# Innovative Construction of User-Centered Software Service Quality Evaluation System Construction and Practical Application

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**Abstract.** In the digital age, the service quality of user-centric software is of great significance. This paper aims to construct an innovative evaluation system for the service quality of user-centric software. Firstly, it analyzes the research background and purpose, pointing out that although there are achievements in software service quality evaluation at present, the evaluation indicators of user-centric software still need to be improved. Then, it elaborates on the classic theories of service quality evaluation, including connotation, characteristics, evaluation principles and methods. Next, it presents in detail the construction of the evaluation index system for the service quality of user-centric software, including the basis and methods for index selection and specific contents. After that, it discusses the implementation and application of evaluation, covering data collection and analysis methods as well as the feedback and application of evaluation results. Finally, it summarizes the research conclusions and looks forward to future research directions, including continuously optimizing the evaluation index system, strengthening user experience evaluation, adapting to multi-platform and cross-device environments, and combining artificial intelligence and automation technologies.

**Keywords:** user-centric software, service quality evaluation, index system

## 1 Introduction

### 1.1 Study Background

In today's digital age, software services play a vital role in all fields. As a key link between users and service providers, user-centered software has a direct impact on user experience and enterprise competitiveness.

With the rapid development of software industry, users have higher and higher requirements for software service quality. On the one hand, good user-centered software service quality can ensure the accurate and complete satisfaction of user needs, and improve user satisfaction and loyalty. For example, according to relevant research, when the quality of software service is improved, the retention rate of users can be



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improved by more than 30%. On the other hand, high-quality software services help reduce the operating costs and risks of the enterprise. Identify and resolve problems early in the software lifecycle, reducing costs by approximately 50% compared to fixing later in the software lifecycle.

At present, the research on software service quality evaluation has achieved some results. Many scholars and institutions have put forward different evaluation methods and index systems, such as the software quality model defined by ISO/IEC 25010, including several quality attributes such as functionality, reliability, ease of use, efficiency, maintainability and compatibility, and provide specific measurement items and evaluation guidelines. However, there are still some shortcomings in the construction of evaluation indicators for user-centered software service quality, which needs to be further studied and completed Good.

## 1.2 Study Objectives

The purpose of this study is to construct an innovative user-centered software service quality evaluation system to meet the high requirements of software service quality in the current digital age. The specific objectives are as follows:

Firstly, the service quality of user-centered software is accurately evaluated to provide clear improvement direction for software developers and service providers. Through the quantitative evaluation of each quality index, the performance of software in terms of functionality, reliability and usability can be clearly understood, and the existing problems and deficiencies can be found in time. For example, by evaluating the functionality, you can determine whether the software meets the diverse needs of users, and whether it has perfect functions such as user management and data processing. According to statistics, about 40% of users will give up using the software due to imperfect functions.

Second, improve user experience and satisfaction. A high-quality user-centered software can provide users with convenient, efficient and stable services, and enhance users' trust and loyalty to the software. For example, when the response time of the software is reduced to less than 1 second, user satisfaction can be improved by about 20%. Through the construction of the evaluation system, the service quality of the software can be continuously optimized, so as to meet the increasing needs of users[1].

Finally, it provides reference for the development of software industry. With the increasingly fierce competition in software industry, it is of great significance to establish a scientific and reasonable service quality evaluation system to promote the development of the whole industry. Through this research, we can provide methods and ideas for evaluating the service quality of other software, and promote the improvement of the overall service quality of the software industry[2].

# 2 Theoretical Basis

## 2.1 Classical Theory of Service Quality Evaluation

The evaluation of service quality has always been the focus of attention in academia and enterprises. Its connotation, characteristics and evaluation dimensions are very important for understanding and improving software service quality.

### 2.1.1 Connotation Analysis of Service Quality.

Service quality is the degree to meet the needs of users and the reflection of customer satisfaction. According to the information searched, the connotation of service quality should include the following five contents: (1) service quality is the object perceived by customers; (2) Service quality should not only be formulated and measured by objective methods, but also measured and tested according to customers' subjective knowledge. (3) Quality of service occurs in the process of service production and transaction; (4) The service quality is realized at the real moment of the transaction between the service enterprise and the customer; (5) The improvement of service quality requires the internal formation of effective management and support system.

In software service, quality of service is also user's perception of software function, performance and usability. For example, if a user-centric software can accurately handle a user's request, provide fast response time, and have a concise user interface, the user will perceive the software as having a high quality of service. On the contrary, if the software frequently fails, response time is slow and operation is complicated, users will be dissatisfied with the service quality.

### 2.1.2 Characteristics of Quality of Service.

Quality of service has the characteristics of invisibility, heterogeneity, indivisibility and perishability. In software services, these features are also evident.

Invisible means that software services can not be touched and seen as physical products, and users can only feel the quality of service through the functions and performance of software. For example, the user cannot directly observe the code quality of the software, but can judge the quality of service through the stability and response speed of the software.

Heterogeneity refers to large differences in service quality, as service delivery is often affected by factors such as personnel, time, and location. In the software service, different users may have different evaluation on the service quality of the software because of the factors such as using environment and operation habits. For example, some users may find the software's interface design attractive, while others may feel that it is not easy to use.

Independency means that the production and consumption of services are carried out at the same time, and users are already experiencing the quality of service in the process of using the software. For example, when a user logs into user-centric software, the performance of the software in terms of responsiveness, security, etc. is part of the quality of service.

Perishability means that a service cannot be stored and once it has been provided, it cannot be provided again. In software service, the user's experience of using software is instantaneous. If the software fails at a certain time, it will affect the user's evaluation of service quality.

## 2.2 Principles and Methods of Software Service Quality Evaluation

Software service quality evaluation should follow certain principles to ensure the accuracy and reliability of evaluation results. Among them, objectivity and impartiality is the basic principle of evaluation, which requires that the evaluation process should not be influenced by subjective factors, and the evaluation should be conducted on the basis of facts. For example, when evaluating the service quality of user-centered software, certain functions of the software should not be evaluated too high or too low because of personal preference or bias. Practicality is also an important principle, and the evaluation results shall be operable to provide practical improvement suggestions for software developers and service providers. For example, the evaluation results should clearly indicate where the software is deficient and how to improve it.

### 2.2.1 Specific Embodiment of Evaluation Principle.

The application of each evaluation principle in practice is illustrated by the cases in the data. For example, when evaluating the service quality of a software company, the principle of objectivity and impartiality is reflected in the evaluation from multiple perspectives, including response speed, professional competence of the technical support team, stability and reliability of the software, and user experience. You should not give a high rating just because one aspect of the software is good, but consider all aspects of it. The principle of practicability is embodied in that the evaluation results can provide reference for enterprises to select software suppliers. If a software company performs poorly in terms of responsiveness, enterprises can consider this factor when choosing a vendor and choose a software company that responds faster[3].

### 2.2.2 Common Evaluation Methods.

The commonly used evaluation methods include quantitative evaluation method and qualitative evaluation method. Quantitative evaluation method measures software service quality through specific data indexes, and has objectivity and accuracy. For example, the stability and response speed of software can be evaluated by counting the data such as fault frequency, fault recovery time and response time. Quantitative evaluation method has the advantages of intuitive results and easy comparison, but the disadvantage is that it may not fully reflect all aspects of software service quality. Qualitative evaluation method mainly measures software service quality by user's subjective feeling and evaluation, which is flexible and comprehensive. For example, users' evaluation on the usability and functionality of the software can be obtained by means of user surveys and interviews. The advantage of qualitative evaluation method is that it can deeply understand the needs and feelings of users, while the disadvantage is that the evaluation result may be influenced by subjective factors and is not objective enough.

In practical evaluation, quantitative evaluation method and qualitative evaluation method can be combined to give full play to their advantages. For example, the basic data index of software service quality is determined through the quantitative evaluation method, and then the subjective feeling and demand of the user are understood through the qualitative evaluation method, so as to supplement and perfect the quantitative evaluation result[4]. In this way, the service quality of the user-centered software can be evaluated more comprehensively and accurately.

# 3 Construction of User-Centered Software Service Quality Evaluation Index System

## 3.1 Basis and Method of Index Selection

### 3.1.1 Customer Demand Analysis.

The service quality assessment of user-centered software requires a deep understanding of customer needs. Through user research, we can collect user expectations and key requirements for the software. For example, users may be concerned about the functionality of the software and expect the software to provide comprehensive user management functions, such as registration, login, and personal information modification; At the same time, the software is expected to have efficient data processing capability, such as fast query, accurate statistics, etc. In addition, users also have higher requirements for the ease of use of software, including concise and clear interface design, easy-to-operate interaction process and so on. According to the user survey results, we can convert these key requirements into specific evaluation indicators, for example, functional indicators can include functional completeness, data accuracy, etc.; The usability index can cover the user-friendliness of the interface and the convenience of operation.

### 3.1.2 Index Selection Method.

The selection of key indicators from many factors requires comprehensive consideration of multiple aspects. First, we can refer to relevant industry standards and success stories. For example, the software quality model defined by ISO/IEC 25010 provides a frame of reference for several quality attributes such as functionality, reliability, ease of use, etc. At the same time, we can study the characteristics of excellent software of the same type, The key indicators are extracted from the advantages of service quality. Secondly, the analytic hierarchy process (AHP) is used to assign the weight of various factors. By establishing a hierarchical structure model, the objective, the criterion and the index are layered, and then the relative importance of each index is determined by means of expert scoring, so as to extract the key index. For example, in terms of functionality, reliability and usability, invite experts and user representatives in the software industry to score, and determine the weight of each index according to the scoring results. Finally, the extracted key indexes are verified and optimized. The effectiveness and rationality of indicators can be checked by means of actual case testing and user feedback, and unreasonable indicators can be adjusted and optimized to ensure that the indicator system can accurately reflect the service quality of user-centered software.

## 3.2 Specific Contents of the Indicator System

### 3.2.1 Functional Indicators.

Functional index is an important aspect of user-centered software service quality evaluation. It includes meeting specific business needs and providing the necessary tool functionality. Specifically, functional completeness is one of the keys to functional metrics. For example, the software shall have comprehensive user management functions, including registration, login, personal information modification, password retrieval, etc. According to relevant statistics, about 70% of users think that a good user-centered software must have perfect user management function. Data accuracy is also an important component of functional metrics. The software shall ensure that the processed and stored data are accurate and the error range shall be controlled within a very small range. For example, in financial user-centered software, the accuracy of data is directly related to the economic interests of users. If data errors occur, they may cause serious losses to users. In addition, the software should have good scalability and be able to add new functions and tools as the business grows and user needs change. According to research, software with good scalability is more competitive in the market and has higher user satisfaction[5].

### 3.2.2 Performance and Reliability Metrics.

Performance and reliability metrics are critical to the quality of service of user-centric software. Response time is one of the important metrics to measure software performance. In general, users want the response time of the software to be as short as possible, preferably within 1 second. For example, when the response time of the software is reduced to less than 1 second, user satisfaction can be improved by about 20 percent, based on the search results. Processing speed is also an important aspect of performance metrics. The software shall be able to process the user's request quickly, especially in the case of large data volume, and still keep the high processing speed. Stability is the core of reliability index. The software shall operate stably under various conditions to avoid frequent crashes or failures. According to statistics, if the software fails more than once a week, about 40% of users will consider replacing the software. In order to improve the performance and reliability of software, some measures such as optimizing algorithm and increasing server resources can be adopted. For example, by optimizing the software algorithm, the processing speed and response time can be significantly improved; Increasing the server resources can improve the concurrent processing ability of the software and enhance the stability.

# 4 Implementation and Application of User-Centered Software Service Quality Assessment

## 4.1 Data Collection and Analysis Methods

### 4.1.1 Data Collection Channels.

Data collection for user-centered software service quality assessment can be conducted through multiple channels to ensure the comprehensiveness and accuracy of the data. A questionnaire is a commonly used method of data collection that is suitable for large user groups. A targeted questionnaire can be designed to cover issues such as functionality, performance and reliability, ease of use, and allow users to evaluate the quality of service of the software. For example, users can be asked whether they are satisfied with software functions, whether they are satisfied with response time, whether the interface is friendly, etc. According to relevant research, the data collected through questionnaire can reflect the overall feeling of software service quality, and about 60% of users will carefully fill in the questionnaire and provide valuable feedback.

Interviews are also an important way to collect data, especially for gaining insight into the specific needs and problems of users. A representative number of users may be selected for interviews to understand their experiences and problems with the software. For example, you can ask the user what is the biggest difficulty in using the software, what features of the software you are least satisfied with, and so on. Interviews may be conducted in a face-to-face, telephone or videoconference format for better communication and communication with users. According to statistics, the data collected through interviews can provide more in-depth user insight, with about 30% of users providing questions and suggestions in interviews that are not covered in the questionnaire.

In addition, data can be collected through usage logs, error reports, etc. of the software. The software usage log can record the user's operation behavior and usage time, which is helpful to analyze the user's usage habit and demand. Error reporting can provide specific information about software failures and help to identify and resolve software problems in a timely manner. For example, the most frequently used function modules can be found by analyzing the usage log, so that optimization can be carried out in a targeted way; By analyzing the error report, we can find out the weak link of the software and improve it.

### 4.1.2 Data Analysis Methods.

Once the data is collected, it needs to be analyzed using appropriate data analysis methods to extract valuable information. Quantitative analysis is a commonly used data analysis method, which can convert users' evaluation and feedback into concrete numerical indexes for statistical analysis. For example, the questions in the questionnaire can be quantitatively scored, and the satisfaction of users can be divided into five grades, i.e. very satisfied, satisfied, general, dissatisfied and very dissatisfied, corresponding to different scores respectively. Then, by calculating the mean value, standard deviation and other statistics, the overall evaluation of software service quality and the

performance of each index are analyzed. According to the searched data, quantitative analysis can provide objective and accurate data support, and about 70% of software service quality evaluation adopts quantitative analysis method.

Comprehensive evaluation is another important data analysis method, which can comprehensively evaluate the service quality of software by comprehensively considering multiple indexes. For example, analytic hierarchy process (AHP) and other methods can be used to determine the weight of each index, and then calculate the comprehensive score of the software according to the user's evaluation and feedback. Comprehensive evaluation can comprehensively consider all aspects of software service quality and avoid the limitation of single index. According to the research, the comprehensive evaluation can provide more comprehensive and accurate evaluation results, and about 40% of the software service quality evaluation adopts the comprehensive evaluation method.

In the process of data analysis, the analysis results can also be displayed in the form of charts in combination with data visualization technology, so as to understand the software service quality more intuitively. For example, charts such as histogram and line chart can be drawn to show the distribution of user satisfaction with each index; You can draw charts such as radar charts to show how the software behaves in different ways. Data visualization technology can improve the efficiency and effectiveness of data analysis. About 50% of the software service quality evaluation uses data visualization technology.

### 4.2 Feedback and Application of Evaluation Results

The evaluation results will be fed back to the enterprise, so that the enterprise can improve the service quality according to the results and provide a powerful basis for the relevant decision-making of the enterprise.

#### 4.2.1 Result Feedback Mechanism.

In order to ensure that the evaluation results can be timely and effectively transmitted to the interested parties, it is necessary to establish a perfect result feedback mechanism. Firstly, the index data, comprehensive score and analysis conclusion of software service quality can be presented in detail by regularly generating evaluation reports. The report can be sent to the management, software development team, customer service department and other relevant personnel in the form of e-mail to ensure that they can understand the current status of software service quality in the first time.

Secondly, set up special feedback channels, such as online feedback platform or hotline, so that relevant parties can raise questions and suggestions on the assessment results at any time. The feedback questions shall be replied and handled in time to ensure smooth and effective communication.

In addition, the evaluation results interpretation meeting can be organized to invite relevant parties to participate in the in-depth interpretation and analysis of the evaluation results. At the meeting, we can jointly discuss the problems and improvement

measures of software service quality, define the responsibilities and tasks of each department, and promote the continuous improvement of service quality.

#### 4.2.2 Application Case Study.

Taking a well-known e-commerce enterprise as an example, the enterprise has obtained rich evaluation results by evaluating the service quality of its user-centered software. In terms of functionality, the evaluation found that some users reported that the product search function was not accurate and the process of modifying personal information was cumbersome. Aiming at these problems, the software development team optimizes the search algorithm and improves the search accuracy; meanwhile, the personal information modification process is simplified, and the convenience of user operation is increased.

In terms of performance and reliability, the data analysis shows that the software has a longer response time during peak hours, impacting the user experience. In order to solve this problem, enterprises increase server resources and optimize the software architecture, so that the response time is greatly shortened. In addition, through the analysis of the error report, some potential security vulnerabilities are found, Stability and safety of the software.

Through the application of the evaluation results, the user-centered software service quality of the e-commerce enterprise has been significantly improved. User satisfaction increased by 25% and user retention increased by 15%. At the same time, business operating costs are also reduced as customer complaints and losses due to software failures are reduced. This case fully demonstrates the important application value of user-centered software service quality evaluation results in enterprises, and provides beneficial reference for other enterprises.

## 5 Conclusion and Prospect

### 5.1 Summary of Study Conclusions

Through the in-depth research on the construction of user-centered software service quality evaluation index, the main achievements and conclusions are as follows:

Firstly, a comprehensive user-centered software service quality evaluation index system is constructed. The system covers multiple indexes such as functionality, performance, reliability, and usability, including functional completeness, data accuracy, response time, processing speed, stability, interface friendliness, operation convenience, etc. The selection of these indicators takes into account the factors of customer demand analysis, industry standards, reference of successful cases and analytic hierarchy process, which ensures the scientificity and rationality of the indicator system.

Secondly, a variety of data collection and analysis methods are proposed. Data was collected through questionnaires, interviews, software use logs and error reports to ensure the comprehensiveness and accuracy of the data. Data analysis methods such as quantitative analysis, comprehensive evaluation and data visualization technology can

effectively extract valuable information and provide objective and accurate data support for software service quality evaluation.

Finally, through the analysis of application cases, the important application value of the evaluation results in enterprises is demonstrated. The establishment of feedback mechanism of evaluation results enables enterprises to know the status quo of software service quality in time, and take effective improvement measures according to the existing problems, thereby improving user satisfaction and retention rate and reducing operation cost[6].

In a word, the user-centered software service quality evaluation index system constructed in this paper provides a clear improvement direction for software developers and service providers, and provides beneficial reference for improving user experience and satisfaction and promoting the development of software industry.

## 5.2 Prospect of Future Research Direction

With the continuous development of software technology and the increasing diversification of user requirements, the user-centered software service quality evaluation system needs to be improved and developed. Here are some prospects for future research:

### 5.2.1 Continuous Optimization of Evaluation Index System.

Dynamic adjustment of indicator weight: The importance of different indicators may change with the development of business and the change of user requirements. For example, with the popularization of mobile Internet, users may have higher requirements for mobile compatibility and response speed of software, so the weight of corresponding indicators shall be adjusted appropriately. The weight allocation in the evaluation index system can be dynamically adjusted by regularly collecting user feedback, analyzing industry trends and conducting expert evaluation, so as to ensure that the evaluation results are more consistent with the actual situation.

Inclusion of emerging technical indicators: as the application of emerging technologies such as artificial intelligence, big data, blockchain and so on in the software field continues to deepen, the indicators related to these technologies shall be considered to be included in the evaluation system. For example, for user-centered software using artificial intelligence technology, the accuracy and personalization degree of intelligent recommendation can be evaluated; Software involving blockchain technology can be assessed for data security and non-tampering. In this way, the evaluation system can better adapt to the trend of technology development and provide users with more comprehensive and accurate service quality evaluation.

### 5.2.2 Enhance User Experience Assessment.

Emotional analysis and user satisfaction: In addition to traditional functional and performance indicators, user emotional experience is also an important aspect of software service quality. Emotion analysis technology can be used to analyze the feedback text of the user and understand the emotional tendency of the user in the process of using the software, such as joy, disappointment, anger and the like. By analyzing the

user's emotional experience, we can get a deeper understanding of the user's satisfaction with the quality of the software service and provide more specific suggestions for improving the software.

Application of Virtual Reality and Augmented Reality: With the development of Virtual Reality (VR) and Augmented Reality (AR), these technologies will be more and more widely used in user-centered software. Future research can explore how VR can be AR and AR technologies are used in user experience assessment, for example, by creating a virtual user-centric environment in which users can operate and experience, thereby more intuitively evaluating software usability and user interface design.

### 5.2.3 Adapt to Multi-Platform and Cross-Device Environments.

Multi-platform compatibility assessment: Today, users are using software on a variety of platforms, including desktops, laptops, tablets, smartphones, and more. The future evaluation system should pay more attention to the evaluation of multi-platform compatibility to ensure that the software can provide consistent service quality on different platforms. Multi-platform compatibility of software can be comprehensively evaluated by performing functional tests, performance tests and user experience tests on different platforms.

Cross-device collaboration assessment: With the development of the Internet of Things technology, users are increasingly looking for seamless collaboration between different devices. For example, a user may want a task started on a cell phone to continue on a tablet, or receive a notification from user center software on a smartwatch. The future evaluation system shall consider the factors of cross-device cooperation, and evaluate the cooperation capability and user experience of software among different devices.

### 5.2.4 Combining Artificial Intelligence and Automation Technology.

Development of automated assessment tools: With the increasing scale and complexity of software, traditional manual assessment methods have been unable to meet the requirements. Future research can be devoted to developing automatic evaluation tools, using artificial intelligence and machine learning technology to automatically collect and analyze data, calculate indicators and generate evaluation results. For example, intelligent monitoring tools can be developed to monitor software performance and reliability indicators in real time to detect problems and give early warning.

Intelligent recommendation and optimization: Using artificial intelligence technology, intelligent recommendation and optimization suggestions can be provided for software developers and service providers according to user needs and behavior patterns. For example, by analyzing user's usage habits and feedback data, you can recommend functional modules or performance indicators that need to be improved most to help developers optimize software more efficiently.

In a word, the future user-centered software service quality evaluation research should closely combine the technical development and the change of user demand, continuously improve the evaluation index system, strengthen the user experience evaluation, adapt to the multi-platform and cross-device environment, and combine artificial

intelligence and automation technology to provide more powerful support for improving the software service quality.

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