



Unpacking the Mediating Role of Doctor–Patient Trust in the Service Quality–Loyalty Link: Insights from a Large Public Hospital in Shandong, China

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ABSTRACT

Our research is done from the perspective of trust between doctors and patients. The study chose Shandong Provincial Hospital as the research object, trying to find out the relationship between the service quality of the hospital, patients' trust in the hospital, and whether patients are willing to come to see a doctor again. The study used the knowledge of service encounter theory and service quality theory to design a questionnaire and send it to patients in the hospital to fill in. Then, we use a method called Structural Equality Modeling (SEM) to analyze the collected data. The study found that patients would trust the hospital more and be more satisfied with the hospital if the service quality of the hospital was good. Moreover, patients' trust is like a bridge, which can connect good service with their willingness to come again. Specifically, whether the hospital's medical equipment is good or not, whether the nurses are friendly or not, whether the doctors are skilled or not, and whether it is inconvenient to register and pay fees will all affect the patients' overall satisfaction and whether they will come next time. In addition, the study also shows that patients generally trust doctors. This degree of trust is positively related to the quality of service, satisfaction and whether they are loyal. That is to say, the better the service, the more trust, satisfaction and willingness they have to come again. Therefore, we suggest that the hospital should constantly optimize the medical equipment and environment, make the medical team's service awareness and professional ability stronger, improve those procedures, and open more channels for patients to give their opinions. By doing so, the quality of service will be improved all the time, and patients will be more willing to choose this hospital. Our research not only supplements the theory about the relationship between service quality and patient behavior in public hospitals in China, but also provides practical evidence for hospital managers to help them formulate patient-centered service improvement strategies.

Keywords: Consumer Behaviour, Hospital Service Quality, Trust, Patient Satisfaction, Patient Loyalty

JEL Classifications: I11, I12, M31, D83

1. INTRODUCTION

In recent years, with the rapid economic development of our country and the deepening reform of the medical system, medical services have become a matter of special concern to everyone. People's demands and expectations for medical services are getting higher and higher, so the relationship among service quality, patient trust, satisfaction and loyalty has become an important topic in hospital management and academic research. The China

Municipal Government attaches great importance to promoting the development of medical services, and has been striving to improve the quality of services to meet everyone's demand for quality health services. However, due to the influence of some old systems in the past, the problems of uneven distribution of medical resources, difficult access to services and affordable prices still exist, resulting in a gap between patients' satisfaction and trust. With the increasingly fierce competition in the medical service market, hospitals should not only improve hardware facilities

and medical technology, but also pay special attention to patients' service experience and emotional needs (Hu and Tao, 2023).

Theoretically speaking, trust-the core element in the relationship between doctors and patients-has changed from a simple idea to a concept with many aspects, and our perspective on it has changed from static to dynamic. Early scholars believe that trust means that patients believe that medical staff will think about their long-term health, and doctors' professional ability and professional ethics are particularly valued here. Later research expanded the scope of trust, which also included good communication, sympathy, the smooth process of seeing a doctor, the cooperative relationship between doctors and patients, and whether decisions can be made together. Service quality theory (such as SERVQUAL model) gives us a multi-faceted theoretical framework, which can be used to measure and improve trust. The relationship commitment-trust model (KMV model) proposed by Morgan and Hunt further points out that trust and commitment are the core intermediary factors for establishing and maintaining long-term cooperative relations. Practical research shows that service quality can enhance patients' loyalty by improving their satisfaction and trust, and trust plays a very important role as a bridge between service quality and loyalty (Liu et al., 2023; Morgan and Hunt, 1994; Parasuraman et al., 1988).

In China, the practical problems, such as tense relationship between doctors and patients, unequal information and uneven distribution of medical resources, make "trust" a key factor affecting people's dissatisfaction with medical services and their willingness to come again. The recent frequent medical disputes and medical injuries are fundamentally due to the lack of trust between doctors and patients. It is found that strengthening doctor-patient communication, optimizing service process and putting patients' needs first are all effective methods to rebuild trust and improve doctor-patient relationship. Empirical research by China scholars further proves that trust is the most important index to predict patients' satisfaction and loyalty, and high-quality service, empathy and positive interaction can significantly improve the level of trust (Hu and Tao, 2023). Therefore, a systematic analysis of the relationship among hospital service quality, patient trust, satisfaction and loyalty can not only help to fill the gaps in theoretical framework and innovation, but also provide scientific basis and practical guidance for medical management practice in China.

Although these related theories and models have been widely used in service industries such as healthcare, hospital and transportation (Shafiq et al., 2019), in our public hospitals in China, especially in Shandong Province, few people have systematically studied the complex relationship between service quality, trust, satisfaction and loyalty. In the past, most of our domestic research only focused on one aspect or a very simple reason, and did not go deep into how multidimensional trust was measured and how it worked in the middle. Traditional patient evaluation mainly focuses on doctors' medical ethics and behaviors, and lacks scientific and systematic measurement tools, so it is difficult to fully reflect patients' true feelings and what they may do next (Shafiq et al., 2019). There is an innovation in our research, which combines five aspects

of SERVQUAL with KMV trust theory, and also uses a method called Structural Equality Modeling (SEM) to analyze the complex relationship between these variables. This approach fills some gaps in theory and methods when studying service management in China public hospitals (German et al., 2022).

Under the background of the continuous reform of our country's medical system and the increasing demand for medical treatment, although Shandong Province is rich in medical resources, its public hospitals are also facing fierce competition and must improve their services. By carefully studying the relationship among service quality, trust, satisfaction and loyalty, these hospitals can find out what is not good enough in service, simplify the process of seeing a doctor, improve the patient's medical experience, and enhance the patient's loyalty and the hospital's reputation. This can provide practical basis for formulating wise policies and promoting the development of the industry (Lin and Yin, 2022).

Focusing on a large public hospital in Shandong, this study comprehensively investigates the complex relationship among service quality, trust, satisfaction and loyalty. Its main objectives are:

- (1) Develop a set of evaluation tools suitable for the medical industry to measure the service process and quality, which combines the trust between doctors and patients with the unique service environment and standards of the hospital.
- (2) Assess the mediating role of doctor-patient trust between patient satisfaction and their continuous loyalty.
- (3) Determine whether the improvement of hospital service quality can really make patients more willing to use medical services, have more confidence in medical care and be more loyal to the hospital they choose.

2. LITERATURE REVIEW

2.1. Hospital Service Quality

SERVQUAL service quality framework was developed by Berry et al. to evaluate the gap between our customers' expectations of service quality and their actual feelings (Berry, 1988). At the earliest, Parasuraman et al. (1985) identified ten specific aspects to evaluate service quality, including tangible things, reliability, timeliness, credibility, politeness, safety, professional knowledge, communication, easy contact and compassion (Parasuraman et al., 1985). Later, in 1988, the PZB research team used a method called factor analysis to combine these ten aspects into five basic parts: Tangible evidence, reliability, responsiveness, assurance and empathy. This model was improved in 1991, and finally the SERVQUAL scale was created. This new scale has reduced duplication, and its reliability and effectiveness have become better. Therefore, it has become a major tool used by academic circles to evaluate service quality (Parasuraman et al., 1988). Reference shows that repurchase intention is significantly impacted by greenwashing of brands' green messaging and image (Razak et al., 2024).

SERVQUAL framework has been used a lot in hospitals in recent years, specifically to see how their service quality is. It is found that patients think better than they actually experience in all five

aspects, among which the biggest gap is reliability, tangibility and empathy (Jonkisz et al., 2022). Good hospital service can not only make patients feel better, but also be particularly critical to building trust and loyalty. High-level medical services can make patients more satisfied, trust this hospital more, and are willing to come back to see a doctor in the future, and will recommend good hospitals to others. On the contrary, if the service is poor, trust and loyalty will be lost, which may cause contradictions and patients will go to other hospitals to see a doctor. Therefore, the SERVQUAL model gives hospitals a good way to help them find out exactly where the service is not working, and then make targeted improvements. Assessing the differences between patients' "expectations" and "actual feelings" in five key aspects can help medical institutions optimize their work processes, improve the communication between doctors and patients, and make employees more service-conscious, so that their services can become better and better (Abu-Hasheesh et al., 2024).

2.2. Patient Trust

Patient trust, as the core element in the relationship between doctors and patients, has experienced the evolution from a single perspective to multiple perspectives and from a static framework to a dynamic framework. Early scholars, such as Crosby Evans and Cowles defined trust as that patients believe that medical staff will serve their long-term interests, with special emphasis on doctors' professional ability and good moral character (Crosby et al., 1990). With the deepening of research, the concept of trust has expanded to include many factors, such as communication quality, empathy, service process, alliance and joint decision-making. Systematic review shows that the factors that promote patients' trust include not only patients' own factors, such as psychological state, health knowledge level and social environment, but also related factors of medical staff, such as their professional ability, communication skills, caring attitude and professional ethics. Moreover, the external environment, such as institutional setup, payment methods and medical system, also greatly affects the formation of trust (Lerch et al., 2024; Zhang et al., 2023).

Service quality theory, such as SERVQUAL model, provides us with a comprehensive method to evaluate and build trust. It mainly looks at five important aspects: Reliability, response, assurance, empathy and tangible display. According to Morgan and Hunt's commitment-trust theory, trust and commitment play a key role in maintaining a long-term cooperative relationship (Morgan and Hunt, 1994). Studies have found that good service quality can make patients more satisfied and trusted, thus becoming more loyal. Trust is like an important bridge between service and patient loyalty (Bai et al., 2023). In the hospital, the invisible things, such as the effective communication between doctors and nurses and you, their sympathy and concern, are particularly important for building this trust. Moreover, trust not only affects patients' unhappiness and unfaithfulness, but also directly affects their disobedience and failure to take medicine on time, and finally affects their health (Liu et al., 2023).

In our medical field in China, the trust between people is not enough. For example, the relationship between doctors and patients is sometimes tense, everyone knows different information, and the

distribution of good medical resources is uneven, which makes trust become the key to whether we are satisfied and willing to continue to use medical services. Nowadays, there are more medical disputes, and even patients hurt doctors. In the final analysis, it is because they don't trust each other enough. It is found that if doctors and patients can communicate better, improve the process of seeing a doctor and listen to the needs of patients more, they can gradually rebuild trust and improve their relationship (Bai et al., 2023). Other China scholars' research also proves that trust is the most important sign of patients' satisfaction and loyalty-good medical service quality, caring care and positive interaction can greatly increase trust (Shang et al., 2024). However, at present, there is not much systematic research on trust in our country, especially on how to evaluate trust from multiple angles and what role trust plays in it. Few people have analyzed it carefully. The study really needs some practical research aimed at the situation of China and drawing lessons from international theories (Zhang and Jian, 2024).

In a word, patients' trust in us is a very complicated and slowly changing feeling and experience. It is not only related to the skills and attitudes of doctors and nurses, but also to the characteristics of each patient and our whole medical environment. Insisting on improving the communication between doctors and patients, constantly improving the service ability and truly putting patients at the center are particularly important for cultivating patients' trust and promoting better medical services.

2.3. Patient Satisfaction

The patient's experience is the key to measure the medical quality and operation level, which will affect the patients' choice, the degree of adhering to the treatment plan, and the reputation of the hospital. Recently, there have been more academic researches on patient experience. The main topics include service process, communication between doctors and patients, treatment environment, and transparency of information. First of all, whether the medical service is stable and effective is considered as the basis for improving the patient experience. Research shows that the professional knowledge, professionalism, communication skills and caring attitude of medical staff will greatly affect patients' evaluation of seeing a doctor. Specifically, patient-centered care-reflected by careful discussion, respect for patients' choices and quick response-can successfully build trust and satisfaction. In addition, patients attach great importance to whether nursing is timely and whether nurses are careful and professional. Good nurse-patient relationship can not only improve satisfaction, but also help to recover and ensure patient safety (Ya-Li et al., 2020). Secondly, whether the hospital environment and equipment are suitable, whether the process is simple and whether the information is clear are also important factors that determine the patient experience. It is found that "visible" aspects, such as clean, quiet and comfortable environment, well-maintained equipment and clear guidance system, will directly affect patients' overall evaluation of medical services. Efficient process, shorter waiting time and high-quality administrative support can also greatly improve patients' feelings of seeing a doctor. In addition, compared with doctors and nurses, patients are usually less satisfied with hospital facilities and equipment. This shows that hospitals should

continue to improve their environment and update their equipment better (Chen and Yang, 2020).

Generally speaking, patient satisfaction is a complex and changeable index, which is influenced by many factors. The quality of clinical service and caring care of medical staff are the most important. At the same time, efficient working procedures and well-maintained hospital environment can greatly improve the overall satisfaction of patients.

2.4. Patient Loyalty

The patient's loyalty to a hospital is an important symbol to measure whether the service of this hospital is good or not and whether it can develop for a long time. This loyalty is reflected in the fact that patients always choose the same hospital and are willing to recommend it to others. The current research finds that this loyalty is actually determined by several aspects, among which the medical level, patient satisfaction, trust and the reputation of the hospital are the most critical. Good treatment can directly make patients more satisfied and trust the hospital and the doctors inside. These positive medical experiences will eventually make patients become loyal fans, such as coming back when they are sick in the future and taking the initiative to put in a good word for the hospital. In addition, there are many specific and sensory factors-such as the hospital environment, the convenience of seeing a doctor, whether the doctor can understand what he said, and whether the information is open and transparent-which have been found to significantly affect the patient's loyalty (Chen et al., 2023; Zhen and Han, 2022).

Patient's satisfaction and confidence are the intermediate links and connecting factors to cultivate loyalty. The more satisfied they are with the hospital service, the more they will have trust in the hospital, which in turn will prompt them to make loyal behavior. Research shows that the influence of service quality on patient loyalty is usually indirect and needs to be realized through satisfaction and confidence. In other words, high-quality service will first enhance patients' satisfaction and confidence, and then bring higher loyalty (Zhang et al., 2022). In addition, factors such as hospital brand image, public reputation, patients' participation in treatment decision-making, and the sympathy of medical staff can also deepen patients' sense of belonging and loyalty to the hospital. With the continuous digital transformation of the medical industry, the role of digital service interaction and data-driven management in shaping patient loyalty is being recognized more and more. In short, in order to cultivate patients' loyalty, medical service providers need to continuously improve service quality, pay attention to patient-centered care, improve communication between doctors and patients, establish a good institutional reputation, and accept new technologies that are constantly developing in medical care services (Tao, 2025).

2.5. Research Hypotheses

2.5.1. Research hypotheses on hospital service quality and patient satisfaction, trust, and loyalty

Improving the quality of hospital services-including environment, response speed, communication, privacy and safety-can greatly increase patients' happiness. Quality medical services can ensure

that patients have a better treatment experience, which in turn will make them more satisfied as a whole (Aladwan et al., 2021). Cross-border research using SERVQUAL method shows time and time again that there is a strong connection between excellent service and patients' happiness (Author et al., 2024). The quality of hospital service not only affects patients' satisfaction, but also makes people have more confidence in hospitals and doctors. Better service is related to patients' higher trust, especially in doctor-patient relationship, service process and professional ability. Moreover, service quality can strengthen this trust by making patients more satisfied (Wahyuningsih et al., 2023). A large number of studies have pointed out that the quality of hospital service has a direct and beneficial impact on patient loyalty. High-quality care brings higher patient satisfaction and trust, which in turn will encourage patients to continue to choose this hospital and give them a good reputation (Author et al., 2024). In short, we put forward the following assumptions:

- H₁: Hospital service quality exerts a significant positive influence on patient satisfaction
- H₂: Hospital service quality exerts a significant positive influence on trust
- H₃: Hospital service quality has a significant positive effect on patient loyalty

2.5.2. Research hypotheses on patient satisfaction, trust, and loyalty

It is found that there is a close relationship among patients' satisfaction, trust and loyalty. Satisfaction not only directly determines the loyalty of patients, but also greatly increases their trust in hospitals and doctors, which in turn will make them behave more loyally. Satisfied patients prefer to go back to the same hospital and recommend it to others, which shows that their loyalty is higher. There is an obvious positive correlation between satisfaction and loyalty; Improving satisfaction can effectively increase the possibility of patients' return visit and active publicity (Zhang et al., 2020). Trust plays an intermediate role in the relationship between satisfaction and loyalty. Some studies show that satisfaction will first build trust, and then strengthen patient loyalty through trust (Ayu and Cahyanti, 2024). People with high satisfaction are more likely to have confidence in the hospital, and this enhanced confidence will prompt them to make more loyal behaviors (Sofia, 2023). Satisfaction has a great positive impact on trust. There is a significant positive correlation between satisfaction and loyalty, and improving satisfaction will strengthen patients' willingness to visit the doctor again and participate in word-of-mouth communication (Wullan et al., 2025). Therefore, we put forward the following assumptions:

- H₄: Patient satisfaction has a significant positive effect on patient loyalty
- H₅: Patient satisfaction has a significant positive effect on trust

2.5.3. Research hypotheses on trust and patient loyalty

When patients trust doctors or hospitals, they will be more willing to come back and recommend them to others, and always choose the services here. This situation can be seen all over the world; For example, studies in China and Egypt have found that trust is the key

reason for patients to stay (Garem et al., 2024; Wullan et al., 2025). In addition to its direct function, trust is often like a bridge, so that the quality of service and patient satisfaction can better affect their loyalty (Rachmatillah and Munawar, 2025). There is evidence that satisfaction can bring loyalty mainly because it builds trust, and when the two things appear together, the effect will be particularly strong (Kristinawati et al., 2023). In addition, stronger trust can help the hospital to establish a lasting doctor-patient relationship, so that patients will come back more often and speak well of the hospital. In short, medical institutions should strive to cultivate trust, such as improving services, strengthening communication and enhancing the experience of seeing a doctor, so as to make patients more loyal and ensure the long-term development of hospital (Wullan et al., 2025). Based on these, we put forward the following assumptions:

H₆: Trust exerts a significant positive influence on patient loyalty

3. RESEARCH METHODOLOGY

3.1. Research Framework

This study examines the relationship between hospital service quality, trust, patient satisfaction, and loyalty by integrating Parasurman et al. (1988) “Service Quality Model” with Morgan and Hunt’s (1994) KMV model as a trust measurement framework (Morgan and Hunt, 1994; Parasuraman et al., 1988). The proposed hypothetical framework is illustrated in Figure 1.

To achieve the research objectives, this study adopts a patient relationship perspective. It further develops a hospital service contact and quality measurement scale, tailored to the characteristics of hospital services, to investigate whether hospital service quality positively influences patient satisfaction, trust, and loyalty towards healthcare services. Consequently, this research proposes a model comprising hospital service quality, patient satisfaction, and the dimensions of patient trust and loyalty (Figure 1).

Our research used the five-aspect method proposed by Parasuraman, Zeithaml and Berry, and later it was further developed by Chang, Chen and Lan to evaluate the service quality of hospitals (Chang et al., 2013; Parasuraman et al., 1988). These five aspects are: Tangible things, reliability, response speed, assurance and empathy. Regarding trust, we adopted a revised version of the medical trust scale designed by Hall et al. (2002), which simplified their original 11 questions into 9 questions (Hall et al., 2002). Patient satisfaction is evaluated according to the framework adjusted by Chang et al. in 2006, which includes four parts: Medical staff, nursing staff, service department and space

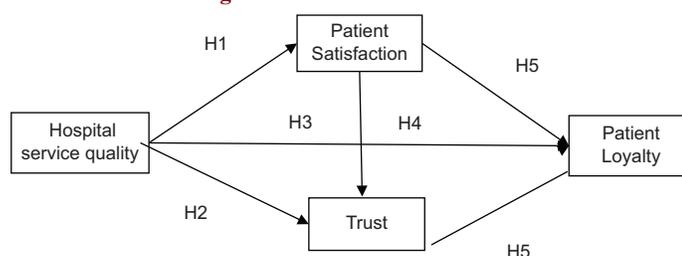
and equipment (Chang et al., 2006). Patient loyalty is measured by a single structure extracted from MacStravic’s research in 1994, which contains three variables: “primary willingness to see a doctor,” “willingness to see a doctor again” and “derivative behavior caused by loyalty” (MacStravic, 1994). All measurements will be collected using a five-point scale, with options ranging from “1” (strongly disagree) to “5” (strongly agree).

3.2. Research Sample and Data Collection

The study chose Shandong Provincial Hospital to study it, because it is particularly representative and the problem needs to be solved urgently. This hospital is the most powerful hospital in Shandong Province, and it has got the highest A+ grade in the evaluation of third-class public hospitals in China. It uses many advanced management methods, such as “total quality concept” and “quality house”, which makes it an example to study the quality of medical services. However, even such a great hospital is now in big trouble in terms of doctor-patient relationship and patient satisfaction. On the one hand, hospitals are faced with the systemic problem that good medical resources are not enough, but too many people want to use them. As a result, the beds in various departments are very tense, and because there are too many people, the time for doctors to talk to each patient becomes shorter, which makes patients feel that the process of seeing a doctor is inefficient and unfair. On the other hand, there are also some shortcomings in the service process-for example, some medical staff do not communicate well, and the route of medical examination is not efficient-which directly affects the patient’s experience and makes it difficult for patients to build trust. These inconsistencies in service quality and fragile trust are the fundamental reasons that affect patients’ satisfaction and whether they are willing to come in the future. Therefore, studying the relationship among service quality, trust, satisfaction and loyalty through this case can not only find the root of these problems, but also provide practical guidance for other public hospitals to solve similar common problems.

The study used non-probabilistic purposive sampling in this study. Because our team has limited resources, choosing this method can ensure that the samples are closer to the people we want to study. The study specially selected suitable participants according to the research objectives. The data were collected through anonymous questionnaires, and all the answers were carefully analyzed. The survey was conducted from September to October 2025. Participants included people who were treated in Shandong Provincial Hospital, and family members or friends who accompanied them. The study know that resources are limited, so we use offline and online methods to collect data: offline surveys (with the prior consent of the staff) are distributed at the entrance of the hospital and nearby areas, while online surveys are distributed through the Wenjuanxian platform. The study received 534 questionnaires by these methods. After removing 129 incomplete or invalid questionnaires (accounting for 24%), 405 valid questionnaires were retained, with an effective rate of 76%. Our criteria for judging the invalidity of the questionnaire are: (1) there are obvious contradictions in the answers; (2) The online questionnaire takes <1 min to complete; (3) The questionnaire that was not filled in as required at the beginning; (4) Submit all questions with the same option.

Figure 1: Research Framework



4. RESEARCH FINDINGS

4.1. Descriptive Statistical Analysis

The study received 534 completed forms in this survey, but 129 (24%) were removed because they did not meet the effective standards. So in the end, 405 questionnaires were used for analysis, and the effective rate reached 76%.

The proportion of boys is even greater, with 58.3% and girls 41.7%. The age is mainly young and middle-aged, and 68.7% of the participants are between 21 and 50 years old, which shows that we have focused on the main consumer groups. The sample also shows that everyone’s social status is quite high: 67.4% people are married, and most of them have a college degree or above (77.6%). Most people’s monthly income is between 2000 and 6000 yuan (71.3%). In terms of occupations, the most common are service employees (26.7%), students (15.6%) and independent contractors (12.6%). Regarding the situation of seeing a doctor, many participants have seen a doctor a lot. Specifically, 40.7% people see a doctor five or more times a year, while 59.3% people see a doctor 1-5 times a year.

4.2. Reliability and Validity Analysis

In order to check whether the scales used in our questionnaire are reliable, we made a reliability analysis to see if they are effective. A highly reliable questionnaire can ensure that the data we collected are reliable and trustworthy. Cronbach’s α coefficient is used to evaluate the correlation between various questions in a scale, which can tell us that the scale as a whole is unreliable. Generally, if Cronbach’s α is between 0.7 and 0.98, it means that the scale is well designed (Tian et al., 2015). The study checked the results and found that the reliability coefficients of all different dimensions and measurement items exceeded the threshold of 0.8, which confirmed the high reliability of the whole scale. These specific coefficients can be seen in Table 1.

The study first employed structural equation modelling for analysis, deriving model fit indices to assess whether the confirmatory factor analysis model met established criteria. The specific findings are presented in Table 2 below:

Table 1: Reliability analysis

| Variable | Dimension | Cronbach's α Coefficient | Cronbach's α coefficient |
|----------------------------|---------------------|---------------------------------|---------------------------------|
| Hospital service quality | Tangibility | 0.880 | 0.969 |
| | Reliability | 0.867 | |
| | Reactivity | 0.900 | |
| | Guarantee | 0.873 | |
| | Caring | 0.874 | |
| Trust Patient satisfaction | | | 0.939 |
| | Medical Personnel | 0.924 | 0.971 |
| | Nursing Staff | 0.897 | |
| | Service Department | 0.876 | |
| | Space and Equipment | 0.891 | |
| Patient loyalty | | 0.845 | |

Source: Compiled by this study

This survey refers to the research of Bagozzi and Yi (1988). The table above shows that this statistical model gives good fitting data. Although there are several standard lines with values close to 0.9, all other indexes have successfully reached the set fitting parameters. Therefore, we think that the fitting degree of this model is acceptable. After completing this fitting evaluation, we then did confirmatory factor analysis. This analysis method can help us to judge whether the relationship between a specific construct and its corresponding measurement items conforms to the theoretical framework proposed by researchers. This study is used to evaluate whether the data conform to our theoretical model. The complete analysis results are in Table 3.

According to recent research, the standardized factor load usually takes 0.3 or 0.5 as the baseline, and if the value is within this range, it means that it has reached the sufficient convergence validity standard (Sharif Nia et al., 2021). In addition, if the average variance extraction, that is, AVE score, is >0.5 , it means that this latent variable can explain more than half of its index variation, showing strong convergence validity and internal consistency (Ghanavati et al., 2022). Therefore, as detailed in Table 3, most of the standardized factor loads of all projects exceed 0.7, which proves the solid convergence validity. Moreover, the AVE score of our model has always remained above 0.5. These results show that our current research shows excellent convergence validity.

4.3. Discriminant Validity Analysis

To see if they are really different, we examined the relationship between these variables and the square root of their ave. “Discriminant validity” is to see if different things can be clearly distinguished. If the square root of AVE is larger than the correlation coefficient between them, then we say that this measurement model is qualified (Liu et al., 2021). Our research model has done this. As can be seen from Table 4, the values of those RMSEA are larger than the correlation coefficient, which shows that they are distinguished very well.

4.4. Regression Analysis

4.4.1. Regression analysis of hospital service quality and patient satisfaction

Table 5 tells us that among the models M1, M3, M5, M7 and M9 with only control variables, only the result of “number of visits” is obvious. Later, we checked the models M2, M4, M6, M8 and M10, in which both control variables and independent variables

Table 2: Analysis of overall research model fit indices

| Fit measure | Indicator name | Criterion value | This research model | Compliance with criteria |
|-----------------|----------------|-----------------|---------------------|--------------------------|
| Absolute fit | CMIN/DF | <3.000 | 1.808 | Compliant |
| | GFI | >0.900 | 0.817 | Approximately |
| | RMSEA | <0.080 | 0.045 | Satisfactory |
| Incremental fit | AGFI | >0.900 | 0.801 | Approximately |
| | CFI | >0.900 | 0.942 | Compliant |
| | NFI | >0.900 | 0.879 | Approximately |
| Minimalist fit | IFI | >0.900 | 0.942 | Conforms |

Table 3: Confirmatory factor analysis

| Indicators | Variables | Estimate | CR | AVE |
|------------|---------------------|----------|-------|-------|
| A1 <--- | Tangibility | 0.774 | | |
| A2 <--- | Tangibility | 0.800 | | |
| A3 <--- | Tangibility | 0.795 | 0.881 | 0.598 |
| A4 <--- | Tangibility | 0.762 | | |
| A5 <--- | Tangibility | 0.732 | | |
| A6 <--- | Reliability | 0.769 | | |
| A7 <--- | Reliability | 0.782 | | |
| A8 <--- | Reliability | 0.792 | 0.867 | 0.619 |
| A9 <--- | Reliability | 0.804 | | |
| A10 <--- | Reactivity | 0.797 | | |
| A11 <--- | Reactivity | 0.802 | | |
| A12 <--- | Reactivity | 0.818 | 0.901 | 0.645 |
| A13 <--- | Reactivity | 0.779 | | |
| A14 <--- | Reactivity | 0.820 | | |
| A15 <--- | Guaranteed | 0.786 | | |
| A16 <--- | Guaranteed | 0.827 | | |
| A17 <--- | Guaranteed | 0.760 | 0.873 | 0.632 |
| A18 <--- | Guaranteed | 0.805 | | |
| A19 <--- | Caring | 0.806 | | |
| A20 <--- | Caring | 0.776 | 0.876 | 0.639 |
| A21 <--- | Caring | 0.794 | | |
| A22 <--- | Caring | 0.822 | | |
| B1 <--- | Medical Personnel | 0.777 | | |
| B2 <--- | Medical Personnel | 0.824 | | |
| B3 <--- | Medical Personnel | 0.808 | | |
| B4 <--- | Medical Personnel | 0.811 | | |
| B5 <--- | Medical Personnel | 0.789 | 0.925 | 0.637 |
| B6 <--- | Medical personnel | 0.801 | | |
| B7 <--- | Medical Personnel | 0.775 | | |
| B8 <--- | Nursing Staff | 0.807 | | |
| B9 <--- | Nursing Staff | 0.794 | | |
| B10 <--- | Nursing Staff | 0.810 | 0.897 | 0.636 |
| B11 <--- | Nursing staff | 0.780 | | |
| B12 <--- | Nursing Staff | 0.796 | | |
| B13 <--- | Service Department | 0.786 | | |
| B14 <--- | Service Department | 0.814 | | |
| B15 <--- | Service Department | 0.818 | 0.878 | 0.642 |
| B16 <--- | Service Department | 0.786 | | |
| B17 <--- | Space and Equipment | 0.767 | | |
| B18 <--- | Space and Equipment | 0.782 | | |
| B19 <--- | Space and Equipment | 0.800 | 0.892 | 0.623 |
| B20 <--- | Space and Equipment | 0.808 | | |
| B21 <--- | Space and Equipment | 0.788 | | |
| C1 <--- | Trust | 0.736 | | |
| C2 <--- | Trust | 0.801 | | |
| C3 <--- | Trust | 0.793 | | |
| C4 <--- | Trust | 0.829 | | |
| C5 <--- | Trust | 0.801 | 0.940 | 0.634 |
| C6 <--- | Trust | 0.777 | | |
| C7 <--- | Trust | 0.797 | | |
| C8 <--- | Trust | 0.806 | | |
| C9 <--- | Trust | 0.821 | | |
| D1 <--- | Loyalty | 0.768 | | |
| D2 <--- | Loyalty | 0.811 | 0.846 | 0.647 |
| D3 <--- | Loyalty | 0.832 | | |

Source: Compiled for this study

were put. Through regression analysis, we found that all aspects of hospital service quality have different effects on different parts of customer satisfaction. This shows that better hospital service quality is linked with a higher level of customer satisfaction. Therefore, the results of our investigation confirm that hypothesis H₁ is correct.

4.4.2. Regression analysis of hospital service quality on trust and patient loyalty

As per Table 6, the four control variables in Model 1 showed no significant effect on the dependent variable of trust. However, after incorporating the five dimensions of hospital service quality in Model 2, the effect reached near-significance. In Model 3, the inclusion of hospital service quality achieved statistical significance (P < 0.001) with a β = 0.872. In Model 4, the four control variables were not significant for the dependent variable of customer loyalty. However, in Model 5, after incorporating the five dimensions of hospital service quality, the relationship largely reached statistical significance. In Model 6, the inclusion of hospital service quality achieved statistical significance (P < 0.001), with a β = 0.801.

It follows that higher hospital service quality correlates with greater trust. Hypothesis H₂ holds. Higher hospital service quality correlates with greater customer loyalty. Hypothesis H₃ holds.

4.4.3. Regression analysis of patient satisfaction with patient loyalty and trust

Table 7 indicates that the four control variables in Model 1 did not significantly influence the dependent variable of customer loyalty (P > 0.05). However, after incorporating the four dimensions of customer satisfaction into Model 2, the relationship reached statistical significance. The four control variables in Model 3 were not significant for the dependent variable trust, whereas Model 4, incorporating the four dimensions of customer satisfaction, achieved statistical significance. This indicates that enhanced customer satisfaction exerts a positive influence on loyalty. Hypothesis H₄ is thus supported. Furthermore, increased customer satisfaction exerts a positive influence on trust. Hypothesis H₅ is therefore supported.

4.4.4. Regression analysis of trust and customer loyalty

In order to see the influence of trust on customer loyalty, we made two models. In Model 1, we first do regression analysis with several control variables to see their effects on customer loyalty. Then, in Model 2, we added trust, and used it together with control variables to predict customer loyalty. Table 8 shows that the four control variables in Model 1 have no obvious influence on customer loyalty. But when we added trust to Model 2, the effect became particularly obvious (P < 0.001), and the β coefficient reached 0.851. This shows that the more trust, the higher the customer loyalty. Therefore, our Hypothesis H₆ has been confirmed.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Research Findings

The study did a study to understand the hospital’s service quality, customer satisfaction, customer loyalty and trust by sending questionnaires. A total of 405 usable answers were received. The study used the statistical software AMOS and SPSS to do the analysis, including looking at the basic situation of the data, checking whether the questionnaire is reliable and effective, seeing whether there is any relationship between various factors, and also

Table 4: Discriminant validity analysis

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1. Tangibility | 0.773 | | | | | | | | | | |
| 2. Reliability | 0.705** | 0.787 | | | | | | | | | |
| 3. Responsiveness | 0.687** | 0.729** | 0.803 | | | | | | | | |
| 4. Assurance | 0.682** | 0.725** | 0.759** | 0.795 | | | | | | | |
| 5. Caring | 0.674** | 0.716** | 0.740** | 0.740** | 0.800 | | | | | | |
| 6. Medical personnel | 0.685** | 0.806** | 0.719** | 0.746** | 0.745** | 0.798 | | | | | |
| 7. Nursing staff | 0.641** | 0.778** | 0.708** | 0.739** | 0.741** | 0.785** | 0.798 | | | | |
| 8. Service sector | 0.664** | 0.793** | 0.698** | 0.716** | 0.713** | 0.770** | 0.775** | 0.801 | | | |
| 9. Space and Equipment | 0.774** | 0.669** | 0.706** | 0.704** | 0.614** | 0.769** | 0.736** | 0.730** | 0.789 | | |
| 10. Trust | 0.671** | 0.797** | 0.708** | 0.832** | 0.635** | 0.709** | 0.768** | 0.775** | 0.660** | 0.796 | |
| 11. Loyalty | 0.706** | 0.731** | 0.756** | 0.766** | 0.756** | 0.733** | 0.711** | 0.707** | 0.602** | 0.752** | 0.804 |
| AVE | 0.598 | 0.619 | 0.645 | 0.632 | 0.639 | 0.637 | 0.636 | 0.642 | 0.623 | 0.634 | 0.647 |

*denotes $P < 0.05$; **denotes $P < 0.01$; *** denotes $P < 0.001$. Diagonal elements represent the square root of the dimension's AVE

Table 5: Regression analysis table for hospital service quality and patient satisfaction

| Dependent variable | Patient satisfaction medical personnel | | Patient satisfaction nursing staff | | Patient satisfaction service department | | Patient satisfaction space and equipment | | Patient Satisfaction | |
|--------------------------|--|------------|------------------------------------|------------|---|------------|--|------------|----------------------|------------|
| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 |
| | β | β | β | β | β | β | β | β | β | β |
| Control variables | | | | | | | | | | |
| Gender | -0.043 | -0.044 | -0.011 | -0.019 | 0.039 | -0.035 | 0.003 | -0.055 | -0.010 | -0.001 |
| Age | -0.112 | -0.042 | -0.056 | -0.026 | 0.007 | -0.133 | -0.034 | -0.115 | -0.058 | -0.032 |
| Educational attainment | 0.132 | 0.020 | -0.051 | -0.045 | 0.044 | -0.008 | 0.009 | -0.029 | -0.026 | -0.042 |
| Frequency | -0.022 | -0.020 | -0.138 | -0.046 | 0.002 | -0.034 | -0.042 | -0.025 | -0.117 | -0.016 |
| Independent variable | | | | | | | | | | |
| Tangibility | | 0.144** | | 0.047 | | 0.154** | | 0.217*** | | |
| Reliability | | 0.113* | | 0.047 | | 0.153* | | 0.036 | | |
| Reactivity | | 0.089* | | 0.135* | | 0.119*** | | 0.213*** | | |
| Guaranteed | | 0.297*** | | 0.342*** | | 0.246*** | | 0.186** | | |
| Caring | | 0.319*** | | 0.359*** | | 0.258*** | | 0.278*** | | |
| Hospital service quality | | | | | | | | | | 0.917*** |
| R ² | 0.023 | 0.801 | 0.021 | 0.778 | 0.020 | 0.751 | 0.015 | 0.747 | 0.015 | 0.845 |
| Adjusted R ² | 0.006 | 0.794 | 0.011 | 0.773 | 0.010 | 0.745 | 0.005 | 0.741 | 0.005 | 0.843 |
| F | 1.324 | 131.137*** | 2.156 | 153.687*** | 2.000 | 132.268*** | 1.488 | 129.530*** | 1.529 | 435.082*** |
| Durbin-Watson | | 1.913 | | 1.806 | | 1.658 | | 1.692 | | 1.771 |

*denotes $P < 0.05$; **denotes $P < 0.01$; *** denotes $P < 0.001$

Table 6: Regression analysis of hospital service quality with trust and patient loyalty

| Dependent variable | Trust | | | Patient loyalty | | |
|--------------------------|---------|------------|------------|-----------------|-----------|------------|
| | M1 | M2 | M3 | M4 | M5 | M6 |
| | β | β | β | β | β | β |
| Control variables | | | | | | |
| Gender | -0.008 | -0.007 | 0.001 | -0.017 | -0.017 | -0.008 |
| Age | -0.074 | -0.045 | -0.049 | -0.022 | 0.004 | 0.001 |
| Educational attainment | -0.001 | -0.001 | -0.017 | 0.009 | 0.004 | -0.005 |
| Frequency | -0.110 | -0.011 | -0.014 | -0.121* | -0.036 | -0.033 |
| Independent variable | | | | | | |
| Tangibility | | 0.135** | | | 0.112* | |
| Reliability | | 0.113* | | | 0.088 | |
| Reactivity | | 0.100 | | | 0.187** | |
| Guaranteed | | 0.276*** | | | 0.259*** | |
| Caring | | 0.321*** | | | 0.219** | |
| Hospital service quality | | | 0.872*** | | | 0.801*** |
| R ² | 0.015 | 0.776 | 0.767 | 0.015 | 0.653 | 0.648 |
| Adjusted R ² | 0.006 | 0.771 | 0.764 | 0.005 | 0.645 | 0.643 |
| F | 1.568 | 152.433*** | 262.634*** | 1.498 | 82.549*** | 146.709*** |
| Durbin-Watson | | 1.877 | 1.893 | | 1.876 | 1.894 |

*denotes $P < 0.05$; **denotes $P < 0.01$; ***denotes $P < 0.001$

Table 7: Regression analysis of patient satisfaction with patient loyalty and trust

| Dependent variable | Patient loyalty | | Trust | |
|---------------------------------------|-----------------|------------|---------|------------|
| | M1 | M2 | M3 | M4 |
| | β | β | β | β |
| Control variable | | | | |
| Gender | -0.017 | -0.008 | -0.008 | 0.004 |
| Age | -0.022 | 0.028 | -0.074 | -0.020 |
| Educational attainment | 0.009 | 0.030 | -0.001 | 0.017 |
| Number of visits | -0.121* | -0.022 | -0.110* | -0.008 |
| Independent variable | | | | |
| Satisfaction Medical Personnel | | 0.321*** | | 0.434*** |
| Satisfaction with Nursing staff | | 0.182** | | 0.128** |
| Satisfaction with service departments | | 0.193** | | 0.232*** |
| Satisfaction with space and equipment | | 0.209*** | | 0.182*** |
| R ² | 0.015 | 0.741 | 0.015 | 0.868 |
| Adjusted R ² | 0.005 | 0.736 | 0.005 | 0.865 |
| F | 1.498 | 141.947*** | 1.568 | 324.561*** |
| Durbin-Watson | | 1.990 | | 1.945 |

*denotes $P < 0.05$; **denotes $P < 0.01$; ***denotes $P < 0.001$

doing the regression analysis to find out how these four things are related. The study put forward six hypotheses altogether. Later, after analyzing the data, it was found that all six hypotheses were established, and the specific results were written in Table 9.

5.1.1. Hospital service quality has a significant positive impact on patient satisfaction

The study found that the quality of hospital service will affect patients’ satisfaction in different ways. It is particularly important that carefulness and reassurance are the two most critical factors for medical staff, nursing staff, service departments and hospital environment. Careful and thoughtful is especially important for nursing staff ($\beta = 0.359, P < 0.001$) and medical staff ($\beta = 0.319, P < 0.001$). However, reassuring has a great influence on nursing staff ($\beta = 0.342, P < 0.001$) and medical staff ($\beta = 0.297, P < 0.001$). These two factors also have obvious influence on the service department and the hospital environment. Conversely, reaction speed, reliability and environmental facilities have little influence on satisfaction. Patients who feel that medical staff care about them and make them feel at ease are more satisfied. This shows that improving service quality can greatly improve patients’ satisfaction. This finding is consistent with the research results of Hu and Tao on hospitalized patients, and also supports our hypothesis H_1 (Hu and Tao, 2023).

5.1.2. Hospital service quality exerts a significant positive influence on trust

This study confirms that the service quality of hospitals has different effects on our trust. In all aspects of evaluation, caring and assurance have the closest relationship with trust, among which caring has the greatest influence ($\beta = 0.321, P < 0.001$), followed by assurance ($\beta = 0.276, P < 0.001$). In contrast, the relationship between responsiveness, reliability and tangibility and patient satisfaction is just so-so. When patients feel that the hospital really cares about them and can ensure their health and safety, it will directly make them trust the hospital more. This evidence further supports the statement that improving service quality can greatly enhance trust. These results are the same as those of Yu et al. (2025). They also found that service quality, especially caring and assurance, is the key reason to make customers trust. Therefore, our hypothesis H_2 is supported.

Table 8: Regression analysis of trust and customer loyalty

| Dependent variable | Patient loyalty | |
|-------------------------|-----------------|------------|
| | Model 1 | Model 2 |
| | β | β |
| Control variables | | |
| Gender | -0.008 | 0.004 |
| Age | -0.074 | -0.020 |
| Educational Attainment | -0.001 | 0.017 |
| Number of visits | -0.110* | -0.008 |
| Independent variable | | |
| Trust | | 0.851*** |
| R ² | 0.015 | 0.728 |
| Adjusted R ² | 0.005 | 0.725 |
| F | 1.498 | 213.955*** |
| Durbin-Watson | | 1.814 |

*indicates $P < 0.05$; **indicates $P < 0.01$; ***indicates $P < 0.001$

Table 9: Verification of research hypotheses

| Research hypothesis | Conclusion |
|--|-------------|
| H_1 : Hospital service quality has a significant positive impact on patient satisfaction | Established |
| H_2 : Hospital service quality has a significant positive impact on trust | Established |
| H_3 : Hospital service quality has a significant positive effect on patient loyalty | Established |
| H_4 : Patient satisfaction has a significant positive effect on patient loyalty | Established |
| H_5 : Patient satisfaction has a significant positive effect on trust | Established |
| H_6 : Trust has a significant positive effect on patient loyalty | Established |

Source: Compiled by this study

5.1.3. Hospital service quality exerts a significant positive influence on patient loyalty

This study tells us that the quality of hospital service has a positive impact on patient loyalty. It is particularly important that the care and guarantee of medical staff can make everyone willing to come again, among which the effect of guarantee is the most obvious ($\beta = 0.259, P < 0.001$) and the effect of care is also very strong ($\beta = 0.219, P < 0.001$). In contrast, the effects of timely response, reliability and environmental facilities on patient satisfaction are relatively general. The data shows that the

hospital's caring support and the ability to provide protection for patients' health and safety are particularly effective in cultivating loyalty. Moreover, the results prove that improving service quality can greatly improve customer loyalty. These conclusions are consistent with the findings of Hu and Tao, who proved that the quality of medical services is directly related to loyalty (Hu and Tao, 2023). Therefore, our initial hypothesis H_3 is supported by evidence.

5.1.4. Customer satisfaction exerts a significant positive influence on patient loyalty

Research shows that customer satisfaction has a positive impact on loyalty to varying degrees. According to the research results, medical staff has the greatest influence on loyalty ($\beta = 0.321$, $P < 0.001$), followed by physical space and equipment ($\beta = 0.209$, $P < 0.001$). The influence of service department is moderate ($\beta = 0.193$, $P < 0.01$), while that of nursing staff is slightly lower ($\beta = 0.182$, $P < 0.01$). When patients are satisfied with medical expertise, treatment and hospital amenities, their loyalty to hospitals will be significantly improved. This proves that the higher the satisfaction, the higher the loyalty. These results are consistent with the findings of Author, Ramanjaneyulu and Nagrani, who found that patient satisfaction acts as a bridge between service quality and loyalty, and better service quality enhances loyalty by enhancing satisfaction (Author et al., 2024). Therefore, our initial assumption H_4 is supported.

5.1.5. Customer satisfaction exerts a significant positive influence on trust

This study found that customer satisfaction will make trust more. Specifically, medical staff have the greatest influence on trust ($\beta = 0.434$, $P < 0.001$), followed by service departments ($\beta = 0.232$, $P < 0.001$), while space and equipment have less influence ($\beta = 0.182$, $P < 0.001$). When customers are satisfied with the professional knowledge and treatment of medical staff, as well as the service department and actual facilities of the hospital, their trust in this institution will increase. These results are the same as Hu and Tao's research in 2023. They also found that satisfaction with the ability and attitude of medical staff, coupled with satisfaction with hospital services and facilities, can enhance trust (Hu and Tao, 2023). Therefore, our original hypothesis H_5 is supported.

5.1.6. Trust exerts a significant positive influence on patient loyalty

It is found that trust is particularly important for us to cultivate customer loyalty. The relationship between trust and loyalty is very close, with a standardized coefficient of 0.851 and reliable data ($P < 0.001$). The more customers trust a healthcare facility, the higher their loyalty. The results also show that enhancing trust can significantly enhance loyalty. In an industry that needs high trust, such as healthcare, the closer the patient is to the medical institution, the more dedicated the patient is. Trust can not only directly encourage people to visit again, but also promote people to put in a good word for the hospital and recommend it to friends. Moreover, trust can make customer loyalty more stable by reducing the perceived risks and deepening emotional ties (Jianping et al., 2021). So, suppose H_6 holds.

5.2. Research Recommendations and Limitations

5.2.1. Research recommendations

5.2.1.1. Continuously optimize the quality of medical services and consolidate the foundation of patient satisfaction and loyalty

The quality of hospital service is a key factor affecting patients' satisfaction, trust and loyalty. Service quality includes not only medical technology, but also nursing work, management process and environmental facilities (Setyanto and Arafah, 2025). Shandong provincial hospital should continue to promote the standardization of medical procedures, strengthen the cooperation of medical teams, optimize the diagnosis and treatment procedures, reduce the waiting time of patients and improve the convenience of seeing a doctor. In addition, hospitals should pay special attention to patients' feelings in the process of seeking medical treatment, meet individual needs and establish a patient-centered service concept. Carrying out patient satisfaction surveys regularly, collecting feedback and improving service deficiencies in time can effectively improve the overall service quality.

5.2.1.2. Strengthen doctor-patient communication and humanistic care, and enhance the trust relationship

Doctor-patient communication ability and humanistic care are important factors affecting patients' trust and satisfaction. Research shows that communication skills, empathy and service attitude of medical staff directly affect patients' trust and loyalty to the hospital (Chen et al., 2025). Shandong provincial hospital should regularly organize medical staff to participate in communication training, so as to improve their ability to listen to patients, explain their illness and calm their emotions, especially in the links of diagnosis, medication guidance and discharge visit. Hospitals can also set up patient service centers and psychological counseling rooms to provide comprehensive humanistic care, thus enhancing patients' sense of security and belonging.

5.2.1.3. Increase investment in hardware facilities and environment to optimize our medical experience

The real environment of the hospital-including medical equipment, spatial layout, cleanliness and waiting area-directly affects patients' satisfaction. Shandong Provincial Hospital should continue to invest in advanced medical equipment to improve the efficiency and safety of medical treatment. At the same time, optimize the spatial layout, make the waiting area, ward and public area more comfortable and private, and reduce noise and congestion, which can enhance the overall environmental experience. Adopting digital solutions such as intelligent triage system and electronic health record will make the process smoother and increase convenience and satisfaction (Guspianto et al., 2023).

5.2.1.4. Improve management and auxiliary services to enhance operational efficiency

The efficiency and convenience of administrative processes, coupled with professional support services (such as patient guidance, consultation and complaint handling), can significantly improve the overall satisfaction and loyalty of patients (Lsloum et al., 2024). Shangdong Provincial Hospital should optimize the procedures of registration, payment and examination and appointment, and reduce patients' waiting time and repeated

procedures. Strengthen the service training of front desk and guide staff, improve their service awareness and ability to deal with emergencies. Establish an efficient feedback mechanism of complaints and suggestions to solve patients' problems in time, so as to increase their trust and goodwill in the hospital.

5.2.1.5. Promote innovation management and continuous improvement, and establish a closed-loop service improvement system

Modern hospital management emphasizes data-driven decision-making and continuous improvement as the core principles. Shandong Provincial Hospital should establish a scientific performance appraisal and quality management system, and regularly analyze key indicators such as patient satisfaction, complaint rate and service process, so as to formulate targeted improvement measures (Lsloum et al., 2024). At the same time, actively introduce advanced management tools such as Lean Management and Six Sigma to optimize resource allocation and improve operational efficiency. Encourage cross-departmental cooperation and innovation, and cultivate a service culture of full participation and continuous improvement.

5.2.1.6. Give priority to patient feedback and promote their participation in hospital governance

Service improvement measures based on patient feedback can meet patients' needs more accurately and improve service quality and patient experience (Shie et al., 2022). Shandong Provincial Hospital should establish a multi-channel patient feedback mechanism, such as satisfaction survey, suggestion box and online evaluation, to encourage patients to actively participate in hospital management and service improvement. By analyzing patient feedback, we can find out the shortcomings and opportunities for improvement in service in time, and form a closed loop of patient-centered service feedback.

5.2.2. Research limitations

5.2.2.1. Sample restrictions and external validity constraints

This study only uses a large general hospital in Shandong Province as a sample, so its representativeness is limited. It is difficult for us to fully reflect the service status and patient experience of hospitals in different types and regions. This kind of single-point investigation may lead to insufficient external effectiveness, and it is difficult to extend it to the whole province or the whole country. In the meta-analysis of highperformance work system and public service motivation, similar limitations have been mentioned many times. The researchers suggest that future research should expand the sample size, include more hospitals, and adopt a multi-center and cross-regional comparative design to enhance the universality and reliability of the research results.

5.2.2.2. The dimension of trust measurement is still single; The theoretical framework needs to be enriched

This study only uses a single trust scale in the trust-commitment model, and fails to fully reveal the multi-dimensional structure of trust and its complex mechanism with relationship commitment, service quality, satisfaction and loyalty. The existing organizational behavior and psychological research shows that variables such as trust and relationship commitment often show mediation or adjustment; Single-dimensional measurements may

underestimate their true impact. Future research should introduce multidimensional trust scale, and combine variables such as relationship commitment, perceived fairness and organizational support to systematically investigate their mediating or mediating role in the relationship between medical service quality and patient satisfaction/loyalty (Dai et al., 2022).

5.2.2.3. Limitations of research methods and data sources

Studies in related fields tell us that if the number of samples is too small, only one data source is used, or the measurement tools are not good enough, the research results may become unreliable and difficult to understand (Hu and Tao, 2023). In the future research, we can try to mix different methods (such as quantitative and qualitative), conduct long-term follow-up investigation, use structural equation model, or try various other methods, which will make the research more scientific and in-depth.

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