Problems and Measures of Information Service Quality Evaluation

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Abstract. Information service is one of the popular application modes in military information systems. Information service quality will directly influence the results of command and control in information networks. The research requirements were analyzed. Some problems about evaluating information service quality were promoted, such as the quality evaluation model, the evaluation indexes system and the evaluation methods. According to the above problems, some measures were discussed. The user’s perception model is a suggested evaluation model. The indexes system must contain multiple dimensions including information quality, service availability, effectiveness, etc. And the evaluation method may be synthesis of multiple evaluation methods.

Introduction

Classic client/server architecture and component-based command and control (C2) systems can’t satisfy the requirements of joint operations. Service-oriented architecture will be the popular mode of military information systems. Information services or information resources will become the core contents of C2 systems. They will support the systems with data and functions [1, 2]. The information service quality will directly influence the quality and effectiveness of the C2 systems [3].

To meet the military requirements of command and control, the C2 systems based on service-oriented architecture need to provide the proper functions for the commanders. They also need to provide the optimal scheme for the decision-makers to establish operation plans with optimal effects. So the service quality may determine the availability and effectiveness of the C2 system information service. Furthermore, it will influence the whole effectiveness of the C2 system. So, it is very important to deeply research the C2 system information service and construct the corresponding evaluation indexes system and evaluation models.

Relevant Research Requirements

In the whole, the concepts of service quality are unclear and the elements need to be explored. The service quality management system is not perfect for C2 systems. There are few researches on information service quality evaluation of C2 system.
Establish the Concept and Theory Framework of Service Quality

Researchers have promoted multiple definitions about service quality. They are shown in Table 1.

Table 1. The Definitions of Service Quality.

<table>
<thead>
<tr>
<th>Year</th>
<th>Researcher</th>
<th>Definition or outline</th>
</tr>
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<tbody>
<tr>
<td>1972</td>
<td>Levit</td>
<td>Service quality is whether the service can satisfy the predefined standard or not.</td>
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<tr>
<td>1978</td>
<td>Sasser</td>
<td>Service quality is the customers’ satisfaction degree to service. The difference between the practical service results and the original service expectations determines the service quality.</td>
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<tr>
<td>1983</td>
<td>Garvin</td>
<td>Service quality is a kind of subjective recognition to quality and not objective evaluation.</td>
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<tr>
<td>1984</td>
<td>Gronroos</td>
<td>Service quality is the customers’ expectations to service and the practical perceptions after service.</td>
</tr>
<tr>
<td>1988</td>
<td>PZB</td>
<td>Service quality is the comparison results between customers’ expectations and the practical service performance.</td>
</tr>
<tr>
<td>1999</td>
<td>Cun-Xiao WANG</td>
<td>Service quality includes environment quality, technology quality, sensibility quality, relation quality and communication quality.</td>
</tr>
<tr>
<td>2006</td>
<td>Dong-Yan TU</td>
<td>Service quality consists of perception quality, offering quality, visual quality and process quality.</td>
</tr>
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</table>

The evolvement of service quality definition reflects the rough process of people recognizing service quality. Many researchers have done valuable works to explore the concepts of service quality. But there are few researches on the meaning and extension of information service quality. That will be the focus of the researchers.

Perfect the Evaluation Indexes System of Information Service Quality

From the researching results, a majority of references focused on information quality [4-6]. The involved fields included management information system, database, data model, knowledge management, etc. The information quality evaluation indexes adopted included completeness, correctness, currency, etc. These indexes are easy to measure and compute, so they are usually adopted. But they can’t reflect the whole meaning of information quality. And they can’t measure the quality of information service in all aspects. So, it is very necessary to deeply research the evaluation indexes system of information service quality and that in C2 systems. And those will become the emphases and difficulty of information service field.

Enrich the Evaluation Methods for Information Service Quality of C2 System

In 1994, Malhotra obtained a result that there existed many differences among uses’ perception modes to service quality in different countries. In 1998, Donthu and Yoo researched the cultural effects on the forming process of users’ expectations to service quality. They
believed that users’ expectations are affected intensively by the differences of the cultures, whether the total service expectations or each dimension of the service expectations.

Now, information war has higher and higher demands on information quality. So, quality evaluation about information service has been one of the focuses of researchers. Many references attempted to construct or improve SERVQUAL model in order to reflect user’s perceptions and expectations [7]. Those researches often focused on evaluating quality of society technical services of profit organizations in civil fields. They mainly aimed at human services and not information services. Only few references improved the SERVQUAL model to evaluate information technical services of information organizations. And such distinguishes essentially with user-oriented quality evaluation of information service. And the results are few about information service quality in military fields.

Problems in Evaluating Information Service Quality of C2 System

No Quality Evaluation Model Can Be Directly Used

Evaluation model is the basis of evaluating information service quality. Now, few researches discussed information service quality from users’ perception. There aren’t mature results in this field. The widely used evaluation models for service quality include PZB’s gap model for service quality and Gronroos’ customer’s perception model for service quality, etc. And no model can be accepted conformably by most researchers. The results are distinctly different in different fields. There has bigger divarication to the dimensions and indexes of service quality.

No Perfect Evaluation Indexes System

From the above, we know there are big differences in researching results on service quality and information services. And most researches about service quality are aimed at the profit services like banks, expresses and telecommunications etc. The researches on information service are all about fields like website or library. Those researches rarely involve nonprofit and military fields. There are no results about information service of C2 systems.

No Applicable Quality Evaluation Methods

Evaluation method is the direct tool to measure service quality. It is the key technology to enhance the service level. Now, models like the SERVQUAL model and the SERVPERF model have been brought forward. But we don’t know which the best model is. Can the methods applied in profit organizations be applied in military information service fields? Perhaps the answer is no. Then how to improve them or establish new evaluation methods? There are series of problems to be explored further.

Some Measures to Evaluate Information Service Quality

Evaluate Information Service Quality Basing on User’s Perception

The process that information system provides information service is involved with information provider and utilizer. The information system provides a certain kind of information services to utilizers. The providing service can satisfy the requirements of the utilizers in a certain extent. The information utilizers have some expectations to the information
services to be received. There may be differences between the expectations and the received services. If the received services don’t reach the expectations the perception or evaluation of the utilizers will be relatively low. The utilizers’ evaluation will become higher and higher with the enhancement of the service level which will gradually close to the utilizers’ expectations and exceed the expectations in the end. So, the utilizers’ evaluation is based on the expectations and perceptions to the service levels.

The utilizers’ perceptions can be used to improve the service quality and enhance the service level. The information providers may adjust the information system continuously to satisfy the requirements of the utilizers better according to their feedback. So, users’ evaluation is an important reference to judge the information service quality. The differences between the perceptive service level and the expected service level can be used to evaluate the quality of the information services.

**Establish Evaluation Indexes System from Multiple Dimensions**

The information service of C2 system has the following characteristics: distribution, duality, timeliness and reliability. We can construct the indexes system of information service quality from seven dimensions, such as characteristics of information quality, service availability, effectiveness, credibility, easiness, security and domain specialty.

The characteristics of information quality dimension mainly measures the quality of information service from the quality of information produced by the information service. The service availability dimension evaluates the information service quality from the angle that the information service can be used by the users. The effectiveness dimension evaluates the degree how much the information service satisfies the users’ requirements. The credibility dimension measures the degree of credibility and dependability of the information service. The easiness dimension mainly measures how easy the information service can be obtained, studied and used. The security dimension evaluates the security degree of the information service, the service results and the service process. The domain specialty dimension measures the unique characteristics of special domains and users’ special requirements. These dimensions can be divided into many indexes further.

**Apply Multiple Evaluation Methods Synthetically**

There are two methods suiting for evaluating the information service quality. One method is synthetical evaluation. The other method is fuzzy evaluation.

**Synthetical Evaluation.** There are many evaluation indexes. They construct a layered structure called the indexes system. The importance of different indexes to the total service quality is different. So, we must determine the relative importance first. Usually the analytical hierarchy process (AHP) is used to compute the importance of the indexes. It combines the qualitative analysis and the quantitative analysis. It can produce quantitative results for the decision problems. The main advantages include the strong systematization, the wide application, concision and practicality.

The evaluation indexes have different types. So, their measurement methods are different. There may be big differences for the index values in dimensions and magnitudes. We must eliminate the influence of the dimensions and magnitudes before the synthetical evaluation. The normalization method is generally used to do this. After normalization, all the index values will...
be mapped into the interval of $[0, 1]$. Finally the synthetical evaluation method can be used to judge the total quality of the information service of C2 systems.

**Fuzzy Evaluation.** Fuzzy evaluation method is based on fuzzy mathematics. It uses fuzzy relation to synthesize the final evaluation results according to multiple elements. The subjection function is used to quantize the considering elements to compute the subjection degree of them to evaluation levels. Finally the subjection degree of all the elements is synthesized under a certain fuzzy rules.

The method considers all the information of every element to reach a whole sufficient judgment about the information service quality. Its evaluation result is a vector, not a single value. That is one of the characteristics of this method. It can be used to synthetical evaluation for subjective indexes and objective indexes.

**Summary**

The research requirements for information service quality evaluation were analyzed based on the existing researching results. According to the practice of C2 systems, the problems to be encountered when evaluating the information service quality were given. And the relevant measures were discussed from aspects of evaluation model, indexes system and evaluation method. The researches on information service quality and its evaluation will become more and more important.

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**References**


