries in this research direction. Still, through the empirical research on WZPH website, it also validates the scientificity, rationality and practicability of the model proposed in this thesis. This model is both of high theoretical value and practical value.

(2) Based on the actual situation of Chinese hospitals, this thesis makes full use of research results of various disciplines, creates a theoretical research platform of medical information service quality based on the reality of WZPH, and sorts out the core of website information service of Chinese hospitals as well as the influencing factors and their correlations. Focusing on the function and quality of hospital information service, it has established a complete and scientific evaluation system of hospital information service that conforms to the actual situation of Chinese hospitals.

(3) For the first time in China, the author conducts comparison and correlation analysis of survey results on comprehensive evaluation of hospital website information service and traffic data through empirical research, in order to discuss the relations between the evaluation results and the traffic data. Up to date, no Chinese literature has expounded on such an empirical research method, which is also applicable to other types of website empirical research. Therefore, it bears considerable reference value.

(4) This study is the first empirical one in China that applies virtual user survey to the dimensions of network interaction information of hospital website. With the virtual user survey, one can make scientific, reasonable and objective evaluation of the dimensions to the greatest extent, and this method bears considerable practical value for research on the dimensions of network interaction information of other types of websites.

6.3 Limitations and Reflections for Future Research

The research and evaluation object of this study is WZPH which, as a public Grade-A third-level hospital, reflects the actual situation facing its kind in China. Yet in China, except the public Grade-A third-level hospitals, there are first-level, second-level, super-level and fourth-level hospitals, as well as other types of medical institutions such as private hospitals and public-private hospitals. The significance of the comprehensive evaluation system of information service of WZPH Information Platform with a theoretical nature to other public hospitals or hospitals of other types

requires further exploration. In addition, it is uncertain if this theoretical platform is suitable for other hospitals, which can be a possible research direction in the future.

The rapid development of network technology in the past three decades has not only changed people's lives but also affected significantly the medical industry. The development of new network information technology often goes beyond hospital managers' imagination. Along with such rapid development, it is foreseeable that the study of information service at hospital platform is not once-and-for-all, but a constantly updated dynamic process. Therefore, the information service evaluation system in this thesis will be enriched with the development of the times and information technology. In the future, researchers will make more scientific, accurate and colorful hospital information service evaluation systems.

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Appendix 1: Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform

First Round of Expert Consultation

Distinguished expert:

It is highly appreciated that you can take time to complete the expert consultation. Thanks a lot for your participation!

This study is about the current situation of website information service of information platforms in Chinese hospitals. Based on the relevant literature and research result in China and abroad, the author puts forward the initial scale of information service evaluation indicator system of WZPH Information Platform, which includes 2 primary indicators, 8 secondary indicators and 70 tertiary indicators.

The ultimate aim of this survey is to invite experts to make suggestions and revision for indicators of "Dimension Structure of Information Service Evaluation Indicator System of WZPH Information Platform (initial)".

Please choose the indicator according to your approval degree. If you have other opinions on the indicator, please write them down on the blank.

1. Whether the classification of each dimension indicator is reasonable;

2. Whether the name of each dimension is correct;

3. Is there any dimension overlapping or missing?

A 1-to-5-point scale is used: 5: strongly agree, 4: agree, 3: neutral, 2: disagree, 1: strongly disagree.

If you have any question, please don't hesitate to contact me.

Person to contact: JIAO Lei

Contact way: tel.: 13957787366; e-mail: jiaolei3@163.com

Your personal information, relevant research direction and familiarity are needed to ensure the data quality of this study. Please fill in the form (Your information is for

research purpose only and will not be released to anyone. Your answer is of great

significance to this study. Thank you once again!)

1. Personal Information

Name	Workplace	Professional title	Major	Years of working

Attributes and Dimensions	Familiarity						Theoretical Basis					Experience Basis					Literature Basis					Intuition Basis				
	A	B	C	D	E	F	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Functional quality attribute of information service																										
Dimension of hospital general information																										
Dimension of tangible medical service																										
Dimension of online medical service																										
Dimension of online interactive information																										
Dimension of healthcare information																										
Dimension of other information service																										
Resource content attribute of information service																										
Dimension of resource quality of information service																										
Dimension of resource administration of information service																										
Technology attribute of information service																										
Dimension of information construction																										
Dimension of information platform capability																										

2. Evaluation Attributes and Dimensions

Remark: Options of A, B, C, D, E and F in familiarity represent for: A-very unfamiliar, B-unfamiliar, C-know a little, D-neither unfamiliar nor familiar, E-familiar, F-very familiar.

Options of 1, 2, 3, 4 and 5 in the bases represent for: 1-almost no, 2-small part, 3-some part, 4-most part, 5-almost all.

3. Please choose your approval degree of each attribute, dimension and indicator.

Dimension structure	Approval degree				
	1	2	3	4	5
1 Functional quality attribute of information service					
1.1 Dimension of hospital general information					
1.1.1 Logo of visual identity system					
1.1.2 Hospital profile					
1.1.3 Hospital scale					
1.1.4 Expert introduction					
1.1.5 Chronicle of events					
1.1.6 News center and bulletin					
1.1.7 Contact information					
1.1.8 Introduction on departments and doctors					
Suggestions on revision					
1.2 Dimension of tangible medical service					
1.2.1 Opening hours of out-patient and emergency departments					
1.2.2 Department layout					

1.2.3 Treatment guideline					
1.2.4 Expert schedule					
1.2.5 Fees and charges					
1.2.6 Device introduction					
1.2.7 Hospitalization and discharge procedures					
1.2.8 Physical examination					
1.2.9 Companion service					
1.2.10 Handy service					
1.2.11 Examination guideline					
1.2.12 Health insurance information					
1.2.13 FAQ					
Suggestions on revision					
1.3 Dimension of online medical service					
1.3.1 Registration service					
1.3.2 Telephone appointment					
1.3.3 Online appointment					
1.3.4 E-mail consulting					
1.3.5 Online consulting					
1.3.6 Text message consulting					
1.3.7 Service enquiry					
1.3.8 Test result enquiry					
1.3.9 Online complaint					
1.3.10 Online medical service					
1.3.11 Virtual hospital					
Suggestions on revision					
1.4 Dimension of online interactive information					
1.4.1 Online forum					

1.4.2 Online message board					
1.4.3 Academic exchange					
1.4.4 Website survey					
1.4.5 Online communication					
1.4.6 President's mailbox					
1.4.7 Disease knowledge					
1.4.8 Common scientific knowledge					
1.4.9 Multimedia video					
1.4.10 Medical laws and regulations					
1.4.11 Medical education					
1.4.12 Medication knowledge					
1.4.13 Academic database					
1.4.12 Relevant website links					
Suggestions on revision					
1.5 Dimension of healthcare information					
1.5.1 Hospital electronic journal					
1.5.1 Electronic journal					
1.5.2 Hospital library					
1.5.3 Research and education					
Suggestions on revision					
1.6 Dimension of other information service					
1.6.1 Personnel recruitment					
1.6.1 Software download					
1.6.2 Advertisement and activity information					
1.6.3 Information of biddings					
1.6.4 Information disclosure					

Suggestions on revision					
2 Resource content attribute of information service					
2.1 Dimension of resource quality of information service					
2.1.1 Readability					
2.1.2 Accuracy					
2.1.3 Credibility					
2.1.4 Completeness					
2.1.5 Information source					
Suggestions on revision					
2.2 Dimension of resource administration of information service					
2.2.1 Copyright					
2.2.2 Qualification licenses for website operation					
2.2.3 Author's identity					
2.2.4 Title					
2.2.5 Accessibility of resource					
2.2.6 Release date					
Suggestions on revision					
3 Attribute of information service technology					
3.1 Dimension of information construction					
3.1.1 Information classification					
3.1.2 Information stratification					
3.1.3 Navigation mark					
3.1.4 Website map					

3.1.5 Format specification					
3.1.6 Specification of domain name					
3.1.7 Content retrieval					
3.1.8 Language					
Suggestions on revision					
3.2 Dimension of information platform capability					
3.2.1 Time taken to open the home page					
3.2.2 Independent domain name					
3.2.3 Digital multimedia function					
3.2.4 Background data					
Suggestions on revision					

Appendix 2: Dimension Structure of Information Service Quality Indicator System of WZPH Information Platform

Second Round of Expert Consultation

Distinguished expert:

It is highly appreciated that you can take time to complete the expert consultation. Thanks a lot for your participation!

This study is about the current situation of website information service of information platforms in Chinese hospitals. Based on relevant literature and research results in China and abroad, the initial scale of information service evaluation indicator system of WZPH Information Platform is put forward, which includes 2 primary indicators, 8 secondary indicators and 65 tertiary indicators.

The ultimate aim of this survey is to invite experts to make suggestions and revision for indicators of "Dimension Structure of Information Service Evaluation Indicator System of WZPH Information Platform (second version)".

Please choose the indicator according to your approval degree. If you have other opinions on certain indicator, please write them down in the margin.

1. Whether the classification of each dimension indicator is reasonable;

2. Whether the name of each dimension is correct;

3. Is there any dimension overlapping or missing?

A 1-to-5-point scale is used: 5: strongly agree, 4: agree, 3: neutral, 2: disagree, 1: strongly disagree.

If you have any question, please do not hesitate to contact me.

Person to contact: Jiao Lei

Contact way: tel.: 13957787366; E-mail: jiaolei3@163.com

Your personal information, relevant research direction and familiarity are needed to ensure the data quality of this study. Please fill in the form (Your information is only for research purpose and will not be released to anyone. Your answers are of great significance to this study. Thank you once again!)

1. Personal Information

Name	Workplace	Professional title	Major	Years of working

2. Evaluation Attributes and Dimensions

Attributes and dimensions	Familiarity						Theoretical basis					Experience basis					Literature basis					Intuition basis				
	A	B	C	D	E	F	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Functional quality attribute of website information service																										
Dimension of online medical information service																										
Dimension of online medical service information																										
Dimension of online interactive information																										
Dimension of digital media service information																										
Supporting attribute of website information service																										
Dimension of resource quality of information service																										
Dimension of resource administration of information service																										
Technological dimension of information service																										
Dimension of information construction																										

Note: Options of A, B, C, D, E and F in familiarity represent for: A-very unfamiliar, B-unfamiliar, C-know a little, D-neither unfamiliar nor familiar, E-familiar, F-very familiar.

Options of 1, 2, 3, 4 and 5 in the bases represent for: 1-almost no, 2-small part, 3-some part, 4-most part, 5-almost all.

3. Please choose your approval degree of each attribute, dimension and indicator.

Dimension structure	Approval degree				
	1	2	3	4	5
1 Functional quality attribute of website information service					
1.1 Dimension of online medical information service					
1.1.1 Hospital profile					
1.1.2 News center and bulletin					
1.1.3 Introduction on doctors					
1.1.4 Expert introduction					
1.1.5 Introduction on departments					
1.1.6 Publicity of medical events					
1.1.7 Specialty medical service					
1.1.8 Open hours of outpatient and emergency departments					
1.1.9 Guideline for treatment					
1.1.10 Introduction on equipment					
1.1.11 Service of nursing and accompanying					
1.1.12 Information of medical insurance					
1.1.13 Briefing on charging standard					
1.1.14 Convenient service					
1.1.15 Telephone appointment					
1.1.16 Contact information					

Suggestions on revision					
1.2 Dimension of online medical service information					
1.2.1 Registration service					
1.2.2 Online appointment					
1.2.3 Enquiry of test results					
1.2.4 Online complaint					
1.2.5 Online virtual hospital					
Suggestions on revision					
1.3 Dimension of online interactive information					
1.3.1 Online consulting					
1.3.2 E-mail consulting					
1.3.3 Text message consulting					
1.3.4 Online medical service					
1.3.5 Online BBS					
1.3.6 Online message board					
1.3.7 Online survey					
1.3.8 online communication					
1.3.9 President mailbox					
Suggestions on revision					
1.4 Dimension of digital media service information					
1.4.1 Disease knowledge					
1.4.2 Common scientific knowledge					
1.4.3 Multimedia video					
1.4.4 Medical laws and regulations					
1.4.5 Medical education					

1.4.6 Medication knowledge					
1.4.7 Academic database					
1.4.8 Relevant website links					
1.4.9 Electronic journals					
1.4.10 Hospital library					
1.4.11 Scientific research and education					
Suggestions on revision					
2 Supporting attribute of website information service					
2.1 Dimension of resource quality of information service					
2.1.1 Readability					
2.1.2 Accuracy					
2.1.3 Credibility					
2.1.4 Completeness					
2.1.5 Information source					
Suggestions on revision					
2.2 Dimension of resource administration of information service					
2.2.1 Copyright					
2.2.2 Qualification licenses for website operation					
2.2.3 Author's identity					
2.2.4 Title					
2.2.5 Accessibility of resource					
2.2.6 Release date					
Suggestions on revision					
2.3 Technological dimension of information service					

2.3.1 Information classification					
2.3.2 Information stratification					
2.3.3 Navigation mark					
2.3.4 Format specification					
2.3.5 Specification of domain name					
2.3.6 Content retrieval					
2.3.7 Language					
Suggestions on revision					
2.4 Dimension of information construction					
2.4.1 Time taken to open the home page					
2.4.2 Digital multimedia function					
2.4.3 Page view of website					
2.4.4 Background data					
Suggestions on revision					

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Appendix 3: Weight of the Indicator System Evaluating the Information Service of the WZPH Information Platform

First Round of Expert Consultation

Distinguished Expert:

It is highly appreciated that you can take time to complete the expert consultation. Thanks a lot for your participation!

This study is about the current situation of website information service of information platforms in Chinese hospitals. Based on relevant literature and research outcomes in this field at home and broad, the author aims to propose a dimensional structure of an indicator system evaluating the information service of the WZPH information platform. According to this dimensional structure, the author plans to use two rounds of expert consultation to determine the weights of the system. In order to ensure that the weights determined in the research are objective, scientific and accurate, please give your suggestions about the weight assignment scheme of the system.

For indicators of each dimension, the author designs four weight assigning schemes. Please mark a "√" for the scheme that you think is the most appropriate one. If none of these four schemes are acceptable for you, please kindly offer the scheme you think is acceptable in the "Your Scheme". For any questions about this consultation, please feel free to contact me.

Contact: Jiao Lei

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Email: jiaolei3@163.com

Your personal information, relevant research direction and familiarity are needed to ensure the data quality of this study. Please fill in the form (Your information is only for research purpose and will not be released to anyone. Your answers are of great significance to this study. Thank you once again!)

1.   Personal Information

Name	Organization	Title	Field	Work Experience

2. Please choose a weight assignment scheme that you think is reasonable in terms of their attributes, dimensions and indicators.

(1) Weight assignment schemes for first-level indicators

No.	Evaluating Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
1	Functional quality attribute of website information service	40	50	60	70	
2	Supporting attribute of website information service	60	50	40	30	
Total		100	100	100	100	100
Scheme acceptable for you						

(2) Weight assignment schemes for second-level indicators

No.	Evaluating Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
1.1	Online medical information service	15	20	25	25	
1.2	Online medical service information	35	30	25	25	
1.3	Online interactive information	35	30	25	35	
1.4	Digital media service information	15	20	25	15	
Total		100	100	100	100	100
Scheme acceptable for you						
2.1	The resource quality of information service	35	40	25	45	
2.2	Information service resources management	35	30	25	15	
2.3	Information service technology	20	15	25	20	

2.4	Information Architecture	10	15	25	20	
Total		100	100	100	100	100
Scheme acceptable for you						

(3) Weight assignment schemes for tertiary-level indicators

No.	Evaluating Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
1.1.1	Hospital Profile	10	8	5	3	
1.1.2	News and Bulletin	7	10	6	4	
1.1.3	Introduction of Doctors	7	10	4	6	
1.1.4	Introduction of Departments	5	10	5	6	
1.1.5	Publicity of Medical Events	5	10	5	6	
1.1.6	Special Medical Treatment	5	5	5	10	
1.1.7	Emergency Service and Outpatient Service Hour	10	5	8	4	
1.1.8	Treatment Guidelines	10	8	5	10	
1.1.9	Device Introduction	10	4	6	10	
1.1.10	Nursing Services	4	5	5	8	
1.1.11	Medical Insurance Information	5	4	8	8	
1.1.12	Charging Standard Notes	5	5	10	8	
1.1.13	Services	5	4	8	5	
1.1.14	Appointments and Registration by Phone	6	6	10	7	
1.1.15	Contact Information	6	6	10	5	
Total		100	100	100	100	100
Scheme acceptable for you						
1.2.1	Registration Service	10	15	20	25	
1.2.2	Online Appointment and Registering	15	20	30	35	

1.2.3	Examination Results Query	15	15	20	25	
1.2.4	Online Complaint	30	25	15	10	
1.2.5	Virtual Hospital	30	25	15	5	
Total		100	100	100	100	100
Scheme acceptable for you						
1.3.1	Online Advisory	10	15	20	30	
1.3.2	E-mail Advisory	30	20	15	10	
1.3.3	Text Message Advisory	30	20	15	10	
1.3.4	Online Medical Service	10	15	20	30	
1.3.5	BBS	10	15	20	15	
1.3.6	Online Message Board	10	15	10	5	
Total		100	100	100	100	100
Scheme acceptable for you						
1.4.1	Disease Knowledge	10	15	20	25	
1.4.2	Popular Science	10	15	20	25	
1.4.3	Multimedia Video	10	7.5	5	2.5	
1.4.4	Medical Policy	10	15	20	25	
1.4.5	Medical Education	10	7.5	5	2.5	
1.4.6	Drug Usage	10	15	20	15	
1.4.7	Academic Database	20	12.5	10	2.5	
1.4.8	Hospital E-journal	20	12.5	10	2.5	
Total		100	100	100	100	100
Scheme acceptable for you						
2.1.1	Readability	15	20	25	30	
2.1.2	Accuracy	35	30	25	20	
2.1.3	Completeness	15	20	25	15	
2.1.4	Information Source	35	30	25	35	
Total		100	100	100	100	100
Scheme acceptable for you						
2.2.1	Copyright	20	25	30	35	
2.2.2	Qualification Licenses for Website Operation	20	35	30	25	
2.2.3	Author's Identity	20	5	15	10	
2.2.4	Title	15	7.5	5	10	

2.2.5	Accessibility of Resource	7.5	20	15	10	
2.2.6	Release Date	17.5	7.5	5	10	
Total		100	100	100	100	100
Scheme acceptable for you						
2.3.1	Information Classification	15	20	25	30	
2.3.2	Information Stratification	15	20	10	12.5	
2.3.3	Navigation Mark	25	15	20	12.5	
2.3.4	Format Specification	25	15	20	12.5	
2.3.5	Specification of Domain Name	15	20	10	12.5	
2.3.6	Language	5	10	15	20	
Total		100	100	100	100	100
Scheme acceptable for you						
2.4.1	Time Taken to Open the Homepage	35	20	25	30	
2.4.2	Digital Multimedia Function	15	20	25	20	
2.4.3	Website Pageview	15	20	25	20	
2.4.4	Background Data	35	40	25	30	
Total		100	100	100	100	100
Scheme acceptable for you						

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Appendix 4: Weight of the Indicator System Evaluating the Information Service of the WZPH Information Platform

First Round of Expert Consultation

Distinguished Expert:

It is highly appreciated that you can take time to complete the expert consultation. Thanks a lot for your participation!

This study is about the current situation of website information service of information platforms in Chinese hospitals. Based on relevant literature and research outcomes in this field at home and broad, the author aims to propose a dimensional structure of an indicator system evaluating the information service of the WZPH information platform. According to this dimensional structure, the author plans to use two rounds of expert consultation to determine the weights of the system. In order to ensure that the weights determined in the research are objective, scientific and accurate, please give your suggestions about the weight assignment scheme of the system.

For indicators of each dimension, the author designs four weight assigning schemes. Please mark a "√" for the scheme that you think is the most appropriate one. If none of these four schemes are acceptable for you, please kindly offer the scheme you think is acceptable in the "Your Scheme". For any questions about this consultation, please feel free to contact me.

Contact: Jiao Lei

Phone: +86 13957787366

Email: jiaolei3@163.com

Your personal information, relevant research direction and familiarity are needed to ensure the data quality of this study. Please fill in the form (Your information is only for research purpose and will not be released to anyone. Your answers are of great significance to this study. Thank you once again!)

1. Personal Information

Name	Organization	Title	Field	Work Experience

2. Experts' Self-proposed Assignment Scheme

No.	Evaluating Indicator	Your Scheme 1	Your Scheme 2
1.1	Online medical information service	40	35
1.2	Online medical service information	25	30
1.3	Online interactive information	15	20
1.4	Digital media service information	20	15
Total		100	100
Scheme acceptable for you			

Appendix 5: Weight of the Indicator System Evaluating the Information Service of the WZPH Information Platform

Second Round of Expert Consultation

Distinguished Expert:

It is highly appreciated that you can take time to complete the expert consultation. Thanks a lot for your participation!

This study is about the current situation of website information service of information platforms in Chinese hospitals. Based on relevant literature and research outcomes in this field at home and broad, the author aims to propose a dimensional structure of an indicator system evaluating the information service of the WZPH information platform. According to this dimensional structure, the author plans to use two rounds of expert consultation to determine the weights of the system. In order to ensure that the weights determined in the research are objective, scientific and accurate, please give your suggestions about the weight assignment scheme of the system.

For indicators of each dimension, the author designs four weight assigning schemes. Please mark a "√" for the scheme that you think is the most appropriate one. If none of these four schemes are acceptable for you, please kindly offer the scheme you think is acceptable in the "Your Scheme". For any questions about this consultation, please feel free to contact me.

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Your personal information, relevant research direction and familiarity are needed to ensure the data quality of this study. Please fill in the form (Your information is only for research purpose and will not be released to anyone. Your answers are of great significance to this study. Thank you once again!)

1.　　　　Personal Information

Name	Organization	Title	Field	Work Experience

2. Please choose a weight assignment scheme that you think is reasonable in terms of attributes, dimensions and indicators.

(1) Weight assignment schemes for first-level indicators

No.	Evaluating Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
1	Functional quality attribute of website information service	40	50	60	70	
2	Supporting attribute of website information service	60	50	40	30	
Total		100	100	100	100	100
Scheme acceptable for you						

(2) Weight assignment schemes for second-level indicators

No.	Evaluating Indicator	Scheme 1	Scheme2	Scheme 3	Scheme 4	Your Scheme
1.1	Online medical information service	20	25	35	27	
1.2	Online medical service information	30	25	30	28	
1.3	Online interactive information	30	35	20	27	
1.4	Digital media service information	20	15	15	18	
Total		100	100	100	100	100
Scheme acceptable for you						
2.1	Resource quality of information	35	40	25	45	

	service					
2.2	Information service resources management	35	30	25	15	
2.3	Information service technology	20	15	25	20	
2.4	Information Architecture	10	15	25	20	
Total		100	100	100	100	100
Scheme acceptable for you						

(3) Weight assignment schemes for third-level indicators

No.	Evaluating Indicator	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Your Scheme
1.1.1	Hospital Profile	10	8	5	3	
1.1.2	News and Bulletin	7	10	6	4	
1.1.3	Introduction of Doctors	7	10	4	6	
1.1.4	Introduction of Departments	5	10	5	6	
1.1.5	Publicity of Medical Events	5	10	5	6	
1.1.6	Special Medical Treatment	5	5	5	10	
1.1.7	Emergency Service and Outpatient Service Hour	10	5	8	4	
1.1.8	Treatment Guidelines	10	8	5	10	
1.1.9	Device Introduction	10	4	6	10	
1.1.10	Nursing Services	4	5	5	8	
1.1.11	Medical Insurance Information	5	4	8	8	
1.1.12	Charging Standard Notes	5	5	10	8	

1.1.13	Services	5	4	8	5	
1.1.14	Appointments and Registration by Phone	6	6	10	7	
1.1.15	Contact Information	6	6	10	5	
Total		100	100	100	100	100
Scheme acceptable for you						
1.2.1	Registration Service	10	15	20	25	
1.2.2	Online Appointment Service	15	20	30	35	
1.2.3	Testing Results Query	15	15	20	25	
1.2.4	Online Complaints	30	25	15	10	
1.2.5	Online Virtual Hospital	30	25	15	5	
Total		100	100	100	100	100
Scheme acceptable for you						
1.3.1	Online Advisory	10	15	20	30	
1.3.2	E-mail Advisory	30	20	15	10	
1.3.3	Text Advisory	30	20	15	10	
1.3.4	Online Medical Service	10	15	20	30	
1.3.5	BBS	10	15	20	15	
1.3.6	Online Message Board	10	15	10	5	
Total		100	100	100	100	100
Scheme acceptable for you						
1.4.1	Disease Knowledge	10	15	20	25	
1.4.2	Popular Science	10	15	20	25	
1.4.3	Multimedia Video	10	7.5	5	2.5	
1.4.4	Medical Policy	10	15	20	25	
1.4.5	Medical Education	10	7.5	5	2.5	
1.4.6	Drug Usage	10	15	20	15	
1.4.7	Academic	20	12.5	10	2.5	

	Database					
1.4.8	Hospital E-journal	20	12.5	10	2.5	
Total		100	100	100	100	100
Scheme acceptable for you						
2.1.1	Readability	15	20	25	30	
2.1.2	Accuracy	35	30	25	20	
2.1.3	Completeness	15	20	25	15	
2.1.4	Information Source	35	30	25	35	
Total		100	100	100	100	100
Scheme acceptable for you						
2.2.1	Copyright	20	25	30	35	
2.2.2	Qualification Licenses for Website Operation	20	35	30	25	
2.2.3	Author's Identity	20	5	15	10	
2.2.4	Title	15	7.5	5	10	
2.2.5	Accessibility of Resource	7.5	20	15	10	
2.2.6	Release Date	17.5	7.5	5	10	
Total		100	100	100	100	100
Scheme acceptable for you						
2.3.1	Information Classification	15	20	25	30	
2.3.2	Information Stratification	15	20	10	12.5	
2.3.3	Navigation Mark	25	15	20	12.5	
2.3.4	Format Specification	25	15	20	12.5	
2.3.5	Specification of Domain Name	15	20	10	12.5	
2.3.6	Language	5	10	15	20	
Total		100	100	100	100	100
Scheme acceptable for you						
2.4.1	Time Taken to Open the Homepage	35	20	25	30	

2.4.2	Digital Multimedia Function	15	20	25	20	
2.4.3	Website Pageview	15	20	25	20	
2.4.4	Background Data	35	40	25	30	
Total		100	100	100	100	100
Scheme acceptable for you						

Appendix 6: Weight of the Indicator System Evaluating the Information Service of the WZPH Information Platform

Second Round of Expert Consultation

Distinguished Expert:

It is highly appreciated that you can take time to complete the expert consultation. Thanks a lot for your participation!

This study is about the current situation of website information service of information platforms in Chinese hospitals. Based on relevant literature and research outcomes in this field at home and broad, the author aims to propose a dimensional structure of an indicator system evaluating the information service of the WZPH information platform. According to this dimensional structure, the author plans to use two rounds of expert consultation to determine the weights of the system. In order to ensure that the weights determined in the research are objective, scientific and accurate, please give your suggestions about the weight assignment scheme of the system.

For indicators of each dimension, the author designs four weight assigning schemes. Please mark a "√" for the scheme that you think is the most appropriate one. If none of these four schemes are acceptable for you, please kindly offer the scheme you think is acceptable in the "Your Scheme". For any questions about this consultation, please feel free to contact me.

Contact: Jiao Lei

Phone: +86 13957787366

Email: jiaolei3@163.com

Your personal information, relevant research direction and familiarity are needed to ensure the data quality of this study. Please fill in the form (Your information is only for research purpose and will not be released to anyone. Your answers are of great significance to this study. Thank you once again!)

1.　　Personal Information

Name	Organization	Title	Field	Work Experience

2.　　Experts' Self-proposed Assignment Scheme

No.	Evaluating Indicator	Your Scheme 1	Your Scheme 2
1.1.1	Hospital Profile	7	8
1.1.2	News and Bulletin	6	7
1.1.3	Introduction of Doctors	6	7
1.1.4	Introduction of Departments	5	4
1.1.5	Publicity of Medical Events	5	4
1.1.6	Special Medical Treatment	5	7
1.1.7	Emergency Service and Outpatient Service Hour	9	11
1.1.8	Treatment Guidelines	9	11
1.1.9	Device Introduction	9	8
1.1.10	Nursing Services	4	4
1.1.11	Medical Insurance Information	5	5
1.1.12	Charging Standard Notes	5	5
1.1.13	Services	5	4
1.1.14	Appointments and Registration by Phone	5	6
1.1.15	Contact Information	5	9
Total		100	100
Scheme acceptable for you			

Appendix 7: WZPH Website Information Service Evaluation Form

Thank you very much for participating in this survey! The survey's purpose is to evaluate the information service quality of WZPH. All contents will be confidential, so you can be assured to fill in all questions objectively. Thanks again for your support and cooperation.

I.　　　Personal Information

Participant:　　　survey time:

Gender:　　　　age:

Working unit:

The first time to log in the website:

Log-in frequency in a year:

II.　　　Survey Contents

1　　　Functional quality attribute of information service

1.1　　　Dimension of online medical information service

1.1.1　　　Hospital Profile (multiple choices; please check in the corresponding brackets; do not check if the item is "To be established")

A. Introduction (　　)　　　B. Logo (　　)

C. History (　　)　　　D. Leadership (　　)

E. Culture (　　)　　　F. Qualification (　　)

G. Honor (　　)　　　H. Environment (　　)

I. Words by the President (　　) J. Video (　　)

1.1.2　　　News and Bulletin (single choice; check the corresponding item(s) of A and B respectively)

A. News

To be established (　　)　　updating every one month and over (　　)

updating every week (   ) updating every two days (   )

B. Bulletin

Established (   )   To be established (   )

1.1.3   Introduction of Doctors (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Personal Introduction (   )   B. Expertise (   )

C. Honor and Academic Achievements (   )   D. Position (   )

E. Contact (   )

1.1.4   Introduction of Departments (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Introduction (   )   B. Expertise (   )

C. Medical Team (   )   D. Honor (   )

E. Contact (   )

1.1.5   Publicity of Medical Affairs (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Clinical Service Management (   )   B. Nursing Management (   )

C. Hospital Regulations (   )   D. Academic Research (   )

E. Medical Education (   )

1.1.6   Special Medical Treatment (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Programs (   )   B. Introduction (   )

C. Effects (   )

1.1.7   Emergency and Outpatient Service Hours (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Time (   )   B. Doctors (   )

1.1.8   Treatment Guidelines (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Transportation Guides (   ) B. Hospital Indoor Navigation (   )

C. Outpatient Information (   ) D. Registration Information (   )

E. Emergency Information ( ) F. Medical Examination Information ( )

G. Inpatient Treatment (   )   H. Discharge Guidelines (   )

1.1.9   Device Introduction (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Type (   )   B. Name (   )

C. Function (   )   D. Distribution (   )

E. Number (   )

1.1.10   Accompanying Service (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Home Care (   )   B. Inpatient Care (   )

C. Postpartum Care (   )   D. Pregnancy Care (   )

E. Others (   )

1.1.11   Medical Insurance Information (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. News (   )   B. Policies (   )

C. Guidelines (   )   D. Organizations (   )

1.1.12   Charging Standard Notes (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Outpatient, Emergency and Comprehensive Medical Services (   ) B. Traditional Chinese and Folk Medicine (   )

C. Medical Technologies (   )

D. Clinical Treatment (   )

E. Special Medical Treatment Services (   )

F. Pharmaceutical Drugs (   )

1.1.13   Handy Service (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Guiding Services (   )   B. Drinking Water (   )

C. Body Temperature Measurement (   )

D. Presbyopic Glasses (   )

E. Wheelchairs and Stretchers (   )

F. Medical Record Copying (   )

G. Free Magazines (   )   H. Parking Guides (   )

I. Testing Report Post Service (   )   J. Others (   )

1.1.14   Appointments and Registration by Phone (single choice; please check the corresponding item)

A. No telephone appointment service (   )

B. The website offers telephone number for appointment but not accessible

(   )

C. The website has accessible telephone number but users cannot make appointment through it (   )

D. The website provides telephone appointment service and users can make an appointment successfully (   )

1.1.15   Contact Information (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Hospital Switchboard (   )

B. Phone Numbers of Departments (   )

C. Discipline Inspection Phone Number (   )

D. E-mail Address (   )

E. Hospital Address (   )   F. Location (   )

G. Traffic (   )   H. Digital Map (   )

I. President's Mail-box (   )   J. Others (   )

1.2   Dimension of online medical service information

1.2.1   Signing-in Service (single choice; please check the corresponding item)

A. No such service (   )

B. The website provides the service but users cannot finish the registration smoothly (   )

C. The website has the service and users can register and use their accounts successfully (   )

D. The website has the service and users can register successfully (   )

1.2.2   Online Appointments and Registering (single choice; please check the corresponding item)

A. No service (   )   B. Service available (   )

1.2.3   Examination Results Query (single choice; please check the corresponding item)

A. No service (   )   B. Service available (   )

1.2.4   Online Complaint (single choice; please check the corresponding item)

A. No service (   )   B. Service available (   )

1.2.5   Virtual Hospital (multiple choices, please check in corresponding brackets; do not check if the item is "To be established")

A. Medical Service Appointment (   )   B. Guidelines (   )

C. Specialist Clinic (　　) 　　D. Hospital Indoor Navigation (　　)

E. Online Test (　　) 　　　　F. 3D Virtual Hospital (　　)

1.3　　　Dimension of online interactive information

1.3.1　　Online Advisory (single choice; if you have chosen item A, please do not choose items of B)

A. No such service　(　　)

B. Service quality

　　Excellent (　　)　　　Satisfactory (　　)

　　Average (　　)　　Poor (　　)

1.3.2　　E-mail Advisory (single choice; if you have chosen item A, please do not choose items of B)

A. No such service　(　　)

B. Service quality

　　Excellent (　　)　　　Satisfactory (　　)

　　Average (　　)　　Poor (　　)

1.3.3　　Text Message Advisory (single choice; if you have chosen item A, please do not choose items of B)

A. No such service　(　　)

B. Service quality

　　Excellent (　　)　　　Satisfactory (　　)

　　Average (　　)　　Poor (　　)

1.3.4　　Online Medical Service (single choice; please check the corresponding item)

A. No such service　(　　)

B. Service provided but cannot be used successfully (　　)

C. Service provided and can be used successfully (　　)

1.3.5　　BBS (single choice; if you have chosen item A, please do not choose items of B)

A. No such service　(　　)

B. Service available

　　Users can register and log in (　　)

　　Users can register, log in and search for information; the number of posts is < 100 (　　)

　　Users can register, log in and search for information, and the number of

posts is ≥ 100 (   )

1.3.6   Website Survey (single choice; please check the corresponding item)

A. No such service (   )   B. Service available (   )

1.4   Dimension of digital media service information

1.4.1   Disease Knowledge (single choice; if you have chosen item A, please do not choose items of B)

A. No such service (   )

B. Service available

   Number of knowledge items is ≤ 50 (   )

   Number of knowledge items is > 50 and ≤ 100   (   )

   Number of knowledge items is > 100 (   )

1.4.2   Popular Science (single choice; if you have chosen item A, please do not choose items of B)

A. No such service (   )

B. Service available

   Number of items is < 50 (   )

   Number of items is ≥ 50 and < 100 (   )

   Number of items is ≥ 100 (   )

1.4.3   Multimedia Video (single choice; if you have chosen item A, please do not choose items of B)

A. No such service (   )

B. Service available

   Number of items is < 10 (   )

   Number of items is ≥ 10 and < 50 (   )

   Number of items is ≥ 50 (   )

1.4.4   Medical Policy (single choice; please check the corresponding item)

A. No such service (   )   B. Service available (   )

1.4.5   Website Resources Download (single choice; if you have chosen item A, please do not choose items of B)

A. No such service (   )

B. Service available

   Website resources ≤ 10 (   )

   Website resources ≤ 50 and > 10 (   )

Website resources > 50 (   )

1.4.6   Knowledge on Drug Usage (single choice; please check the corresponding item)

A. No such service (   )   B. Service available (   )

1.4.7   Academic Database (single choice; please check the corresponding item)

A. No such database (   )   B. Database available (   )

C. Academic Database with self-owned data resources available (   )

1.4.8   E-journal (single choice; if you have chosen item A, please do not choose items of B)

A. No such service (   )

B. Service available

Number of e-journals ≤ 5 (   )

Number of e-journals > 5 and ≤ 10 (   )

Number of e-journals > 10, with the function of classified search (   )

2.1   Dimension of information service resource quality

2.1.1   Readability (single choice; please check the corresponding item)

A. Easy to understand (   )   B. Can understand (   )

C. Difficult to understand (   )   D. Cannot understand (   )

2.1.2   Accuracy (single choice; please check the corresponding item)

A. Very accurate (   )   B. Mostly accurate (   )

C. Inaccurate (   )   D. Totally wrong (   )

2.1.3   Completeness (single choice; please check the corresponding item)

A. All complete (   )   B. Pretty complete (   )

C. Partially complete (   )   D. Incomplete (   )

2.1.4   Information Source (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Source of the article (   )   B. Reprint Mark (   )

C. Reprint Review (   )   D. Online Reference Links (   )

E. Reminding (   )

2.2   Dimension of information service resources management

2.2.1   Copyright (single choice; please check the corresponding item)

A. No such service (   )   B. Service available (   )

2.2.2   Qualification Licenses for Website Operation (multiple choices, please check

in the corresponding brackets; do not check if the item is "To be established")

A. Internet Drug Information Service License (   )

B. MOH Health Information Service Network Management Review (   )

C. Internet Medical and Health Information Service License (   )

D. Internet Education Information Service License (   )

E. Internet Domain Name Accreditation (   )

F. Internet Publishing License (   )

G. Internet Program Broadcasting License (   )

H. Internet Payment License (   )

I. Value Added Tele-communication Business License (   )

J. Others (   )

2.2.3　Author's Identity (multiple choices, please check in the corresponding brackets; do not check if the item is "To be established")

A. Name (   )   B. Education (   )

C. Title (   )   D. Organization (   )

E. Contact (   )   F. Others (   )

2.2.4　Title Marking (single choice; please check the corresponding item)

A. The website does not mark any title (   )

B. Homepage or a certain web page has a marked title (   )

C. Homepage and other pages all have marked titles (   )

D. Homepage and other pages have different title marks (   )

2.2.5　Accessibility of Resources (single choice; please check the corresponding item)

A. Number of invalid links ≥ 10 (   )

B. Number of invalid links < 10 and > 5 (   )

C. Number of invalid links ≤ 5 and > 0 (   )

D. No invalid links (   )

2.2.6　Release Date (single choice; please check the corresponding item)

A. No Publishing time or date(   )

B. Time or date is marked (   )

C. Both time and date are marked (   )

2.3　　Dimension of information service technology

2.3.1   Information Classification

A. Layout of pages on the website (single choice; please check the corresponding item)

Excellent (   )   Satisfactory (   )

Average (   )   Poor (   )

B. Homepage has information classification (single choice; please check the corresponding item)

Excellent (   )   Satisfactory (   )

Average (   )   Poor (   )

C. Information classification is reasonable (single choice; please check the corresponding item)

Excellent (   )   Satisfactory (   )

Average (   )   Poor (   )

D. Information classification meets users' demands (single choice; please check the corresponding item)

Excellent (   )   Satisfactory (   )

Average (   )   Poor (   )

E. Names of classified information are easy to understand (single choice; please check the corresponding item)

Excellent (   )   Satisfactory (   )

Average (   )   Poor (   )

2.3.2   Information Stratification (single choice; please check the corresponding item)

A. Number of the grades ≥ 10 (   )

B. Number of the grades > 5 and < 10 (   )

C. Number of the grades ≤ 5 and ≥ 4 (   )

D. Number of the grades < 4 (   )

2.3.3   Navigation Mark (multiple choices; please check the corresponding items)

A. A back link to the last page on every page   (   )

B. A back link to the homepage   (   )

C. A back link to the information classification page (   )

D. A link to the homepage prompt message (   )

E. A navigation map for the website (   )

2.3.4   Format Specification (multiple choices; please check the corresponding item)

A. Well-designed pages (   )   B. User-friendly font size (   )

C. Uniform page layout   (   )

D. Appropriate page margin (   )

E. Pagination on long pages   (   )

F. A horizontal scroll bar on large pages (   )

G. Zoom-in and zoom-out function (   )

H. All browsers supported   (   )

2.3.5   Specification   of   Domain   Name   (single   choice;   please   check   the corresponding item)

A. Domain name is not composed of the hospital's English name or Chinese pinyin initials, and it does not have multiple corresponding domain names (   )

B. Domain name is composed of the hospital's English name or Chinese pinyin initials, while it does not have multiple corresponding domain names (   )

C. Domain name is composed of the hospital's English name or Chinese pinyin initials, and it has multiple corresponding domain names formed by the hospital's English name and Chinese pinyin initials   (   )

2.3.6   Language (single choice; please check the corresponding item)

A. Only has simple Chinese version (   )

B. Two or more language versions including Chinese (   )

2.4   Dimension of information architecture

2.4.1   Time Taken to Open the Homepage (single choice; please check the corresponding item)

A. > 10 seconds (   )   B. > 8 seconds and ≤ 10 seconds (   )

C. > 4 seconds and ≤ 8 seconds (   )   D. ≤ 4 seconds (   )

2.4.2   Digital Multimedia Function (multiple choices; please check the corresponding items)

A. Pictures (   )   B. Sounds (   )

C. Videos (   )   D. Flashes (   )

E. Dynamic Pages (   )   F. 3D Interaction Programs (   )

G. Popup Ads (   )   H. Ad floaters (   )

2.4.3   Website Pageview (single choice; please check the corresponding item)

A. No such service (   )   B. Service available (   )

2.4.4   Background Data (single choice; please check the corresponding item)

A. Resources are not in the format and form of background data (   )

B. Part of the contents on the website is in the format and form of background data (   )

C. Half or more of the contents of the website are in the format and form of background data (   )

D. All the contents of the website are in the format and form of background data   (   )

Thank you for your support!!

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Appendix 8: Virtual User Questionnaire on WZPH Website Information Service Evaluation

Email 1:

Subject: Consulting on Transportation to Hospital

_____Hospital,

Greetings! I would like to know how I can get to your hospital for treatment by bus or car, as well as the following things.

(1) Where is the hospital？

(2) How many divisions does the hospital have? What departments each division has？

(3) How to get to the hospital by public transport?

(4) How to drive to the hospital?

(5) How is the traffic around the hospital? Are there any parking lots?

(6) Does the hospital have a hotline?

Looking forward to you rely. Thanks!

Mr. Jiao

Email 2:

Subject: Consulting on Hospital's Out-patient Services

_____Hospital,

Greetings! I would like to know if your hospital provides out-patient service appointment, as well as the following aspects.

    (1) In what ways can I schedule an outpatient appointment?

    (2) What are the procedures of scheduling an outpatient appointment?

    (3) How to get a serial number as an outpatient?

    (4) What departments are there in the hospital?

    (5) Are there any precautions before going to hospital?

    (6) What is the process of seeing a doctor?

    (7) Does the hospital have a hotline for outpatient services?

Looking forward to you rely. Thanks!

Mr. Jiao