

Research on the Establishment of the Quality Evaluation Index System for Sports Information Network Service of Universities and Colleges in China

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ABSTRACT: The 21st century is the information age. The development of information technology has a huge influence on people's social life, and more and more people get information through the Internet. As a part of universities and colleges, sports is faced with the problem that is how to promote informatization, which gives a higher demand on the quality of sports information. So it is a urgent topic for research. The quality evaluation index system for sports information network service of universities and colleges is made through looking for lots of literature and learning from predecessors. The system includes 4 indexes in level one, 11 indexes in level two and 24 indexes in level three. AHP is used to calculate the weight of each index; Pre-evaluation was carried out and received a good result.

KEYWORD: Sports education in universities and colleges; Sports information network; Information Services; The quality of information service evaluation index

1 INTRODUCTION

People make a huge progress in all kinds of areas in 21st century, especially the information technology. As we can see, the IT has an immense influence in all areas. It is said that "The 21st century is a new revolution whose center is information technology." [1] The development of information technology has a huge influence on people's social life, and more and more people get information through the Internet. China Internet Network Information Center found that by the end of December 2012 there are 564 million netizens, and it increases 50 million and 900 thousand in the whole year. The Internet penetration is 42.1%, which increase 3.8% compared to 2011.

With the development of IT, the IT in universities and colleges makes a breakthrough, and the campus information network in China has almost done and was brought into use. The wireless in campus covers everywhere. Internet penetration is more than 80%, and the wireless in public areas covers more than 16% [2]. According to the research of China Internet Network Information Center, it shows that almost everyone is a netizen in college, the number accounts for 32.3% in all the netizens [3]. As a part of universities and colleges, sports is faced with the problem that is how to promote informatization, which gives a bigger space for the development of sports information but it also gives a higher demand

on its quality. Faced with so many netizens, how to promote the quality of sports information network service is an urgent problem which should be studied.

Sports information is that something is concerned with sports and it can reflect the essence of sports like information, instruction, data, signal and so on, and it is used to satisfy the specific needs of sports [4]. Information service is an activity that is the beginning and ending of information management activities, and it belongs to the research field of information management, and it adopts many methods to supply information requirement for users. Information service activities passes meaningful information to users through studying the demands of users and organizing services. To some extent, information service is a process, which means that the study of the quality of information service should consider not only the results but also users' feelings. So the definition of the quality of information service is that users' feelings in the process of receiving services and their cognition of the utility of information service results and the result of comparing to their expectations [5]. When users' feelings and cognition are the same as or more than their expectations, the information service quality is high. On the contrary, when users' feelings and cognition are less than their expectations, the quality of information service cannot make them satisfied. However, the sports information service is

a kind of activity that provides original sports information, effective sports information and knowledge which are after processing and organizing for users through aiming at users' demands[6] and basing on the modern IT and internet. There is a big difference between internet sports information service and original sports information service. The difference is mainly reflected on the scope and time of the supplied information resource, the manner of inquiring information and the information carrier and so on[7]. For example, the database service, search engine service, navigation service and information push service are all new kinds of sports information services, and they develop with the development of information environment. So, to establish the evaluation index system for sports information network service of universities and colleges can make the evaluation more objective and make a reference for the quality of sports information service.

2 GETTING STARTED

2.1 Research Objects

The research objects are Chinese websites of relevant universities' departments for sports, and according to the China Ministry of Education, those universities are the top 30 in China.

2.2 Research Methods

2.2.1 Document Analysis Method

According to the content of this study, I looked for lots of relevant books and periodicals through all kinds of Media channels. And in order to establish the system, I used the internet and HowNet to search a lot of literature to master last research trends. And I used information service evaluation modes from other industries for reference. These provide powerful guarantee for the system.

2.2.2 Delphi Method

The study mainly used Delphi method, which is inventing experts from relevant areas to form a expert panel. There are 21 people in the expert panel included 2 famous professors, 5 professors, 11 associate professors, 2 lecturers and 1 teaching assistant. I used the questionnaire to ask the experts' advice, and then I decided the indicator system. In Delphi method, every expert makes a judgment on the importance of indexes and uses 5 level evaluation method. In this study, there are expert consultation for 2 rounds. In the first round, I organized the results. And in the second round, I revised and improved the system.

2.2.3 Analytic Hierarchy Process

Analytic Hierarchy Process (AHP) is a structured technique for organizing and analyzing complex decisions. Based on mathematics and psychology, it was developed by Thomas I. Saaty in the 1970s and has been extensively studied and refined since then. It has particular application in group decision making, and is used around the world in a wide variety of decision situations.

(1) *Establish a Hierarchical Structure of the System*
I established a hierarchical structure of the system according to the basic demand of Analytic Hierarchy Process and Delphi method. The hierarchical structure included 1)target layer; 2)criterion layer: index in level two; 3) measure hierarchy: index in level three[8].

(2) *Establish a Judgment Matrix*

In the quality evaluation index system for sports information network services, I compared all the levels of indexes, and then I used the YAAHP software to calculate the weight of indexes. In the compare among scales in AHP, it shows that all scalings have isotonicity[9], so it suggests using 1 to 9. As for those scalings who have a higher demand on accuracy, it suggests using $e0/5 \sim e8/5$ or $e0/4 \sim e8/4$. According to what I mentioned above, I used $e0/5 \sim e8/5$.

(3) *Calculate Index Weight and Make Consistency Check*

After establishing the judgment matrix, it needs to calculate index weight and make a consistency check. The computational formula of concordance rate is :

$$r = c/R \quad (1)$$

$$c = (d - n)/(n - 1) \quad (2)$$

$$d = \frac{1}{n} \sum_{i=1}^n (b_i / q_i) \quad (3)$$

$$b_i = \sum_{j=1}^n a_{ij} q_j \quad (4)$$

If $r < 0.05$, the judgment matrix has a good consistency. If $r > 0.05$, the judgment matrix needs to be adjusted.

3 THE RESULTS AND ANALYSIS

3.1 *Theoretical Foundations of the Establishment of the Quality Evaluation Index System for Sports Information Network Service in Universities and Colleges in China*

3.1.1 *Theoretical Foundations*

In the study, I looked for lots of literature and learned from predecessors. And I referred to 4 information service quality theory evaluation modes

which are SERVQUAL, E-SERVQUAL, ISO information service quality theory evaluation mode and ITSS. I combined theory modes and universities' realities. The sports network information service quality in universities is consisted of 5 parts which are tangibility, reliability, responsiveness, assurance and empathy.

3.1.2 Empirical Foundations

I made a survey on Chinese top 30 universities, and I used internet technology to survey security and contents of their sports information websites. The results are as follows.

Table 1. The Homepage Contents of Top 30 Universities' Sports Department

Main aspects of content in websites	Sports department websites	Percentage %
Introduction	29	96
Sports news	15	50
Organization	22	73
Physical education	26	86
Mass sports	21	70
Physical training	22	73
Venue facilities	18	60
Sports common sense	10	33
Students physical health	7	23
Others	10	33

These 30 universities all have sports information websites, but the page design is simple and lacking of beauty, which is bad the use of users. The update of information contents lacks of timely. There are 8 universities' contents are more than one year, which accounts for 26.7% of all. 5 universities, which accounts for 16.7% of all, still use static web pages and the network technology is obsolete. From the results we can see that the establishment of sports information resource is weak; the system is not enough; the management is backward. So it cannot form a complete and systematic sports information resource to serve teachers and students.

3.2 Selecting Principles of the Quality Evaluation Index for Sports Information Network Service in Universities and Colleges in China

3.2.1 Scientificity and Representativeness Principles

During the process of designing the evaluation index system, it must grasp the main question and simplify the levels of it. The levels cannot be very complex, and the chosen data should have a good generality and pertinence in order to guarantee the accuracy. Otherwise, it will waste lots of human capital and material resources, and evaluation results will become low. The chosen indexes should have

representativeness, but it is not mean the more the better. Too many indexes can easily cause the repetition of contents, which can affect results.

3.2.2 Operability Principle

During the process of designing the system, all indexes should acquire data in practical application, otherwise, the indexes are meaningless; all indexes should have specific meaning and can be got data from statistics, which can guarantee the quality of data.

3.2.3 The Combination of Qualitative and Quantitative Principles

Quantitative evaluation plays a main role in many evaluations. Because its objectivity is good, and it can elucidate questions with data. It is suitable for those indexes like sport technique standards, physical quality, body shape, body function and so on. But, in reality, the factors are always abstract and vague, and it is hard to measure the indexes and make them quantification. Those indexes cannot be ignore. Because if ignored, the evaluation will be not comprehensive. So when evaluating students' extracurricular activities, the qualitative and quantitative principles should be combined. In this way, the fact can be got.

3.2.4 Comparability Principle

It demands that the meaning of indexes should be clear, and all index sets should explain specific questions. In the process of evaluation, all the faculties can have a compare. And at the time of compare, the data should be standardized and use percentage as soon as possible.

3.3 The Establishment of the Quality Evaluation Index for Sports Information Network Service in Universities and Colleges in China

3.3.1 Primary Election of the Evaluation Index

Through researching and analyzing information service quality models, in the manner of tangibility, reliability, responsiveness, assurance and empathy and according to the realities and the universities' literature contents, I established the basic framework of the quality evaluation index system for sports information network service and formed experience evaluation index system. The system includes sports network information resource, sports office automatic system, sports website and sports network information environment. The four levels constitute indexes in level one. Besides, contents of these four levels divide into 11 indexes in level two, 40 indexes in level three. The specific list is as follows.

Table 2. Initial Quality Evaluation Index System for Sports Information Network Service of Universities and Colleges in China

level one	Level Two	Level Three
A1: Campus sports network information resource	B1:the development level of database	C1 Contents in database
		C2 Data sharing level
		C3 Security arrangement
		C4 Database development technology
	B2:the quality of Information	C5 Validity
		C6 Timeliness
		C7 Authority
		C8 Information utilization
		C9 Information value
	B3:the application of Information resources	C10 The influence of leaders' decision
		C11 the application of sports teaching
		C12 the application of sports teams
		C13 the application of mass activities
		C14 Information contents
A2: Campus sports office automatic system	B4:System Application	C15 OA system coverage areas
		C16 OA system utility ratios
		C17 OA system practicability
		C18 OA system service efficiency
	B5 :Benefits	C19 Teachers and students profitability
		C20 Teachers and students influence degree
		C21 Teachers and Students applied range
A3: Campus sports websites	B6:Website construction	C22 Page design
		C23 Website search and navigation
		C24 Users' information protection
		C25 Page view
	B7:Website content	C26 Column contents
		C27 Affairs public
		C28 Networking
		C29 Information update frequency
	B8:Website operation	C30 Website updates
		C31 Network linking
		C32 Stability
	B9:Public influence	C33 Interaction
		C34 Teachers and students satisfaction
C35 Influence degree		
A4: Campus sports network information environment	B10:Human capital	C36 Specifically responsible
		C37 Personnel training inputs
		C38 Informatization regulations
	B11:Rules and regulations	C39 Informatization security system
		C40 Specialized personnel funds

Table 3. Statistical Table of Experts' Discussion Results in Two Rounds

	Round One	Round Two	Established Indexes
Index Number	40	31	24
Average Importance Degree	3.78	4.10	4.12
Average Dispersion Degree	1.2027	0.8312	0.4211
Average Variable Coefficient	0.3088	0.2517	0.1224

Table 4. The Quality Evaluation Index System for Sports Information Network Service of Universities and Colleges in China

level one	Level Two	Level Three
A1:Campus sports network information resource	B1 Database development level	C1 Contents in the database
		C2 Data sharing level
		C3 Security arrangement
	B2 Information quality	C4 Validity
		C5 Timeliness
		C6 The influence of leaders' decision
	B3 Application of information resource	C7 The application of sports teaching
		C8 The application of sports teams
		C9 The application of mass activities
A2:Campus sports office automatic system	B4 System application	C10 OA system coverage area5
	B5 Benefit	C11 OA system utility ratio5
A3:Campus sports websites	B6 Website construction	C12 Teachers and students profitability
		C13 Teachers and Students Influence Degree
		C14 Page design
	B7 Website contents	C15 Website search and navigation
		C16 Column contents
		C17 Affairs public
	B8 Website operation	C18 Website updates
		C19 Network linking
		C20 Teachers and students satisfaction
B9 Public influence	C21 Influence degree	
	C22 Specifically responsible	
A4: Campus sports network information environment	B10 Human capital	C23 Personnel training input
	B11 Rules and regulations	C24 Informatization regulations

3.3.2 Revise of the Evaluation Index System

On account of initial indexes belonging to experiential indexes and lacking of scientific demonstrations, so I invented 21 experts who are good at school physical or physical management or sports information to consist a expert panel. I had two-round questionnaire surveys for them. Then I revised all indexes. In the process of revising indexes, I made initial indexes into questionnaire. Each item has 5 levels that are very important(5), important(4), compared important(3), not important(2) and unrelated(1), and then I used these questionnaire to evaluate every index. After the first round, I removed 9 indexes whose importance are less than 3, and according to experts' advice, I combined three repetitive indexes and removed two indexes which are hard to measure. After the second round, I removed 2 indexes whose variable coefficient are more than 0.5. And according to related theories of complex system evaluation, I carried out index selection and standardization. At last, I established the quality evaluation index system for sports information network service of universities and colleges in China. The system includes 4 indexes in level one, 11 indexes in level two and 24 indexes in level three.

3.3.3 The Establishment of all the Indexes Weight

I used analytic hierarchy process software YAAHP V0.5 to establish a model and make a hierarchical relation, as follows:

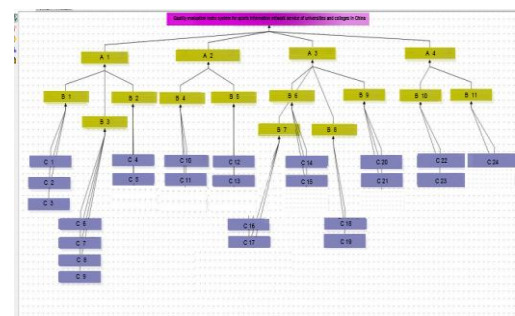


Fig. 1.The Diagrammatic Figure of Index System Constitution

The section scale is $e0/5 \sim e8/5$, and the software can form all levels of index judgment matrix according to the model, as follows:

I gave the table to 21 experts, and I recycled 21. The return rate is 100%. I typed scores into software to calculate results. The results are as follows:

(1) *The Quality Evaluation Index System for Sports Information Network Service of Universities and Colleges in China (TABLE 5)*

Proportion of Judging Matrix Consistency: 0.0019;
Weight for General Objective: 1.0000

Table 5. Matrix Decision Table of Quality Evaluation Index in Level One for Sports Information Network Service of Universities and Colleges in China

Quality evaluation index system for sports information network service of universities and colleges in China	A1	A2	A3	A4	Wi
A1	1.0000	1.2214	1.8221	3.3201	0.3709
A2	0.8187	1.0000	1.4918	3.3201	0.3193
A3	0.5488	0.6703	1.0000	1.8221	0.2036
A4	0.3012	0.3012	0.5488	1.0000	0.1063

(2) *A1 Campus sports network information resource (TABLE 6)*

Proportion of Judging Matrix Consistency: 0.0043;
Weight for General Objective: 0.3709

Table 6. A1 The Second Level Matrix Decision Table of Campus Sports Network Information Resource

A1 Campus sports network information resource	B1	B2	B3	Wi
B1	1.0000	1.4918	3.3201	0.5004
B2	0.6703	1.0000	2.7183	0.3586
B3	0.3012	0.3679	1.0000	0.1410

(3) *A2 Campus Sports Office Automatic System (TABLE 7)*

Proportion of Judging Matrix Consistency: 0.0000;
Weight for General Objective: 0.3193

Table 7. A2 The Second Level Matrix Decision Table of Campus Sports Office Automatic System

A2 Campus sports office automatic system	B4	B5	Wi
B4	1.0000	1.8221	0.6457
B5	0.5488	1.0000	0.3543

(4) *A3 Campus Sports Websites (TABLE 8)*

Proportion of Judging Matrix Consistency: 0.0359;
Weight for General Objective: 0.2036

Table 8. A3 The Second Level Matrix Decision Table of Campus Sports Websites

A3 Campus sports websites	B6	B7	B8	B9	Wi
B6	1.0000	2.2255	1.8221	2.2255	0.4026
B7	0.4493	1.0000	1.8221	1.8221	0.2567
B8	0.5488	0.5488	1.0000	1.8221	0.1999
B9	0.4493	0.5488	0.5488	1.0000	0.1409

(5) *A4 Campus Sports Network Information Environment (TABLE 9)*

Proportion of Judging Matrix Consistency: 0.0000;
Weight for General Objective: 0.1063

Table 9. A4 The Second Level Matrix Decision Table of the Campus Sports Network Information Environment

A4 Campus sports network information environment	B10	B11	Wi
B10	1.0000	1.4918	0.5987
B11	0.6703	1.0000	0.4013

3.3.4 *The Establishment of the Quality Evaluation Index for Sports Information Network Service of Universities and Colleges in China*

After calculating, the frame of the quality evaluation index system for sports information network service of universities and colleges in China has been established, as follows.

Table 10. The Quality Evaluation Index System for Sports Information Network Service of Universities and Colleges in China (WI)

Index I	Wi	Index II	Wi	Index III	Wi				
A1 Campus sports network information resource	0.3709	B1 Database development level	0.1856	C1 Contents in the database	0.0777				
				C2 Data sharing level	0.068				
				C3 Security arrangement	0.0399				
	B2 Information quality	0.1331	B3 Application of information resource	0.0523	C4 Validity	0.0755			
					C5 Timeliness	0.0576			
	A2 Campus sports office automatic system	0.3193	B4 System application	0.2061	C6 The influence of leaders' decision	0.0196			
					C7 The application of sports teaching	0.0131			
		B5 Benefit	0.1132	B6 Website construction	0.0819	C8 The application of sports teams	0.0108		
						C9 The application of mass activities	0.0088		
A3 Campus sports websites		0.2036	B7 Website contents	0.0523	C10 OA system coverage areaS	0.1068			
					B8 Website operation	0.0406	C11 OA system utility ratioS	0.0993	
							C12 Teachers and students profitability	0.0534	
		B9 Public influence	0.0287	B10 Human capital	0.0635	C13 Teachers and Students Influence Degree	0.0598		
						B11 Rules and regulations	0.0427	C14 Page design	0.039
								C15 Website search and navigation	0.0429
	A4 Campus sports network information environment	0.1062	B11 Rules and regulations	0.0427	C16 Column contents	0.0249			
					C17 Affairs public	0.0274			
					C18 Website updates	0.0231			
C19 Network linking					0.0175				
				C20 Teachers and students satisfaction	0.0172				
				C21 Influence degree	0.0115				
				C22 Specifically responsible	0.0488				
				C23 Personnel training input	0.0147				
				C24 Informatization regulations	0.0427				

3.4 *Pre-evaluation on the Quality of Sports Network Information Service in Parts of Universities and Colleges in China*

I used the established system and adopted systematic sampling to choose 5 universities among 30 universities to make a pre-evaluation. Each index has 100 scores. The formula mode is as follows. The full mark is 100.

$$C = \sum W_i P_i \quad (5)$$

where C = the score of quality information service; W_i = index weight; and P_i = index test scores.

I collected index scores through questionnaire, inquiring the websites and visiting others. I used

EXCEL to calculate results. The results are as follows.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 *Quality evaluation method of sports information service*

In this study, I made the quality evaluation index system for sports information network service of universities and colleges in China through looking for lots of literature, learning from predecessors and setting up expert panel which had three times' meeting to analyze, organize and grade the weight. The system includes 4 indexes in level one, 11 indexes in level two and 24 indexes in level three. The AHP is used to calculate the weight of each index; the pre-evaluation is carried out and received good results. The establishment of the system can reflect the development level of sports network information of universities and colleges in China more accurate, and it can make a reference for establishing sports information service quality.

4.2 *There is an important role in the construction of sports information network*

Under new environment, the establishment of sports network information of universities and colleges in China develops very fast, but it also faced with opportunities and challenges. So it is important to pay more attention to the establishment of sports network information, and at the same time, it is also crucial to lay emphasis on exploiting and developing softwares. It is necessary to have sports digitization, exploit the campus sports information resource and put the sports information physical space and digital soft space into practice. And also it is necessary to

make more efforts in sports information propagation mode and process. Only in this way, the sports network information service quality and the sports level of modernization can be promoted.

4.3 *Sports information management personnel need further training*

The study found out that sports information service tends to be industrialization. So it is necessary and important to cultivate special talents and make our sports information service bigger and stronger.

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