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Health Care Service Quality and Patients' Satisfaction Under Dual-Capital Operations Mode—The Case of Shanghai General Hospital

SHEN Jing

Doctor of Management

Supervisor:
PhD Paula Vicente, Associate Professor,
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BUSINESS
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July, 2021

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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: 沈静 Date: 21.07.2021

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Abstract

The dual capital operation mode of Chinese public hospitals studied in this thesis is the combination of two state-owned capitals. However, few studies have provided valid evidence that dual capital has stronger advantages than single capital in hospital operation. Based on the perspective of interactive memory, a link moderation model is proposed in this thesis. The model links the independent and dependent variables via the two mediating variables. In this study, we argue that the hospital's dual capital operation model is helpful in increasing the team collaboration of physicians compared to the single capital operation model. And the team collaboration helps to improve the quality of medical services, which in turn helps to promote patient satisfaction. Therefore, this study concludes that the dual capital operation model can enhance patient satisfaction via the mediating role of team coordination and medical service quality. In addition, this thesis further demonstrates the role of a dual capital operation model for hospital service quality improvement through a case study. We believe that the conclusion provides a theoretical support to demonstrate the effectiveness of a dual capital operation system in hospitals. In the future reform of the hospital operation system, we suggest that public hospitals in China introduce other capital to further drive high quality development.

Keywords: dual capital operation mode, team coordination, medical service quality, patient satisfaction

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Resumo

O sistema dual capital operation mode em hospitais públicos abordado nesta tese é a combinação de dois tipos de capitais públicos. No entanto, são poucos os estudos que têm investigado as vantagens que este sistema tem sobre um sistema de single capital operation mode em contexto hospitalar. Com base na perspetiva da memória interativa, nesta tese é proposto um modelo com efeitos mediadores. O modelo relaciona as variáveis independentes e dependentes por meio das duas variáveis mediadoras. Neste estudo, é avaliada a utilidade que um sistema dual capital operation mode em contexto hospitalar tem na melhoria da colaboração da equipa de médicos em comparação com um sistema de single capital operation mode. Por sua vez, a colaboração da equipa médica ajuda a melhorar a qualidade dos serviços médicos, o que por sua vez ajuda a promover a satisfação dos pacientes. Portanto, este estudo conclui que um sistema dual capital operation mode pode aumentar a satisfação dos pacientes através do papel mediador da colaboração da equipa médica e da qualidade do serviço prestado. Além disso, esta tese mostra o papel que um sistema dual capital operation mode tem na melhoria da qualidade do serviço hospitalar num estudo de caso concreto. A conclusão fornece um suporte teórico para demonstrar a eficácia de um sistema dual capital operation mode em hospitais. Numa futura reforma do sistema hospitalar na China, sugerimos que sejam introduzidas outras formas de capital para impulsionar ainda mais um desenvolvimento de elevada qualidade.

Palavras-chave: dual capital operation mode, coordenação de equipas, qualidade do serviço de saúde, satisfação dos pacientes

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摘要

本文研究的中国公立医院中的双重资本运营模式是两个国有资本相结合的模式。然而，没有研究提供有效证据表明，在公立医院运营过程中，双重资本运营模式比单一资本具有更强的优势。本文基于交互记忆视角，提出了一种链路调节模型。该模型通过两个中介变量链接独立变量和因变量。本研究认为，与单一资本运营模式相比，医院的双重资本运营模式有助于增加医生的团队协作。团队协作又有助于提高医疗服务质量，从而有助于提高患者的满意度。因此，本研究认为，双重资本运营模式能够通过团队协作与医疗服务质量的中介作用更好地提升患者满意度。此外，本文还通过案例研究进一步论证了双重资本运营模式对医院服务质量提升的作用。本文认为，该结论为论证医院构建双重资本运营体系的有效性提供了理论支持。因而，在未来的中国公立医院运营体制改革过程中，我们建议中国公立医院可以投入其他社会资本或者国有资本，进一步提高医院高质量发展水平。

关键词：双重资本运作模式，团队协作，医疗服务质量，患者满意度

JEL: I10, M10

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Acknowledgements

It is a great honor to participate in the Doctor of Management in Healthcare Program that is cooperated by China Southern Medical University and ISCTE Lisbon University Institute. The program is up-to-date the first one and the only one sino-foreign doctoral degree program in "public healthcare policy and management" which certified by Chinese Ministry of Education. In retrospect, scenes from the interview exam, entrance ceremony, monthly course, the thesis proposal, defense for report progress, to numerous painful and exhausting thesis revisions... are still fresh in memory with all sorts of feelings well up in my heart. However you won't achieve anything without hard work and great efforts. The strict professional academic trainings will benefit me a lot in my future work and lifelong study.

I am truly grateful for the cross-border education program that provides us with an international platform where we can throughly learn and exchange knowledge regarding the health management. I also want to offer my sincere thanks to all instructors, especially my supervisor, Professor Paula Vicente, for her meticulous guidance and selfless support over the past four years. I am deeply impressed by her profound knowledge, rigorous scholarly attitude and excelsior work style and also thoroughly convinced by her modest and open-minded scholarliness.

I am also grateful to Prof. Virginia Trigo, Prof. Nelson Antonio, Prof.Wang Dong, Prof. Ma Shaozhuang, Prof. Sun Ping, Prof. Zhang Chichen Mrs Eva Xu and Vian Ou for their heartfelt guidance and enthusiastic help during my doctoral life! My thanks also to my classmates of the 2015 class for their continuous encouragement and immense support during my thesis writing! Our friendship will last forever!

I express my heartfelt thanks to my family and friends, the leaders and colleagues of the Shanghai General Hospital affiliated to Shanghai Jiaotong University for their full support to my study. I also thank Professor Lian Yuqiang of East China University of Political Science and Law, Dr. Zhang Qi and Dr. Zhou Shenghai of School of Management of Shanghai Jiaotong University for their academic guidance and discussions.

Last but not least, my most profound gratitude is especially to Professor Virginia Trigo and Prof. Nelson Antonio, head of ISCTE-IUL doctoral program, and Professor Wang Dong, head of the Sino-Portugal Ph. D Program in Southern Medical University!

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致谢

非常荣幸能攻读中国南方医科大学（SMU）与葡萄牙里斯本大学学院（ISCTE-IUL）合作开办的，中国首个，也是目前唯一获得中国国家教育部资格认证的、博士层次的、“公共卫生政策与管理”方向中外合作管理学博士学位项目。蓦然回首，从面试、入学、每月一次的课程，再到论文开题、中期答辩、记不清次数的濒临放弃的论文修改……一幕幕记忆犹新，无限感慨。忍受得住破茧成蝶的痛，才担得起振翅高飞的美。经过这一系列严格的学术训练，在我今后的工作和学习中也必将受益终生。

衷心感谢该项目为我们提供了一个研究医药卫生管理领域的国际化的学习交流与研究平台。感谢学校的各位授课老师，特别是我的导师Paula Vicente教授四年多的悉心指导和无私帮助。Paula教授渊博的专业知识、严谨的治学态度、精益求精的工作作风让我特别感动，她温文尔雅、虚怀若谷的学者气质也让我折服和尊重。

在学习期间，得到了 Prof. Virginia Trigo、Prof.Nelson Antonio、王冬教授、马绍壮教授、孙平教授、张持晨教授、许睿敏(Eva Xu)老师、班主任欧玮艳(Vian Ou) 老师等诸多专家的指导和热心的帮助！感谢2015级中葡合作公共卫生政策与管理博士学位项目的同班同学们对我不断的鼓励和在论文写作遇到困难时提供的诸多帮助！我们的友谊，地久天长！

必须感谢我的家人和朋友、我的工作单位上海交通大学附属第一人民医院的领导和同事们对我完成学业所提供的全方位支持，感谢华东政法大学练育强教授、上海交通大学管理学院张琦博士、周声海博士的学术指导和探讨。在此，一并表示由衷的感谢！

特别致敬葡萄牙ISCTE-IUL中国项目负责人Prof. Virginia Trigo和Prof.Nelson Antonio、南方医科大学中葡项目总负责人王冬教授！

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List of Abbreviations

ADR	Adverse Drug Reaction
BOO	Build Own Operate
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CNKI	China National Knowledge Infrastructure
CPC	Communist Party of China
EFA	Exploratory Factor Analysis
NDRC	National Development and Reform Commission
PPP	Public-private Partnership
	Public-public Partnership
RMSEA	Root Mean Square Error of Approximation
ROT	Renovate Operate Transfer
SEM	Structural Equation Modeling
SERVPERF	SERVPERF Model
SERVQUAL	SERVQUAL Model
SGH	Shanghai General Hospital
SHDC	Shanghai Hospital Development Center
SMHEEA	Shanghai Medical and Healthcare Ethos Enhancement Association
SPD	Supply, Processing and Distribution
SPG	Shanghai Pharmaceutical Group Co., Ltd.
SRMR	Standardized root mean residual
TLI	Tucker–Lewis index
TOT	Transfer Operate Transfer

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Chapter 1: Introduction

1.1 General setting

1.1.1 Policy environment

The health care system of China encompasses both urban and rural areas, consisting of hospitals, primary health care facilities, and public health facilities. Nevertheless, due to the large population and unbalanced regional economic development, medical resources are still relatively insufficient. Most of China's fine health care resources are only found in public hospitals from economically developed eastern cities. To improve the quality and widen the population's access to medical healthcare services, President Xi Jinping put healthcare and development at the center of the Chinese government's agenda. In 2016, the "Healthy China 2030" Scheme was launched to frame the country's policy-making mechanism related to official healthcare policy (Xiao, 2017).

In order to better the quality of health services and contribute to higher patient satisfaction, the government introduced relevant policies to encourage public hospitals to be responsible for their own profit and loss. Progressively, Chinese hospitals changed from a single state-owned capital mode to the coexistence of various capital ownerships.

In 2011 the Ministry of Health of People's Republic of China set the Rules for Implementing Criteria for the Review of Tertiary General *Hospitals* (tertiary hospitals, also called third-grade hospitals, are referred to as the top-three hospitals. It is the highest-ranking hospital in China for the implementation of the "three-level ten-class" classification according to the *Hospital Classification Management Measures*.

As of the end of 2018, there were 2,548 tertiary hospitals in the country. The assessment of tertiary hospitals is generally carried out by the provincial health administrative department). According to the new Rules, patients' experience is measured with the medical service. Since then the notion of "patient satisfaction" became one vital indicator of hospitals' medical service quality and medical ethics.

The 3rd Plenum of the 18th Central Committee of the CPC put forward that the restructuring of public hospitals should be in various forms in 2013. In March 2015, the State Council officially announced for the first time the *Outline of National Health Service System*

Planning (2015-2020), which provides the policy basis for the dual-capital operation model. In October 2015, CPC's 5th Plenum reiterated the direction of public hospitals' reform. In July 2017, the General Office of the State Council officially introduced the *Guiding Opinions of the General Office of the State Council on Establishing a Modern Hospital Management System*. It clarified that "the modern hospital management system constitutes a major pillar of the primary care and health system with Chinese characteristics." The basic principles are "adhering to the separation of the government and public institutions and of administration and operation" (General Office of the State Council, 2017). By 2020 it is expected that "a modern hospital management system with clear rights and responsibilities, scientific management, complete governance, efficient operation and effective supervision shall be basically developed" (Xi, 2017).

1.1.2 About capital operation mode

1.1.2.1 Concept of capital operation mode

Capital operation is a kind of management idea to improve economic benefits in an all-round way. It aims at profit maximization and capital increase, and is characterized by value management. It pursues obtaining the maximum capital benefit at the lowest possible cost, that is to maximize the profit margin of equity capital (Du, Xu, & Gao, 2003).

In a broad sense, capital operation aims at maintaining and increasing the value of capital, and takes the rate of return on capital as the core index to evaluate the performance and maximize the capital profitability.

It is characterized by the operation of monetary value, and is the process of effective operation of all capital through the optimal allocation of all capital and its forms of production factors and the dynamic adjustment of industrial structure.

It covers all the operations aiming at maximizing capital appreciation, including the commodity operation and the hospital service operation(Li, 2006).

1.1.2.2 Concept of capital operation mode in hospitals

As a part of state-owned capital, state-owned hospitals also need to operate capital in the process of reform. China has been implementing health system reform for quite a few years. As reforms of the medical insurance system, pharmaceutical institutions and the drug circulation system continue, public hospitals are facing many new situations and new problems, and there is a need for capital operation at the same time. The *Decision of the CPC Central Committee and the State Council on Health Reform and Development*, issued on

January 15,1997, clearly points out that China's health service is a social public welfare institution where the government implements certain welfare policies.

Currently, health care institutions in China are public welfare institutions that enjoy the government's certain welfare policies. Hospitals in China, especially public hospitals, have the characteristics of particularity, welfare and commonweal, as well as the characteristics of efficiency and economy. Under the premise of insufficient government subsidies and separated ownership and rights of use, it has become a realistic choice for hospitals to carry out hospital capital operation to ensure the integrity and efficiency of hospital assets and keep or even increase the value of state-owned assets. Hospital management in China is converting from service management to capital operation management (Li, 2006).

The operation of hospital capital regards all tangible and intangible assets and human resources at the disposal of the hospital as activated capital that can be added value in circulation. Through strict management and flexible dispatch of capital structure, financing and investment by market mechanism, optimal allocation of resources and dynamic adjustment of the industrial structure (e.g. acquisition, merger, shareholding system, equity participation, holding, trusteeship, auction, alliance, lease, etc.), hospitals can operate effectively so as to lower operational risks, improve the efficiency of the use of assets, obtain the maximum output and benefits with the minimum input, and maximize capital appreciation (Xu, 2002).

In other words, in the process of capital or owner's equity inflow and outflow, optimal combination is achieved with the minimum input to gain the maximum output to appreciate capital subsequently. Capital operation requires hospitals to focus on improving economic benefits, emphasize improving the quality of capital operation, comprehensively strengthen cost accounting and capital management, improve capital operation efficiency, absorb incremental assets with stock assets, optimize the stock assets through incremental assets, and promote low-efficiency assets to achieve high-efficiency appreciation, thus continuing to strengthen the economic strength of hospitals and enhance market competitiveness (Chen et al., 2002).

At present, the capital operation activities carried out by hospitals are actually capital operation activities in a narrow sense, which are based on monetized and securitized capital or the capital that can be operated according to monetization and securitization, and which improve the efficiency and benefits of capital operations through mergers, acquisitions, strategic alliances and other ways (Li,2006).

Hospital capital operation is to regard all the tangible and intangible asset and human resources of the hospital as the activated capital that can be increased in value, or to study the allocation of hospital resources from the perspective of capital. By various forms like optimizing the allocation of production factors and dynamic adjustment of industrial structure, the optimal combination can be realized. In the process of capital inflow and outflow, the maximum output can be obtained with the minimum input, and the capital increase can be realized. It is also operation and management activities with capital operation at the core (Du, Xu, & Gao, 2003).

The capital operation of hospital is:

(1) to make use of all kinds of resources of hospitals through all kinds of channels and in all forms to change dead assets into living assets and control the majority of assets with the minority, thus making the tangible assets of hospital grow and the profit increase constantly;

(2) to expand the intangible asset of the hospital and transform it into tangible (valuable) assets, thus increasing the capital accumulation of the hospital;

(3) to leverage large assets with small assets, absorb incremental assets with stock assets, optimize the stock assets through incremental assets, promote inefficient assets to achieve efficient proliferation, strengthen fund management roundly, constantly improve the efficiency and benefits of capital operations, so that the strength of the hospital can rapidly grow (Cai et al., 2005).

1.1.2.3 Introduction of PPP mode

The cooperation mode between government and private capital is called Public-Private Partnership, abbreviated as PPP mode. PPP is an organizational model of a long-term partnership that combines different skills and resources among organizations in an innovative way to offer products or services. PPP mode produces public goods through the cooperation between public and private capital to meet the needs of the public.

As a financing means, it has been widely used in many fields at home and abroad, and has become an important financing channel for large and medium-sized projects such as infrastructure, public utilities and natural resources exploitation.

PPP model application in health care is common in foreign countries. Although PPP model in public hospitals is not mature in China, relevant government departments have started to turns their eyes to it. Under the active guidance of government policies, the implementation of PPP model in the health care sector has become a focus of the society. The PPP model provides a way to relieve the financial pressure by introducing private capital into

public utilities, which is beneficial to the promotion of investment and funding patterns and sustainable economic growth.

The European Commission (Zhang, 2018) defines PPP as a partnership between the public and private sectors for better provision of public services which are traditionally offered by the government.

The international understanding of PPP is mainly divided into two aspects.

In the narrow sense, PPP is a general term for a series of projects with the same characteristics, including BOT (Build-Operate-Transfer: the basic idea of a BOT financing model is that a government or agency should provide a Concession Agreement as the basis for financing the construction and operation of a project. To some extent, it can ease the contradiction that the government cannot meet the huge capital demand for infrastructure construction due to various reasons) and BOO (Build-Own-Operate: the contractor builds and operates an industrial project under a concession granted by the government, but does not transfer the infrastructure project to the public sector). It also includes less used forms of financing such as TOT (in Transfer-Operate-Transfer model, the ownership of the assets in stock are transferred from government organs to private capital or project company for a price, and put it in charge of the operation, maintenance and user services, while the assets and ownership will be handed over to the government upon the invalidation of the contract) and ROT (Renovate-Operate-Transfer in which the government increases the expansion of the content of the operation of the project on the basis of TOT model).

More broadly, PPP refers to the public and private sectors providing public goods and services through building up partnerships. In the definition of the PPP model, the NDRC has pointed out that it refers to various investment entities as private capital, including state-owned enterprises, private firms, firms with foreign investment, firms with mixed ownership or other investment and operation entities. The government can improve the supply ability and efficiency of public goods by establishing the partnership in which benefits and risks are shared with private capital.

The Ministry of Finance defines PPP model in a more practical way, pointing out that in the partnership, design, construction, operation, maintenance and other related work fall on the shoulders of private capital. Besides, the income of private capital parties should be ensured through a reasonable return mechanism(Zhang, 2018).

The introduction of private capital into public hospitals by PPP model can help activate the private capital stock, expand the investment space of private capital, supply more public services, and improve the effective allocation of medical resources. Meanwhile, PPP model in

public hospitals also broadens the source of funds for relieving the government's financial pressure, and can effectively disperse and reduce the risk borne by the government.

Since the new medical reform kicked off in 2009, the central government has been introducing private capital to the health care sector. In recent years, private capital has been encouraged to be actively involved in the reform of public hospitals.

In November 2014, the *Guidance on Investment and Financing Mechanisms in Key Areas of Innovation to Encourage Private Capital Investment by the State Council* stipulates that the reform of medical institutions in resource-rich areas of public hospitals should create conditions for private capital.

In May 2015, according to the *Guidance on the Promotion of the Cooperation Model Between Government and Private Capital in the Field of Public Service*, PPP should be promoted in various fields of public service including sub-sectors of health.

In February 2016, the *Opinions on Further Improving the Relief and Support System for People Living in Extreme Poverty* by the State Council encourages the use of PPP to support the development of medical service institutions through public-establishing with private-operation and private-run with public-assist or other patterns. Various policies have vigorously promoted the participation of private capital in the restructuring and recombination of public hospitals, and local governments have allowed public hospitals to cooperate with private capital in the form of franchising and have gradually started the pilot work of franchising in public hospitals, thus promoting the development of PPP model in health care. A series of supporting policies show that the application of PPP model in public hospitals is feasible in policy (Zhang, 2018).

1.1.3 The importance of capital operation mode

Capital operation and its constructive interaction between material and knowledge can greatly improve the allocation of resources, the operation of assets and the efficiency of medical service. The importance of the capital operation mode includes the following aspects:

(1) The capital operation of the hospital always centers around improving the economic benefit, focuses on the quality of the capital operation and pursues the maximization of capital value appreciation and management contribution. It turns dead assets into living assets, controls large amounts of assets with small amounts of assets, thus increasing the value of the hospital's tangible assets, increasing profits, expanding intangible asset, and converting them into tangible assets, thereby to increase hospital capital accumulation (Li, 2006).

(2) Give full play to the core competitiveness of hospitals through rapid capital expansion at low cost. The survival and development of hospitals in the market economy environment must have strong core competitiveness. In general, the core competitiveness depends on the advantages of human capital and the corresponding advantages of physical capital. If the internal composition of hospital capital is unreasonable, it is impossible to form strong core competitiveness, or the core competitiveness of the hospital cannot be effectively utilized.

In order to correct the unreasonable internal composition of hospital capital, the economic and effective means is to utilize various strategies of capital operation, including acquisition and merger, or forging alliance with other hospitals and non-hospitals capital. Reorganization of hospital capital can achieve capital expansion in a rapid, effective and low-cost manner, thus creating conditions for the full play of the hospital's own core competitiveness.

(3) Improving efficiency, reducing cost and relieving patients' burden are the sustainable and effective means of business operation to improve the competitiveness of hospitals. However, it might not be easy to improve the efficiency, reduce the cost and relieve the burden of patients by relying on the business operation itself.

The horizontal and vertical capital concentration of hospitals can make logistics services more efficient, and can realize the two-way referral between tertiary hospitals and secondary hospitals as well as community health service centers, thus creating conditions for reducing costs, cutting down the economic burden of patients and private health insurance and finally laying a foundation for the formation of strong hospital core competitiveness (Ko et al., 2014).

(4) From a micro perspective, hospitals can optimize capital structure and asset quality through legal and unobstructed financing channels and asset restructuring, invigorate the stock of funds or invest idle funds in financial markets, so as to get out of difficulties, expand rapidly in scale, strengthen the competitiveness in market and improve investment and operation benefits. As far as the specialty is concerned, we can mainly adjust the specialty structure and integrate the specialty development, which is helpful to improving the whole effectiveness of specialty.

From a macro perspective, capital operation can help effectively allocate health resources, enhancing the flow of stock assets and realizing the complementary advantages between hospitals and the rationalization of investment between regions (Zheng, 2005).

Before the reform of public hospitals, public hospitals had three subsidy channels: service charges, drug subsidy and government subsidy. Drug subsidy was born during the initial stage of new China when the country was facing economic difficulties. In 1954, the "Drug Subsidy

Policy" was introduced, which proposed that medical institutions were allowed to adopt a higher retail price of drugs on the basis of wholesale price when the government took the profit and loss of public hospitals.

Since the 1980s, the Chinese pharmaceutical industry has been on the rise. A large number of foreign enterprises poured in at that time. On the one hand, the supply and variety of drugs significantly increased. On the other hand, drug abuse was aggravated, and the phenomenon of non-standard competition in circulation was severe. After the reform, the "Drug Subsidy Policy" was abolished, with only two subsidy channels left.

Since the 1980s, the proportion of government investment in public medical institutions gradually decreased from 30% to 10% (Wang & Kamaruzaman, 2009). By 2008, under the premise of unreasonable rise of medical service price, pharmaceutical revenues accounted for 46% of public hospitals' business income. When seeking medical services, patients have to pay the "expensive" fees for drugs and checkups. According to their own situation, some hospitals took the initiative to explore a set of management methods to control artificially high drug prices.

The reform of the national medical system identifies the public welfare nature of public health facilities and advocates a "patient-centered" philosophy among these facilities. Conflicts of value orientation do exist when private capital enters public medical institutions with the pure purpose of making profits. Besides, the development of public hospitals will also be more oriented towards medical quality management and usage management of pharmaceutical supplies. To this end, we choose Shanghai General Hospital as the object of study, which applies the mode of cooperation between state-owned capital and state-owned capital.

Therefore, based on this background, it's significant for us to dig into the topic.

1.1.4 The capital operation partnership modes in Chinese hospitals

Chinese hospitals are now operating with a single capital and dual capital operation mode. The single capital operation mode can be divided into public hospitals with completely state-owned (government) capital operation mode and private hospitals with completely private (or individual) capital operation mode. Dual-capital operation mode can be split into private hospitals with cooperation operation model between private (or individual) capital and state-owned (government) capital and public hospitals with cooperation operation model between state-owned (government) capitals.

There are currently four kinds of capital operation partnership modes in Chinese hospitals: a) capital owned only by the state government; b) capital owned by private entities; c) public-private partnerships mode, i.e., capital owned by the state government and private entities; and d) public-public partnership mode, i.e., capital owned both by state government.

According to data from the *China Health Statistics Yearbook* (2019) , hospitals in China are classified according to the type of registration, namely, the capital operator (public and private hospitals), the sponsor (divided into government-run, private-run and individual-run hospitals), the management category (divided into non-profit-making and profit-making), the level (divided into tertiary, secondary and primary) and the type of institutions (divided into general hospitals, traditional Chinese medicine (TCM) hospitals, hospitals of integrated Chinese and Western medicine, hospitals for ethnicity, specialist hospitals and nursing homes).

See Table 1.1 below for detailed statistics.

Table 1.1 Number of Hospitals in China

Classification	2010	2014	2015	2016	2017	2018
Total	20918	25860	27587	29140	31056	33009
By type of registration						
Public Hospital	13850	13314	13069	12708	12297	12032
Proportion (%)	66.21	51.48	47.37	43.61	39.6	36.45
Private Hospital	7068	12546	14518	16432	18759	20977
Proportion (%)	33.79	48.52	52.63	56.39	60.4	63.55
By sponsor						
Government	9629	9668	9651	9605	9595	9649
Proportion (%)	46.03	37.39	34.98	32.96	30.90	29.23
Society	5892	6331	6570	6808	7103	7386
Proportion (%)	28.17	24.48	23.82	23.36	22.87	22.38
Individual	5397	9861	11366	12727	14358	15974
Proportion (%)	25.80	38.13	41.20	43.68	46.23	48.39

By management						
Non-profit-making	15822	17705	18518	19065	19752	20451
Profit-making	5096	8155	9069	10075	11304	12558
By level						
Tertiary	1284	1954	2123	2232	2340	2548
Secondary	6472	6850	7494	7944	8422	9017
Primary	5271	7009	8759	9282	10050	10831
By institution type						
General hospitals	13681	16524	17430	18020	18921	19693
TCM hospitals	2778	3115	3267	3462	3695	3977
Hospitals of integrated Chinese and Western medicine	256	384	446	510	587	650
Hospitals for ethnicity	198	233	253	266	284	312
Specialist hospitals	3956	5478	6023	6642	7220	7900
Nursing homes	49	126	168	240	349	477

Source: National Health Commission (2019)

As shown in Table 1.1, the share of public hospitals fell from 66.21% in 2010 to 36.45% in 2018. The percentage of private hospitals rose from 33.79 % in 2010 to 63.55% in 2018.

An example of private capital mode can be found in Suqian (a city in Jiangsu province) (Zhang & Xiong, 2014). Suqian is the only prefecture-level city in China that did not have a public hospital in 2003, and is also a test field for the privatization of public hospitals. The growth rate of medical service supply in Suqian is higher than that in the nearby areas, and the drug prices are relatively low.

At the same time, there was always a shortage of medical resources of high quality. It ignored the difference between public demand and individual demand (Wang, 2013) and tried to abandon government actions by using comprehensive market-oriented means. There is no tertiary hospital in its jurisdiction.

An example of a public-private partnership mode is the China International Trust and Investment Corporation (CITIC) in Shanwei. The latest joint-stock reform of public hospitals jointly launched by Shanwei, Guangdong and CITIC Medical (Zhang et al., 2016) is different from the previous trusteeship methods adopted by some public hospitals as it affected property rights and realized the capitalization of public hospital assets.

An example of a state-owned (public) and state-owned (public) partnership mode is Shanghai General Hospital (SGH) studied in this thesis. Shanghai General Hospital is the first third-level Grade A general hospital in Shanghai that has adopted this mode.

The number of hospital admissions by category according to Table 1.1 is shown in Table 1.2.

Table 1.2 Number of admissions in various hospitals of China

Classification	2010	2014	2015	2016	2017	2018
Admissions (ten thousand people)	9523.8	15375.1	16086.8	17527.7	18915.4	20016.9
By type of registration						
Public Hospital	8724.2	13414.8	13721.4	14750.5	15594.7	16351.3
Private Hospital	799.5	1960.3	2365.4	2777.2	3320.7	3665.7
By sponsor						
Government-run	8065.1	12586.5	12905.2	13937.8	14845.7	15609.1
Society-run	939.8	1450.2	1595.5	1765.2	1913.5	2065.3
Individual-run	518.9	1338.4	1586.1	1824.7	2156.3	2342.5
By management						
Non-profit-making	9082.4	14332.5	14894.9	16144.7	17237.1	18140.2
Profit-making	441.4	1042.7	1192.0	1383.0	1678.3	1876.8
By level						
Tertiary	3096.8	6291.0	6828.9	7686.2	8396.3	9292.2
Secondary	5115.7	7005.7	7121.2	7570.3	8005.8	8176.7
Primary	463.7	798.0	965.2	1039.3	1168.9	1209.5

Ungraded	847.5	1280.3	1171.7	1231.9	1344.5	1338.7
By institution type						
General hospitals	7505.5	11844.1	12335.4	13402.3	14360.1	15040.3
Tradition Chinese medicine hospitals	1167.7	2010.6	2101.8	2278.6	2492.9	2668.9
Hospitals of traditional Chinese and Western medicine	91.3	177.9	203.3	229	261.3	289.1
Hospitals for nationalities	24.3	49.3	56.2	59.6	74.8	92.6
Specialist hospitals	732.8	1286.8	1380.5	1545.6	1705.8	1899.6
Nursing homes	2.1	6.5	9.6	12.6	20.5	26.5

Source: National Health Commission (2019)

By comparing Table 1.1 and Table 1.2, we can see that although the number of private hospitals in China (including part of the private capital and individual capital) has increased year by year, surpassing the number of public hospitals, the latter still contribute to the largest part of admissions. It shows that government-run public hospitals are still the main source of high-quality medical care in China.

In addition, Article 40, Chapter III of the *Basic Medical Care and Health Promotion Law of China* (adopted at the 5th Plenum of the 13th Standing Committee of the NPC on December 28, 2019) stipulates that health care facilities run by the government shall adhere to the nature of public welfare.

All revenues and expenditures shall be brought into budgetary control, and shall be rationally set up and controlled in accordance with the plans of the health service system.

The state encourages government-run medical and health institutions to cooperate with private forces in setting up non-profit-making health care facilities. Government-run health care facilities are not allowed to invest with other organizations to set up health care facilities which are not independent legal persons, nor are they allowed to operate profit-making medical and health institutions in cooperation with private capital.

That is to say, China does not allow public hospitals to adopt the mode of cooperation between state-owned capital and private capital to organize profit-making medical activities.

Therefore, the operation mode of Shanghai General Hospital (SGH), which is a Grade A tertiary public hospital, that is, a cooperation capital operation mode of non-profit-making public hospital, which is between a state-owned (government) capital and another state-owned capital (government), is studied in this thesis. It's more suitable for the current situation of public hospital operation in China, and the successful experiences can be promoted.

1.2 Research questions and objectives

1.2.1 Research questions

Although private medical institutions have received support and encouragement from national policies in China (Zhou, 2015), there are still many constraints, such as balancing the profit-making purpose of private capital and the non-profit requirements of state-owned capital. The effective cooperation between these two forms of capital is still on the way and has yet to be explored.

Currently, the public-private partnership mode is mainly implemented in private hospitals. Its concretization in the context of state-owned capital hospitals is defined as the dual capital operation mode in this thesis. Chinese hospitals managed under a dual capital operation mode are scarce. Still, some success cases can already be found, which offer promising perspectives for widening the implementation of this mode.

However, no studies have yet been done on this topic. Our study intends to contribute to this subject by investigating health care service quality and patient satisfaction with medical services in a hospital managed under a dual capital operation mode.

There are few studies on capital operation modes at the theoretical level. In particular, there are no studies that analyze the relationship between capital operation modes on health care service quality and patient satisfaction.

We aim to analyze the above relationship and determine how the dual capital operation mode effectively improves patient satisfaction. We hope to analyze the dual capital operation mode's value from a new perspective and propose suggestions for the hospital resource operation model's reform and practice.

Moreover, there are many relevant studies on medical service quality and its impact on patient satisfaction. The factors affecting medical service quality are also elaborated in detail (see literature review in Chapter 2 for more information).

However, few scholars have analyzed capital operation mode. This study is expected to delve into the influence of capital operation mode on medical service quality from the perspective of team interaction process theory.

What's the relationship between capital operation modes on health care service quality and patient satisfaction? How does the dual capital operation mode effectively improve patient satisfaction?

1.2.2 Research purpose

The main aim of this study is to understand what dual capital is, what a hospital's dual capital operating model looks like, and the positive effects of dual capital injection in hospitals. In the following, the research objectives will be presented in two specific ways.

On the one hand, the concept of a dual capital operation mode is presented on the basis of literature review, and the differences between the different capital operation modes are further analyzed. One of purposes is to better understand what constitutes a dual capital operation mode for hospitals. We hope that this study's research will provide a basis for hospital managers to actively promote the dual capital operation mode.

On the other hand, this study further analyzes the relationship between the dual capital operation mode and patient satisfaction. Specifically, we argue that there is a chain mediating effect between the positive relationship of the dual capital operation mode on patient satisfaction.

By looking into the relations between the capital operation modes and patient satisfaction, we can effectively further expand the application of team interaction process theory and strengthen the understanding of the role of hospital capital operation modes.

Therefore, we hope that this study provides a theoretical basis for the promotion of dual capital operation mode in hospitals.

In this regard, the author bases only on public capital and intends to study the empirical case of Shanghai General Hospital to explore the impact the dual-capital operation mode with public & public partnership has on the medical service quality.

We intend to develop a model of the relationship between service quality and patient satisfaction under the dual capital operation mode. We want to base our research on the SERVQUAL model and the SERVPERF method which are built upon the study of service quality and patient satisfaction. We also refer to other models to evaluate the relationship between service quality and patient satisfaction.

The objectives of this study are as follows:

Objective 1 - We present the concept of a dual capital operation mode on the basis of literature review and analyze the differences between the different capital operation modes. We aim to understand better what constitutes a dual capital operation mode for hospitals. We hope that this study can offer hospital managers the theoretical ground to actively promote the dual capital operation mode.

Objective 2 - This study further analyzes the relationship between the dual capital operation modes and patient satisfaction. Specifically, we argue for a chain mediating effect between the positive relationship of the dual capital operation mode on patient satisfaction. By looking into the relationship between hospital capital operation mode and patient satisfaction, we can effectively further expand the application of team interaction process theory and strengthen the understanding of hospital capital operation modes' role. Therefore, we hope that this study provides a theoretical basis for promoting the dual capital operation mode in hospitals.

1.3 Shanghai General Hospital: a case of dual capital operation mode

1.3.1 Case selection

At present, in the medical field of China and other different countries (regions), the PPP model, that is, the public-private partnership model, is being implemented to various degrees.

Under this model, government and private agencies cooperate in public projects, sharing benefits on a non-profit basis. In the "dual capital" PPP model referred to by this research topic, the capital is contributed by two parties, either by public and private parties (Public & Private Partnership) or by two different public parties (Public & Public Partnership). The core of the dual capital operation mode is to work in cooperation with a due division of labor, complement each other, and emphasize specialization to ensure maximum capital operation efficiency.

The dual capital in the case of Shanghai General Hospital in this research refers mainly to that between public and public capital.

1.3.2 Shanghai General Hospital

Shanghai General Hospital (hereinafter referred to as "SGH"), founded on March 1, 1864, was one of the oldest western medicine general hospitals nationwide. In 1992, it passed the

review of the Ministry of Health, becoming one of the first Grade-A tertiary general hospitals in China. It has many historical notable milestones, such as China's first acupuncture anesthesia operation, China's first liver lobe resection, Asia's first adult kidney-islet cell transplantation, and so on.

Since 1990, it has won such honors as National Top 100 Hospital, National Advanced Unit in Health System, and National Advanced Spiritual Civilization Building Unit.

SGH, with its Southern Branch and Northern Branch, covers 294,775 m^2. The Southern Branch was the first Grade-A tertiary general hospital seated in the outer suburbs of Shanghai.

In 2019, there were 4206 permanent staff in the hospital, including 570 with senior professional titles and 1,411 with a master's degree or above. Around 2,580 beds were available in the hospital.

There were 68 clinical tertiary disciplines and medical technology disciplines in the two branches. The hospital had 4,299,000 visits at outpatient and emergency departments, 129,600 discharges (53.8% inpatients from Shanghai, 43.5% inpatients from provinces other than Shanghai, 2.7% international inpatients), 111,000 hospitalizations for surgery, and 6.26 days for hospitalization on average. The gross income was 3.616 billion RMB.

In 2020, SGH had two diseases ranked first had two diseases ranked second and had ten diseases ranked in the first three places in Shanghai, accounting for 16.7% of 54 key diseases of Shanghai Hospital Development Center (SHDC, established in September 2005, is a state-owned non-profit institutional legal entity approved by Shanghai Municipal People's Government. It is responsible for the investment, management and operation of the state-owned assets of municipal public medical institutions and the responsible entity of government-run medical institutions), and 23 types of diseases ranked in the first five places, accounting for 42.59% (see Table 1.3).

Table 1.3 Leading Disease Diagnosis and Treatment in the SGH

Disease Diagnosis and Treatment	Ranking in Shanghai, 2019
Cataract extraction and intraocular lens implantation Hematopoietic stem cell transplantation	1
Vitreoretinal surgery Radical resection of larynx malignant tumor	2
Acute pancreatitis Implantation/replace of cardiac pacemaker, defibrillator Interventional stent treatment of thoracic aorta Stenting for acute myocardial infarction Bronchial asthma Radiofrequency ablation for arrhythmia	3
Severe preeclampsia Intervertebral discs operation Laparoscopic cholecystectomy Interventional stent of thoracic aorta Bronchial asthma Selective PCI	4
Natural labor Uterus myomasurgery Cervix malignant tumor operation Type 2 diabetes Pituitary gland tumor surgery Acute craniocerebral trauma Complex therapeutic ERCP	5

Source: SHDC (2019)

In 2019, the SGH won 93 national natural science funding projects including two National Key Projects of the National Natural Science Foundation of China. In the last five years, it successfully applied for 491 provincial funding projects. More than 1,100 SCI papers are published in renowned journals, such as Lancet, Nature Biotechnology, Nature Medicine, New England Journal of Medicine and Gastroenterology and Cancer Research. Its international partners include Royal Melbourne Hospital, Mayo Clinic, Vivantes Hospital Group in Berlin, etc.

Additionally, SGH has opened a global teleconsultation platform directly connected with the top medical treatment in Europe and the United States. SGH has received more than 80 international medical students for rotating training and internship since 2009 and has sent more than 280 colleagues abroad for long-term or short-term studies for the last four years.

The hospital has always adhered to the service concept that "patients are the center of everything," and advocates the mission of "serving mankind with benevolence." As the hospital's core management target, SGH strives to improve the patient's sensitivity and satisfaction. To innovate the hospital's internal management mode, SGH first put forward the "Six Beams and Six Columns" hospital total quality management (h-TQM) theory system (Pan, Li, & Sun, 2017) and put it into practice.

By combining the benchmarking of performance excellence standards, SGH has contributed wisdom and strength to the early realization of the grand goal of "Healthy China 2030." With state-of-the-art technology and rigorous management, the hospital provides more and better medical services for patients at home and abroad. The hospital management is also actively exploring new forms of modern public hospital management model.

1.3.3 SGH's dual capital operation mode

In SGH, the government has increased investment in large-scale equipment under budget, capital construction and other projects in recent years.

In 2016, the hospital revenue excluding the project income consists of the government's basic subsidy (4.5%), medical service income (41.5%), drug income (33.6%) and consumables income (18.5%). The hospital director believes that with the deepening of health care reform, the hospital's revenue will mainly rely on medical services income, which will bring much pressure on the hospital's operation and further force public hospitals to adjust medical service.

SGH is among the first batch of hospitals in China whose capital operation mode falls under the category "dual capital mode" since it combines profit and non-profit goals under state-owned capital. SGH is a tertiary hospital affiliated to public capital whose aim is social welfare instead of profit. The Shanghai Pharmaceutical Group Co., Ltd. (SPG) is an enterprise under the Shanghai Pharmaceutical Distribution Holdings, Ltd. and conducts pharmaceutical R&D, manufacturing, distribution and retail. Although affiliated to state-owned capital, SPG pursues profit and economic benefits.

In July 2013, SGH reached strategic cooperation with SPG to enhance the service quality and patient satisfaction of SGH. Both entities are state-owned capital, but they are under the management of different higher-level state administrations.

SGH performance appraisal is conducted by Shanghai Municipal Health Commission. SPG performance appraisal is conducted by Shanghai State-owned Assets Supervision and Administration Commission (a special agency directly under the Shanghai Municipal Government which acts as the state-owned assets investor on behalf of the central government). According to the authorization of the State Council, the state-funded enterprises fulfil their responsibilities as investors on behalf of the State Council (Ying, 2018).

The strategic cooperation between SGH and SPG enabled SPG's capital to enter to operate the international advanced Supply, Processing & Distribution (SPD) management model, which is centralized management or outsourcing management of logistics such as the supply, inventory and processing of medical items.

To meet SPD services' requirements, SPG formed a special department to fully support the smooth development of SPD services. This model separates the non-medical parts from the overall process of hospital material management. For the hospital, the dual capital operation mode enables medical staff to focus on medical work by having professional people manage the hospital's storage and inventory of traditional drugs and supplies. This mode also facilitates the reform of the purchasing and distribution process of pharmaceutical consumables and other pharmaceutical circulation processes.

In 2013, SGH carried out medical supplies logistics reform of the supply chain model based on SPD (Supply- Processing- Distribution). In this way, it tried to rely on the modern supply chain management mode to optimize internal processes, enhance the quality of drug supplies, consumables and reagents, improve efficiency and reduce costs.

The drug supply chain holds the key to the change of hospital supply chain management. From a global perspective, the pharmaceutical industry is an indispensable part of health care economy, whose spending takes up 20% to 30% of global level.

In China, the circulation cost is the major contributor to the high cost of drugs. Drug distribution costs generally account for 15%-20% of the drug prices in developed countries with a proportion of less than 10% in the United States, but as high as 40%-50% in China.

Developed countries have entered the stage of "large production, large circulation." The top five pharmaceutical wholesale enterprises in the United States account for 95% and 40% of the national and world pharmaceutical market share. Germany's top three pharmaceutical wholesale enterprises account for 70% of its market share.

However, 491 larger pharmaceutical distribution enterprises in China account for only 20% of the Chinese pharmaceutical market share (Chen, 2016).

As a result, public medical institutions urgently need to carry out drug supply chain reform and compress the costs of drug distribution.

SPG is the main distribution platform subordinate to the Shanghai Pharmaceutical group, with a distribution business ranking in the top three nationwide. With a distribution network covering 30 provinces and cities and more than 80% of county regions in mainland China, as well as the top three hospitals in East China, SPG takes hospitals as its main clients.

On the one hand, the company introduced the international advanced SPD management philosophy. On the other hand, in order to cater to the needs of hospital SPD services, the hospital set up a special department and fully guaranteed the promotion of SPD services from the aspects of organization, personnel and other resources.

In July 2013, SGH and SPG reached a consensus of reforming from the drug circulation links, exploring the modern management model of materials in public hospitals, and integrating centralized logistics services management on medical supplies, inventory, processing, distribution, etc., to promote the management efficiency and reduce the management costs of medical supplies.

Traditionally, Chinese public hospitals' pharmacies are in charge of all the work after drugs enter the hospital. These tasks make pharmacists fail to develop their professional abilities. Meanwhile, the extensive management of pharmacies also allows room for "kickbacks" at various links.

The core of the SPD supply chain new model is to "let professional people do professional things" so that professional logistics managers can manage the inventory and take the responsibility of distributing drugs to departments in need by extending their service to hospitals. In the past, pharmaceutical logistics companies were only responsible for sending drugs to the hospital pharmacy warehouse.

Now, professional logistics managers extend their service to hospitals, who will manage the inventory and take the responsibility of distributing drugs to departments in need. In the outpatient pharmacy and ward pharmacy, there are also business professionals working with hospital staff.

After three years of trying, this new model has brought significant improvement to the efficiency of hospital drug management. Throughout logistics services, the management freed medical staff from the intricate logistics work and helped them focus on medical work. The

hospital further combed the list of drugs and minimized the discretion of the doctor in the choice of drugs under the premise of meeting clinical needs.

Specific changes are presented in Table 1.4 below.

Table 1.4 Changes in Shanghai General Hospital under the operation of dual capital

Change	Item	Before implementation	After implementation
Lean management was improved	Lean management	No data showing department consumption	Hospital managers at all levels can know the real-time consumption of materials in departments
	Supply mode	Push type	Pull type
	Supply management model	Plan management	Fixed management
	Inventory management	The hospital manages inventory	Vendors manage Inventory
	Settlement	Purchase settlement	Post-settlement / window settlement
Comprehensive costs decreased	Net volume of inventory items (consumption points)	1.26 m^2	0.17 m^2
	Units requesting	FCL	Fixed package
	Requesting cycle	Biweekly/month	Day
	Reduce pharmacists/ nurses/reservoirs	16 people / (2 people / consumption points) / 6 people	11 people / (1 person / consumption point) / 3 people
Efficiency was improved	Prescription processing time	30-40 seconds	10-15 seconds
	Medication, consultation windows	4 medication windows,1 consultation window	7 medication windows,2 consultation windows
	Transformation of pharmacists' work	Deployment, review, medication, consultation	More emphasis is placed on medication consultation and transformation to clinical pharmacy

Source: Chen (2016)

As of the end of 2019, the application of dual public capital in Grade-A tertiary general hospitals in Shanghai is mostly in logistics services sectors, such as catering, customer service, security and cleaning. Only SGH and Shanghai Oriental Hospital have promoted SPD supply chain cooperation projects in their pharmaceutical departments. Among all Grade-A tertiary specialized hospitals in Shanghai, only the International Maternal and Child Health Hospital is exploring the same model.

However, the dual capital operation in Shanghai General Hospital and Shanghai Oriental Hospital are different in cargo owners' scope in supply chain and settlement payment methods. SGH is one of the two hospitals engaging in SPD supply chain cooperation projects in the pharmaceutical department.

In the scope of cargo owners in the supply chain, SGH has cooperated with the Shanghai Pharmaceutical Group. The SPD supply chain of the group is mainly responsible for transferring most drugs within SGH. Most drugs in the pharmacies (including pharmacies in outpatient and emergency department, static distribution center, drug warehouse, etc.) are owned by the cargo owners in the supply chain. Shanghai Oriental Hospital has cooperated with the national pharmaceutical group. When drugs are distributed to the pharmacies (including pharmacies in outpatient and emergency department, static distribution center, drug warehouse, etc.), the hospital is the owner. In terms of settlement method, the mode of SGH and SPG is to settle after patients receive drugs; the mode of Shanghai Oriental Hospital is to pay by bill of lading when drugs arrive at the hospital.

With the help of the new SPD supply chain model, SGH improved the clinical pharmacist system. It not only completed the task of zero profit drug supply policy but also improved the efficiency of hospital drug management. At the same time, clinical pharmacists have returned to the essential role in ensuring the safety of drugs and controlling the cost of drugs, which improves the quality of health care services.

The dual capital in the case of SGH in this research refers mainly to that between public and public capital.

SGH is controlled by public capital. As a tertiary public hospital, it must save the dying. SPG is also controlled by public capital with the responsibility of pharmaceutical R&D and manufacturing, distribution and retail. The two capitals were originally operated independently.

In July 2013, SGH and Shanghai Pharmaceutical Distribution Holdings Limited, the main distribution platform of SPG, reached strategic cooperation. They introduced SPG's capital to

operate the internationally advanced SPD management model, allowing professional people to manage the hospital's storage and inventory of traditional drugs and supplies.

To meet the needs of SPD services, SPG formed a special department to fulfill the requirements of SPD services and thereby fully guaranteed the smooth development of SPD services from the aspects of organization, personnel and other resources. By introducing external capital from SPG, combined with SGH's original public capital, this model utilized lean management, information technology, intelligence and standardization to separate the non-medical parts from the overall process of hospital material management.

For the hospital, this public and public dual capital operation mode impacts the medical staff's work arrangements, enabling them to focus on medical work and improve medical service quality. This mode also facilitates the reform of the purchasing and distribution process of pharmaceutical consumables and other pharmaceutical circulation processes. It thus plays a key role in reducing the hospital's operating costs and improving medical efficiency, service quality and patient satisfaction.

Does this model enhance patient satisfaction? What is the relationship between the quality of health care and patient satisfaction under this model? The research and analysis to be carried out in this thesis is based on this starting point.

Therefore, we urgently need to establish appropriate models to look at the influencing factors of medical service quality and their relations under the dual capital operation mode and investigate into the relationship between service quality and patient satisfaction.

1.4 Thesis structure

The thesis is composed of five chapters: Introduction, Theoretical Framework and Literature Review, Research Design and Methodology, Results and Discussion and Conclusion.

Chapter 1, as the introduction of this thesis, mainly presents the related basic situation of this study from the research background, theoretical issues, research objects and thesis structure.

First, the policy environment in which the research is conducted, the basic concepts related to the research and the background of the research objects are discussed in general. It argues that in the context of the central government's policy that "modern hospital management system constitutes a major pillar of the primary care and health system with Chinese characteristics", the study of hospital capital operation mode is significant to promoting the construction of modern hospital management system.

It then discusses the concept of capital operation mode, the application of PPP mode in hospital capital operation, the background of hospital capital operation and the types of hospital capital operation modes in China.

Second, the chapter elaborates on the theoretical issues and the objectives to be achieved in this study, and puts forward the theoretical concept and practical value of the "Dual Capital Operation Mode", and the attempt on finding out the answer through the study of hospital double capital operation mode and medical service quality and patient satisfaction. The thesis tries to extract the theoretical concept and characteristics of "Dual Capital Operation Mode" and draws a conclusion of the relationship between dual capital operation mode and patient satisfaction.

Third, it describes the basic situation of the research object, regarding the operating conditions of Shanghai General Hospital as representative quality and suitable for the research object. Fourth, a general description is made to conclude the structure of this thesis and the main contents of each part.

Chapter 2, as the theoretical basis of this study, gives a comprehensive description of the relevant research results, with focuses on health care service, service quality, measurement of service quality, service satisfaction, relationship between service quality and patient satisfaction, relationship between hospital management and service quality and patient satisfaction, team interaction process, etc.

On the theoretical basis of previous studies, it applies the theoretical concepts related to quality to the specific context of medical services in China, thus contextualizing and guiding the research in this thesis, defining the theoretical categories of the key concepts in the research and laying a foundation for the measurement model of this research.

Chapter 3, as the empirical preparation of this research, explains in detail the empirical research approach adopted, including four parts: research hypothesis, theoretical model based on research hypothesis, data collection and data analysis.

Firstly, six research hypotheses are put forward based on the existing theoretical research results from the three perspectives of "dual capital operation mode, team cooperation and medical service quality", "team cooperation, service quality and patient satisfaction", "dual capital operation mode and the chain reaction of patient satisfaction".

Secondly, based on the above-mentioned hypotheses, a theoretical model is proposed to explain "the relationship among capital operation mode, team cooperation and medical service quality", "the relationship among team cooperation, medical service quality and

patient satisfaction" and "the relationship among capital operation mode, team cooperation, medical service quality and patient satisfaction".

Thirdly, it explains the scope of the empirical research and research methods. The research objects include both patients and doctors and the survey was carried out in the form of random participation questionnaires, with different questionnaire designs for doctors and patients.

Fourthly, the analysis tools and methods of the empirical data are introduced. Mplus is used as the analysis tool in the research, and the data are successively analyzed using exploratory factor analysis (EFA), confirmatory factor analysis (CFA), descriptive statistical analysis and Bootstrap analysis techniques, to ensure the validity of each hypothesis.

Chapter 4 is the Results chapter. Firstly, it analyzes the basic information of the sample in detail, and describes the measurement tools of "team cooperation", "quality of medical service" and "patient satisfaction". The results of data analysis are then described accurately On the basis of exploratory factor analysis, confirmatory factor analysis and regression analysis. Finally, the validity of each of the six research hypotheses is analyzed and verified, and the results show that all six research hypotheses are supported. The proposition that "dual capital operation mode has positive effects on patient satisfaction" is supported by empirical data.

In terms of the new model of hospital pharmaceutical care, this thesis focuses on the basic concept and process flow of the supply chain management model (SPD), the effects of the SPD model on promoting the development of pharmacy and the practical significance of the SPD model to optimizing clinical drug administration, expounding the transformation and effects of hospital pharmaceutical service mode under SPD logistics mode.

Chapter 5 is the Discussion and Conclusion chapter and presents the research conclusion, research significance and research limitations.

The framework of the study is shown in Figure 1.1.

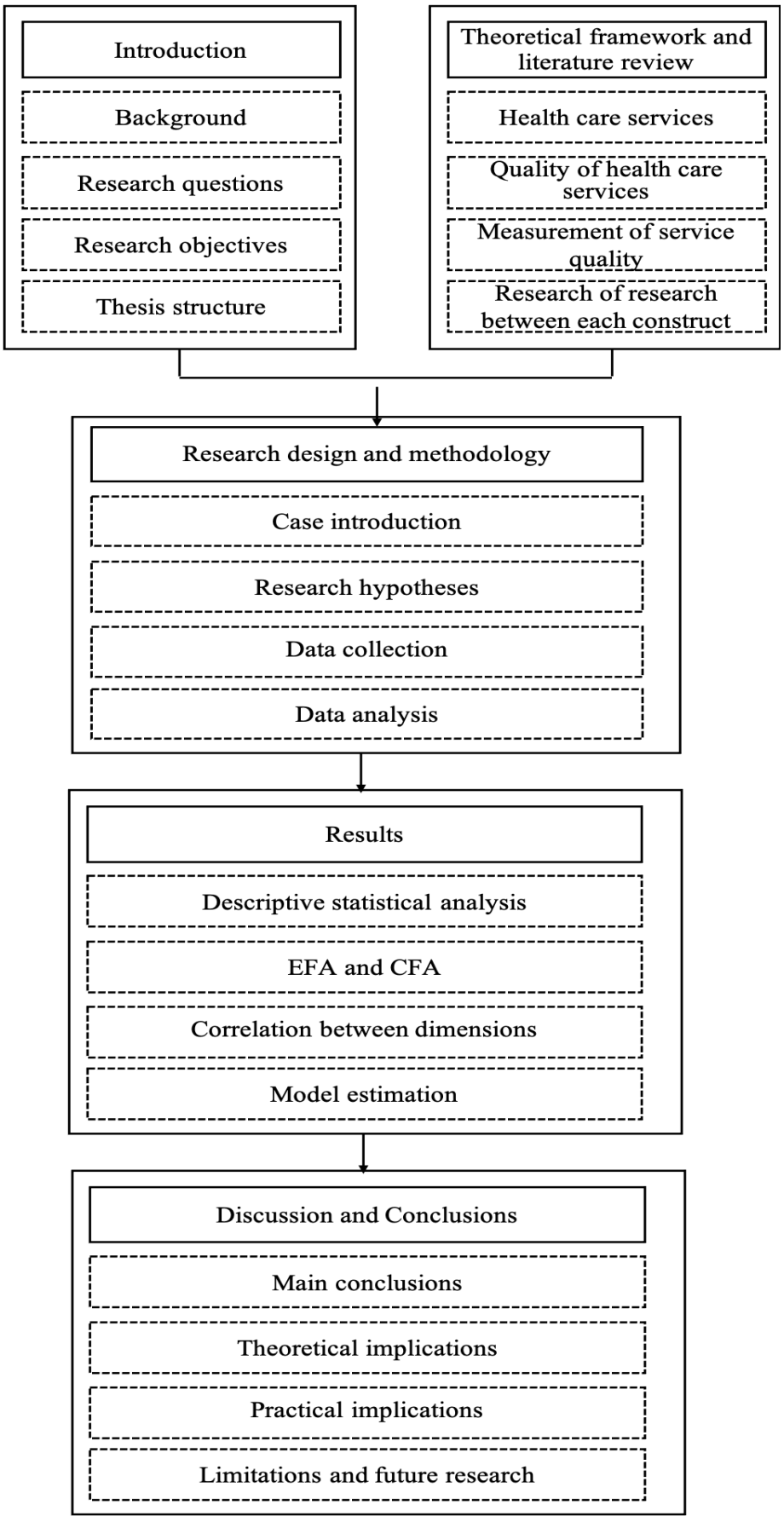

Figure 1.1 The study framework

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Chapter 2: Theoretical Framework and Literature Review

This chapter presents the major theoretical concepts relevant to the subject of quality applied to the specific context of health care services in order to contextualize and guide the research. To put into perspective, the quality of medical services, it is essential to clarify the underlying concepts, namely the concepts of health care services, quality of healthcare service, and dimensions of quality of healthcare service.

Measurement models of health care services are also presented and discussed. Additionally, the concept of patient satisfaction is presented, and its relationship with the quality of healthcare services is discussed with references from the most recent literature.

2.1 Health care services

"Health care" is synonymous with "medical care" when used to represent the services patients receive at health practitioners' offices and hospitals, i.e., activities solely related to medical behaviors (Hornby, 2014; Garson, Carolyn, &Engelhard, 2018) or the organized provision of medical care to individuals or communities. The scope of "health care" is broader as it includes not only medical care but also many socioeconomic and environmental factors, such as health insurance (Compilation Committee of OXFORD English-Chinese Dictionary, 2013).

Healthcare is a fundamental human right. In other words, everyone is entitled to the highest attainable standard of physical and mental health, including access to all health services, decent housing, adequate food, healthy working conditions, sanitation, and a clean environment. Therefore, hospitals, clinics, medicines, and doctors' services should be accessible, available, acceptable, and of good quality for everyone, on an equitable basis, where and when needed.

In a legal context, "health care services" are defined as any medical or remedial care or service, including supplies delivered in connection with the care or services recognized under state law. The term, therefore, could be interpreted as the furnishing of medicine, medical or surgical treatment, hospital services, nursing, dental services, optometric services, complementary health services, or any or all of the enumerated services or any other necessary services of similar characters, whether or not contingent upon sickness or personal

injury, as well as the furnishing to any person other services and goods to prevent, alleviate, cure or heal human illness, physical disability or injury (Oregon Laws.org, 2017).

In the medical dictionary, "health care services" mean: (1) a business entity that provides inpatient or outpatient testing or treatment of human disease or dysfunction; (2) dispensing of drugs or medical devices for treating a human disease or dysfunction; and (3) a procedure performed on a person for diagnosing or treating disease (Farlex, 2018).

The concept is broad, and its definition can be deepened by including reference to providers and types of health care. According to Study.com (2018), "health services" include medical organizations, professionals, and ancillary health care workers offering medical care to those in need. Health services are for patients, families, communities and populations. These services include emergency, preventative, rehabilitative, long-term, hospital, diagnostic, primary, palliative and home care.

Accessibility, sound quality and being patient-centered have always run close to the heart of health services. Successful health services entail various kinds of health care and providers. One broad classification of such services comprises primary care, outpatient care and emergency care. However, a larger proportion of health services are targeted at certain illnesses or problems, which may include mental health care, laboratory and diagnostic care, dental care, preventative care, substance abuse treatment, pharmaceutical care, physical and occupational therapy, transportation and prenatal care, and nutritional support.

Although health care services are mainly provided in specific facilities, such as hospitals, they can be provided at home in some cases. According to Johns Hopkins Medicine (2018), home health services available for patients cover a wide range. It may include nursing care, doctor care, medical social services, physical, occupational, and/or speech therapy, care from home health aides, companionship, volunteer care, homemaker or primary assistance care, pharmaceutical services, nutritional support, laboratory and X-ray imaging, transportation and home-delivered meals.

According to the World Health Organization (WHO, 2018), health care services should be safe, accessible, of high quality, people-centered, and integrated to ensure universal care. The service delivery systems shall provide health services for patients, individuals, families, communities and populations in general instead of for patients only. While patient-centered care is commonly understood as focusing on the individual seeking care (the patient), people-centered care encompasses these clinical encounters. The latter requires attention to people's health in communities and their critical role in advising health policy and health services.

The whole spectrum of care should also be a major factor to consider in the delivery systems, from promotion and prevention to diagnostic, rehabilitative and palliative care, as well all levels of care, including primary care, home care, self-care, community care, hospital care, and long-term care. In this way, integrated health services can be better ensured throughout the whole life.

China has chosen health care as one priority objective for its social and economic wellbeing.

President Xi Jinping made it very clear in the 17th National Congress by saying that "We shall deepen the reform of the health system, build special Chinese systems for the provision of basic healthcare, medical insurance, and quality and efficient services, and set up a sound modern hospital management system" and that "We will improve healthcare services at the community-level, and cultivate a better team of general practitioners" (Xi, 2017).

As part of this global strategy, by 2020, a hierarchical diagnosis and treatment model with primary diagnosis at the grass-roots level, two-way referral, differentiated treatment for acute and chronic diseases, connectivity between upper and lower levels will be gradually formed:

- Primary diagnosis: the state will adhere to the principle of voluntary participation by the people and policy guidance, improve and gradually standardize the treatment of patients with common and frequently-occurring diseases in primary health facilities. For diseases that exceed the functional positioning and service capabilities of primary health facilities, referral services shall be offered by these facilities.
- Two-way referral: the state will continue to promote medical treatment in a scientific way, make it more accessible and efficient, streamline two-way referral procedures, clear referral channels for patients whose conditions are relieved or at recovery stages, and ensure smooth and orderly referral between health facilities of different levels and categories.
- Tiered diagnosis and treatment of emergency cases and chronic diseases: the state will define and implement the functions of emergency and chronic diseases diagnosis and treatment services by medical institutions at various levels, optimize the chain of treatment, rehabilitation and long-term care, and provide patients with rational, due and continuous diagnosis and treatment. Acute and critically ill patients can go to secondary and tertiary hospitals directly for treatment.

- Up and down linkage: the state will guide medical institutions of different levels and categories to establish a mechanism with clear objectives and clear powers and responsibilities, to promote the rational allocation of quality health resources.

2.2 Quality of health care services

2.2.1 Quality

It is essential to understand the concept of quality, given its importance in most organizations. In organizations that provide services, quality is considered one of the main pillars in developing and implementing a successful management strategy. The concept, however, is not universal. It has changed over the years and can be analyzed according to different approaches and perspectives.

According to the American Society for Quality (ASQ), "quality" can be assessed either from a quantitative or qualitative perspective. In a quantitative approach, quality comprises three aspects: (1) whether the product is defective, (2) whether the product conforms to certain standards or requirements, and (3) the incidence of "internal" failures (those observed before a product leaves the plant) and "external" failures (those incurred in the field after a unit has been installed) (ASQ, 2018).

In a qualitative approach, "quality" focuses on the client's subjective perceptions. For example, according to ASQ, "quality" includes the characteristics of a product or service that bear on its ability to meet the needs stated or implied, or dedication to seeking the best solutions that ensure success and fulfillment of obligations (ASQ, 2018). The International Organization for Standardization (ISO) defines "quality" as the combined attributes of a product or service that bear on its ability to meet the needs stated or implied based on the characteristics of the product and service (Lang, 1995).

In commercial, engineering and manufacturing lenses, "quality" refers to a characteristic that constitutes the perceptional, conditional, somewhat subjective attribute of a thing, which usually varies from person to person. From this perspective, quality is clearly defined as the non-inferiority or superiority that a thing possesses, or any of the features that is suitable for its intended purpose and meets customers' expectations (Wang & Wang, 2005; Nanda, 2016). Xu (2003) argues the quality of something is how good (or bad) it is according to the industry

standard, or specifically, it is the sum of the characteristics of products, processes and services that bear on the ability to meet the specified requirements or potential needs.

Several scholars define "quality" from the standpoint of customers (see Figure 2.1). Drucker (1985) defines the quality of a product or service as what customers receive and are willing to pay for. For Feigenbaum (1991), quality is what best meets customer's requirements. Juran and Godfrey (1998) define quality as "fitness to use," i.e., the essential characteristics of the service to meet customers' needs and promote customer satisfaction. Grönroos (2000) shares a similar opinion, conceptualizing the quality as what the clients perceive and not how the organization determines it. Kotler and Keller (2012) also define that quality corresponds to the characteristics that a product or service presents and that satisfy the client's needs.

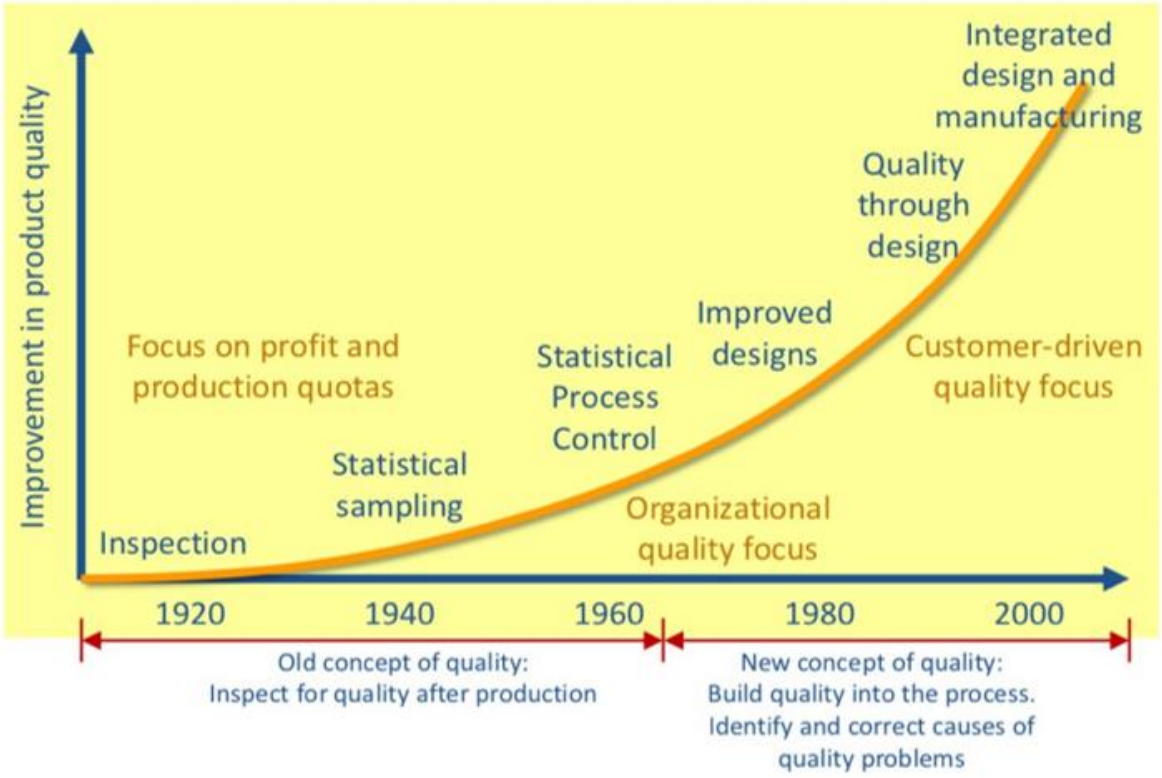

Figure 2.1 Evolution of quality concepts

Source: Power (2013)

Some scholars regard quality as a multi-dimensional concept. Kano et al. (1984) believes that quality consists of two aspects, namely "must-be quality" (to what extent the product or service is suitable to use) and "attractive quality" (the attributes of a product or service which could yield satisfaction when achieved fully but are not normally expected by customers).

Parasuraman et al. (1985) consider there are three dimensions: "physical quality," which includes the physical facets during the process of product or service delivery, "interactive quality," which comes from the interaction between customers and contact personnel, and "corporate quality," which is related to the company's profile or image.

Alongside the different perspectives, the concept of "quality" has evolved over time (see Table 2.1). In early 20thcentury, quality was a concern only after the production and was basically a detection of defects or flaws in the production. In the second half of the century, "quality" became a broader term and involved the whole company to ensure customer satisfaction.

Table 2.1 Relevant scholars in quality management and main contributions

Scholar and dates	Main Contribution
Walter A. Shewhart (1891-1967)	• Contributed to the understanding of process variability • Developed the concept of statistical control charts
Edwards Deming (1900-1993)	• Emphasized management's responsibility for quality • Developed "14 points" for quality improvement of companies
Joseph, M. Juran (1904-2008)	• Defined quality as "fitness for use" • Developed the concept of cost of quality
Armand. V. Feigenbaum (1922-2014)	• Introduced the concept of total quality control
Philip B. Crosby (1926-2001)	• Coined the phrase "quality is free" • Introduced the concept of zero defects
Kaoru Ishikawa (1915-1989)	• Developed cause-and-effect diagrams • Identified the concept of internal customer
Genichi Taguchi (1924-2012)	• Focused on product design quality • Developed loss function

Source: Power (2013)

In short, quality is a complex and not uniform concept (Snipes, Loughman, & Fleck, 2010) which can be seen either in an objective way, e.g., quality is the absence of failures, or in a subjective way, e.g., quality is how well a product or service delivered matches customer's needs (Niu et al., 2005). Moreover, the concept is not static and has changed over time.

2.2.2 Service quality

The success of organizations that provide services depends, to a large extent, on their capacity to satisfy the customers, anticipating their needs and expectations and building loyalty relationships. It is, therefore, crucial to provide services with quality, as it contributes to customer satisfaction and loyalty, productivity enhancement, cost reduction, return on investment and the increase in market share (Yang, 2006).

The perception of quality from the lens of the service sector complicated due to the multi-dimensional nature and the fact that a service is something non-tangible (Parasuraman, Zeithaml, & Berry, 1985). Moreover, the definition of quality in services is not static. It depends on the evolution of customer needs, the specific context of the service, and the market (Zeithaml, Bitner, & Gremler, 2006).

According to ISO's specifications, service quality is defined as the degree to which a set of fixed characteristics of service activities meet the requirements. It has multiple attributes, including the consumers' satisfaction level, perception of the service that they receive and assessment by the service provider regarding how well the service level satisfies the consumers' needs. In a narrow sense, service quality only refers to the quality attributes that occur in the whole process of product delivery by service firms (Zhang, & Xiong, 2014).

Service quality in a broader sense refers to the quality attributes of intangible and physical products and services delivered to customers, which is a combination of process quality and outcome quality, hardware quality and software quality, subjective quality and objective quality, internal quality and external quality, as well as interactive quality and one-way quality (Huang & Xu, 2008).

However, some other definitions of service quality can also be found in the literature.

Parasuraman, Zeithaml, and Berry (1985, 1988) associate service quality to the expectations of customers about the service and effective perceptions of service performance. Haywood-Farmer (1988) considers service quality consists of three essential attributes: professional judgment, physical facilities and procedure (behavior), each attribute being composed of many factors. Cronin and Taylor (1992) believe that service quality should be regarded as an attitude. Besides, Rust and Oliver (1994) presented a service quality mode structured in three components: 1) the technical quality, which results from the service itself; 2) service delivery, i.e., the interpersonal interactions that occur during its delivery; and 3) the service environment, i.e., the set of tangible elements associated to the service.

Grönroos (2000) emphasizes that service quality consists of the results of the service and the interaction with the service provider, and that its conceptualization is made through the distinction of functional and technical quality, two different dimensions reflecting the customers' perceptions of the service. Technical quality involves what the customer actually receives as a result of the service provided. It can be assessed with reasonable objectivity, and it is essentially what satisfies the nuclear need, i.e., why the consumer seeks the service. On the other hand, functional quality relates to the way the service is provided, including the interaction between the customer and provider, and is often perceived subjectively. In the specific case of health care services, functional quality refers to aspects such as facilities, cleanliness, hospital food quality, attitudes of hospital staff (Bowers, Swan, & Koehler, 1994), while technical quality refers to doctors' clinical and operational skills, laboratory technicians' expertise in testing blood samples, nurses' familiarity with drug management (Tomes & Ngs, 1995), the compliance of professional norms or technical accuracy of medical diagnosis and procedures (Lam, 1997).

In summary, it is essential to retain three aspects regarding the concept of quality of services:

- It is more difficult to assess service quality than product quality due to their intangibility and heterogeneity;
- Service quality involves comparing consumer expectations with the service provided;
- Service quality does not rely only on its outcome. It is also associated with how it is provided, that is, the entire service delivery process is essential for determining its quality.

2.2.3 Service quality in health care

A set of objective criteria such as mortality and morbidity were used to measure the quality of health care services in the past. At present, the concept is more comprehensive, focusing essentially on the human factor's presence in service performance(Dagger, Sweeney, & Johnson, 2007). The quality level of health care services is primarily measured by patients, based on the performance of the hospital during the service provision (Rakhmawati et al., 2013), and the hospitals are increasingly concerned to provide quality health care services (Itumalla, Acharyulu, & Shekhar, 2014).

While most hospitals offer the same range of medical services, there are differences in health care service quality. This situation works as a source of differentiation between the hospitals and boosts market competitiveness, particularly for private hospitals that inevitably

compete to provide the best health care services and win patients from competitor hospitals (Suki, Lian, & Suki, 2011; Zarei et al., 2012).

Health care services are complex and demanding. There is no unique definition of its quality. However, the concept is much relevant and has captured the attention of hospital managers and academics.

The WHO's definition of health service quality is the entirety of the abilities of health service departments and institutions that provide health services for patients to meet their stated and implied needs (Roemer & Montoya-Aguilar, 1988). Figure 2.2 presents the overall and specific concepts of health care service quality. Quality feature in (health care) resources and (health care) activities levels is a magnificent factor, especially in the conceptualization of quality assessment of the whole health care system.

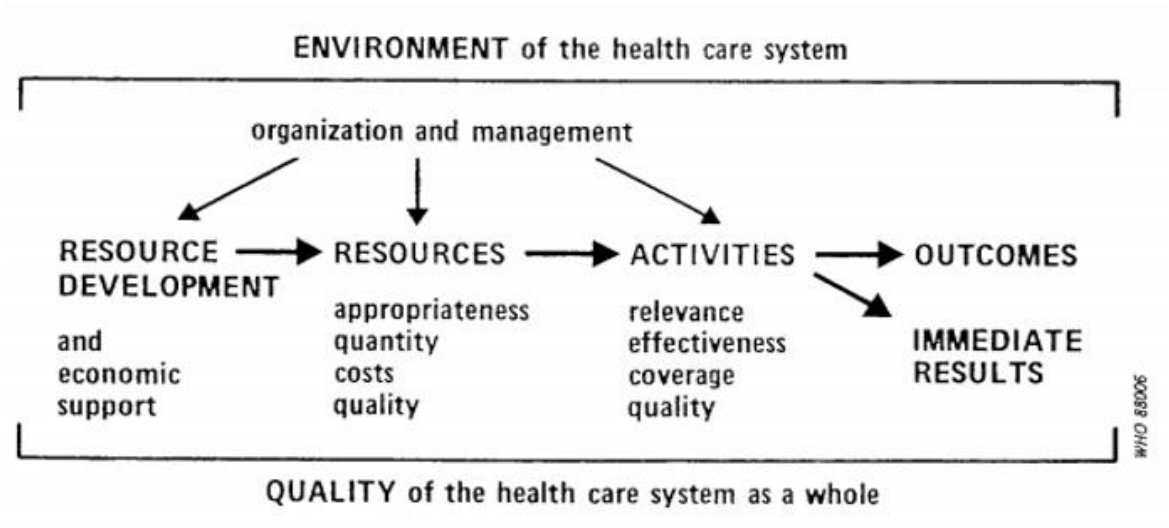

Figure 2.2 Overall and specific concepts of medical quality

Source: Roemer & Montoya-Aguilar (1988)

The American Medical Association defines the quality of health services as the delivery of health services to individuals and groups based on existing health expertise to improve the likelihood of achieving the desired health conditions(Long &Fairfield, 1996), while the American Institute of Medical Sciences puts forward six dimensions of health care service quality: safety, treatment outcomes, patient-centered, timeliness, efficiency and fairness (Institute of Medicine, 2001).

Fuentes (1999) argues that such quality is a multi-dimensional concept, reflecting the judgment of whether particular health care services are best suited to produce the best results

in the reasonable expectation of patients, and whether such services are offered with due attention to the doctor-patient relationship.

Campbell, Roland, and Buetow (2000)find that the quality of health care services has two dimensions – accessibility and outcomes of services; the service outcomes include clinical service outcome and interpersonal service outcome.

Xu (2003)defines health service quality as the totality of the characteristics of the abilities of health service departments and institutions that provide health services for residents employing certain health resources to meet their stated or implied health service needs. Its characteristics refer to the unique nature of health service activities and attributes that distinguish health service activities from other service activities.

Yang (2007)thinks that the quality of health care services can fall into two aspects: individual service quality and group service quality. Individual service quality refers to whether an individual can obtain the health services he/she needs and whether the services yield expected outcomes. Group service quality refers to the ability to obtain effective services on the basis of efficiency and fairness in order to improve the health conditions of the whole population. Alternatively, the quality of health care services includes two components embodied in the delivery of health services, treatment process and outcome: accessibility and effectiveness. Accessibility is the degree to which institutions and services of the health system can meet patients' needs. Effectiveness refers to the outcome of health services offered to satisfy patients' needs, including clinical services and interpersonal services.

Aagja and Garg (2010)define the quality of hospital services as the discrepancies between patients' or medical staff's perceptions of the actual services offered by a certain hospital and their expectations.

Finally, the quality of health care services can be identified through the set of elements proposed by Donabedian (2005), namely the process, the structure and the results. The process corresponds to the delivery of the medical services (exams, treatments, diagnostics). The structure refers to the administrative and related procedures that support the provision of healthcare services (such as facilities and equipment, administrative structure and operations). The results reflect the effectiveness of the quality of medical services, conditioned by technology and medical science.

2.3 Measurement of service quality

The connotation of service quality is very wide with interdisciplinary attributes, which makes it difficult to define. Parasuraman, Zeithaml, and Berry (1985)stress that the difficulty of defining the quality of service is caused by service characteristics such as intangibility and consumer participation in the process of service delivery. Compared with tangible products, the evaluation of service quality is more challenging (Parasuraman, Zeithaml, & Berry, 1985). However, several instruments have been developed to measure service quality, some of which are adapted to the specific features of the service.

In this section, some models of service quality are reviewed briefly, together with models measuring the quality of health care services.

2.3.1 The Grönroos' service quality model

In Grönroos' model(1984), service quality is based upon customers' perceptions of service quality (see Figure 2.3).

In the model, customers' perceived service quality is the result of a comparison between customers' expectation of a service (expected service) and customers' perception of the service they actually receive (perceived service) (Grönroos & Arnold, 1988). If the results of the experience are better than expected, customers' satisfaction will increase. That is to say, if the customer's expectation is relatively low, the customer would be satisfied with relatively mediocre service at a low price. Similarly, if the customer feels that the previous service quality is better or that the product is expensive, or the service is not worth the price, he/she will not be satisfied with it.

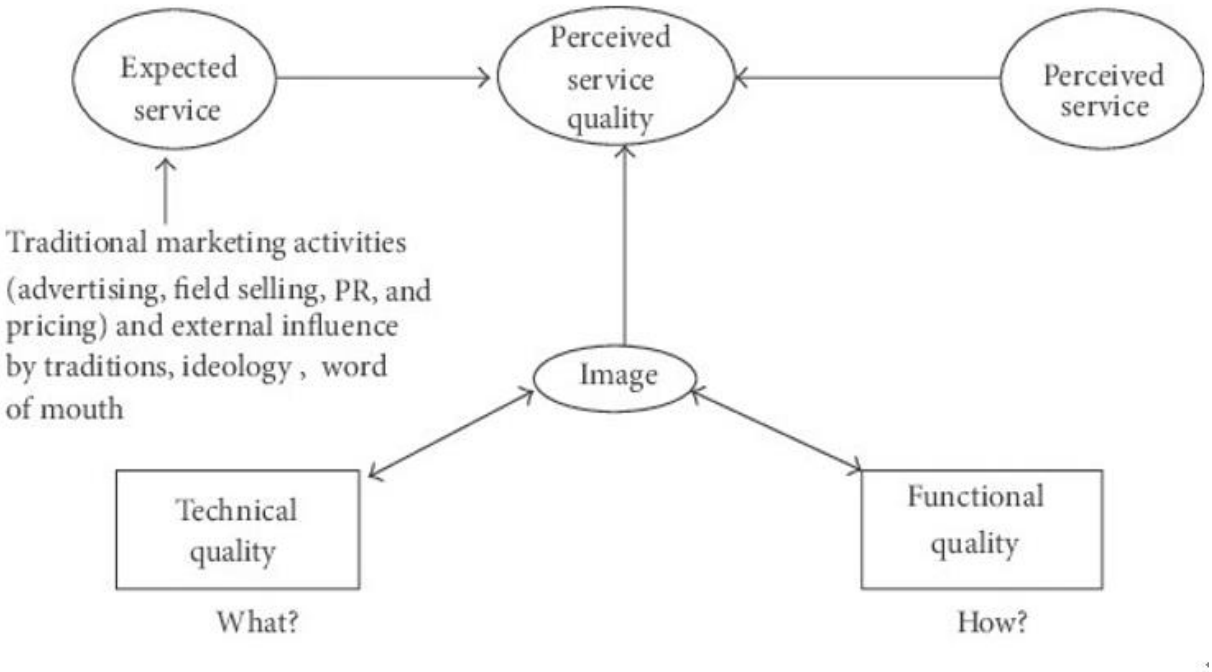

Figure 2.3 Grönroos service quality model

Source: Grönroos (1984)

According to Grönroos' model (1988), service performance evaluations include two aspects: a technical aspect and a functional aspect. Both technical and functional quality can affect perceived service quality. To be more specific, technical quality, which customers can objectively assess, refers to the "what", i.e., the outcome of a service, while functional quality, which is a subjective assessment of customers, refers to the "how", that is, the manner or process that a service is performed. These two dimensions are also interrelated (Grönroos, 1984). Acceptable technical quality can arguably be regarded as a precondition of successful functional quality.

Although satisfaction with the technical service quality may not influence functional quality, when there is no technical quality to talk of, functional quality alone will not suffice to compensate for this (Solomon et al., 1985). According to Grönroos (1984), functional quality is more important to overall perceived service quality as long as the technical quality dimension is at least satisfactory.

In addition, Grönroos (1988)proposes that a third dimension, a company's corporate image, also influences perceived service quality. A company's corporate image can be affected by factors like price, external communications, technical and functional quality, physical location, the appearance of the site, and the competence and service of the employees

(Ghobadian & Speller, 1994). Grönroos (1984)points out that if a business leaves a customer with a positive image (for one or more of the above-mentioned reasons for example), the customer tends to find excuses for his/her negative experience with technical or functional quality.

Nevertheless, that customer's image of the service provider will deteriorate if the negative experience with quality continues. Likewise, perceived problems with service quality might easily increase as a result of a negative image. In the case of service quality perception, the service provider's image can be regarded as a filter (Grönroos, 1984; Grönroos & Arnold, 1988).

Grönroos and Arnold (1988)further honed the model and added six criteria of sound perceived service quality. Each of these six criteria are classified into his three-dimensional service quality model. Professionalism and skills, the first of these criteria, is a technical quality dimension as it is outcome-related. Reputation and credibility, the last criterion, is image-related. The other four criteria including accessibility and flexibility, attitudes and behavior, reliability and trustworthiness, and recovery, represent the functional quality dimension because they are process-related.

Grönroos' model has been widely accepted and applied.

However, there is some criticism on the model in three aspects: first, the technical and functional dimensions cannot adequately cover all elements of service; second, the two dimensions should be put on an equal basis; and third, the model may not be able to successfully describe services where physical and technological elements play a major role because of its heavy reliance on human interaction(Seth, Deshmukh, & Vrat, 2005).

2.3.2 The SERVQUAL model of service quality

A model proposed by Parasuraman, Zeithaml, and Berry (1985) takes service quality as the outcomes of comparison between expected service (customer expectation) and service performance (customer perception). "Expectation" is what customers think a service provider should offer, while "perception" is customers' evaluation of services by the service provider.

As shown in Figure 2.4, the model is divided into two parts.

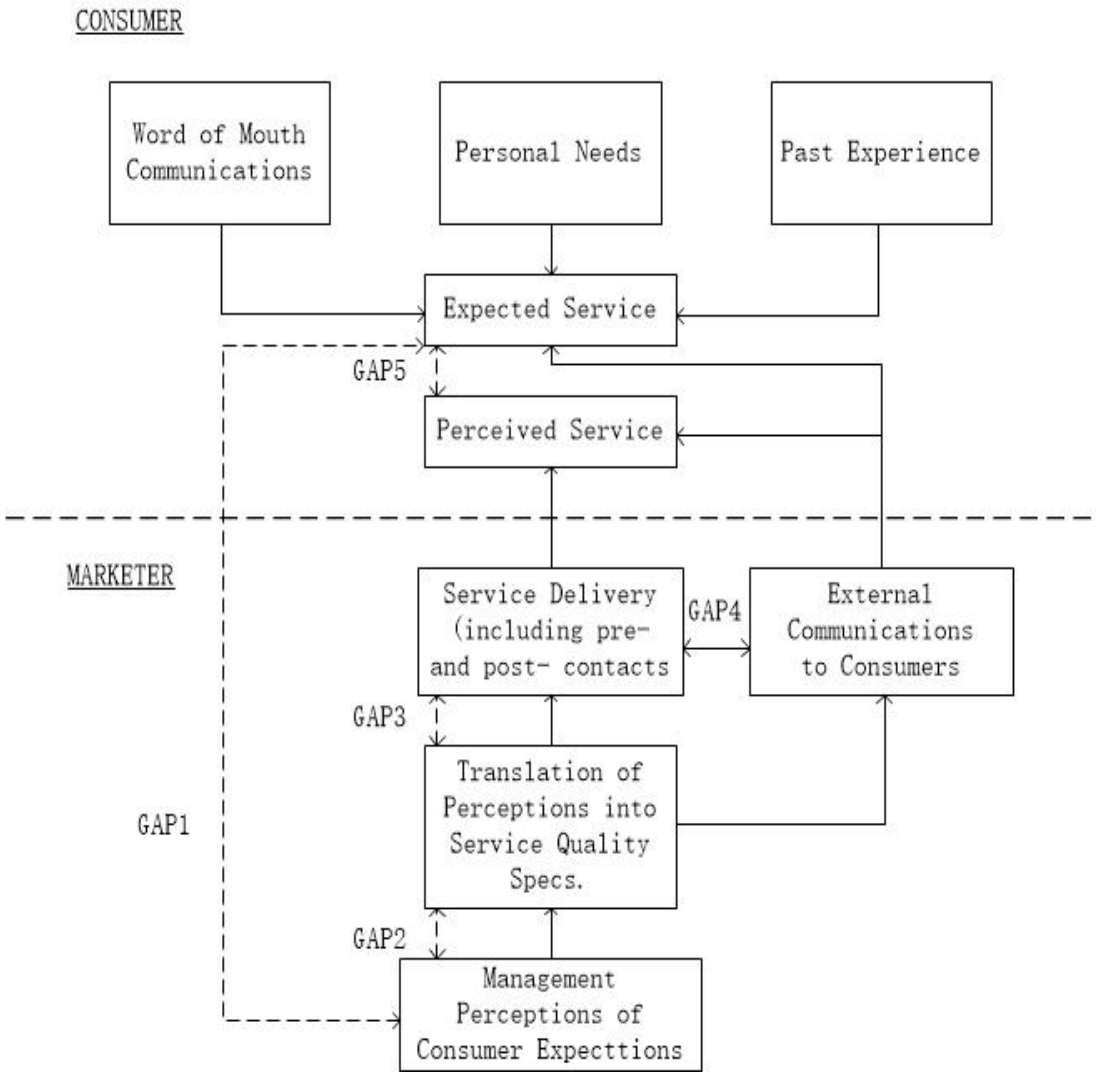

Figure 2.4 The Gap model of service quality

Source: Parasuraman, Zeithaml, and Berry(1985)

The upper part is customer-related. This part is the same as the previously mentioned perceived quality of service model. The lower part of it is concerned with the service provider. In the model, the expected service of the customer is a function of the customer's previous experience, individual needs and word of mouth (WoM) communication. At the same time, it is also affected by customers' perception of service, the perception of customer expectations of the service provider's management, the external communication between providers and customers (such as marketing campaigns of service business) and other aspects.

The customer's perceived service in the model refers to the service experienced by customers, which is the result of a series of activities and internal decision-making of the service provider and interacts with customer expected services.

The model suggests that there are five gaps – differences between expectations and perceptions – that turn out to influence customer's satisfaction: Gap 1 –that between customer

expectations and management perceptions of those expectations; Gap 2 –that between management perceptions of consumer expectations and the provider's service quality specifications; Gap 3 – that between service quality specifications and actual delivery; Gap 4 – that between actual delivery and external communications with patients about the service; and Gap 5 – that between expected service and perceived service performance.

Parasuraman, Zeithaml, and Berry (1985)proposed ten criteria to measure service quality. Later they classified these criteria into five aspects: (1) Tangibility: physical facilities, appearance of personnel and equipment; (2) Reliability: honoring commitments and delivering the service at the designated time; (3) Responsiveness: the willingness or readiness of employees to offer customers services; (4) Assurance: knowledge and courtesy of employees and their ability to inspire trust and confidence; and (5) Empathy: paying thoughtful and personalized attention to customers.

These dimensions are the basis of creating the SERVQUAL scale, which starts from the premise that quality can be evaluated by identifying gaps between expectations and perceptions of customers regarding service performance. The dimensions are represented by 22 pairs of items since the scale is administered at two different moments. In the first moment, customers express their general expectations of the service. The second moment occurs after the customer's contact with the service, and intends to measure the actual quality perception.

As shown in Figure 2.5, when perception exceeds expectations, the service is considered to be of good quality, that is, a surprise and pleasure. The service is deemed unacceptable if expectations are not met. When expectations coincide with the perception, the quality of services is satisfactory.

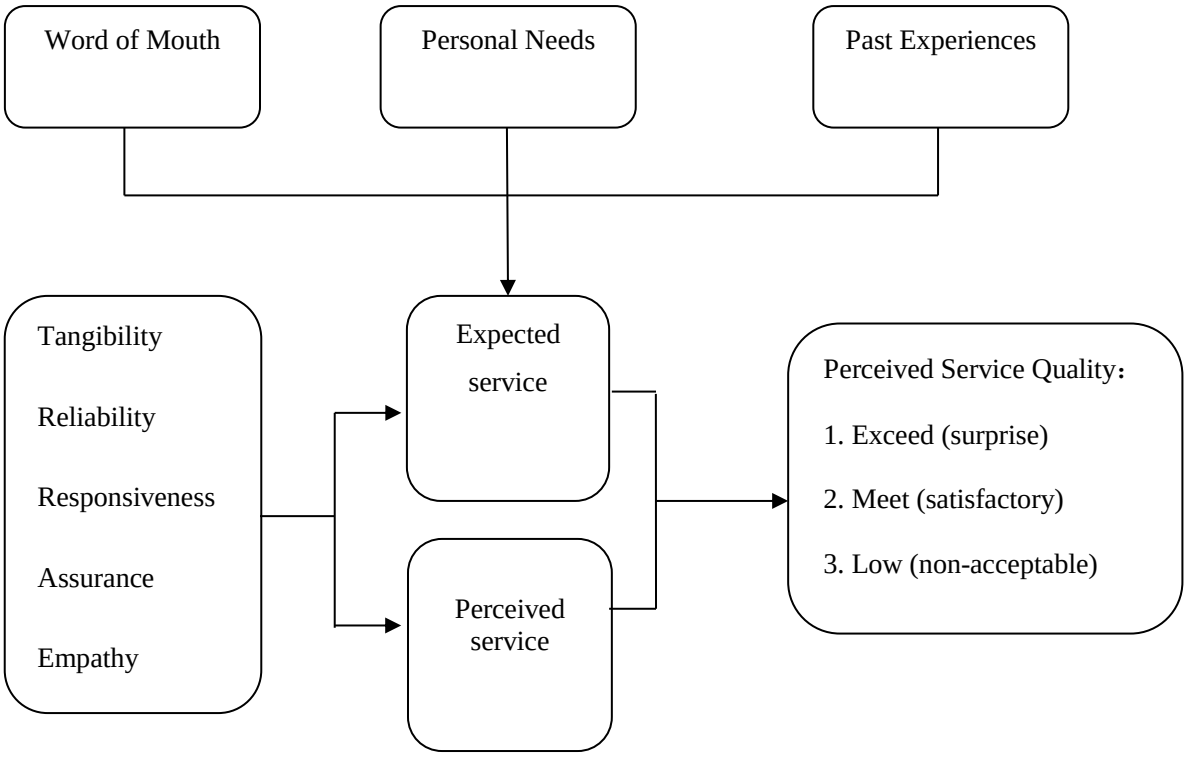

Figure 2.5 Determinants of perceived service quality

Source: Parasuraman, Zeithaml, and Berry (1985)

From the angle of total quality management and by analyzing the gaps in the five pairs of relations, the SERVQUAL model evaluates, manages and improves service quality. It is extensively applied in the service industry to understand the service needs and perceptions of customers and offer a set of methods for managing and measuring service quality for service providers. Meanwhile, for the service provider, the SERVQUAL model is used to understand employee perception of service quality to achieve the purpose of improving services.

2.3.3 The SERVPERF model of service performance

Cronin and Taylor (1992)developed an alternative method to operationalize the perceived service quality – the SERVPERF. The SERVPERF model only uses the perceptions part of the SERVQUAL scale. According to Cronin and Taylor (1992), perceptions of actual service received, rather than the difference between perceptions and expectations as suggested by Parasuraman, Zeithaml, and Berry (1988), can better predict service quality. Experiences are measured over a range of attributes developed to describe the service as conclusively as possible.

Compared with the SERVQUAL model, the SERVPERF model does not change in dimensions and measurement indicators. The main changes are reflected in the manner in which perceptions are measured. Cronin and Taylor (1992)maintain that service quality is

determined by performance, not performance-expectation. They further reason that customer expectations are imbedded into performance. Therefore, it is unnecessary to measure separately. That is to say, SERVPERF considers customer perceived service quality as an attitude. If the gap between customer expectations and customer perception is used to measure customer perceived service quality, customer expectations may be repeatedly calculated(Bowers, Swan, & Koehler, 1994; Roemer &Montoya-Aguilar, 1998; Jain &Gupta, 2004; Fang, 2012).

Ladik, Carrillat, and Solomon (2007) find that SERVQUAL and SERVPERF were equally cited over the last years, although SERVPERF has become more and more popular. They also find that both scales are equally valid and adequate predictors of overall service quality despite acknowledging that SERVQUAL would be more important to practitioners.

Although SERVPERF is not as popular as SERVQUAL, it has been proven to be a reliable instrument for the measurement of perceptions of service quality in a lot of industries. Andronikidis and Bellou (2010) found that SERVPERF is both theoretically and empirically superior to SERVQUAL. Jain and Gupta (2004)concur in their study of the fast-food restaurant industry in India.

2.3.4 Models of health care service quality

Several instruments have emerged in the health care domain to evaluate service quality (Padma, Latha, & Jayakumar, 2009), whose operationalization ranges from modifications of the dimensions of SERVQUAL/SERVPERF to the addition of other dimensions, as well as the creation of new dimensions of service quality (Itumalla, Acharyulu, & Shekhar, 2014).

The measurement instruments can be adapted to the type of health service under review or to the country where the research takes place (Pai & Chary, 2013). Among the various measurement instruments, we highlight some of the most recent ones: The Hospital Qual, the HEALTHQUAL, the 5 Qs model and the PRIVHEALTHQUAL. Pereira (2015) presents a resume of these models' features.

The HospitalQual was developed to evaluate the quality of the hospitalization service in public hospitals. The instrument comprises 25 items, distributed in seven dimensions designated as medical service, nursing service, administrative service, support service (support), communication with the user, user safety and hospital infrastructures(Itumalla, Acharyulu, & Shekhar, 2014).

HEATHQUAL was designed to evaluate the quality of services offered in health care centers from the perspective of users and managers. This instrument makes it possible to detect discrepancies between two different health stakeholders, who assume opposite positions in the provision of the service. In this context, this instrument is considered a pioneer in the European context, having been initially tested in Spanish health centers. Its composition is 25 items grouped in four critical dimensions, alluding to medical staff, non-medical staff, facilities and efficiency measures (Miranda et al., 2010).

The 5 Qs Model is an instrument that intends to measure the quality of the health service in the specific context of hospitalization. The instrument was conceived to examine potential similarities and differences between users from two different sites. It consists of 48 items, divided into five different qualities (dimensions) essential to a hospital: the quality of the object (technical quality), process quality (functional quality), quality of the infrastructure, quality of interaction and quality of the atmosphere. This instrument was further developed with the ambition of being more accessible than traditional ones, although it incorporates some items from the SERVQUAL instrument. Additionally, it includes attributes considered essential to analyze health care services (Zeithaml, Bitner, & Gremler, 2006).

PRIVHEALTHQUAL has been specifically designed for use in private health care units to determine the quality of services provided for users. This instrument comprises three sections. The first includes 47 items representative of the different aspects of a private health service. The second consists of an issue intended to assess the service overall. The third section is designed for demographic characteristics. This instrument results from a modification of the SERVQUAL instrument, which implies adding items and adapting them to the health sector, so some of its dimensions are equivalent to the SERVQUAL scale. The instrument thus encompasses seven dimensions that focus on the following characteristics: tangibility/image, reliability/fair and equitable treatment, responsiveness, assurance/empathy, medical services/professionalism/skills/competencies, equipment and records, and the dissemination of information (Ramsaran-Fowdar, 2008).

In terms of medical quality measurement dimensions, aside from the five dimensions of the most classic SERVQUAL and SERVPERF measurement models, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) proposed nine dimensions of medical quality (Sower et al., 2001): Efficacy, Appropriateness, Efficiency, Respect and Caring, Safety, Continuity, Effectiveness, Timeliness and Availability.

Besides, some researchers have put forward the Total Quality Management model to evaluate service quality under the medical operating environment from the perspective of Quality Function Deploy (QFD)(Lim, 2000).

These researches delve into the quality of medical services from the perspective of patient experience, such as the subjects of medical service quality, the process and the effects of hospital staff on customer perceived medical service quality (Kenagy, Berwick, & Shore, 1999).

Research on measurement of health care service quality in China has focused mainly on WANFANG data (Wanfang data knowledge service platform is a digital content publishing platform founded by Beijing Wanfang Data Co., LTD. It is generally considered to be one of the three academic resource databases in mainland China, parallel with CNKI and WIPRO information).

Niu et al. explored and established a medical service quality evaluation model, which is based on SERVQUAL, including medical service quality evaluation index system and scale interpretation method (Niu et al., 2005). Additionally, western service quality management theory and SERVQUAL measurement tools were used to explore the applicability and feasibility of Grönroos' service quality model and SERVQUAL in the health sector from the perspective of hospital management and patients, combined with the characteristics of Chinese medical services (Lin, Chiu, & Heish, 2001) .

SERVQUAL or SERVPERF scale was also used to measure the quality of nursing or medical services(Fang, 2012) . Llosa et al. (2007) only revised the research scale based upon the original SERVQUAL or SERVPERF scale and designed two sets of scales for patients group and hospital staff group according to the five dimensions of scale. Either set of scales has questionnaires with a certain number of questions. These questionnaires were handed out to hospital outpatient clinics, hospitalized patients and hospital workers. Workers were asked to fill out the questionnaires to self-evaluate the quality of services they provided for patients (Niu, 2005). Researchers then came to conclusions and offered suggestions for improvement according to a statistical analysis of the data (Lin, Chiu, & Heish, 2001; Niu, 2005).

To sum up, the SERVQUAL and SERVPERF measurement models provide a basic theoretical measurement tool to help understand the characteristics of medical and health services, such as the service process of medical institutions, service results, the causes of medical and health institution images, medical service quality problems, the relationship between medical service quality and patient satisfaction, and the relationship between patient

satisfaction and patient loyalty (treatment intention) not only from the perspective of service recipients– patients, but also from service providers – medical service institutions.

2.4 Satisfaction with health care services

Customer satisfaction is a common term in marketing, which measures how products and services offered by a company meet or exceed customer expectation. It refers to the number of customers, or percentage of customers, whose reported experience with a company, its products, or its services (ratings) exceeds specified satisfaction goals (Farris et al., 2010).

Since customer satisfaction is a key issue in the business strategy of many organizations, there is an increased interest in understanding the determinants of customer satisfaction. The health care sector is no exception. In fact, patient satisfaction evaluation is widely used in medical institutions both in China and other countries. It is a tool to evaluate the quality of medical services and the performance of health care workers.

The concept of satisfaction can be approached essentially by cognitive elements and affective elements. The cognitive domain resorts to the Disconfirmation Paradigm Model proposed by Oliver (1980), according to which satisfaction relies on a comparison between pre-purchase expectations and consumption outcomes. If the performance exceeds the consumer's initial expectations (positive disconfirmation), satisfaction occurs; on the contrary, when a product or service fails to meet the customer's expectations and needs (negative disconfirmation), dissatisfaction arises; when pre-purchase expectations equal consumption outcomes, confirmation occurs (Oliver, 1993). Satisfaction is, therefore, the result of a comparative process (see Figure 2.6).

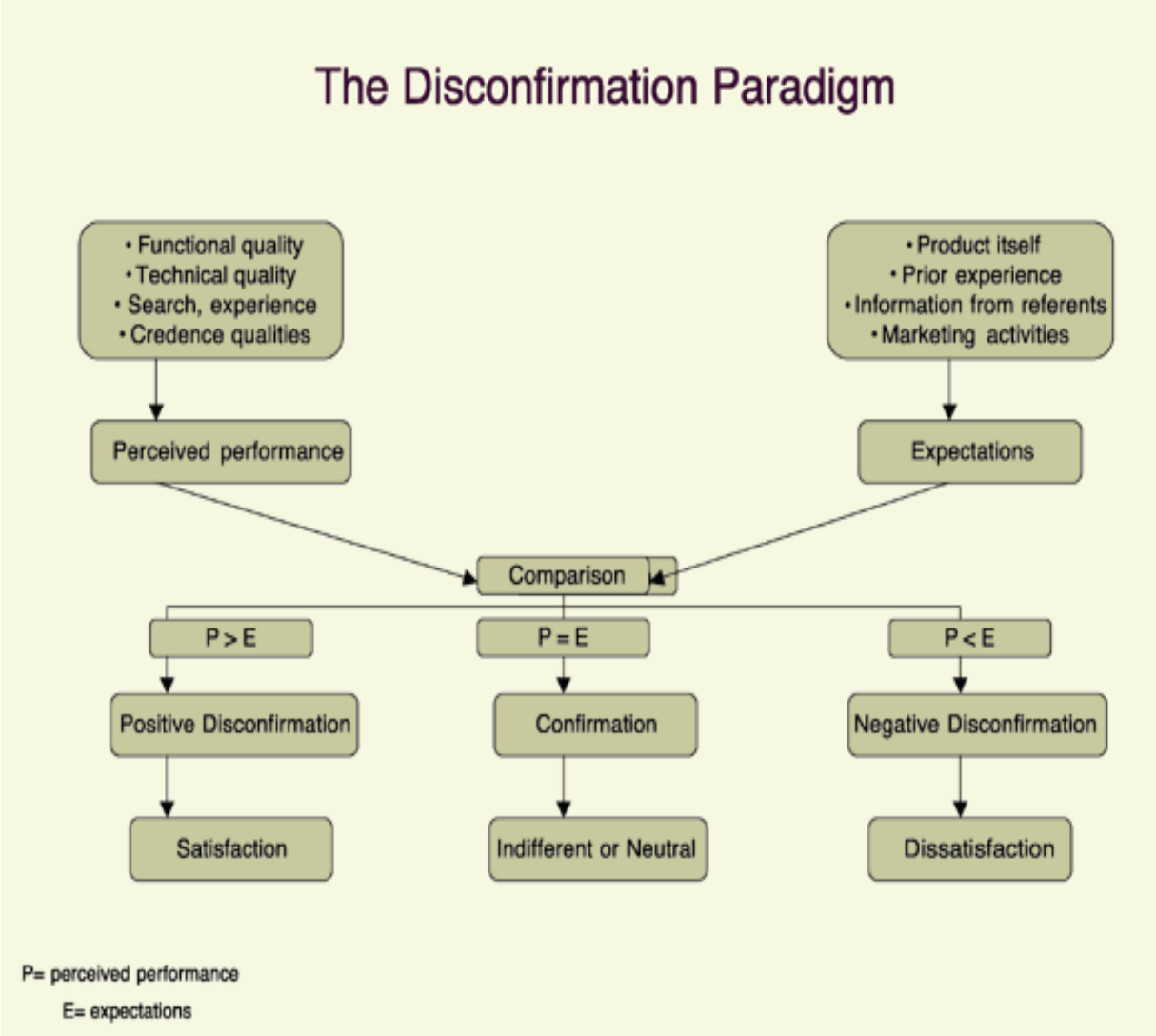

Figure 2.6 The Disconfirmation paradigm model

Source: Walker (1995)

Oliver（1997)then recognized that in addition to cognitive reaction, affective responses to a product stimulus should also be used to evaluate consumer satisfaction (Chen, 2010). Westbrook (1987)suggests that consumers form two affective states, one based upon the positive affection in consumption and the other upon the negative idea, both of which are significantly related to satisfaction(Oliver, 1993).

Russell (1980) suggested the Circumplex model of emotion to describe the two primary orthogonal dimensions of affective responses (see Figure 2.7): pleasantness/unpleasantness (valence) and arousal/sleepiness (arousal). He proposed that affective states are best represented as a circle in a two-dimensional space (Coghlan & Pearce, 2010). The first dimension is labeled pleasure – displeasure (on the horizontal axis) and the second dimension arousal – sleepiness (on the vertical axis), while the center of the circle stands for a neutral valence and a medium level of arousal. In this model, emotional states can be represented at

any level of valence and arousal, or at a neutral level of one or both of these factors (Rubin & Talerico, 2009). The Circumplex models has been mostly used to test stimuli of emotion words, emotional facial expressions and affective states (Remington, Fabrigar, & Visser, 2000).

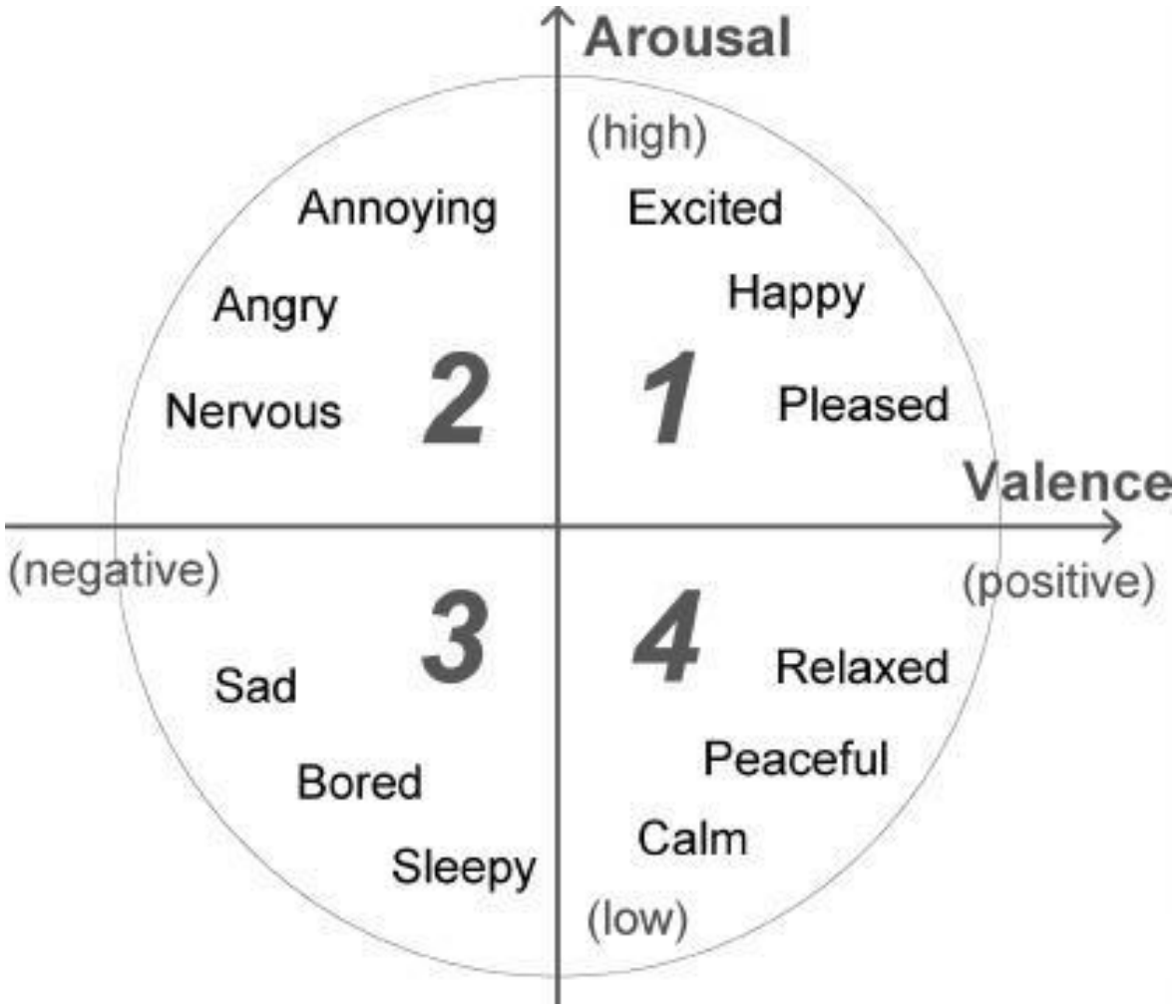

Figure 2.7 The Circumplex model of emotion.

Source: Adapted from Yang & Chen (2012)

Similarly, satisfaction is regarded as one of the key factors to evaluate the hospital service level in medical field. In order to gain recognition from the public and the society, the hospitals must provide high level of service quality. Therefore, the patients' response to the medical quality has become increasingly important in the process of improving the health care system. In particular, with the advancement of modern civilization and the improvement of economic level, the demand for medical services of patients has been greatly increased. Improving medical services has become a top priority for all hospitals, with the ultimate goal of achieving a high degree of patient satisfaction.

The degree of satisfaction on medical service reflects how much patients and their families are satisfied with the treatment. Currently, the reputation of hospitals is considered to be the key factor to decide which hospital the patients will choose. Therefore, evaluating the health services quality from the perspective of patients has attracted more attention, and has become the core practices of all health institutions, just because it has been regarded as an important indicator to measure whether medical institutions, especially public hospitals, have provided the medical services that are up to standard.

As a key and commonly used indicator to measure healthcare quality, patient satisfaction acts as a measure of a patient's satisfaction level with the care they receive from the provider (Prakash, 2010). However, patient satisfaction seems to be vaguely defined. Despite many attempts to offer an accepted definition, there is no consensus over the definition yet (Salehi et al., 2018).

According to the definition by Linder-Pelz (1982), patient satisfaction refers to the "positive evaluations of distinct dimensions of healthcare," such as "a single clinic visit, treatment throughout an illness episode, a particular healthcare setting or plan, or the healthcare system in general." Lack of consensus on a general definition can also be reflected in the patient satisfaction questionnaires as these questionnaires often involve extensive topics from the communication skills of health professionals to the hospital sanitation and parking condition during visits or appointment scheduling (Salehi et al., 2018).

From the current research results, most researchers believe that patient satisfaction research is derived from mature customer satisfaction theories. In each constituting dimension, the comparison between the patient expectation and the actual medical service determines the satisfaction of this dimension, and the integration of the satisfaction of all patients in respect of each dimension is patient satisfaction.

In the health sector, the concept of satisfaction is introduced for better quality of services. Therefore, patient satisfaction and medical service quality are closely related.

2.5 Relationship between health care service quality and patients' satisfaction

The quality of medical services is closely related to patient satisfaction. Empirical studies found that the quality of medical care affects patient satisfaction (and patient behavioral tendencies) and the long-term relationship between hospitals and patients.

The research by Andaleeb (1998)found important correlations between patient satisfaction and medical service quality; medical service quality was in this study measured by five dimensions: communication with patients, staff's ability, staff behavior, equipment quality and perceived costs. The study emphasizes the importance of making the most of patients' advice in providing health care services in developing countries.

Ladhari and Rigaux (2013)studied in Canadian public hospitals the causal relationship between patient-perceived service quality, consumer sentiment and consumer satisfaction, and concluded that perceived quality of services is positively correlated with patient satisfaction, and that emotion plays a key role in the determinants of satisfaction with hospital services.

The study by Wicks and Chin (2008)argues that the SERVQUAL model only includes the first stage, i.e., the expectation (pre-treatment segment before the medical service experience) and the third stage of patients' satisfaction evaluation, i.e., the perception (the treatment segment after the medical service experience) to evaluate the quality of medical services, excluding the second stage - the process (the medical service experience process segment), the most important of the three. The results of the study indicate that each process stage mediates subsequent stages. The process segment bears the greatest significance to the patient. The impacts of antecedents on patient satisfaction differ depending on where in the process the antecedent is evaluated.

Amin and Nasharuddin (2013) investigated the quality of medical services, patient satisfaction, and patient behavior intention from the patients' perspective. The results concur that the five factors - hospitalization, medical services, overall services, discharge and social responsibility are the unique structure of medical service quality. What's more, each factor is significantly related to the quality of medical services, thus proving that better quality of medical services will enable patients to have higher satisfaction and behavioral intentions by increasing patient loyalty and allowing hospitals and patients to establish long-term relationships.

Research in Chinese domestic literature(Deng, 2015)mainly uses management science models to study patient satisfaction. One category of the research assesses the satisfaction status of non-medical technology services in hospital outpatient clinics and analyzes patients' and medical workers' needs for outpatient non-medical technology services based on the KANO model analysis method.

It concludes that doctors and patients have cognitive differences in their expectations and demand for non-medical technical services in outpatient due to the different knowledge structure, information mastery and psychological roles of doctors and patients. This difference

is one of the important reasons leading to contradictions and even conflicts between doctors and patients. Therefore, hospitals need to correctly and objectively understand the cognitive differences and take positive measures in a targeted manner to create a sound work atmosphere for medical staff while satisfying the psychological needs of patients.

2.6 Hospital management and the relationship between medical service quality and patient satisfaction

On the relationship between capital and medical care, there is more research about the relationship between private capital and medical institutions. However, there is little literature on the impact of capital on the quality of medical services.

One of the core purposes of the medical system's reform is to enrich the medical resources and improve the quality of medical services so that all people can enjoy basic medical insurance. To this end, private capital entering the medical institutions can both satisfy the need for rich medical resources and reflect the profit-seeking nature of capital, but whether capitals with different natures have different impact on the improvement of medical service quality remains to be studied.

2.7 Team interaction process

When hospitals pay attention to both types of capital, it will promote specialized labor and team collaboration (from interviews, detailed in Chapter 3). Therefore, deeper knowledge of the role of team interaction theory in management helps us better understand why a dual capital operating model can have a positive effect.

Consistent with the philosophical cognition of the interaction theory, many scholars began to go deep into the micro level in the 1960s to pay attention to the effect of team member interaction on team effectiveness in the business environment. Mcgrath and Solter (1984)pointed out that a company's acquisition of team effectiveness depends not only on the talents of the team members and the resources owned by the company (input factors), but also on a certain "chemical reaction" between team members in order to accomplish their goals.

The original I-P-O (Input-Process-Output) model originated from the independent proposal research of Gouran (1973) in the field of communication and the research of Hackman and Morris (1975) in the field of psychology. Gouran (1973) pointed out that a communicator's related cognition (including beliefs, attitudes, motivations, goals, emotions

and personality traits), when activated by contextual factors (Input), will affect its subsequent information processing process (Process), and then further affect the cognition of the next communicator (Output). A conclusion consistent with this is common in the field of business management (Weisband, 1992) and psychology (Kelly &McGrath, 1985). Hackman and Morris (1975) proposed a team system theory based on the I-P-O model according to the relationship between team work design, team process and team effectiveness. They also constructed a general research paradigm using team interaction process as an intermediary variable to analyze the relationship between team input and team output, that is, team input affects performance results through interactive processes.

Specifically, the input process at the individual level (such as individual's strengths, attitudes, personality and beliefs, etc.), team level (such as team structure, team size, etc.) and organizational level (such as work nature, motivational measures, and organizational pressure, etc.) affects performance results (such as performance quality, work efficiency, and number of errors, etc.) and other results (such as member satisfaction, team cohesion, and changes in member attitudes, etc.) through team internalization process.

Hackman and Morris (1975) pointed out that in certain task situations, when a team with high cohesion has a higher performance level than a team with low cohesion, the difference in performance between high cohesion teams and low cohesion teams can be analyzed through the team interaction process. This shows that the relationship between input and output can be understood through team interaction. For example, Pavitt et al., (2014) used the I-P-O model to compare the differentiated effects of the three social influence processes (argument, comparison and compliance) in team decision making.

The study of McGrath and Solter (1984) broke the previous cognition that "process" was limited to the exchange of various elements in their "sites," and pointed out that "interactive process" is an indispensable connection element between the team's early input and the later output. In other words, they pioneered that the team interaction process may play an intermediary role between input variables and output variables. Since then, research on the "interactive process" has gradually attracted the attention of the theoretical and practical fields.

For example, Jewell and Reitz (1981) proposed four types of factors that affect team output: team member traits, team traits, environmental factors and team member interaction. Team member traits refer to members' abilities, skills, knowledge and personality traits; team traits include structural factors (cohesion, maturity, roles, codes of conduct, and number of personnel) and composition factors (inclusiveness, heterogeneity); environmental factors

include material factors (task nature, resources and technology, spatial arrangement) and social factors (goals, incentive system); team member interaction factors include communication, decision-making, influence, cooperation and competition.

The research of Jewell and Reitz (1981) is essentially a continuation of the McGrath "I-P-O" model framework (see Figure 2.8). Its main value is to start enumerating the variables that affect team effectiveness during team interaction.

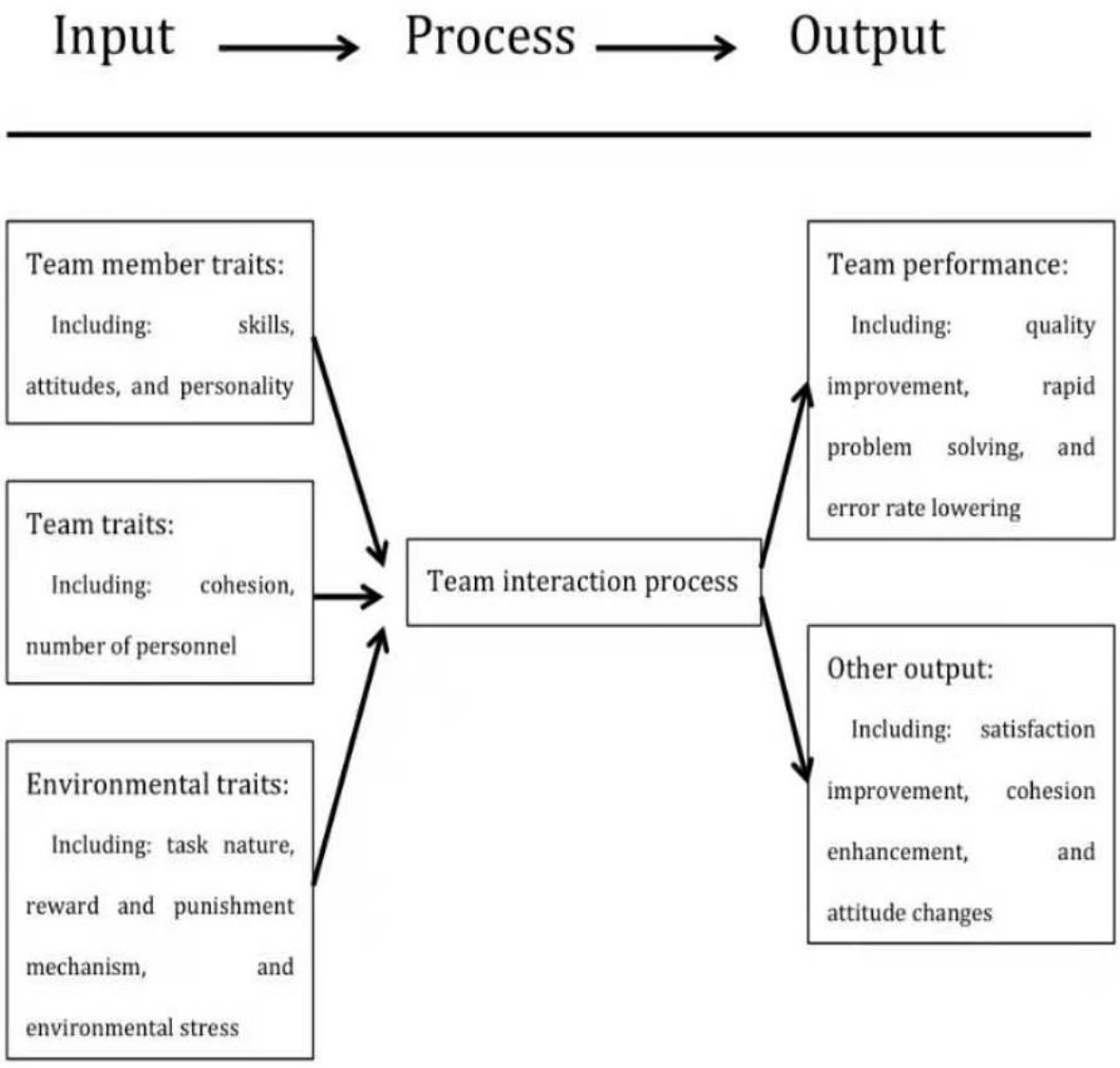

Figure 2.8 "I-P-O" model framework

Source: McGrath and Solter (1984)

Team interaction represents the interaction between team members. Hackman and Morris (1975) did a foundational work on the understanding and measurement of intra-team interaction. They believe that team interaction is a combination of "task behaviors" and "social emotional behaviors." The category of social-emotional behavior is defined as the

interpersonal communication between team members: who is talking with whom, who is fighting side by side with whom, who is paired with whom, etc.

At the same time, Hackman and Morris (1975) define task behavior as those interactive aspects directly related to work tasks, and believes that it can assess whether the team effectively uses the energy and talents of members (rather than waste or misuse them), and determine whether the team develops and expand (rather than impair) the members' business capabilities.

The model of team interaction process proposed by Hackman and Morris (1975) still continues the traditional "input-process-output" (Input-Process-output, I-P-O) theoretical framework. But compared with previous studies, its research perspective is more focused on the influence mechanism of internal factors in the enterprise system. On the one hand, the model proposed by Hackman and Morris (1975) focuses on the linear relationship between the organizational system and team interaction, with special emphasis on the organization's use of reward systems, improving education and training systems, and improving information systems, which have a significant positive effect on team interaction quality and team performance.

For example, the use of reward mechanisms at the individual or group level by companies can motivate team members to work hard and enhance personal professional knowledge and skills, which in turn positively affects team effectiveness (including meeting customer needs, team member growth, and overall team growth).

On the other hand, in the model, the team interaction process is innovatively subdivided, that is, it points out that the effort of all team members (team effort), the professional quality of the team members, and the performance strategy are the three main parts to measure the team interaction process.

In addition, the moderating effect of the internal team (team dynamics) and the external organization (environmental resources) on the overall model is considered. However, although the model proposed by Hackman and Morris (1975) is more systematic than previous research models, especially for the useful exploration of the team interaction process itself, its qualitative research is relatively rough, and the division of the team interaction process is still not clear enough and lacks persuasive evaluation basis. For example, concepts such as team knowledge and skills look more like pre-influencing factors of team interaction than the interaction process itself. And Hackman and Morris (1975) did not give a theoretical interpretation of the criteria for dividing the team interaction process.

Gladstein (1984) also proposed an efficiency model centered on team interaction. Through empirical research on more than 100 product sales teams, it constructed a relatively comprehensive general model of team behavior. The research idea of the model still adopts the logical framework of the "I-P-O" model, but the content construction at the input level, process level and output level is clearer and more reasonable. From the input level, it includes team characteristics, team structure, available resources and organizational structure; from the process level, it includes elements such as open communication, support, conflict, strategic discussion, and personal input; from the output level, it is mainly a team effectiveness indicator based on performance and satisfaction. See Figure 2.9 for more details.

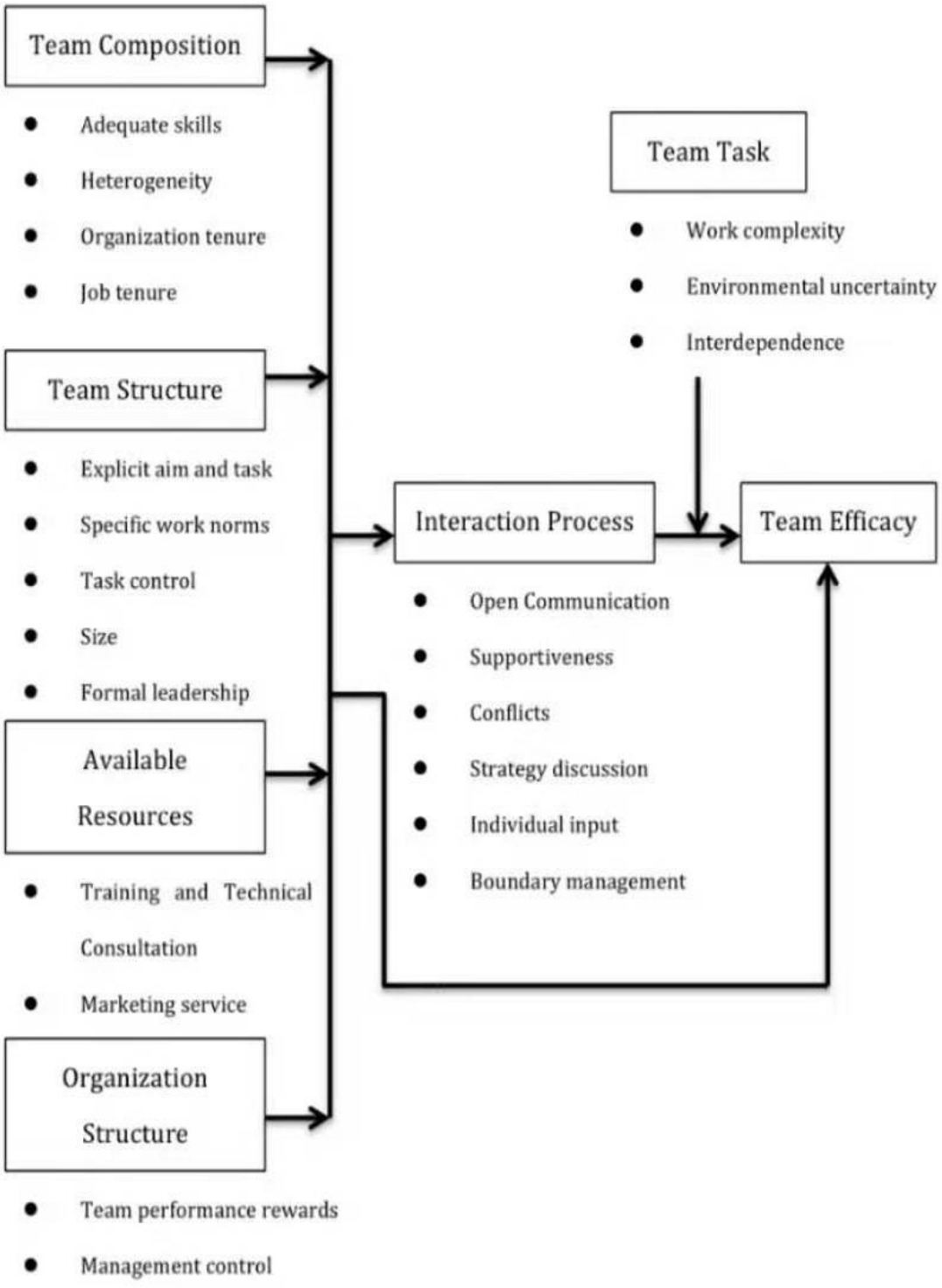

Figure 2.9 The General model of team behavior

Source: Gladstein (1984)

Different from previous studies, Gladstein (1984) conducted an empirical test on the proposed model after collecting survey data from more than 100 product sales teams. This has promoted the development of team interaction theory that mainly focused on qualitative research.

The empirical results show that factors such as open communication, support, leadership characteristics and personal input affect team performance. At the same time, the model also pays attention to the moderating role of team tasks represented by work characteristics, external environment and interdependence. The whole model not only adds important variables that affect team effectiveness, but also suggests how to use these variables to build a team. But its model still has some shortcomings.

Although the theoretical model proposed by Gladstein (1984) divides the process of team interaction in more detail, there are some overlaps in the concepts of the interactive elements such as open communication, support, conflict, strategic discussion, personal input and boundary management. In addition, it is difficult for the interactive elements to fully cover the whole process of interaction.

Marks, Mathieu, and Zaccaro (2000) conducted a comprehensive and systematic study on the concept of team interaction and the division of dimensions. Different from the previous team interaction research based on the "I-P-O" model, the team interaction framework proposed by Marks, Mathieu, and Zaccaro (2000)is divided according to the time period of purposeful actions. Such time periods are called "events" (episodes). The so-called "event" is a time period that can be distinguished on the basis of performance increase and valuable feedback (Zaheer & Zaheer, 1999). They form the rhythm of team task performance and are marked as recognizable action cycles and conversion cycles during the action. Specifically, Marks and Panzer (2000)divides team interaction into three stages: transformation process stage, action process stage and interpersonal interaction stage.

The focus of the transformation process stage is to evaluate and plan actions to guide the completion of team tasks or goals.

Task analysis, detailed goal interpretation and strategy formulation usually occur at the time of analysis, evaluation, and determination of future directions. Task analysis is the interpretation and evaluation of the team's tasks, including identifying the main tasks, external environmental conditions, and resources owned by the team that can be used to perform the tasks. This process also includes discussions with team members to ensure that all members have a common vision for the purpose and goals of the team.

Task analysis focuses on backward evaluation and forward visioning. Backsight evaluation involves the diagnosis of past performance and the explanation and analysis of the reasons for successful or failed projects. Blickensderfer, Cannon-Bowers, and Salas (1998)pointed out that the team has an in-depth understanding of the underlying reasons for past performance, which can help organizations better prepare for future work. The part of the outlook involves describing the level of future development of ongoing activities.

It is worth noting that the team that fails to conduct a thorough task analysis will be weakened due to changes in the environment or can only operate in a purely passive mode. Gersick, Bartunek, and Dutton (2000)pointed out that if a team shortens or omits the steps of task analysis activities, this will generate great risks. Since mistakes lead the development direction of the entire development team, it is bound to affect the team members' efforts and enthusiasm, and even cause irreparable losses to the team.

Goal detailing refers to identifying task goals and selecting the priority of goals and sub-goals.

In this process, the team develops and assigns overall task goals, breaks down the goals into many detailed sub-goals, and determines the specific time for completion of each task goal and the quality standards or requirements for completion. For example, the real estate agency will set how many houses to sell and rent or how much turnover to achieve within a month. This process usually also occurs in the transformation phase and is linked to task analysis and strategic development.

However, the goal may also be arranged in the action phase, because a team cannot fully foresee all sudden or unexpected situations. For example, if the country's macro-economy fluctuates or the government introduces new real estate control policies, real estate intermediaries must adjust their business goals accordingly. Effective goal planning is challenging and can be achieved by the team through hard work, which is consistent with the organization's vision and collective development strategy.

Ineffective goal planning will disrupt the normal progress of team work, dampen or inhibit the initiative of team members, and have a destructive effect on team performance. These invalid goals may be vague, contradictory, impractical or worthless.

Strategy formulation refers to the process of developing alternative mission action plans.

This involves how team members will implement their tasks, through the discussion of relevant task information by team members, to determine priorities and role assignments (Stout et al., 1999; Beecham, 2014). Strategy formulation needs to consider factors such as

context and time constraints, the resources of the team, the professional expertise of members, and the changing environment.

The strategy developed includes the roles and responsibilities of the relevant members, the timing and sequence of actions, and how to conduct and carry out related tasks and activities. In this link, we must pay special attention to the arrangement of related plans. Ineffective planning arrangements will force the team to rely on past experience or improvisational play. Once faced with relatively complex and fresh situations, it would be extremely difficult for the team to proceed, and the whole process might even come to a standstill.

Marks(2000) further divide the strategy formulation into three sub-dimensions: precise planning, emergency planning and reactive planning adjustment. The precise plan refers to the main action steps formulated to complete the task.

It is the most important action in the transformation process stage. For example, the team determines the work schedule and plan for the week at the regular meeting every Monday, and assigns specific work to each member. The precision plan is the team's specific action guidelines formulated based on the information currently available to the team, including the scale, time and complexity of the activities, the capabilities of the members, and the importance of the incident.

Emergency plans refer to alternative plans and strategic adjustment plans drawn up by the team in the preparation of changes. It is to clarify what each member of the team is responsible for, when to do it, and determine the corresponding planning steps and resource preparation before, during and after the emergency. Its purpose is to enable the team to ensure that the team can maintain its order and stay organized when facing emergencies and improve the team's ability to respond to external changes, and reduce the risk of losses caused by emergencies. For example, when an external competitor launches a new product, or a new product launched by the company itself has problems in the consumer goods market, the organization adopts contingency plans to deal with dynamic and unpredictable internal and external situations.

Reactive plan adjustment refers to the process of responding to unknown changes from the external environment or the process of adjusting the existing plan or strategy based on the team's internal performance feedback. Unlike precise planning and emergency planning, reactive planning adjustments occur in the action phase. A team often encounters unexpected situations. This change is neither within the original strategic steps nor within the scope of the emergency plan. Instead, it develops a new plan based on the current environment. In the

process of new product development, the creativity of the team faces the constraints of the initiative of team members and the internal norms of the organization. For example, the work content and methods of team members are often set in advance, and it is difficult for members to flexibly arrange work content according to their own working methods. An efficient team must abandon, adjust and reset the original plans in real time to adapt to changing internal and external requirements and challenges. In this process, the team is oriented towards achieving mission goals, and can eventually generate a new rule or plan to adapt to environmental changes or respond to emergencies.

The action phase occurs when the team carries out specific activities centered on achieving goals. Marks, Mathieu, and Zaccaro (2001) analyzed four specific interaction dimensions that occur in the action phase: (1) monitoring process toward goals; (2) system supervision; (3) team supervision and supportive behavior; and (4) coordinated action.

Monitoring process toward goals. Monitoring process toward goals refers to tracking the progress and completion of tasks, explaining the information needed to achieve the goals and passing the progress to team members.

This includes providing team members with feedback on the progress of task completion, so that team members can understand the status of their current work completion and the possible results of future work. Walker (1995) pointed out that this team supervision behavior is actually a timely assessment of the difference between the actual situation and the set goals. The goal monitoring process provides a basis for remedying work gaps or adjusting plans by reminding the team of possible deficiencies or deviations in the task completion process. For example, after comparing and analyzing the target task and the actual completion situation, the new product development team determines whether to adjust the work objectives and direction, or adopt methods such as seeking external help to carry out the next step.

It should be noted that the goal monitoring process is not only to detect the progress of the team's tasks, but also to pass relevant information to each member. This information includes the tasks that the team has completed and how the team should change its work goals or efforts to achieve the overall task goals (Mathieu et al., 2000; Burke & Barnes, 2006). Once the supervision task is not carried out smoothly, it is likely to cause deviation of the team's task orientation, work slack, wasted time and cost, and inappropriate feedback reports.

Systems monitoring. Systems monitoring refers to tracking team resources and environmental conditions as they relate to mission accomplishment.

It involves (1) internal systems monitoring, tracking team resources such as personnel, equipment and other information that is generated or contained within the team, and (2)

environmental monitoring, tracking the environmental conditions relevant to the team. Effective teams manage their environments, both internal and external to the teams themselves, by observing changes that occur as they perform. They do this by monitoring critical information internal and external to the team. This process is similar to what some have referred to as "situational assessment," in the sense that the process of monitoring critical internal and external systems, along with the effective communication of this information among team members, leads to situational awareness (Jentsch & Roth, 1999).

Team monitoring and backup responses. Team monitoring and backup refer to the extent to which corresponding supportive actions are taken to complete the team's overall goals and tasks.

Team supervision and supportive behavior includes three aspects: to provide team members with feedback and guidance; to assist other team members in their actions; to undertake and complete other team members' tasks. In this process, team members need to understand the role assignments of other members to determine the effective way to assist. For example, it is necessary to arrange at least two pilots in the cockpit of a large passenger aircraft, and the co-pilot must be able to keep up with every movement of the captain in order to supervise or compensate for possible errors or negligence in judgment.

The failed team monitoring process often puts the hope of success on the individual, while ignoring the interaction between team members, thus magnifying the individual's influence on the entire team. In other words, if team members lack mutual supervision and help, it may cause the risk of failure of the entire team due to the failure of a single member.

Team monitoring is mainly a cognitive operation. By observing the behavior of other members and paying attention to possible errors or differences in goals, team members provide corrective opinions and supportive behaviors for members who need help, so that the work can return to normal trajectory (Mclntyre, 1997).

Coordination activities. Coordination activities refer to the process of orchestrating the sequence and timing of interdependent actions.

In this process, special emphasis is placed on the consistency of team members' information exchange and adjustment actions between each other (Bunderson & Sutcliffe, 2002; Lewis, 2003). The characteristic of teamwork is task-oriented and close attention to the completion of team tasks. Therefore, the process of coordinated actions often occurs in the action phase. The higher the cooperation requirements of the work tasks among team members, the more important it is to coordinate their actions with each other (Dechurch & Mesmer-Magnus, 2010). Once the coordinated actions between team members become

inefficient and disorderly, it may lead to unclear powers and responsibilities among members, vague information transmission or errors etc., which in turn affects the completion of the target task, and even causes huge losses to the target performance of the entire team.

In short, the four components of the action phase are not isolated from each other, but are connected and closely related to each other. The goal monitoring process often requires tracking and monitoring of relevant internal and external resources and the environment, so system supervision provides important support for the goal monitoring process. At the same time, in the process of team cooperation, team supervision and supportive behavior can also be understood as a positive prerequisite for improving team coordination. The active behavior of members tends to make up for issues such as disputes or ambiguities in powers and responsibilities caused by cross-working in the cooperation process, thereby promoting the orderly conduct of coordinated actions among members and the overall efficiency of team work.

We hope that an understanding of team interaction theory will help us to better understand the relationship between different variables. The analysis above helps us understand the reasons for the positive effect of dual capital operation mode in hospitals. It helps us to further open the black box of the relationship between dual capital operation mode and patient satisfaction.

Chapter 3: Research Design and Methodology

3.1 Patient satisfaction of Shanghai General Hospital measured by SMHEEA

Patient satisfaction is defined as people's expectations for medical services based on their needs in health, disease treatment, quality of life, etc., and evaluation of the medical services they receive based on this expectation. In recent years, quite a few studies can be found on the methods and contents of patient satisfaction evaluation in medical institutions both in China and foreign countries. Since 2013, the Shanghai Medical and Healthcare Ethos Enhancement Association (SMHEEA) has acted as a third party to evaluate the patient satisfaction of public medical institutions in Shanghai. The conclusion over the past eight years is that the overall service quality of public medical institutions in Shanghai is high, but the quality of some medical services still needs further improvement.

Entrusted by Shanghai Municipal Health Commission (formerly Shanghai Municipal Health and Family Planning Commission), Shanghai Medical and Healthcare Ethos Enhancement Association (Established on March 11, 2013, SMHEEA is a joint non-profit social organization legal person voluntarily formed by hospitals in Shanghai and individuals engaged in healthcare) has carried out questionnaire survey on the satisfaction of outpatients and inpatients of all 50 tertiary hospitals in Shanghai (33 tertiary general hospitals and 17 tertiary specialized hospitals) and five secondary general hospitals and ten community health service centers (one secondary general hospital and two community health centers in each of the five districts of Shanghai, namely, Xuhui District, Fengxian District, Yangpu District, Hongkou District and Changning District), with a view to continuously improve the service quality of public medical institutions in Shanghai, and fully meeting patients' expectations of the service quality of medical institutions.

We resort to the results of this study, to reflect on patient satisfaction level since the implementation of the dual capital operation mode at Shanghai General Hospital in 2016.

3.1.1 Purpose of the SMHEEA study

Led by a third party and based on the principles of justice, fairness and openness, this research conducted a questionnaire survey on the quality of outpatient and inpatient services of Shanghai General Hospital (SGH) from 2016 to 2020, aiming to help SGH to further improve service quality, enhance patient satisfaction and provide decision-making basis and key points.

(1) Patient satisfaction analysis

The project team evaluated the quality of medical services for outpatients and inpatients in SGH according to the outpatient satisfaction measurement scale and inpatient satisfaction measurement scale from 2016 to 2020. Based on the evaluation, the project team analyzed the service quality items, dimensions, and overall patient satisfaction and satisfaction rate of SGH, and compared and analyzed the overall situation with medical institutions at its corresponding level in Shanghai.

In 2020, due to the impact of COVID-19, the quality of medical services was only evaluated based on the outpatient satisfaction measurement scale.

(2) Evaluation and analysis of service quality of medical institutions by observers

The project team hired and trained observers for service quality of public health facilities in Shanghai and asked them to evaluate the quality of outpatient and inpatient services by SGH. The observers observe the status of hospital outpatient and inpatient non-doctor services (hospital equipment and facilities, services provided by other medical staff, and medical service processes and effectiveness) and thatof outpatient and inpatient doctor services. In the evaluation of the service status of the outpatient doctors, the observers observe the outpatient treatment process in the doctor's office after obtaining the informed consent of the outpatient.

3.1.2 Methodology of the SMHEEA study

(1) Patient questionnaire survey

The patient satisfaction survey questionnaires of SGH from 2016 to 2019 include the Shanghai Public Medical Institutions Outpatient Satisfaction Questionnaire and Shanghai Public Medical Institutions Inpatient Questionnaire. In 2020, only the Shanghai Public Medical Institutions Outpatient Satisfaction Questionnaire was used. The survey was carried out on working days (Monday to Friday). In order to make the questionnaire survey more

representative, the investigators randomly surveyed outpatients and inpatients in a balanced manner every morning and afternoon.

Satisfaction scores are evaluated according to the Likert 5-point system, and "satisfied", "relatively satisfied", "neither satisfied nor dissatisfied", "relatively dissatisfied" and "dissatisfied" are recorded as 5 points, 4 points, 3 points, 2 points and 1 point. The item contents "not involved" are recorded as missing value.

In the questionnaire survey, the investigators used the IPAD-based "Medical Evaluation Interaction in Shanghai" electronic questionnaire survey system to randomly select outpatients and inpatients in SGH, and conducted questionnaire survey if the patients were willing and able to cooperate. After the investigation, the results were directly encrypted and uploaded to the back-end database every day.

(2) Observational survey

From 2016 to 2017, this project asked observers to use the Observational Questionnaire for Outpatient Doctor Services in Public Medical Institutions in Shanghai to observe one visit at the outpatient doctor's office every day from Monday to Friday. With the informed consent of the patient (or guardian), the observer accompanied the patient to the outpatient clinic to observe and evaluate the doctor's diagnosis and treatment process.

From 2016 to 2019, the project team asked five observers to use the Observational Questionnaire for Outpatient Non-Doctor Services in Public Medical Institutions in Shanghai to evaluate the outpatient non-doctor services of SGH.

In 2020, the project team asked five observers to evaluate the outpatient "hospital equipment and facilities", "service provided by other medical staff", "medical service process and effectiveness" and "outpatient epidemic prevention and control measures" of SGH.

(3) Quality control

Before carrying out the patient satisfaction survey and observational survey, the project team conducted survey training for investigators and observers on the purpose of the project, satisfaction evaluation items, and questionnaire survey and observational evaluation methods. During the formal survey, the project team set up survey supervisors to monitor the process, coordinate and help the survey spots to complete the questionnaire survey smoothly and effectively, and ensure the quality of survey data. After the on-site investigation, the project team used Excel to establish a database, and then did logical analysis to ensure the reliability of the data.

(4) Data analysis method

When analyzing the patient satisfaction rate, the project team calculated the satisfaction rate by adding frequencies of "satisfied" and "relatively satisfied" groups; if the patients "did not involve" certain items, these patients were excluded from the total number of patients for these items. The project team calculated the satisfaction of each item, each dimension, the overall satisfaction and observational satisfaction score value (full score of 7), in which the satisfaction of each dimension and the overall satisfaction are scored by the average value of the included items; missing values were replaced by the overall average value of the project evaluation.

The project team used descriptive analysis to analyze the patient satisfaction and observational evaluation of the service quality of SGH; and used the chi-square test to compare the length of stay of the outpatients in SGH and other tertiary general hospitals in Shanghai.

3.1.3 Outcomes of the SMHEEA survey

3.1.3.1 Outpatient satisfaction and satisfaction rate

The survey shows that from 2016 to 2020, the overall average score of the outpatient satisfaction of SGH was 4.52 points (out of 5 points); the average scores over the years were 4.64 points, 4.49 points, 4.39 points, 4.58 points, 4.52 points. According to the scores, the out patient satisfaction was the highest in 2016 and the lowest in 2018. In terms of major indicators, the data of "hospital equipment and facilities" were (excluding 2020) 4.64 points, 4.51 points, 4.43 points, and 4.54 points, an average of 4.53 points; the data of "doctor services" were 4.70 points, 4.60 points, 4.37 points, 4.65 points, and 4.57 points, an average of 4.58 points; the data of "service provided by other medical staff" were (excluding 2020) 4.64 points, 4.52 points, 4.52 points, and 4.63 points, an average of 4.58 points; the data of "medical service process and effectiveness" were 4.59 points, 4.32 points, 4.25 points, 4.47 points, and 4.28 points, an average of 4.38 points. In addition, the major indicators in 2020 also included "non-doctor services" and "status of outpatient epidemic prevention and control measures", which were 4.58 points and 4.71 points respectively (see Table 3.1).

Table 3.1 Outpatient satisfaction ratings of Shanghai General Hospital from 2016 to 2020

	Medical facilities	Doctor services	Other medical staff's services	Process and effect of medical services	Non-doctor services	Current situation of prevention and control measures for epidemics in outpatient department	Average overall score
2016	4.64	4.70	4.64	4.59			4.64
2017	4.51	4.60	4.52	4.32			4.49
2018	4.43	4.37	4.52	4.25			4.39
2019	4.54	4.65	4.63	4.47			4.58
2020		4.57		4.28	4.58	4.71	4.52
Average score	4.53	4.58	4.58	4.38	4.58	4.71	4.52

According to the survey, from 2016 to 2020, the overall satisfaction rate of SGH was 87.81%, and the overall satisfaction rates over the years were 91.08%, 87.16%, 83.21%, 89.59%, and 88.03%. In terms of major indicators, the data of "hospital equipment and facilities" were (excluding 2020) 89.67%, 87.54%, 85.48%, and 88.77%, with an average of 87.87%; the data of "doctor services" were 93.16%, 91.20%, 82.11%, 92.28%, and 89.78%, with an average of 89.71%; the data of "service provide by other medical staff" were (excluding 2020) 90.51%, 87.38%, 87.21%, and 91.80%, with an average of 89.23%; the data of "medical service process and effectiveness" were 90.02%, 81.54%, 79.85%, 85.84%, and 79.37%, with an average of 83.32%. In addition, the major indicators in 2020 also included "non-doctor services" and "status of outpatient epidemic prevention and control measures", which were 89.79% and 95.47% respectively (see Table 3.2).

Table 3.2 Outpatient satisfaction rate of Shanghai General Hospital from 2016 to 2020

	Medical facilities	Doctor services	Other medical staff's services	Process and effects of medical services	Non-doctor services	Current situation of prevention and control measures for epidemics in outpatient department	Overall satisfaction rate
2016	89.67%	93.16%	90.51%	90.02%			91.08%
2017	87.54%	91.20%	87.38%	81.54%			87.16%
2018	85.48%	82.11%	87.21%	79.85%			83.21%
2019	88.77%	92.28%	91.80%	85.84%			89.59%
2020		89.78%		79.37%	89.79%	95.47%	88.03%
Average score	87.87%	89.71%	89.23%	83.32%	89.79%	95.47%	87.81%

Additionally, the analysis shows that from 2016 to 2020, 48.65% outpatients stayed in the hospital for over two hours in SGH, and 51.14% outpatients stayed for more than two hours in Shanghai's tertiary general hospitals. There is no statistical difference between the two (see Table 3.3).

Table 3.3 Length of Stay in SGH from 2016 to 2020

Length of stay	SGH		Tertiary General Hospitals	
	Patients	Percentage (%)	Patients	Percentage (%)
<1 hour	278	26.68%	7404	22.10%
1 hour-	257	24.66%	8966	26.76%
2 hours-	299	28.69%	9637	28.76%
3 hours-	133	12.76%	4401	13.13%
4 hours-	75	7.20%	3101	9.25%
In total	1042	100.00%	33509	100.00%

3.1.3.2 Inpatient satisfaction and satisfaction rate (excluding 2020)

According to the survey, the overall average score of inpatient satisfaction in SGH was 4.88 points (out of 5 points); the average scores over the years were 4.97 points, 4.79 points, 4.83 points, and 4.92 points. Inpatient satisfaction was the highest in 2016and the lowest in 2017. In terms of the major indicators, the data of "hospital/ward environment and process" were 4.98 points, 4.74 points, 4.86 points, and 4.92 points, an average of 4.88 points; the data of "doctor services" were 4.99 points , 4.87 points, 4.89 points, and 4.99 points, an average of 4.94 points; the data of "service provided by other medical staff" were 4.98 points, 4.86 points, 4.85 points, and 4.95 points, an average of 4.91 points; the data of "other services and effectiveness" were 4.91 points, 4.62 points, 4.73 points, and 4.80 points, with an average score of 4.77 points (see Table 3.4).

Table 3.4 Inpatient satisfaction ratings of Shanghai General Hospital from 2016 to 2020

	Hospital/ward environment and process	Doctor services	Other medical staff's services	Other services and effects	Average overall score
2016	4.98	4.99	4.98	4.91	4.97
2017	4.74	4.87	4.86	4.62	4.79
2018	4.86	4.89	4.85	4.73	4.83

2019	4.92	4.99	4.95	4.80	4.92
Average score	4.88	4.94	4.91	4.77	4.88

According to the inpatient satisfaction analysis, the overall satisfaction rate of inpatients in SGH was 97.39%, and the overall satisfaction rates over the years were 99.71%, 94.92%, 96.67%, and 98.26%. In terms of major indicators, the data of "hospital/ward environment and process" were 100.00%, 93.88%, 98.07%, and 97.29%, with an average of 97.31%; the data of "doctor services" were 99.84%, 96.87%, 98.35%, and 99.86%, with an average of 98.73%; the data of "service provided by other medical staff" were 99.85%, 97.10%, 96.81%, and 98.45%, with an average of 98.05%; the data of "other services and effectiveness" were99.01%, 89.08%, 93.45%, and 96.10%, with an average of 94.41% (see Table 3.5).

Table 3.5 Inpatient satisfaction rate of Shanghai General Hospital from 2016 to 2020

	Hospital/ward environment and process	Doctor services	Other medical staff's services	Other services and effects	Overall satisfaction rate
2016	100.00%	99.84%	99.85%	99.01%	99.71%
2017	93.88%	96.87%	97.10%	89.08%	94.92%
2018	98.07%	98.35%	96.81%	93.45%	96.67%
2019	97.29%	99.86%	98.45%	96.10%	98.26%
Average score	97.31%	98.73%	98.05%	94.41%	97.39%

3.1.4 Outcomes of the SMHEEA Observational Study

(1) Observational satisfaction analysis of outpatient service

In 2016 and 2017, the project team conducted an observational survey of the outpatient services of 24 visits and 25 visits in SGH. According to the survey, the scores of observers' satisfaction with the service quality of outpatient doctors in SGH were 4.66 points and 4.58 points, and the average score was 4.62 points.

(2) Observational satisfaction analysis of outpatient non-doctor services

From 2016 to 2020, the average score of observers' satisfaction with the non-doctor outpatient services of SGH was 4.36 points (out of 5 points); the average scores over the years were 4.43 points, 3.98 points, 4.23 points, 4.52 points, and 4.66 points respectively. In terms of the major indicators, the data of "hospital equipment and facilities" were 4.36 points, 3.87 points, 4.27 points, 4.50 points, and 4.64 points, an average of 4.33 points; the data of "service provided by other medical staff" were 4.66 points, 4.09 points, 4.29 points, 4.86 points, and 4.77 points, an average of 4.53 points; the data of "medical service process and effectiveness" were 4.30 points, 4.20 points, 4.00 points, 3.80 points, and 4.40 points, an average of 4.14 points. Besides, the major indicators in 2020 also included "status of outpatient epidemic prevention and control measures", with a score of 4.73 points (see Table 3.6).

Table 3. 6 Analysis on the observational satisfaction of outpatient service in Shanghai General Hospital from 2016 to 2020

	Medical facilities	Other medical staff's services	Process and effect of medical services	Current situation of prevention and control measures for epidemics in outpatient department	Average score of satisfaction with the quality of outpatient non-doctor services
2016	4.36	4.66	4.30		4.43
2017	3.87	4.09	4.20		3.98
2018	4.27	4.29	4.00		4.23
2019	4.50	4.86	3.80		4.52
2020	4.64	4.77	4.40	4.73	4.66
Average score	4.33	4.53	4.14	4.73	4.36

3.2 In-depth interview: the Supply Processing Distribution model in the Shanghai General Hospital

With the help of the human resources department of the hospital, we conducted interviews with a head of the Department of Clinical Pharmacy and ten clinical pharmacists in order to understand their attitudes and views on the dual capital operation mode. The interview questions include how familiar they are with the dual capital operation mode, the change of team cooperation and work tasks (for example, the practical characteristics of SPD logistics management, the transformation of pharmaceutical care mode and clinical rational drug use, see Appendix A). The interview for each respondent lasts around 5-10 minutes. Some questions will be deeply discussed according to interviewees' answers to the questions. Based on the interview content (see Table 3.7), we conducted content analysis (see section 3.2.1 to 3.2.4).

Table 3. 7 Interview results

Interviewees	The change of team cooperation and work tasks		
	The practical characteristics of SPD logistics management	The transformation of pharmaceutical care mode	Clinical rational drug use
1	The drug supply-processing-distribution (SPD) reform, in the "drug warehouse move" procurement mode, settlements are done after drug use	SGH follows the requirement that the ratio of the number of beds to the number of pharmacists should be 100:2.5, there are 45 specialist clinical pharmacists in SGH	Drugs are delivered to hospital pharmacy under the supervision of hospital pharmacists
2	SPD supply chain provides a team of more than 50 pharmacists and over 40 service staff to the northern and southern branches of the hospital	It put the pharmacist-in-charge with a bachelor's degree or above and after on-job standardized training under the clinical pharmacist team for management	It helps to keep improving its service awareness and attitude and ensure the safe supply of drugs in the hospital
3	Hospital pharmacists are only responsible for checking prescriptions, leaving prescription dispensing to the SPD pharmacists or its automatic dispensing machines, instead of the old way	In the spirit of encouraging clinical pharmacists to go back to clinical practice	The clinical pharmacy has set up clinical pharmacist workstations for the closed-loop management of "pre-during-post" medication

4	More SPD pharmacists are allowed to enter the hospital to engage in basic pharmaceutical care	The clinical pharmacy proposed a work mode where clinical pharmacists are based in clinical services rather than occasionally engaging in clinical services	During ward rounds, pharmacists can participate in the design of clinical treatment plan, optimizing treatment plan and monitoring medication
5	The principle of having professionals do professional things	Pharmacists are able to work in the clinical ward area during the whole shift, engaging in activities at the clinics and inpatient wards in a comprehensive and multi-dimensional way	SGH has carried out featured joint outpatient services
6	The SPD supply chain can cover 95% of the essential drugs, enabling "zero" inventory for the hospital	Pharmacists join the medical team to safeguard patient safety and rational drug use	Zero drug safety incident has occurred
7	SPD aims at ensuring the quality and safety of drugs in hospital and meeting clinical needs	Pharmacists are encouraged to deeply engage in clinical practice and carry out a new multidisciplinary diagnosis and treatment mode featuring chronic disease management in collaboration with clinical, nursing and medical technology departments	The publicity and awareness campaigns of rational drug use are carried out in and out of the hospital, online and offline, to constantly improve the service content of clinical pharmacists
8	More SPD pharmacists are allowed to enter the hospital to engage in basic pharmaceutical care	The hospital has built a multi-dimensional training and learning system for pharmacists, in the past three years, 82 clinical pharmacist students and 66 clinical pharmacist teachers were trained	Clinical pharmacists can put forward suggestions on rational drug use
9	The team has become stronger	The hospital has explored a hierarchical management system and performance appraisal system of clinical pharmacists, strengthened scientific research，improved the ability to hold international and domestic conferences	Clinical pharmacists can participate in the development of individualized medication regimen, carry out medical records and prescription analysis, carry out rational drug use monitoring and assessment work, and also participate in the case discussion of critically patients

10	SGH has constantly promoted the construction of high-quality platforms	Such as digital work platform for clinical pharmacists, refined pharmaceutical care quality platform, new media pharmaceutical care platform, platform for early review of prescriptions and active ADR monitoring and reporting platform	It is beneficial for hospitals to establish strict drug logistics control process
11	The proportion of personnel with intermediate professional titles of the discipline has been significantly increased	It is beneficial to develop new clinical technologies, six new clinical technologies have been developed in the last three years	During the covid-19 epidemic, special online pharmaceutical counseling clinic services were carried out

3.2.1 Basic concept and characteristics of SPD

SPD (Supply Processing Distribution) mode refers to a typical lean management mode evolved along the trend of supply chain integration. It aims at ensuring the quality and safety of drugs in hospital and meeting clinical needs. Supported by information technology in logistics, it involves specialized management of each link and coordinates the external and internal demands. It is a centralized management model integrating supply, distribution and other links of logistics for drugs in hospital.

With a thorough consideration of the operation rules and characteristics of each management link and the interconnection of various links in drug logistics, the SPD model optimizes the drug management in conventional hospitals with the support of supply chain management theory and information technology.

The Department of Clinical Pharmacy in Shanghai General Hospital is a comprehensive discipline integrating drug supply, management, clinical practice, teaching and research. In an effort to drive the development of hospital pharmacy under the medical reform, the Department of Pharmacy was renamed as the Department of Clinical Pharmacy in August 2013. The hospital places great emphasis on the development of clinical pharmacy, and pioneers in carrying out the drug supply-processing-distribution (SPD) reform in Shanghai. Under the new SPD model, more than 40 clinical pharmacists in various departments at Shanghai General Hospital are able to re-focus their energy on clinical work and patients, offering better pharmaceutical services to doctors, nurses and patients, and safeguarding rational drug use in clinical practice. The information related to the SPD mode between SGH

and SPH obtained from the interviews with a head of clinical pharmacy and some clinical pharmacists in the hospital are presented in the following sections.

3.2.2 Practice of SPD logistics management in SGH

After introducing the SPD model, the hospital provides the drug procurement catalog, and the SPD supply chain is responsible to move the drug warehouse to the hospital (i.e., procurement in the traditional sense). In the "drug warehouse move" procurement mode, settlements are done after drug use. In this case, the hospital does not purchase and pay for the drugs. Instead, the drug warehouse is first moved to the hospital, and then the drugs are paid for by patients upon use. The SPD supply chain can cover 95% of the essential drugs except for psychotropic drugs, radioactive drugs, narcotic drugs and toxic drugs for medical use, enabling "zero" inventory for the hospital.

After the SPD mode was introduced, hospital pharmacists are only responsible for checking prescriptions, leaving prescription dispensing to the SPD pharmacists or its automatic dispensing machines, instead of the old way of having hospital pharmacists do both. The SPD supply chain provides a team of more than 50 pharmacists and over 40 service staff to the northern and southern branches of the hospital, incorporating the whole process of drug delivery into the closed-loop quality control of the drug supply chain.

The cooperation between the SPD drug supply chain and the clinical pharmacy department of the hospital has successfully brought more pharmaceutical services to the hospital. More SPD pharmacists are allowed to enter the hospital to engage in basic pharmaceutical care, which provides the human resources for the hospital to carry out the resident clinical pharmacist service mode.

3.2.3 Transformation of pharmaceutical care mode based on SPD management

With the principle of having professionals do professional things, the hospital adopted the new modern model of SPD drug management, and promoted the SPD model and the management of front-line pharmacists in both branches. It put the pharmacist-in-charge with a bachelor's degree or above and after on-job standardized training under the clinical pharmacist team for management.

In the spirit of encouraging clinical pharmacists to go back to clinical practice, the clinical pharmacy proposed a work mode where clinical pharmacists are based in clinical services rather than occasionally engaging in clinical services. In other words, they are able to

work in the clinical ward area during the whole shift, engaging in activities at the clinics and inpatient wards in a comprehensive and multi-dimensional way, and safeguarding patient safety and rational drug use.

According to the *Regulation on the Administration of Pharmaceutical Affairs of Medical Institutions*, SGH strictly follows the requirement that the ratio of the number of beds to the number of pharmacists should be 100:2.5. At present, there are 45 specialist clinical pharmacists in SGH, covering 100% of the clinical pharmaceutical care. All doctors' advice in their responsible wards are covered. Patients are able to enjoy better clinical pharmaceutical care.

On the basis of the existing clinical pharmacist work, the hospital has strengthened the team development of professional clinical pharmacists for antimicrobial drugs, anti-tumor drugs, anticoagulants and immunosuppressive drugs. Pharmacists are encouraged to deeply engage in clinical practice and jointly carry out a new multidisciplinary diagnosis and treatment mode featuring chronic disease management in collaboration with clinical, nursing and medical technology departments. The closed loop and seamless management of clinical pharmacist work are carried out in the medical history understanding on admission, clinical ward rounds, pharmaceutical ward rounds, prescription and doctor's advice review, medication counseling, medication monitoring, drug concentration measurement, medication guidance during hospitalization, ADR reporting, drug evaluation, clinical trial management of new drugs, medication guidance for patients after discharge, etc.

At the same time, SGH has constantly promoted the construction of high-quality platforms, such as digital work platform for clinical pharmacists, refined pharmaceutical care quality platform, new media pharmaceutical care platform, platform for early review of prescriptions and active ADR monitoring and reporting platform, etc. Meanwhile, the hospital has built a multi-dimensional training and learning system for pharmacists and explored a hierarchical management system and performance appraisal system of clinical pharmacists.

Progress has been made in several aspects in the work mode of clinical pharmacists under the SPD model.

Firstly, the team has become stronger. The proportion of personnel with intermediate professional titles of the discipline has been significantly increased by nearly two folds. Personnel in the discipline have been enrolled in more than ten talent training programs in the past three years.

Secondly, the discipline is now more capable of developing new clinical technologies. In the past three years, a total of six new clinical technologies have been developed. 38 new

therapeutic drug monitoring projects and eight drug gene testing projects have been carried out at the individualized therapeutic drug monitoring center.

Thirdly, better standardized training is now available in the discipline. In the past three years, 82 clinical pharmacist students and 66 clinical pharmacist teachers were trained.

Fourthly, the ability to hold international and domestic conferences of the discipline has been improved. In the past three years, the discipline has held three international conferences, such as the International Seminar on Drug Interaction and Accurate Analysis of Clinical Rational Drug Use. It has held 15 domestic conferences such as the annual academic meeting of Clinical Pharmacy Branch of Shanghai Medical Association.

Fifthly, Scientific research has been strengthened in the discipline. In the last three years, it has applied for nine projects of the National Natural Science Foundation of China, one national science and technology major specialty project, six projects of Shanghai Health Commission, seven medicine-engineering cross-projects of Shanghai Jiao Tong University, three projects of the hospital pharmacy research foundation of Shanghai Jiao Tong University School of Medicine, four projects of clinical pharmacy innovation of Shanghai Jiao Tong University and two projects of clinical pharmacy innovation of Shanghai Pharmaceutical Association. The cumulative funding is 7,294,000 yuan. In the last three years, the discipline has published 107 scientific research papers, among which 26 are listed in SCI and 81 are listed in Chinese core journals. It has won six invention patents, published four monographs, and won the Bronze Award of Excellent Invention in the 29th Shanghai Excellent Invention Competition.

3.2.4 Promoting rational drug use in hospital based on SPD management

According to the *Opinions on Strengthening Pharmaceutical Administration in Medical Institutions and Promoting Rational Drug Use* (No. 2 [2020] issued by the National Health Office) and the requirements of the *National Essential Medicines List*, the clinical pharmacy department shall keep improving its service awareness and attitude and ensure the safe supply of drugs in the hospital.

Through the top-level design, the hospital can extend the SPD drug supply chain, with drugs delivered to hospital pharmacy under the supervision of hospital pharmacists. The hospital can realize the whole logistics quality management of most drugs, the tracking of the full life cycle of part of the drugs and post-use settlement. Through adaptation and system optimization, zero drug safety incident has occurred at the clinic and emergency pharmacy,

inpatient pharmacy or PIVAS (pharmacy intravenous admixture services) center. These departments were awarded the "spiritual civilization service window" for multiple times. The clinical pharmacy has been awarded the title of "Advanced Unit of Clinical Pharmaceutical Administration in Shanghai" for five consecutive years, and won the first place in the quality control inspection of clinical pharmaceutical affairs in Shanghai in 2019.

The hospital has developed strict drug logistics control process, especially for drugs under special management, carried out the whole life cycle management of drugs in hospital, and stored them in strict accordance with the storage conditions stipulated in the drug instructions.

Inpatients can scan the supervision code or traceability code on the outer package of the drug with the "HaoZhi System" to link the information. In case of drug return, the inpatient pharmacy will scan the supervision code or traceability code of the returned drug to remove the link between the returned drug and the patient, making room for the next binding. For outpatients, when the outpatient pharmacy dispenses drugs, it can directly scan the supervision code or traceability code on the outer package of drugs to link to the patients. Through the refined barcode management of the whole process, drug use becomes traceable in the hospital, thus ensuring the quality, safety and reliability of clinical drug use.

In order to ensure rational and safe drug use in the hospital, the clinical pharmacy has set up clinical pharmacist workstations to fully leverage the role of pharmacists, through the prescription/orders audit system, rational antimicrobial drug use management system, monitoring and reporting system for adverse drug reaction, prescription review system and the system of prescription review in advance for outpatient and emergency departments.

During ward rounds, pharmacists can participate in the design of clinical treatment plan, optimizing treatment plan and monitoring medication with their expertise. Clinical pharmacists can put forward suggestions on rational drug use through the information system, participate in the development of individualized medication regimen, actively carry out medical records and prescription analysis, carry out rational drug use monitoring and assessment work, and also participate in the case discussion of critically ill patients on the information platform. This can promote rational drug use and build a complete system of rational drug use reaching every corner of the hospital.

The closed-loop management of "pre-during-post" medication refers to: (1) pre-medication: a complete early prescription review system has been built, which is now successfully online and being rolled out to all clinical departments; (2) during medication: an experimental platform of individualized therapeutic drug monitoring center has been built. Currently, the TDM project involves more than 30 drugs, and TDM has been carried out in

more than 50,000 cases; (3) post-medication: rational drug use review is carried out on a regular basis in each specialty. At the same time, as a national ADR sentinel hospital, SGH has built a direct reporting system for active monitoring of ADRs. In 2019, a total of 1,597 cases of ADRs were reported in the two branches. Both the quality and quantity of the reporting have been steadily improved.

With "rational drug use" as the core, the publicity and awareness campaigns of rational drug use are carried out in and out of the hospital, online and offline, to constantly improve the service content of clinical pharmacists. SGH has opened a WeChat official account and TikTok account on pharmacy, regularly pushing promotional articles and videos. Based on the different positioning of the northern and southern branches, the hospital has carried out awareness campaign on rational drug use in Hongkou community (Jiading, Ouyang, etc.) and Songjiang community (Jiuting, etc.), including activities such as lectures and rational drug use college for the elderly. During the covid-19 epidemic, special online pharmaceutical counseling clinic services were carried out. In the first half of 2020 alone, the clinical pharmacy of SGH has carried out more than 80 awareness campaign programs, with cumulatively 5,000 views of the popular medical science articles in the WeChat account and 510,000 clicks on TikTok videos.

Due to SPD logistics reform, and through the building of a professional team of clinical pharmacists in the early stage, SGH has carried out featured joint outpatient services. At present, the clinical pharmacy of the northern branch of SGH has set up special joint clinics including atrial fibrillation joint clinic and heart failure joint clinic, joint clinic for sleep disorders, hematopoietic stem cell transplantation joint clinic, Hongkou community sleep pharmacology clinic, and CCC oncology combined therapy team. Special joint clinics in the southern branch include the joint clinic for maternal and infant diabetes, special joint clinic of cardiology, standardized metabolic disease management clinic and vascular surgery joint clinic. These joint clinics have served nearly ten thousand patients and gained good social benefits and reputation.

The discipline of clinical pharmacy has been successfully funded by the construction project of the National Health Commission's key clinical specialty, Shanghai key clinical specialty, Shanghai key weak discipline, Shanghai key potential discipline of the School of Medicine of Shanghai Jiao Tong University and Shanghai General Hospital's key discipline. In addition, the discipline has been supported by the major specialist projects of the Ministry of Science and Technology of China, the National Natural Science Foundation of China, Shanghai Science and Technology Commission, Shanghai Health Commission, School of

Medicine of Shanghai Jiao Tong University, Shanghai Pharmaceutical Association and the hospital, laying a solid ground for the discipline development in the future.

With the support and under the guidance of leaders at all levels and through the concerted efforts of all the pharmacists, the clinical pharmacy was awarded by the Bureau of Medical Administration of the National Health Commission as the "advanced department for improving medical services in China 2018-2020." It won the honorary title of "the disciplinary team for promoting rational drug use" in the Rational Drug Use - China's Action campaign guided by the Bureau of Medical Administration and hosted by *Health News* in 2020. Moreover, its clinical pharmacist service system is one of the first "Innovative Medical Service Brands" of Shanghai's health system.

3.3 Research hypotheses

3.3.1 Dual capital operation mode, teamwork and medical service quality

Both the study conducted by the Shanghai Medical and Healthcare Ethos Enhancement Association (SMHEEA) and the in-depth interviews previously described allowed us an in-depth understanding of the capital operation mode of Shanghai General Hospital: we found that the hospital's dual capital operation mode helps to enhance the specialization and refinement of medical services.

Specifically, those departments with dual capital also involve pharmacists in developing treatment plans for patients, which leads to more scientific medication plans. Therefore, we suggest that there may be a relationship between the capital operation mode and the quality of health care services. This result is from our conversation with some clinical pharmacists and heads of departments from the dual capital operation mode department (see Chapter 3.2).

Having professional people do professional thing has enabled clinical pharmacists to focus on clinical services. As a result, pharmacists are better assigned, with more reasonable job responsibilities and stronger specialist capabilities. They are able to work in the clinical ward area during the whole shift, engaging in activities at the clinics and inpatient wards in a comprehensive and multi-dimensional way, and safeguarding patient safety and rational drug use.

We further pointed out that the professional services of each member of the doctor team can help improve the collaboration of the doctor team. According to the team interaction process theory (see Chapter 2), group members carry out cognitive division of their tasks and

specialize in the areas they are responsible for. In this way, group members have all the information needed to complete the task. Mutual trust allows individual members to develop deeper expertise in the professional field, while ensuring that others have access to task-related information (Wegner, 1987). Therefore, the interactive memory system can effectively help individuals in the team to use professional knowledge quickly and coordinately, so that more task-related knowledge can effectively serve the team task.

Lewis (2003) further improved the interactive memory system and proposed that the degree of collaboration is an important content of the interactive memory system. Coordination refers to the cooperation of team members in performing tasks. Team collaboration is not only an important mechanism for integrating knowledge, but also a division of labor system for coordinating the cognition of team members. It reflects the cooperative division of labor system between team members to acquire, store and apply knowledge in different fields. We believe that the dual capital operating mode can affect the collaboration of the doctor team. Thus, the following hypothesis is proposed:

Hypothesis 1: Dual capital operating mode has positive effects on team coordination.

Previous explorations on this topic have demonstrated the positive effect between collaboration and followers' work outcomes (Lewis, 2003), which is critical to team success of work (e.g., task performance). Collaboration helps members understand the distribution of the team's expertise, improves the team's ability to process, apply and integrate information and knowledge through interaction at work (Rico et al., 2008), thereby aiding in better team performance.

Combined with our study, we believe that the quality of services can directly reflect the results of the team's work. Therefore, we can also conclude that the team's collaboration can help improve the team's service quality.

This effect is usually explained by two different mechanisms: better decision-making and more effective team processes.

First of all, information sharing helps team members to have a full picture of the team's task information and overcome personal biases. It also helps team members to consider more choices, learn from the experience of others, make better use of team-level information resources, discover potential problems, and explore more alternative solutions to problems, leading to better decision-making.

Secondly, information sharing is conducive to the understanding of expertise between team members, reducing cognitive pressure, leading to better coordination and less process

loss. Obtaining a variety of new information through information sharing helps team members adopt new work processes and ultimately improve the team's process performance.

Therefore, according to this logic, we believe that the teamwork of doctor members can help improve the quality of medical services.

Thus, the following hypothesis is proposed:

Hypothesis 2: Team coordination has positive effects on medical service quality.

Through the analysis above, we believe that the dual capital operation mode can affect the collaboration of the doctor team, and that the team collaboration of the doctor team can help better the quality of medical services. Following the logic of the intermediary relationship mechanism, we think that dual capital operation mode can help enhance the quality of medical services, and that the teamwork of doctors can mediate the relationship between them.

Thus, the following hypothesis is proposed.

Hypothesis 3: Team coordination mediates the positive relationship between dual capital operation mode and medical service quality. Compared with the single capital operation mode, the dual capital operation mode has stronger positive effects on medical service quality.

3.3.2 Teamwork, service quality and patient satisfaction

According to the analysis of hypothesis 1, we understand that doctor team collaboration can effectively improve the quality of services of the medical team. Combined with the relevant research on the team interaction process (Hinsz, Tindale, & Vollrath, 1997), we understand that team coordination action refers to the process of coordinating mutual assistance actions among team members in a reasonable order and timing. In this process, special emphasis is placed on the consistency of team members' information exchange and adjustment actions between each other (Guastello & Guastello, 1998).

The characteristic of teamwork is task-oriented and close attention to the completion of team tasks. Therefore, the process of coordinated actions often occurs in the action phase. For example, when a doctor proposes a treatment plan, he needs to consider the basic condition of the patient and the medication plan recommended by the pharmacist.

However, coordinated actions sometimes also occur in the transformation process stage because the team often needs to consider the actual situation and opinions of each department when arranging the work plan. For example, doctors need to make effective adjustments

based on the specific utility, price and actual conditions of the inventory of drugs that the pharmacist has. Therefore, the higher the requirements for cooperation among team members on tasks, the more important it is to coordinate their actions with each other (Zhou, 2016).

Once the coordinated actions between team members become inefficient and disorderly, it may lead to unclear rights and responsibilities among members, vague information transmission or errors, which in turn affects the completion of the target task, and even affects the target performance of the entire team. Hence, a huge loss.

Therefore, we think that the teamwork of doctors is positively affecting the quality of medical services. It is further explaining hypothesis 2.

Perceived service quality is the patient's judgment of the overall excellence of medical service providers (Parasuraman, Zeithaml, & Berry, 1988). This judgment is based on what the patient believes the medical service provider should provide (his/her expectations) and their perception of the actual performance of medical services (Parasuraman, Zeithaml, & Berry, 1988).

Patient satisfaction constitutes a key indicator of the quality of medical services. It is the comparison between the patient's expectations before receiving medical services and the actual service received. It is a kind of comprehensive assessment based on the patient's own understanding and needs for health and medical services, combined with the perception of the quality of services offered by medical institutions.

In the literature on service quality, a general belief is that perceived service quality positively affects patient satisfaction (Cronin & Taylor, 1992; Cronin et al., 2000; Brady et al., 2005; Bei & Chiao, 2006; Shukla, 2010). This positive relationship was found by Cronin et al., (2000) in six service environments, including health care services.

With regard to specific health service research, a five-dimensional model of patient satisfaction with hospital services was developed and empirically tested by Andaleeb (1998): facility quality, staff attitudes, communication with patients, staff capabilities and perceived costs. The empirical research results show that the five dimensions explain 62% of the changes in patient satisfaction, and that the greatest impact on satisfaction comes from the employee competence (Andaleeb, 1998). According to Dagger, Sweeney, and Johnson (2007), overall health service quality significantly positively affects customer satisfaction and behavioral intentions. They reported that patients' satisfaction with cancer clinic services is greatly affected by their perception of the quality of technical service.

Thus, we propose the following hypothesis.

Hypothesis4: Medical service quality has positive effects on patient satisfaction.

Combined with the conclusions of the above-mentioned scholars' research, we believe that the teamwork of doctors can positively affect the satisfaction level of patients. We believe that there are two reasons:

First, the main purpose of patients in the hospital is to receive the most scientific treatment to achieve good health. The quality of medical services is mainly reflected in whether doctors can provide treatment programs scientifically and effectively, and provide timely treatment information for patients and their families. The teamwork of doctors can effectively enhance the quality of medical services. If the patient has a higher perception of the quality of medical services, the patient believes that they can receive the best treatment and meet their own expectations. From the perspective of the needs of patients, the degree of medical collaboration positively impacts patient satisfaction level.

Second, the cooperation of doctors and pharmacists can enable everyone to quickly and efficiently make professional recommendations, which can greatly improve the treatment speed and treatment level of patients. Patients can get professional answers from each doctor, and can be more confident in the ability and level of the doctor team. If the doctor team cooperates well, the patient will increase their trust in the doctor team. From this perspective, we believe that the level of patient satisfaction will also increase.

Therefore, based on the above analysis, we believe that the teamwork of doctors can positively affect the satisfaction level of patients.

Thus, we propose the following hypothesis.

Hypothesis 5: Team coordination has positive effects on patient satisfaction via medical service quality. In other words, patient satisfaction will be stronger when transactive memory system is higher.

3.3.3 Chain reaction between dual capital operation mode and patient satisfaction

According to Hypothesis 3, we believe that the dual capital operation mode can affect the collaboration of the doctor team and further improve the quality of medical services. In other words, the dual capital operation mode is positively impacting the quality of medical services, and the collaboration of the doctor team plays an intermediary role in the above-mentioned relationship.

According to Hypothesis 5, we believe that the collaboration of the doctor team can improve the quality of medical services and further enhance patient satisfaction. In other

words, the collaboration of the doctor team positively affects patient satisfaction, and the quality of medical services plays an intermediary role in the above-noted relationship.

According to the principle of chain mediation effect, we believe that the logic of Hypothesis 3 and Hypothesis 5 is that there is a chain reaction between the dual capital operation mode and patient satisfaction. Specifically, we believe that the dual capital operating mode has a positive effect upon patient satisfaction, and that the collaboration of the doctor team and the quality of medical services play a mediating role in the relation mentioned above.

The dual capital operation mode effectively helps each doctor in the team to provide professional solutions in their respective fields (for example, the attending doctor proposes a treatment plan, and the pharmacist provides a medication plan). Effective communication of information helps to build a high level of teamwork among doctors to provide the best medical services. And patients can feel the quality of medical services, which then affects their satisfaction.

Therefore, based on this logic, we propose Hypothesis 6.

Hypothesis 6: In an interactional episode, team coordination and medical service quality mediates the positive relationship between dual capital operation mode and patient satisfaction (i.e., dual capital operation mode — team coordination — medical service quality — patient satisfaction).

Based on the research hypotheses noted above, we propose the following theoretical model diagram (see Figure 3.1).

Hypothesis 3 aims to explain the relationship between the capital operation mode, teamwork and quality of care. Hypothesis 5 aims at explaining the relationship between teamwork, quality of care and patient satisfaction. Hypothesis 6 aims to explain the relationship between the capital operation mode, teamwork, quality of care and patient satisfaction.

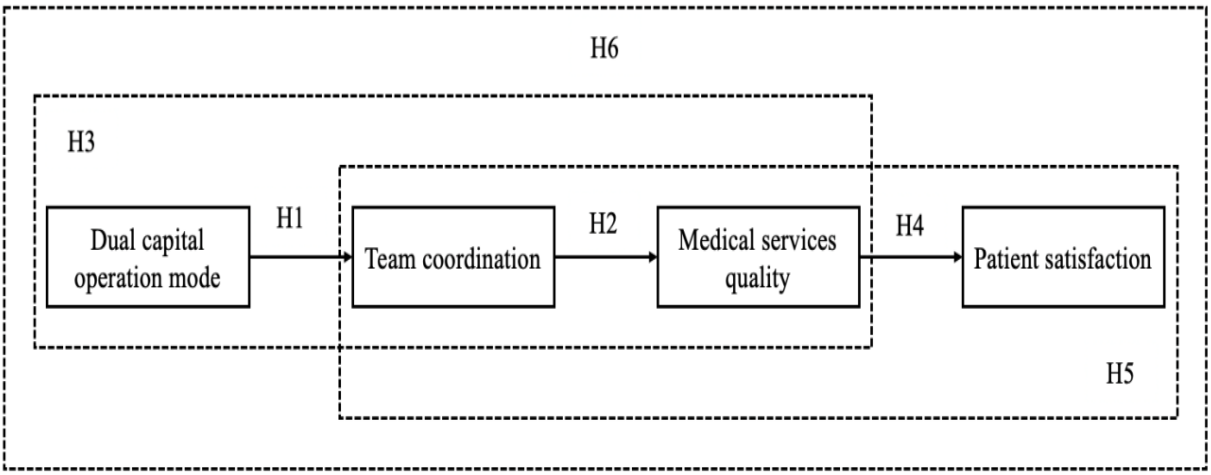

Figure 3.1 Theoretical model diagram

3.4 Methodology: data collection

3.4.1 Participants and process

Our data comes from two surveys conducted at the Shanghai General Hospital: i) a survey on patients and ii) a survey on doctors. The hospital's departments fall into two categories: dual capital and single capital, based on the capital operation mode of each department. We distributed different questionnaires to doctors and patients, in which doctors assessed team collaboration, and patients assessed medical service quality and patient satisfaction.

We planned to collect 100 patient-physician dyads from dual capital-infused departments (i.e., thoracic surgery, cardiology, urology, endocrinology, gastroenterology, orthopedics, neurology, hematology, pediatrics, ENT (ear-nose-throat), neurosurgery, respiratory, emergency and critical care, general surgery, clinical medicine center, trauma medical center and tumor clinical medicine center). The patient-physician dyads data refers to data from patients and their treating physicians. Similarly, we planned to collect 100 patient-physician dyads from single capital-infused departments (i.e., obstetrics and gynecology, cardiology, urological oncology, geriatrics, ophthalmology, rehabilitation and IMCC).

In order to maximize the normality of the samples analyzed, the participants are non-randomly selected. We asked a staff member from the hospital's human resources department to assist us in collecting the data, as this staff member know well the heads of departments and had a strong appeal to get doctors and patients in each department to fill in the questionnaire. First, we distributed 50 questionnaires to the doctors working in the departments adopting the single capital operation mode (see Questionnaire II in Appendix C)

and 100 questionnaires to patients (see Appendix B for questionnaire I). Then half a month later, we distributed 50 questionnaires to doctors in the departments implementing the dual capital operation mode and 100 questionnaires to patients in the same sampling way. Finally, we recovered 58 patient questionnaires and 35 doctor questionnaires from departments operating with single capital operation mode, and 126 patient questionnaires and 32 doctor questionnaires from departments implementing dual capital operation mode.

3.4.2 Questionnaire

Two distinct questionnaires were designed.

The patient's questionnaire measures patient demographics (gender, age, education, occupation, income and length of stay), quality of medical services and patient satisfaction. The measurement of perceived quality of medical services was based upon the SERVQUAL scale (Parasuraman, Zeithaml, & Berry, 1988). The attributes were selected to capture both doctors' techniques and service quality.

The original scale responds to patients' assessments of their satisfaction with different aspects of the hospital, such as: infrastructure, environment, hygiene environment, etc. Therefore, to measure more accurately the evaluation of the quality of doctors' services, we used eight items on the basis of the original scale, as follows："The doctor takes the initiative to tell the patient exactly when the service will be provided" "The doctor is always ready to provide timely services" "The doctor is always ready to help patients" "The doctor can always arrange his/her working hours to timely meet the needs of patients" "The doctor is trustworthy" "Patients will feel relieved in the process of seeing a doctor, checking and taking medicine" "The doctor is polite" "Doctors can get appropriate support from hospitals to provide better services"

We use a scale developed by Gacem et al., (2013) to measure patient's satisfaction. There are four items in total. Among them, 1 means strongly disagree, 7 means strongly agree.

The doctor's questionnaire contains demographic information about the physicians (i.e., gender, age and education) and teamwork. We combined the measurement items used by Lewis (2003) and used the 7-point Likert scale to measure team collaboration. Among them, 1 means strongly disagree, 7 means strongly agree.

Additionally, we registered the capital mode of the respondents: dual capital operation mode is coded with "1" and single capital operation mode is coded with "0".

The specific questionnaires are shown in Appendix C (patient's questionnaire) and Appendix D (doctor's questionnaire).

3.5 Methodology: data analysis

We use Mplus, a powerful latent variable modeling software that combines multiple latent variable models into a unified analytical framework. Mplusdeals with the following models: exploratory factor analysis (EFA), confirmatory factor analysis (CFA), structural equation modeling (SEM), path analysis, item response theory, latent category analysis, potential transformation analysis, survival analysis, growth models, multilevel models, complex data and Monte Carlo simulations. The most important feature of Mplus is its ability to express complex models in simple language while being easy to understand. In most cases, it is possible to express complex relationships using very short statements. This feature is significantly better than other similar software.

The data was treated in three steps.

Firstly, an exploratory factor analysis was conducted for lower data dimensionality and to identify the underlying relationships between measured variables. We resort to Cronbach's alpha to evaluate the reliability of multiple-question Likert scale surveys. These are very difficult to measure in real life. Cronbach's alpha can show us how closely related a set of items are as a dimension.

Secondly, we further tested the discriminant validity of the variables using confirmatory factor analysis. Confirmatory factor analysis helps decide whether these items are representative of the constructs they represent and whether there are cross-factor loadings across these items. In addition, confirmatory factor analysis can help us further determine whether there are issues of common method bias, specifically, whether there are homophile issues between patient satisfaction and quality of care from questions completed by patients.

Thirdly, we tested our research model, evaluating each hypothesis through the Mplus software, using Bootstrap analysis and path analysis techniques. By analyzing the data, we obtained regression coefficients for each of the three paths: capital operating modes and doctors' team collaboration, doctors' team collaboration and medical service quality, and medical service quality and patients' satisfaction. In addition, we further examined the mediating effect of doctors' team collaboration on the relation between capital operation modes and medical service quality, and the mediating effect of medical service quality on the relation between doctors' team collaboration and patients' satisfaction. Ultimately, we used

doctors' team collaboration as a team and medical service quality as two mediating variables to promote the positive effect of capital operation model on patients' satisfaction.

3.5.1 Exploratory factor analysis and confirmatory factor analysis

Factor analysis is a way to achieve a reduction in the number of dimensions of the constructs by finding common factors.

Exploratory factor analysis (EFA) also attempts to clearly articulate the structural framework of the content with a minimum number of factors. The factors obtained after EFA can also be referred to as dimensionality, internal attributes, or shallow variable factors that reflect the content of a concept(Ford, MacCallum, &Tait, 1986). These factors can effectively and scientifically reflect the covariance between the measured question items (Shore & Tetrick, 1991). Thus, we can obtain the common traits among the measurement items through exploratory factor analysis.

In the social or behavioral sciences, these factors often represent structural features that are not observable by the measurer (Tucker & MacCallum, 1997). Statistically, these factors represent the variability in scores obtained on the question items being measured. As described by Brown (2015), the core purpose of EFA is to find the number of factors that are representative of the observed variables and the relationship between each factor and each measured question item.

In addition, the intrinsic structure of the constructs reflected by complex measurement question items can be greatly thereby simplified by factor analysis (Tucker & MacCallum, 1997). The assumption of using EFA is that each side-measure question item reflecting a construct is assumed to be matched to a specific factor. Factor loadings can effectively reflect this assumption. Thus, factor loading results are data that we value highly.

Exploratory factor analysis and confirmatory factor analysis have a major difference

Exploratory factor analysis has no a priori information. Therefore, exploratory factor analysis is the process of extracting valid factors by several types of factor extraction methods based on the original sample data without knowing the factor structure. In contrast, confirmatory factor analysis is different from the above-mentioned case idea, where the structure of the constructs is already known before analyzing the data with the software. In exploratory factor analysis, since there is no a priori information, its judgment of the structure of the constructs is made through factor loadings(Guadagnoli & Velicer, 1988). This helps the

researcher handling the data to effectively determine the relationship between each particular factor and the measured question items.

In management research, it is difficult to obtain accurate research conclusions from data alone without theoretical support (Hinkin, 1998). Therefore, exploratory factor analysis is more suitable for data analysis without theoretical support, which helps us to obtain data that can effectively reflect the measurement constructs.

Confirmatory factor analysis, on the other hand, is based on a pre-established theory that requires a priori assumptions about the factor structure, with the a priori assumption that each factor corresponds to a specific subset of the indicator variables, so as to test the consistency of this structure with the observed data.

That is, in the mathematical mode above, the number of common factors m is first determined based on a priori information, while certain parameters in the model are also set to a certain value according to the actual situation. In this way, confirmatory factor analysis also makes full use of a priori information to test whether the collected data information works according to the predetermined structure in the case of known factors.

The main assumptions of exploratory factor analysis include the following: first, all common factors are correlated (or none of them are). Second, all the common factors directly affect all the observed variables. Again, the special (unique) factors are independent of each other. More importantly, all observed variables are influenced by only one special (unique) factor. Finally, the public and special (unique) factors are independent of each other.

Exploratory factor analysis is mainly applied to three aspects. First, EFA is applied to seek the basic structure and figure out the problem of strong correlation between variables in multivariate statistical analysis. Secondly, EFA is applied to data simplification. Thirdly, EFA is applied to the development of measurement scales.

The confirmatory factor analysis complements for the weakness of exploratory factor analysis with too strong constraints on assumptions, which mainly include the following assumptions: firstly, the latent factors can be correlated or uncorrelated with each other. Secondly, the observed variables can be influenced by only one or a few latent factors, and do not have to be influenced by all latent factors. Likewise, the special factors can be correlated with each other, and there can also be observed variables free from error factors. Finally, the latent factors and the special factors are independent of each other.

Confirmatory factor analysis allows the researcher to form a measurement model of the observed variables based on a theory or a priori hypothesis, and then to evaluate the extent to which this factor structure is consistent with the sample information defined by the theory.

First, CFA is used to validate the dimensionality or orientation of a scale, or factor structure, and to determine the most valid factor structure. Second, CFA is applied to validate the hierarchical relationships of the factors. Third, CFA is used to assess the reliability and validity of the scale.

Exploratory factor analysis and confirmatory factor analysis are two inseparable components of factor analysis. They are inseparable in the practical application of management research. They must complement each other to make the research more in-depth. Without either of the two factor analyses, the factor analysis will be incomplete. In general, if the researcher does not have a solid theoretical ground to support the study, the internal structure of the observed variable in question is usually analyzed by exploratory factor analysis. A theory about the internal structure is first generated, and the confirmatory factor analysis is then used on this basis, which is a more scientific approach. However, this must be done with two separate sets of data.

If the researcher directly puts the results of the exploratory factor analysis into the confirmatory factor analysis of the unified data, the researcher is simply fitting the data, not testing the theoretical structure. The data sample can be randomly divided into two halves if the sample size is large enough. It is reasonable to do exploratory factor analysis with half of the data first, and then use the factors obtained from the analysis in the remaining half of the data for the confirmatory factor analysis. Exploratory factor analysis must also be used to look for inconsistencies between the data and the model in the case of a poor fit of the confirmatory factor analysis.

Confirmatory factor analysis is a multivariate statistical procedure used to test how to measure the number of variables representing a structure. Confirmatory factor analysis and exploratory factor analysis are similar techniques, but in exploratory factor analysis, the data are simply exploration and provision of information on the quantity of factors needed to represent the data. In exploratory factor analysis, all measured variables are correlated with each potential variable. However, in the confirmatory factor analysis, researchers can specify the number of factors needed in the data and which measured variables are associated with which latent variables. Thus, confirmatory factor analysis is used to confirm or reject measurement theories.

The application of the root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker–Lewis index (TLI) depends heavily on the critical values of these fit metrics. In earlier studies, a RMSEA value < 0.05 indicated a "close fit" and < 0.08 indicated that the fit of the data and model was reasonable. In addition, Bentler and Bonett

(1980) suggested that TLI values > 0.90 indicate an acceptable fit of the data and model. However, these recommendations are mainly based on intuition and experience and do not derive from statistically proven conclusions (Hau, Marsh, & Wen, 2004).

To address this issue, Hu and Bentler (1999) carried out a simulation study in which the authors analyzed rejection rates under correct/incorrect models by setting different critical values for a number of fit indices (e.g., RMSEA, CFI, and TLI). Hu and Bentler (1999) suggested that values of less than 0.08 for RMSEA and CFI and TLI values greater than 0.90 indicate a better fit of the model to the data. Hu and Bentler's (1999) study has been very influential and their suggested critical values for each fit metric have been adopted in many empirical studies. Therefore, in our study, the recommendations provided by that study were also used for the confirmatory factor analysis.

3.5.2 Correlation and regression analysis

3.5.2.1 The distinction between correlation analysis and regression analysis

Correlation analysis is the study of a relationship between variables and how strong the relationship is. Regression analysis is the study of whether there is an influence relationship and how the influence relationship is. Correlation analysis only studies the direction and degree of correlation between variables. It cannot infer the specific form of the mutual relationship between variables, nor can it infer the change of another variable from the change of one variable. In practical application, only the combination of correlation analysis and regression analysis can achieve the full purpose of research and analysis.

There are many methods of correlation analysis. Elementary methods can quickly find the relationship between data, such as positive correlation, negative correlation, or uncorrelation. Intermediate methods can measure the strength of relationships between data, such as perfect correlation, incomplete correlation, etc. Advanced methods can transform the relationship between data into a model and use the model to predict future business development. The correlation coefficient is a statistical indicator of the closeness of the relationship between two variables. The more the correlation converges to 0, the weaker the correlation is.

Regression analysis is a statistical analysis method which is used to identify the quantitative relationship between one dependent variable and one or more independent variables. By the number of independent variables, it can be divided into simple regression analysis and multiple regression analysis; by the type of relationship between independent and dependent variables, it includes linear regression analysis and nonlinear regression analysis.

According to whether the dependent variable is continuous or not, it can be further divided into linear regression (the dependent variable is a continuous one) and logistic regression (the dependent variable is a qualitative one). The multiple-linear regression is used in this study.

The variables involved in correlation analysis do not have the problem of dividing the independent and dependent variables, and the relationship between the variables is reciprocal; in regression analysis, on the other hand, the variables must be divided into independent and dependent variables according to the nature of the research object and the aim of the research analysis. Therefore, the relationship between variables in regression analysis is not reciprocal.

In correlation analysis, all variables must be random variables. In regression analysis, the independent variable is definite while the dependent variable is random, which means that the estimates of the dependent variable obtained after substituting the given values of the independent variable into the regression equation are not uniquely definite but will exhibit -determined random fluctuations.

The correlation analysis reflects the magnitude of correlation between variables through an indicator (i.e., correlation coefficient), which is uniquely determined because the variables are equivalent to each other. In regression analysis, for two variables that are mutually dependent (e.g., human height and weight, price of goods and demand), there may be multiple regression equations.

It should be noted that the existence of a "true correlation" between variables is determined by the intrinsic relationship between the variables. Although correlation analysis and regression analysis can quantitatively reflect the form of association between variables and their closeness, they cannot accurately determine the existence of intrinsic association between variables or the causal relationship between variables. Therefore, in specific applications, attention must be paid to the combination of qualitative and quantitative analysis and carry out quantitative analysis on the basis of qualitative analysis.

3.5.2.2 The mediating effect

An investigation into the mediating effect tests whether independent variables affect dependent variables through mediator variables (Preacher & Kelley, 2011). For example, drinking can lead to faster driving, which in turn causes traffic accidents. Another example is that low wages might lead to higher employee turnover through influencing employee satisfaction. Such a relationship is called a mediating effect.

The mediating effect is to tap into the nature of how things relate. Mediating effects are often found in management studies. For example, overtime does not have a direct effect on

employee resignation. Some studies point out that overtime increases employee role overload, which in turn causes employee turnover. Thus, role overload plays a mediating role between overtime and turnover (Youngblood, 1984).

We propose a chain effect in this study. That is, we argue that the positive effect of the capital operating model on patient satisfaction is achieved via the team coordination and medical service quality. On this study, we first test the positive effect of the capital operation mode on team collaboration, and also the positive effect of team coordination on the medical service quality. Based on this, we further test the positive effect of the capital operation mode on the medical service quality through team coordination. This is the first mediating effect. In addition, we examine the positive effects of medical service quality on patient satisfaction. Combining the positive effect of team coordination on the medical service quality, we propose a second mediating effect. That is, the positive influence of team coordination on patient satisfaction is generated through the medical service quality. Combining these two mediating effects, we conclude that there is a positive effect of the capital operation mode on patient satisfaction.

3.5.2.3 The analytical strategy of mediating effect

Hypothesis test can be seen as a question of "yes" and "no". First the null hypothesis is designed, and if we find phenomena in the sample that do not match the null hypothesis, we overturn the null hypothesis and embrace the alternative hypothesis. Thus, for the researcher, it is either accepting or rejecting the null hypothesis. If the statistical term we are interested in is the correlation coefficient, we say either that x and y in the aggregate are uncorrelated, or that x and y are correlated. This process of hypothesis testing is perfectly reasonable in statistical terms. However, when applied to real research, it may be a bit problematic.

A methodological master, Professor Frank Schmidt from the University of Iowa, began advocating a movement to abandon hypothesis testing in the late 1980s. His main argument is that hypothesis testing violates the spirit of scientific sharing and summarization (Zhang, 2014). In management research, there are many times when the utility values of variables are not very high. Also, the sample sizes of studies are generally small because it is increasingly difficult to collecting data in companies (Hayes & Scharkow, 2013). Therefore, even if the overall parameter is not zero, researchers will often find non-significant results.

The problem is that academic journals tend not to publish studies that do not have significant results. If a study hypothesizes that XaffectsY, but the result of the hypothesis test turns out to be non-significant, this will have two serious consequences. First, many

well-designed studies without significant results could not be published and will just be left behind. Hence, a waste of valuable research data. Second, it will lead to "positive bias" in published research results. The positive bias refers to the overestimation of the utility value of the variable. From a statistical point of view, even if the true population parameter has a non-zero utility value, some studies should have significant results while others should have non-significant ones. Theoretically speaking, significant and non-significant findings should both be taken into consideration in order to obtain the correct estimate of the population parameter.

Professor Frank Schmidt has been advocating the use of "confidence interval" to replace hypothesis testing in research. The so-called "confidence interval" is a probability-based confidence interval next to the observed statistical term of the sample. Thus, instead of saying that we have 95% confidence that the overall parameter is zero based on the statistical term of the sample, it is better to propose an interval in which the overall parameter is likely to occur. By doing so, there would be no "significant" or "insignificant" results, and no study would be rejected simply because the results were not significant. From this perspective, confidence intervals are indeed more constructive than hypothesis testing.

How should we interpret the confidence intervals constructed in this way? The correct interpretation of "95% confidence interval" is that for each sample drawn from the population, we can calculate such a 95% confidence interval (Bishara & Hittner, 2012). If an infinite number of samples are taken by replacement sampling, there are theoretically 95% confidence intervals that will include the true overall parameter. Only 5% of the confidence intervals established by this method do not include the overall parameters.

A very simple example that we have always used when discussing hypothesis testing is that the sampling distribution of the statistic is normal (Bishara & Hittner, 2017). We have also talked about the fact that many of the statistics used in management have known and familiar sampling distributions, such as the t-distribution, F-distribution, X2-distribution, etc.For these statistics and the corresponding standard sampling distributions, because the mathematical formulas of the distribution curves are known, it is possible to calculate exactly what their critical points are when alpha (α)= 0.05. However, as we will see later, there are many times when we simply cannot deduce what shape the sampling distributions of certain statistics are. In the case of the correlation coefficient, for example, without the Fisher-Z transformation to convert its sampling distribution into a normal distribution, it is not easy to calculate the exact sampling distribution corresponding to the p-value when the correlation coefficient between x and y is not equal to zero (Silver & Dunlap, 1987). How can we do

hypothesis testing when we do not know what the sampling distribution of the statistical term is, or when the sampling distribution of a statistical term is not a simple standard probability distribution? This may be done with the help of bootstrapping (Freedman, 1981).

Bootstrapping is actually a very simple method, which is to put it bluntly, the sample is considered as the total, and then reset and resample (Mooney & Duval, 1994). Originally, we randomly select an infinite number of samples from the total. The distribution composed of different samples is the sampling distribution. Now we have only one sample in hand, we will consider this sample as the total. If this sample is a randomly selected sample from the total, it should be representative of the total. Now we use the reset sampling method to draw many random samples from the original sample. The probability distribution composed of these sub-samples is a reasonable representation of the sampling distribution of the total.

One more consideration when using the bootstrapping method is that because the sub-samples are randomly selected, sometimes the statistics will be larger than the overall parameters, and sometimes smaller than the overall parameters (Efron, 2003). Even if we do 1000 resamples, there is no guarantee that the statistical items that are larger than the overall parameter and smaller than the overall parameter will have the same chance of occurrence (Simar & Wilson, 2000). Therefore, the sampling distribution obtained by bootstrapping is almost certainly asymmetric. However, when doing two-tailed tests, an asymmetric sampling distribution may not be good. Thus, some statisticians have suggested that the actual bootstrap distribution be assumed to be normal and then transformed into a symmetric sampling distribution. After such a transformation, it is called bias corrected bootstrap estimates.

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Chapter 4: Results

4.1 Descriptive statistical analysis

We used doctors and patients from different departments of Shanghai General Hospital as our sample. We sent out a total of 200 questionnaires to patients and collected 184 valid questionnaires which gives a response rate of 92%. In addition, we effectively collected 67 physicians' questionnaires for team coordination.

4.1.1 Patients' socio-demographics

Among the 184 respondents, 126 are from the dual capital operation mode, and 58 are from the single capital operation mode.

Regarding gender distribution, 55% of the respondents are male. The average mean is 36.35 years old.

33% of the participants have a college's degree or below, 52% have a bachelor's degree, and 15% have a master's degree.

24% of the participants are employees of private enterprises, 18% are employees of public institutions, 30% are self-employed, 9% are farmers, and 19% have retired (see Figure 4.1).

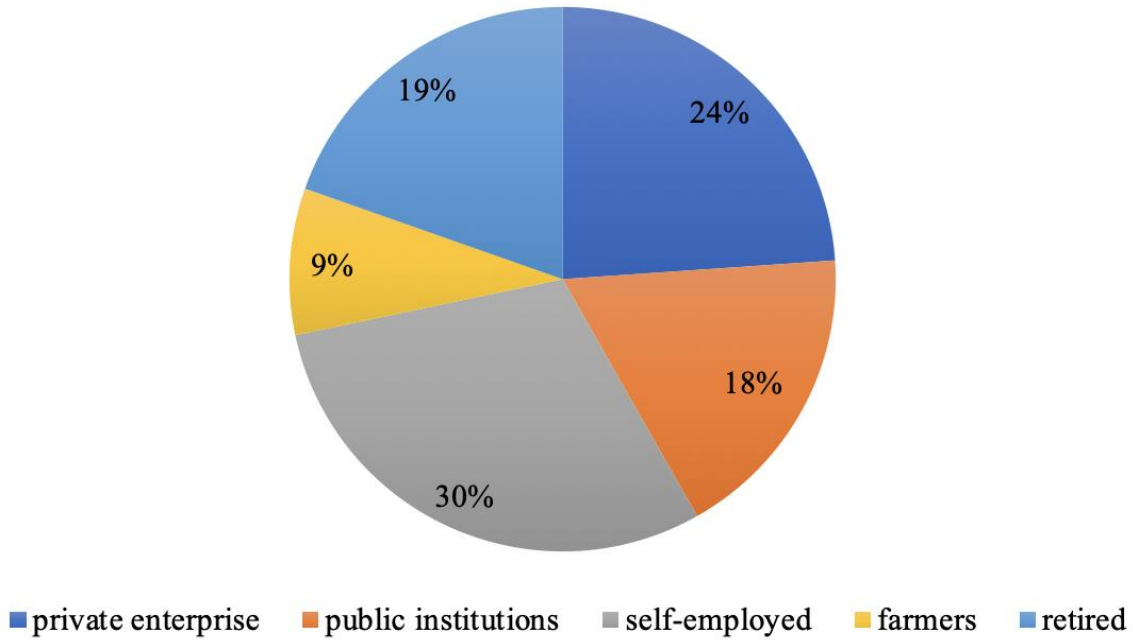

Figure 4. 1The distribution of patient occupation

In addition, 84.2% of the respondents have a monthly income of less than 10,000 yuan, 8.7% between 10,000 and 20,000, 5.4% between 20,000 and 30,000, 1.6% 30,000 and above (see Figure 4.2).

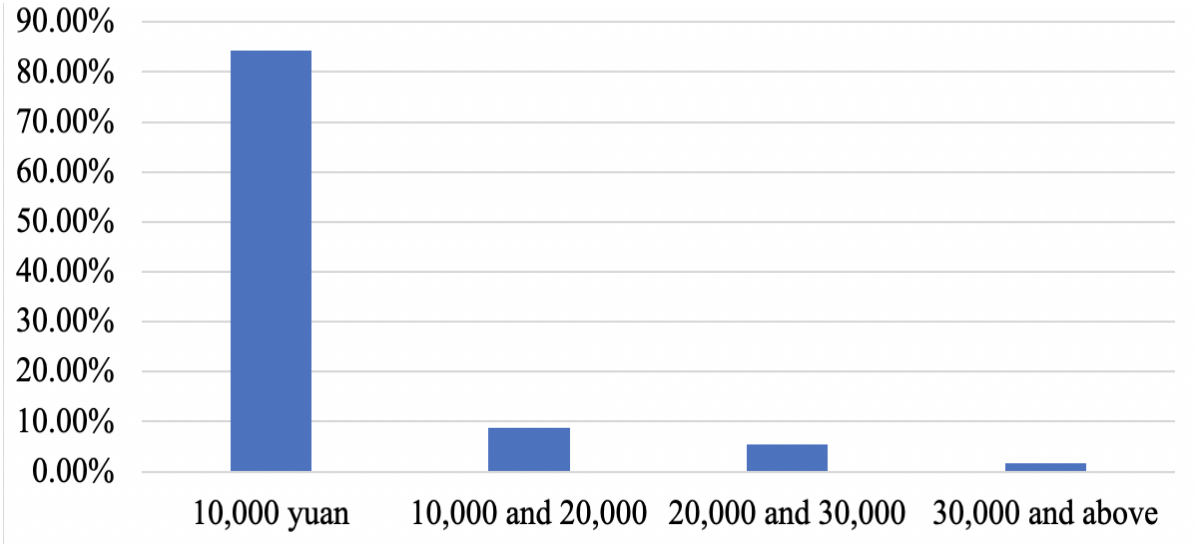

Figure 4. 2The distribution of patient monthly income

Lastly, 47% of the participants spent five days or less in the hospital, 41% spent six-ten days in the hospital, and 11% spent 10-20 days in the hospital, 1% spent more than 20 days in the hospital (see Figure 4.3).

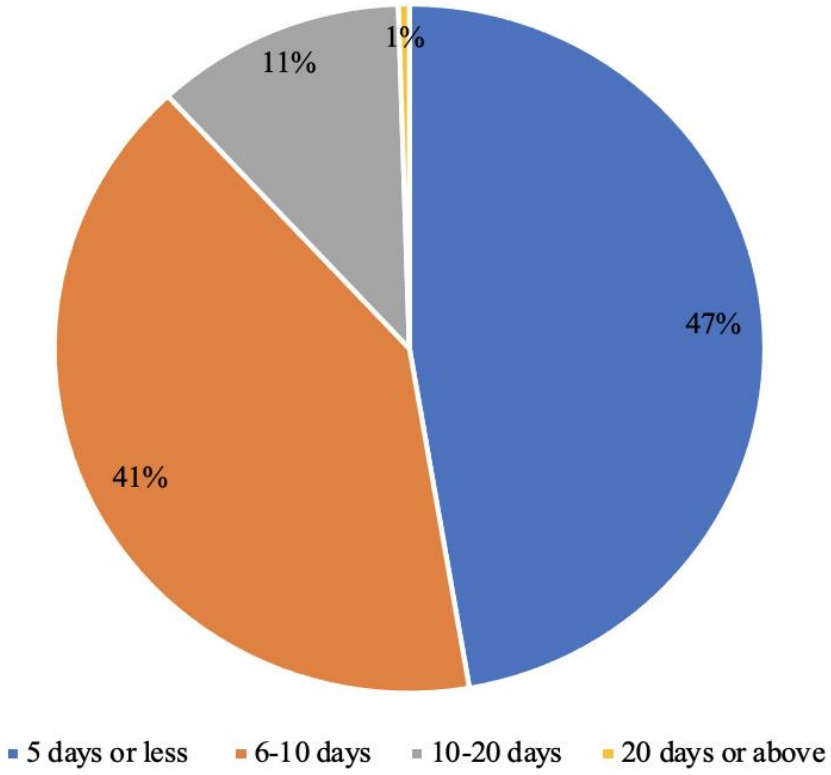

Figure 4. 3The distribution of patient hospital days

4.1.2 Doctors' socio-demographics

We distributed a total of 100 questionnaires of which 67 are valid. The response rate was 67%. Among them, 32 are from department with dual capital operation mode, and 35 from department with single capital operation mode.

Table 4.1 Descriptive statistical information of doctors

	Category	Percentage
Age	Less than 30	4.5%
	31 years to 40 years	29.8%
	41 years to 50 years	47.8%
	More than 50	17.9%
Gender	male	59.7%
	female	40.3%
Marital status	Married	100%
	Single	0%
Education	Bachelor's degree	20.9%
	Master's degree	26.9%
	Doctoral degree	52.2%
Work experience	Less than 5 years	6%
	5 to 10 years	13.4%
	11 to 20 years	37.3%
	More than 20 years	43.3%

Note. n = 67

Most of the respondents (47.8%) are aged 41 to 50 years; 13.4% are 50 years old or older, and 59.7% are males (Table 4.1). In addition, all doctors are married.

Based on the descriptive statistics of the doctors' education, we know that 20.9%of the doctors have a bachelor's degree. 26.9%have a master's degree. 52.2% have a doctoral degree.

Additionally, 6% of the doctors have less than 5 years of work experience, 13.4% of doctors have 5 to 10 years of work experience, 37.3%have 11 to 20 years of work experience and 43.3% have over 20 years of work experience.

4.1.3 Descriptive statistics of quality of medical services

The mean results for the eight measured items concerning the quality of medical services ranged from 2.68 to 3.38 (Table 4.2). The strongest agreement is found in "The doctor takes the initiative to tell the patient exactly when the service will be provided" (mean=3.38) and the lowest agreement is with "The doctor is always ready to help patients" (mean=2.68). The standard deviation of those measured items ranged from 1.10 to 1.28.

Table 4.2 The descriptive statistical information of medical services quality

	Mean	Standard Deviation
The doctor takes the initiative to tell the patient exactly when the service will be provided	3.38	1.28
The doctor is always ready to provide timely services	2.70	1.13
The doctor is always ready to help patients	2.68	1.18
The doctor can always arrange his/her working hours to timely meet the needs of patients	2.83	1.25
The doctor is trustworthy	2.84	1.24
Patients will feel relieved in the process of seeing a doctor, checking and taking medicine	2.81	1.20
The doctor is polite	2.70	1.10
Doctors can get appropriate support from hospitals to provide better services	3.27	1.46

Note. n = 184

4.1.4 Descriptive statistics of patients' satisfaction

The mean results for the four measured items range from 4.78 to 5.14 (Table 4.3). The highest satisfaction is found in "This hospital is adequate to my needs" (mean=5.16) and the lowest satisfaction is with "This hospital is ideal to me" (mean=4.78).

Table 4.3The descriptive statistical information of patients' satisfaction

	Mean	Standard Deviation
On the whole, I am satisfied with the hospital	5.12	0.97

This hospital is up to my expectations	5.14	0.97
This hospital is ideal to me	**4.78**	1.05
This hospital is adequate to my needs	**5.16**	0.99

Note. n = 184

4.1.5 Descriptive statistics of team coordination

The mean results for the four measured items ranged from 4.48 to 5.18 (Table 4.4). The standard deviation of those measured items ranged from 1.37 to 1.42. The strongest agreement is with "The medical team has little confusion about what to do together" (mean=5.18) and the lowest agreement is with "In the treatment of patients, the medical team is given the medication regimen by the pharmacist, and the treatment regimen is given by the attending physician" (mean=4.48).

Table 4.4 The descriptive statistical information of doctors' team coordination

	Mean	Standard Error
The medical team works together in a coordinated manner	4.59	1.41
The medical team has little confusion about what to do together	5.18	1.41
In the treatment of patients, the medical team is given the medication regimen by the pharmacist, and the treatment regimen is given by the attending physician	4.48	1.42
In treating patients, the attending physician and pharmacist work together to develop a comprehensive plan based on their expertise	4.66	1.37

Note. n = 67

4.2 Factor analysis

4.2.1 Exploratory factor analysis

We conducted Harman's single-factor analysis by loading all of the items in an exploratory factor analysis (EFA) and examining the unroasted factor solution. All items from the scale of team coordination, medical service quality, and patient satisfaction. The results showed that the eigenvalues of four factors are greater than one. The total variance explained by these three factors added up to 73.02%, with medical service quality explaining 35.03%, team

coordination explaining 21.23%, and patient satisfaction explaining 13.75%. The results of Harman's single factor test showed that common method variance was not a concern in this study, which allowed us to test the theoretical model.

Factor loadings are a basis for eliminating redundant measurement questions. If the factor loadings of item are less than 0.7, the it emits not a valid representation of the construct. Specifically, the factor loadings for all four topics of the measurement team collaboration were greater than 0.8. Factor loadings are an important component of the output of factor analysis results. Similarly, the factor loadings for each item measuring medical service quality and patient satisfaction are greater than 0.7, which means that these items are a good representation of the constructs they represent.

Table 4.5 The result of all variables' factor loading

Factor	Cronbach α	Factor loading
Team coordination	0.84	
The medical team works together in a coordinated manner		0.90
The medical team had little confusion about what to do together		0.88
In the treatment of patients, the medical team is given the medication regimen by the pharmacist, and the treatment regimen is given by the attending physician		0.84
In treating patients, the attending physician and pharmacist work together to develop a comprehensive plan based on their expertise		0.89
Medical service quality	0.88	
The doctor takes the initiative to tell the patient exactly when the service will be provided		0.70
The doctor is always ready to provide timely services		0.77
The doctor is always ready to help patients		0.80
The doctor can always arrange his/her working hours to timely meet the needs of patients		0.83
The doctor is trustworthy		0.86
Patients will feel relieved in the process of seeing a doctor, checking and taking medicine		0.89
The doctor is polite		0.89
Doctors can get appropriate support from hospitals to provide better services		0.76
Patient satisfaction	0.86	
On the whole, I am satisfied with the hospital		0.92
This hospital is up to my expectations		0.90
This hospital is ideal to me		0.90
This hospital is adequate to my needs		0.88

In addition, the results of team coordination showed that all seven items loaded on one factor, and that their factor loadings all exceeded .60 (see Table 4.5). Four items factor loading of team coordination are 0.90, 0.88, 0.84 and 0.89, and no items were cross loaded, indicating that the predictor and criterion in our hypothesized model were clearly distinguished in the EFA.

The Cronbach alpha for the team coordination in this sample was 0.84, which exceeded the psychometric criteria ($\alpha > .70$) and indicated a high reliability. Similarly, the results of medical service quality showed that all eight items loaded on one factor (factor loadings are 0.70, 0.77, 0.80, 0.83, 0.86, 0.89, 0.89, 0.76) and that no items were cross loaded.

The Cronbach alpha for the team coordination in this sample was 0.88, which indicated a high reliability. The results of patient satisfaction showed that all four items loaded on one factor (factor loadings are 0.92, 0.92, 0.90, 0.88) and that no items were cross loaded. The Cronbach alpha for the team coordination in this sample was 0.86, which indicated a high reliability.

4.2.2 Confirmatory factor analysis

CFA was conducted to examine the distinctiveness of the three dimensions (medical service quality, team coordination and patient satisfaction). The results revealed that the three-factor model (χ^2 = 229.98, *df* = 117, RMSEA = 0.07, CFI = 0.94, TLI= 0.93, SRMR = 0.06) was superior to all plausible alternative models (Table 4.6). The CFA result of two-factor model (i.e., team coordination + medical service quality, patient satisfaction, χ^2 = 595.08, *df* = 119, RMSEA = 0.15, CFI = 0.74, TLI= 0.70, SRMR = 0.13) was not better than the three-factor model, $\Delta\chi^2$ (Δdf = 2, n= 184) = 365.10, p-value< 0.01.

Similarly, the CFA results of two-factor model (i.e., team coordination + patient satisfaction, medical service quality, χ^2 = 625.64, *df* = 119, RMSEA = 0.15, CFI = 0.73, TLI= 0.69, SRMR = 0.17) was not better than the three-factor model, $\Delta\chi^2$ (Δdf = 2, n= 184) = 399.66, p-value< 0.01. The CFA result of two-factor model (i.e., patient satisfaction + medical service quality, team coordination, χ^2 = 671.66, *df* = 119, RMSEA = 0.16, CFI = 0.70, TLI= 0.69, SRMR = 0.14) was not better than the three-factor model, $\Delta\chi^2$ (Δdf = 2, n= 184) = 441.68, p-value< 0.01.

The CFA result of two-factor model (i.e., all variables are combined, χ^2 = 671.66, *df* = 119, RMSEA = 0.20, CFI = 0.50, TLI= 0.44, SRMR = 0.19) was not better than the three-factor model, $\Delta\chi^2$ (Δdf = 3, n= 184) = 806.68, p-value< 0.01. In a nutsehll, the results of

Harman's single factor test and the CFA demonstrated that common method variance was not a concern in this study, which enabled us to test the theoretical model.

Table 4.6 Model fit results for confirmatory factor analyses

Models	χ^2	*df*	RMSEA	CFI	TLI	SRMR
Team coordination, medical service quality, patient satisfaction	229.98	117	0.07	0.94	0.93	0.06
Team coordination and medical service quality are combined, patient satisfaction	595.08	119	0.15	0.74	0.70	0.13
Team coordination and patient satisfaction are combined, medical service quality	625.64	119	0.15	0.73	0.69	0.17
Team coordination and patient satisfaction are combined, team coordination	671.66	119	0.16	0.70	0.69	0.14
All variables are combined.	1036.66	120	0.20	0.50	0.44	0.19

Note: n = 184.
RMSEA = Root mean square error of approximation.
CFI = Comparative fit index.
TLI = Tucker–Lewis index.
SRMR = Standardized root mean residual.

4.2.3 Correlation between dimensions

Table 4.7 presents the means, standard deviations, and correlations of all study dimensions plus capital operation mode variable. The perception about team collaboration is higher in dual capital operation mode (r = 0.14).

Team collaboration has a moderate-weak positive correlation with medical service quality (r = 0.29). In other words, the higher the level of team collaboration, the higher the level of medical service quality.

Medical service quality has a moderate-weak positive correlation with patient satisfaction (r = 0.25), which means that the higher the quality of medical service quality, the higher the level of patient satisfaction. However, this link is not very strong.

Finally, there is a weak positive correlation between capital operation mode and patient satisfaction (r = 0.06) which means that patient satisfaction is higher under dual capital operation mode, but that link is weak.

Table 4.7 Descriptive statistics and correlations

Variables/Dimensions	Mean	Standard Deviation	1	2	3
1. Capital operation mode	0.69	0.47			
2. Team collaboration	4.73	1.23	0.14		
3. Medical service quality	2.90	1.00	0.09	0.29	
4. Patient satisfaction	5.05	0.90	0.06	0.06	0.25

Note: n = 184.

4.2.4 Model estimation

In this study, we tested the model of the hypothesis by regression analysis using boots trap and path analysis technique. In addition, when analyzing the mediating effects, we use confidence intervals to determine whether the mediating effects are significant rather than p-values.

Hypothesis 1 proposes that capital operation mode has significant effects on team coordination. The outcomes reveal that the dual capital operation mode significantly affects team coordination (b = 0.16, p-value<0.05, Table 4.8). Thus, Hypothesis 1 is supported.

Hypothesis 2proposes that team coordination significantly affects medical service quality. It is supported (b = 0.24, p-value< 0.001, Table 4.8).

Table 4.8 Regression model outcomes for the three dimensions

Variables	Team collaboration	Medical service quality	Patient satisfaction
Constant	4.50^{***}	2.51^{**}	5.44^{**}
Age of patient	-0.01	-0.01	0.01
Gender of patient	-0.08	-0.17	-0.26
Education of patient	0.06	-0.12	-0.08
Income of patient	-0.04	0.01	0.17
Number of days in hospital	0.29	-0.08	0.08
Capital operation mode	0.16^{*}		
Team coordination		0.24^{***}	0.23^{***}
R^2	0.04	0.89^{***}	0.12^{**}

Note: n = 184.
***p< 0.001, **p< 0.01, *p< 0.05.

To show the results of indirect effects more clearly, we plotted Table 4.9. In this table, Model 1 (M1) aims to analyze the direct relationship between capital operation mode and medical services quality; Model 2 (M2) aims to analyze the indirect relationship between capital operation mode and medical services quality via the mediation role of team coordination; Model 3 (M3) aims to analyze the direct relationship between team coordination and patient satisfaction; Model 4 (M4) aims to analyze the indirect relationship between team coordination and patient satisfaction via the mediation role of medical service quality; Model 5 (M5) aims to analyze the link-indirect relationship between capital operation mode and patient satisfaction via the mediation role of team coordination and medical service quality.

Hypothesis 3 proposes that the relationship between capital operation mode and medical service quality is mediated by team collaboration. After the entry of team collaboration into regression, the capital operation mode was significantly related to medical service quality (*b* = 0.25, *p-value*< 0.001, Table 4.9). According to Table 4.10, the indirect effect of team collaboration was also significant (0.10, *p-value*< 0.05, 95% CI = [-0.22, -0.03]). Thus, Hypothesis 3 is supported. Moreover, we can easily see that capital operation mode positively affects medical service quality; specifically, the perception about medical service quality is higher under dual capital operation mode.

Hypothesis 4 proposes that medical service quality significantly affects patient satisfaction. The outcomes reveal that the medical service quality significantly affects patient satisfaction (b = 0.23, p < 0.001, Table 4.8), and thus Hypothesis 4 is supported. Therefore, we consider that there is a significant causal relationship between medical service quality and patient satisfaction.

Hypothesis 5 proposes that the relationship between team collaboration and patient satisfaction is mediated by medical service quality. After the entry of medical service quality into regression, team collaboration was significantly related to patient satisfaction (*b* = 0.27, p < 0.01, Table 4.9). Model 1 (M_1) aims to analyze the direct relationship between capital operation mode and medical services quality; Model 2 (M_2) aims to analyze the indirect relationship between capital operation mode and medical services quality via the mediation role of team coordination; Model 3 (M_3) aims to analyze the direct relationship between team coordination and patient satisfaction; Model 4 (M_4) aims to analyze the indirect relationship between team coordination and patient satisfaction via the mediation role of medical service quality; Model 5 (M_5) aims to analyze the link-indirect relationship between capital operation

mode and patient satisfaction via the mediation role of team coordination and medical service quality.

According to Table 4.10, the indirect effect of medical service quality was also significant (0.06, $p < 0.01$, 95% CI = [-0.12, -0.03]). Thus, Hypothesis 5 is supported.

Table 4.9 Outcomes of main effect and mediating effect

Variables	Medical services quality		Patient satisfaction		
	M_1	M_2	M_3	M_4	M_5
Intercepts	4.50***	2.35***	5.44**	5.15***	5.06***
Age of patient	-0.01	-0.01	0.01	0.01	0.01
Gender of patient	-0.08	-0.17	-0.26	-0.26	-0.26*
Education of patient	0.06	-0.12	-0.08	-0.09	-0.09
Income of patient	-0.04	-0.01	0.17	0.18	0.17
Number of days in hospital	0.29	0.02	0.08	0.05	0.11
Capital operation mode	0.16*	0.25***			-0.20
Team coordination		0.30*	0.23***	0.10*	0.10*
Medical service quality				0.27***	0.27**
R^2	0.04	0.11**	0.12**	0.13*	0.14***

Note: n = 184.
Capital Operation Mode: 1 = dual capital operating mode; 0 = single capital operating mode.
***p< 0.001, **p< 0.01, *p< 0.05.

Table 4.10 Conditional indirect effect of capital operation mode on patient satisfaction through team collaboration and medical service quality.

	Indirect effect	95% CI
Capital operation mode—team collaboration—hospital services quality	0.10	[-0.22, -0.03]
Team collaboration—medical service quality—patient satisfaction	0.06	[-0.12, -0.03]

Capital operation mode—team collaboration—medical service quality—patient satisfaction	0.10	[-0.20,-.010]

Note: n = 184; ***p< 0.001, **p< 0.01, *p< 0.05.

Hypothesis 6 proposes a chain mediating effect, where capital operation mode affects patient satisfaction through the medicating effect of team collaboration and medical service quality. To further confirm the significance of the indirect relationships, we used bootstraps to estimate the 95% confidence intervals (CIs) for the indirect effects on the basis of the distribution-of-product method. The indirect relationships between capital operation mode and patient satisfaction via team collaboration and medical service quality were 0.10 (95% CI = [-0.20, -.01]). Thus, Hypothesis 6 is supported.

These analyses support hypothesis 1 to 6. Therefore, we believe that the dual capital operation mode positively affects patient satisfaction. Specifically, team coordination mediates the positive relationship between dual capital operations mode and medical service quality. Compared with the single capital operation mode, the dual capital operation mode has stronger positive effects on medical service quality. Team coordination has positive effects on patient satisfaction via medical service quality. In other words, patient satisfaction will be stronger when transactive memory system is higher. Team coordination and medical service quality mediate the positive relationship between dual capital operation mode and patient satisfaction (i.e., dual capital operation mode — team coordination — medical service quality — patient satisfaction).

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Chapter 5: Discussion and Conclusions

5.1 Main conclusions

Capital operation is a kind of management idea to improve economic benefits in an all-round way. It aims at profit maximization and capital increase and is characterized by value management. Chinese hospitals are now operating with a single capital and dual capital operation mode. Dual-capital operation mode can be split into private hospitals with cooperation operation model between private (or individual) capital and state-owned (government) capital and public hospitals with cooperation operation model between state-owned (government) capitals (Wu & Tsai, 2005).

Among all Grade-A tertiary hospitals in Shanghai, Shanghai General Hospital was the first to implement this dual capital operation mode. Therefore, our study focuses on the Shanghai General Hospital. Specifically, we argue that hospitals' dual capital operation mode can introduce more flexible resources to team interactions and help activate team interactions. The objectives of this research are: (a) present the concept of a dual capital operation mode based on the literature review and analyze the differences between different capital operation modes, and (b) analyze the relationship between the dual capital operation mode and patient satisfaction based on team interaction theory.

Our data comes from two surveys conducted among patients (n=184) and doctors (n=67) at Shanghai General Hospital. We selected the departments at the SGH managed under dual capital mode and others managed under single capital operation mode.

The outcomes reveal that the capital operation mode is positively related to patient satisfaction. To be more specific, patient satisfaction is higher under dual capital operation mode. By testing Hypothesis 1: "Dual capital operating mode has positive effects on team coordination", Hypothesis 2: "Team coordination has positive effects on medical service quality" and Hypothesis 3: "Team coordination mediates the positive relationship between dual capital operation mode and medical service quality", we found that there is an indirect effect of the dual capital operation mode on patient satisfaction. Specifically, team coordination mediates the positive relationship between dual capital operation mode and medical service quality. Compared with the single capital operation mode, the dual capital

operation mode has stronger positive effects upon medical service quality. Team coordination has positive effects upon patient satisfaction via medical service quality (Ambrosini, Bowman, & Burton-Taylor, 2007). In other words, patient satisfaction will be higher when team coordination is better. Team coordination and medical service quality mediate the positive relationship between dual capital operation mode and patient satisfaction (i.e., dual capital operation mode — team coordination — medical service quality — patient satisfaction).

In addition, we conducted in-depth interviews at the Shanghai General Hospital. The results of the interviews suggest that the implementation of the dual capital operation mode at Shanghai General Hospital has contributed to the improvement of the level of physician teamwork.

Last, we also show from the results of third-party statistics (Shanghai Medical and Healthcare Ethos Enhancement Association) that the level of patient satisfaction in Shanghai General Hospital has steadily improved year by year since 2016. This result further validates the positive effect of the dual capital operation mode on patient satisfaction.

It is concluded from interviews, questionnaires, and third-party data that the dual capital operation mode has stronger positive effects upon patient satisfaction than single capital operation mode does. Therefore, this study suggests that the introduction of dual capital operation mode in Chinese public hospitals could help improve medical services and patient satisfaction.

5.2 Theoretical implications

5.2.1 The dual capital operation mode and public-public partnership mode are proposed

According to the statistics of *China Health Statistics Yearbook* by National Health Commission (2019), the proportion of private hospitals funded by private capital or individual capital in China is increasing year by year and the health institutions funded by various kinds of non-public capital outnumbered government-run public hospitals in 2019. Nevertheless, public hospitals still have far more inpatients than the private hospitals do. Given China's actual conditions and national policies and according to statistics, the high-quality medical resources in China are still concentrated in the government-sponsored public hospitals.

Different from the public private partnership (PPP) mode, we believe that the public-public partnership mode proposed in this study is more suitable for China's actual conditions and system requirements.

First, it is compliant with the provisions of the Constitution of China (2018) (referred to as "the Constitution"). According to Article 6 of the Constitution, China's socialist economic system is built upon the socialist public ownership of the means of production, i.e., ownership by the whole people and collective ownership by the working population. The system of exploitation of man by man is replaced by the system of socialist public ownership. The latter follows the principle of "everyone shall fulfill his/her due responsibility and resources shall be allocated in proportion to the work one does". China remains at the primary phase of socialism. In the basic economic system, public ownership is the principal element, with the coexistence of diverse ownership forms. Resource allocation based on the work done is the major model while a variety of other modes of distribution also exist. According to Article 7 of the Constitution, state economy is the sector of socialist economy owned by the whole people. It is the leading force in the national economy. The consolidation and growth of state economy shall be guaranteed. Therefore, the partnership between two types of public (government) capital is in line with the provisions of the Constitution.

Second, China's public hospitals must always champion the public-welfare nature. According to the *Guiding Opinions of the General Office of the State Council on Establishing a Modern Hospital Management System* (hereinafter referred to as the "guidance") (General Office of the State Council, 2017), the responsibility of party committees and the government for leading, guaranteeing and supervising public hospitals shall be implemented. Social benefits shall come first. Attention shall be paid to health fairness, and inclusiveness shall be enhanced. The *Basic Medical Service and Health Promotion Law of the People's Republic of China* issued by the Standing Committee of National People's Congress (2019) stipulates that the government-run hospitals shall not partner with other organizations to set up health institutions with non-independent legal personality, and shall not cooperate with private capital to establish for-profit health institutions. That is to say, public hospitals are not allowed to conduct for-profit medical activities in partnership with health institutions sponsored by private capital in China. The reason is that the private hospitals are run for profits rather than for public good.

Third, China encourages innovation in the business model of public hospitals. According to the guidance (General Office of the State Council, 2017), we should correct the hygiene and health development path with Chinese characteristics, make efforts to realize the organic unity of social benefits and operation efficiency, strengthen the leading role of public hospitals, and form a health care system with different types of investors and diverse investment models. Government's leading role shall be combined with market forces so as to

cater to people's multi-layer, personalized and diversified needs for health care. We should speed up the transformation of government functions, advance the reform of "streamlining administration and delegating power, combining deregulation with management, and optimizing service", clarify the responsibility of the government as the sponsor of public hospitals and the public hospitals as independent operators, so as to separate ownership from management. The guidance (General Office of the State Council, 2017) requires that the health administrative departments at all levels should innovate the management mode, change their role from direct management to industrial administration, strengthen governmental functions in the formulation of policies and regulations, industry planning, formulation of standards and norms, as well as the supervision and guidance of public hospitals, with the aim to constantly improve the quality of medical services, fully mobilize the enthusiasm of medical staff, and implement democratic management and scientific decision-making. Therefore, the public-public partnership between state-owned capital and state-owned capital under the dual capital partnership mode is more suitable for the public hospitals in China.

5.2.2 Dual capital operation mode has a positive effect on patient satisfaction

We believe the study provides evidence that the dual capital operation mode positively affects patient satisfaction through the theoretical lens.

First, our study explains the relationship between the dual capital operation mode and patient satisfaction. We argue that there is a chain mediating effect between these two seemingly unrelated concepts. To be more specific, the collaborative nature of the physician team and the quality of care mediate the relationship between the dual capital operation mode and patient satisfaction. In the study, we explain why the dual capital operation mode can effectively enhance physician team collaboration; why team collaboration can effectively enhance health care service quality (Martinussen et al., 2012); and why healthcare service quality can effectively enhance patient satisfaction (Chang & Chang, 2013). We explain the positive effect of the dual capital operation mode on the collaborative nature of physician team based on interviews with Shanghai General Hospital. We interpret the relationship between teamwork, quality of care and patient satisfaction based upon team interaction theory (McGrath & Solter, 1984). Our study offers evidence to prove that the dual capital operation mode positively affects patient satisfaction. This fills a gap in previous studies (Zhou et al., 2014).

Second, our study enriches the research of team interaction theory. Team interaction theory (McGrath & Solter, 1984) holds that effective input of capital can provide more support to the team (e.g., clear division of labor and specialization of team members). According to previous literature, the research sample of team interaction theory comes from data of resource companies (Hackman &Morris, 1975). Therefore, no studies have applied the theory to studies of physician team interaction in hospitals. Our study could enrich the scope of research on team interaction theory to some extent. This further extends the application of the theory to some extent.

Third, our study explains the effectiveness of the dual capital operation mode on team collaboration. This strongly suggests that the use of a dual capital operation mode in hospitals helps to activate team interaction. This is consistent with prior study (Hackman and Morris, 1975). Specifically, we argue that the introduction of a dual capital operation mode in hospitals can facilitate greater specialization of each member of the physician team (according to the interviews). The attending physician specializes in developing the patient's treatment plan, while the pharmacist specializes in developing the patient's medication regimen. This effectively avoids task conflicts and enhances collaboration between primary care physicians and pharmacists. Thus, our study can be used as an evidence to justify the introduction of a dual capital operation mode in hospitals. Hospitals can look for different capital infusion according to the needs and variability of each department. What we need to point out in the study is that the introduction of capital must be in line with the hospital's reality. In particular, conflicting capital situations need to be avoided. Each hospital should fully evaluate each type of capital to ensure the effectiveness of capital infusion.

5.3 Practical implications

We believe the study can advise hospitals on how to improve the quality of care and patient satisfaction from a practical point of view.

We believe that this study can provide valuable suggestions for hospitals to improve medical quality and patient satisfaction from a practical point of view. This study proves that medical departments adopting public-public partnership mode have obvious advantages in improving medical service quality and patient satisfaction than those supported by single public capital. Meanwhile, the results of the doctor questionnaire show that compared with doctors from departments operating with a single capital operation mode, doctors from departments implementing the dual capital operation mode have a more positive evaluation of

team cooperation, which demonstrates that the dual capital operation mode is very effective. Therefore we can deliver this important and positive information to doctors to further get their support for the dual capital operation mode. It is suggested to promote and generalize the dual capital operation mode among public hospitals and encourage those medical departments operating with single capital operation mode to shift to the dual capital operation mode.

Based on the theoretical research proposed in Section 5.2 above, we believe that the dual capital partnership model proposed in this study can be applied to not only the Shanghai General Hospital, but also other public hospitals in Shanghai and even all public hospitals across China. According to *China Health Statistics Yearbook* (2019), China currently has 12,032 public hospitals, accounting for 36.45% of the total. Therefore, it is of great practical significance to experiment with the dual public capital partnership mode in China.

More significantly, this study deeply explores the diversified business modes of hospitals advocated by China's medical system reform. As mentioned in Section 1.1.4, hospitals in China are mainly sponsored by single capital and dual capital modes. The single capital mode involves the public hospitals wholly owned by the government or private health institutions entirely sponsored by non-public investors, while the dual capital sponsor mode involves the non-public health institutions partnering with public capital or the public hospitals adopting the public-public partnership mode proposed in this study.

The typical hospital business mode emerging in China's health care reform such as non-public capital mode and private-public partnership mode is not applicable everywhere in China. For example, the Suqian model in Jiangsu Province is not successful. The sweeping privatization of all public hospitals in Suqian since 2000 has made it the only prefecture level city in China without public hospitals in 2003. Practice has proved that Suqian model not only ignores the difference between public demand and individual health needs, but also fails to provide sufficient high-quality medical resources. As a result, in October 2013, Suqian Municipal People's government signed an agreement with Jiangsu People's Hospital (public hospital) to jointly establish the Suqian First People's Hospital. Meanwhile, Jiangsu People's Hospital is entrusted with managing the Suqian First People's Hospital. The Suqian First People's Hospital has become the livelihood project with the largest government investment since the founding of Suqian city. Thus the indispensable role of public hospitals can be seen in the national welfare and the people's livelihood. Another example is the Shanwei model, which is the product of the joint-stock reform of public hospitals jointly launched by Shanwei city, Guangdong province and CITIC pharmaceutical. The Shanwei model is a typical private-public partnership formed between public hospitals and a few large medical groups

with strong strength. However, the source of restructuring cost, the reform of property right system, the reform of HR system and the reform of operation and management mechanism are all the difficulties facing public-private partnership mode, which need to be further explored and solved. Another problem is how public hospitals make profits under the existing legal framework after the non-public capital is introduced. Furthermore, how does the government supervise the private capital invested in the not-for-profit hospitals?

In short, whether from the theoretical perspective or practical implications, the dual public-public partnership mode proposed in this study is more applicable to China's public hospitals and the successful experience is worth popularizing.

5.4 Limitations and future research

Our study has the novelty of investigating the effects of a dual capital operation mode on health care service quality and patient satisfaction, which we believe is groundbreaking, but additional research is necessary in the future to continue to analyze the positive effects of the dual capital operation mode in hospital service. The study has some limitations.

First, our study collected data by questionnaires, and all data were obtained from physicians and patients at the Shanghai General Hospital. This is a major limitation. For example, whether the data collected from other hospitals with dual capital operation mode support our findings is unknown. Therefore, in future studies, we can try to collect data from other hospitals with dual capital operation mode. In addition, we can also analyze data from tertiary hospitals in Shanghai with different capital operation modes to determine whether there are significant differences in medical services quality and patient satisfaction among hospitals with different capital operation modes.

Second, we argue that the dual capital operation mode effectively enhances the quality of care provided by physician teams. When elaborating upon the research hypotheses, we argue that team interaction theory explains the above-mentioned relationship. Specifically, we argue that the ability of teams to generate effective interactions is influenced by resource input. If the input of medical resources is adequate, medical teams will produce better collaborative and positive work outcomes. Thus, the theoretical basis for our study comes from team interaction theory, a theory derived from the research in the field of organizational management. Currently, we have not found a theory that better explains this study. In future research, we can combine theories from the field of economics to analyze the impact of the input of healthcare resources on the work outcomes of healthcare teams.

Third, patient satisfaction is the dependent variable, while dual capital operation mode, physician team collaboration, and quality of care are the independent variables in the study. When we analyzed the relationship between the independent and dependent variables, we took into consideration the influence of basic demographic statistical variables, which helped to increase the accuracy of the relationship between dependent and independent variables. However, we believe that there are more influencing factors that affect patient satisfaction, such as individual's factors and hospital's factors. Therefore, we need to consider more control variables in future studies. In particular, we need to take into account the level of treatment of physicians, the infrastructure of the hospital and the reputation of the hospital in the region in the study of the relationship between the dual capital operation mode and patient satisfaction.

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Annex A

Interview guide

1. How familiar are you with the dual capital operation mode?

2. The change of team cooperation and work tasks (for example, the practical characteristics of SPD logistics management, the transformation of pharmaceutical care mode and clinical rational drug use).

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Annex B

Questionnaire on Patients' Satisfaction in Shanghai General Hospital

Questionnaire I (patient assessed)

调研问卷 I（患者用表）

Dear friend:

Hello! Thank you very much for taking the time to participate in this survey. The purpose of this questionnaire is to study the quality of hospital services in the context of mobile Internet, and to provide theoretical guidance for hospitals to better serve patients. This questionnaire is for academic research and analysis purposes only. The information you provide will not be made public. Please feel free to answer it! Your assistance will make this research even more valuable.

亲爱的朋友：

非常感谢您抽出时间参与这次调查。本次网络问卷调查的目的是研究医院服务质量，为医院更好地为患者服务提供理论指导。本问卷仅作学术研究和分析之用。你提供的资料将不会对外公布。请随意回答!您的协助将使这项研究更有价值。Basic information 基本信息

1. Age 年龄:
2. Gender 性别：

   A male 男　　B female 女

3. Education 学历:

A high school and below 高中及以下 B college 大专 C undergraduate 本科 D master and above 硕士研究生及以上

4. Occupation 职业:

   A student 学生　　B enterprise employee 企业员工

   C public institution employee 事业单位员工　D self-employed 自由职业

   E farmer 农民　　F retirement 退休人员　　G other 其他

5. Income/month 月收入:

A 3000 yuan and below 3000 元以下 B 3001-5000 yuan 3001-5000 元

C 5001-8000 yuan 5001-8000 元 D 8001-12000 yuan 8001-12000 元

E 12001-20000 yuan12001-20000 元 F20001-30000 yuan20001-30000 元

G 30001 yuan and above30000 元及以上

6. Number of days in hospital 医院就诊天数:

A 0 days 0 天 B 1 day 1 天 C 2-3 days 2-3 天

D 4-6 days 4-6 天 E 7-14 days 7-14 天 F 15 days and above15 天

Please answer the following questions based on your medical experience

请根据您的就诊经历回答下述问题

Quality of medical services

医疗服务质量

1. The doctor takes the initiative to tell the patient exactly when the service will be provided 医生会主动告诉患者提供服务的准确时间

2. The doctor is always ready to provide timely service 医生总能提供及时的服务

3. The doctor is always ready to help patients 医生总是乐意帮助患者

4. The doctor can always arrange his/her working hours to timely meet the needs of patients 医生总可以安排好工作时间，及时满足患者的需求

5. The doctor is trustworthy 医生是值得信赖的

6. Patients will feel relieved in the process of seeing a doctor, checking and taking medicine 在就诊、检查、取药等过程中患者会感到放心

7. The doctor is polite 医生是有礼貌的

8. Doctors can get appropriate support from hospitals to provide better services医生可从医院得到适当的支持，以提供更好的服务

Patient's satisfaction

患者满意度

1. On the whole, I am satisfied with the hospital 总的来说，我对这家医院感到满意

2. This hospital is up to my expectations 这家医院符合我的期望

3. This hospital is my ideal traditional Chinese medicine hospital 这家医院是我理想中医院的样子

4. This hospital is adequate to my needs 这家医院能满足我的需求

Annex C

Questionnaire on team coordination in Shanghai General Hospital

Questionnaire II (doctor assessed)

调研问卷 II（医生用表）

Dear friend:

Hello! Thank you very much for taking the time to participate in this survey. The purpose of this questionnaire is to study the quality of hospital services in the context of mobile Internet, and to provide theoretical guidance for hospitals to better serve patients. This questionnaire is for academic research and analysis purposes only. The information you provide will not be made public. Please feel free to answer it! Your assistance will make this research even more valuable.

亲爱的朋友：

非常感谢您抽出时间参与这次调查。本次网络问卷调查的目的是研究医院服务质量，为医院更好地为患者服务提供理论指导。本问卷仅作学术研究和分析之用。你提供的资料将不会对外公布。请随意回答!您的协助将使这项研究更有价值。

Basic information 基本信息

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4. Is the medication regimen given by the medical team when treating a patient developed by a pharmacist 医疗组在治疗病人时所给的药物方案是否由临床药师制定？

   A Yes 是 B No 否

Please answer the following questions based on your medical experience：

请根据您的医疗经验回答下述问题：

1. The medical team works together in a coordinated manner 医疗组以协调一致的方式一起工作

2. The medical team had little confusion about what to do together 医疗组对共同要做的事情基本没有困惑

3. In the treatment of patients, the medical team is given the medication regimen by the pharmacist, and the treatment regimen is given by the attending physician 在治疗病人时，医疗组用药方案由临床药师给出，治疗方案由主治医生给出

4. In treating patients, the attending physician and pharmacist work together to develop a comprehensive plan based on their expertise 在治疗病人时，主治医生和临床药师根据自己的专业知识合作制定综合方案