Establishment of One-card Evaluation Index System in Colleges and Universities Based on Analytic Hierarchy Process

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Abstract. With the progress of informatization in colleges and universities, construction of one-card system has been an important part of colleges and universities, so it is of great significance for further construction of one-card system to establish a scientific and reasonable one-card evaluation index system. In this paper, it first establishes the colleges and universities' one-card evaluation index system from the perspectives of purposes and principles with further elaboration of the construction basis. Then it introduces methods of determining index weight. At last, it elaborates the selection basis of index score.

Introduction

With the promotion and deepening of digitization and informatization in colleges and universities, campus one-card has become an important part of informatization in colleges and universities. At present, construction of one-card system has been carried out in most colleges and universities to different degrees with certain achievement. Xu Chang'an and Geng Xinfeng have concluded in 2013 that one-card construction in colleges and universities has three levels. The first level is that different departments have different cards without common use, which is called simple system on application level. The second level is application level integrated by identity recognition and electronic payment. The third level is expansion and promotion level with integrated and shared information resources among humans, fortunes and materials [1].Since the construction of campus one-card system is of different levels in different colleges and universities, it is especially important to have an evaluation system. In this paper, some initial explorations on the establishment of a comprehensive evaluation index system for campus one-card system have been made, which are expected to have certain guiding effect on the construction of one-card system in colleges and universities.

The Purposes and Principles of Establishing One-card Evaluation Index System in Colleges and Universities

The Purposes of Establishing Evaluation Index System. The evaluation index system is not only a standard for the establishment of one-card system, but it is also a guideline for the establishment. The purpose of establishing a unified one-card evaluation index system is to correctly and objectively evaluate the construction level of one-card system in colleges and universities so as to provide services for related departments and enterprises regarding one-card situation and decision-makings. On the other hand, it can help to lead the construction of campus one-card system with decision-making support. From the macro perspective, campus one-card evaluation index system in colleges and universities can improve the general level of one-card system. From the micro perspective, it can make colleges and universities more accurately master the connotation

of one-card so as to formulate development strategies and plans for information integration and sharing including human resources, fortunes and material.

The Principles of Establishing Evaluation Index System. The evaluation index system of campus one-card in colleges and universities should reflect various aspects of one-card construction comprehensively, such as planning, function, safety and application and so on. Therefore, establishment of such evaluation index system should follow scientific, objective and practical principles. The scientific principle manifests on objective and comprehensive reflection on various aspects with scientific classification and high representative and comprehensiveness. The objective principle means less subjective assumption, instead more scientific methods should be adopted to determine the index weights. The practical principle means the availability of index data as well as the practicability of assessment.

The Establishment of One-card Evaluation Index System in Colleges and Universities

A hierarchy model(refer with table 1) can be established by considering the overall structure of one-card as well as students' user experience comprehensively with employment of AHP thought, which can be divided into goal level, criterion level and index level.

Table 1 The Evaluation Index System of One-card in Colleges and Universities

The criterion level B	The index level C	Interpretation of indicators
Importance to one-card system B1	Construction and planning of one-card system C1	Planning and deployment of one-card system
	Leaders' attitude C2	Leaders' knowledge about one-card system
	Investment on the construction of one-card system C3	Investment on the construction of one-card system including investment on hardware, software and human resources.
Construction of infrastructure B2	Distribution of transfer machines C4	Amounts of transfer machines and the rationality of distribution
	Distribution of POS machines C5	Amount of POS machines and the rationality of the distribution
	Network construction C6	Situation of multi-networks communication and information sharing
Safety B3	Network safety C7	safety of hardware, software and system
	Data safety C8	Data consistency and completeness
	Card safety C9	guarantee for users' interest when their card get lost or abnormal
	Measures of management C10	regulations and rules of safety and the implementation situation
Functional integration B4	Function of payment C11	Payment for meals, water and electricity bills, transportation, campus commodities etc.
	Function of management C12	Attendance management, access management, book borrowing management, student management, shelves management etc.
User experience B5	Usefulness C13	Usefulness for life and study
	Usability C14	One-card can be used and managed easily and conveniently
	Aesthetics C15	Outlook of one-card and the aesthetics of materials

The Basis of Establishing Campus One-card Evaluation Index System in Colleges and Universities

To establish one-card evaluation index system, various factors affecting the evaluation should be analyzed comprehensively. On one hand, features of the overall structure of one-card system should be considered with conclusion of its contents. On the other hand, students' demands should be analyzed from their user experience with conclusion of the influential factors. In the following parts, basis for the establishment of criterion level will be analyzed.

The Criterion for the Importance of One-card System. From the overall structure of one-card system, campus one-card system is part of digital campus, so its design should be included into the overall plan of digital campus to cooperate with digital construction. Thus, whether construction plans of one-card system are suitable for the strategic demands of digital campus or the important contents of informatization can embody colleges and universities' importance to the construction of one-card system.

The Criterion for the Construction of Infrastructure. The one-card system is combined with other information systems of the school to realize information integration and sharing around the whole school. The first-level platform is a data center. The second-level platform is a management center. The third-level platform is a sub-system of functional system [2], which fully embodies the important position of infrastructure during one-card construction. The construction of infrastructure is the foundation to realize information integration and information sharing. While the transfer machine and POS machine are the precondition and basis for the usage of one-card.

Safety Rules. One-card system in colleges and universities involves various campus information systems, which are also connected to many banking consumption systems by offering cross-database and cross-platform information platform, so its safety is of great priority [3], which can be seen as a lifeline. According to Chen Xiaohong, one-card safety involves equipment safety, transaction data safety, database safety, data transmission safety and banking transfer safety and so on [4]. However, Zhu Ziqing pointed out that one-card system safety includes network safety, data safety and card safety [3]. Based on many studies, I find that network safety, data safety and card safety manifest on the application of safety skills; while as for safety, management is another factor besides technology. Thus, the index of management measures is also added to the indicators.

The Principle of Functional Integration. Liu Xuemin [5], Liu Weimin [6], Cai Hong [7] and Wang Yongming [8] ave classified and listed various functions of campus one-card system from different angles. This evaluation index system takes various functions of one-card into consideration, and its functions have been divided into three kinds according to functional integration principle. One is payment function, including payment for meals, water and electricity bills, transportation, campus commodities, campus medical care and so on. The second function is management, which is reached by identity confirmation such as attendance management, access management, library lending management, registration management, shelf management, independent transfer and independent inquiry and so on. The principle of functional integration can evaluate one-card system's variety and completeness.

Principle of User Experience. The final purpose of one-card construction is to meet students' demand to satisfy users. Thus, this evaluation system should include usefulness, practicability and aesthetics of one-card from the perspective of user experience.

Ways to Determine the Weights of Evaluation Index

It is very important to evaluate campus one-card system comprehensively with scientific and rational evaluation index system to determine weights of various indicators in the system. The

proportions of weights can embody the role, function and importance of each index. Once they are determined, they will be relatively stable. The sum of all weights should be one. The index weight of this system should be determined by expert investigative method and AHP comprehensively.

First, with the adoption of expert investigative method, importance of each index can be determined. First, according to the first-level principles, importance of the total goal can be scored by 10-point system or 100-point system. Second, according to the second-level index, importance of the subordinated first-level principles can be scored.Second, with Suttie's one-to-nine scale, according to experts' concrete scores, judgment matrix of the overall goal and judgment matrix of the subordinated first-level principles are established, which are six in total.At last, according to judgment matrix, the weights can be accounted. Meanwhile, the consistency of single judgment matrix can be tested. The specific accounting process can refer to the AHP method.

The Scores of Evaluation Index can be Determined

Addressing scores of each secondary index, we can determine the concrete scores of indicators according to their concrete situations. After that, we can use the weight of each indicator to the general goal multiply by the score of this indicator, and then the overall score of the evaluation subject is the summary aggregation. The scores of evaluation index can be determined according to the specific situation of 10 points, six points and 2 points

Conclusion

Evaluation of campus one-card system is a complicated systematic project which involves many contents. In this paper, it makes initial explorations on the construction and employment of evaluation index system of one-card system. Establishment of this index system may have some deficiencies, for example, determination of index score adopts the qualitative method but less quantitative method. Besides, specific process of the weights determination by AHP is simplified so as to further analyze the concrete determination of index weight in the future study. Meanwhile, employment of this index system will be further explored by empirical study.

Acknowledgment

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