The Study of Influential Factors on Information Disclosures of Institutions of Higher Learning

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Abstract. Recently, the public is paying more and more attention on the information disclosure of institutions of higher learning (IDIHL). The influential factors on IDIHL and the relationships among these factors would be explored in this paper. Firstly, the relevant literature was analyzed and 15 factors were extracted. Secondly, the IDIHL model based on the interpretative structural model (ISM) was built. Thirdly, the mutual relations and the action modes of IDIHL system were analyzed. The analysis of the model will be a theoretical framework for the empirical study of IDIHL.

Introduction

The information disclosure of institutions of higher learning (IDIHL) is that the information which is formed and mastered by colleges when they fulfill the functions of educational administration, except for those that cannot be disclosed by laws should be disclosed [1]. With the further improvement of the social system, people's awareness of exercising the right of supervision is more and more intense. The desire for the openness of government affairs is also getting higher and higher. As a part of administrative information open system, IDIHL is very important for teachers and students, and other people who pay attention to the dynamic of the universities outside the colleges. In order to protect the citizens, legal people and organizations to get higher education information in accordance with the law, the Ministry of Education issued Measures for the Information Disclosure of Institutions of Higher Learning [2] in April 6, 2010, which means that the system of IDIHL was formally established in China. In order to promote the development of IDIHL in China, the Ministry of Education announced the list of Information Disclosure of Institutions of Higher Learning in July 2014, which required all colleges disclosed the enrollment, construction bidding, the property donated, going-abroad of college cadres, academic misconduct and other 50 items to be disclosed before the end of October 2014 [3]. Obviously, there were more stringent requirements on the breadth and depth of IDIHL. At the same time, there are still many problems being exposed, for example, the IDIHL system is not perfect, the IDIHL guidelines are vague, the scope of IDIHL is not clear, the effect of IDIHL is not good [4], etc. The influential factors on IDIHL system will be analyzed, the interpretative structural model will be built, the relationship between the factors will be explored, and the corresponding suggestions will be put forward in this paper.

Analysis of the Current Situation and Influential Factors on IDIHL

Current Situation of IDIHL

After the promulgation of the Measures for the Information Disclosure of Institutions of Higher Learning, the colleges all over the country launched the process of information publicity. Some scholars and units carried out investigation and research on it. H. Ma and H. Lv's [5] survey showed that among 2147 colleges all over the country, less than 20% of them set up IDIHL website construction, of which the normal ones are less than 10% at the end of March, 2011. L. Zhou and Z. Liu’s [6] survey report showed that only about 45% of the whole 114 of the country's 211 project universities set up IDIHL website or column at the end of August, 2011. A random sampling was conducted by K. Li, M. Zhao [7] in 100 universities. It was found that the proportion of colleges...
setting up websites and office systems are 97% and 81%, and there are more than 50% of colleges launching micro-blog public accounts, publications, journals and other carriers. All the data showed that IDIHL in China have made some progress. However, according to China higher education transparency index report (2015), although the IDIHL has been increasing year by year, there are still many problems, such as the low level of the construction of the portal website, the imbalance of the construction of the information disclosure platform and the information disclosure is not timely [8]. In other words, the current construction of the IDIHL has been greatly improved in the number of indicators, but still uneven in the quality level. IDIHL has yet to be further promoted.

The Influential Factors on IDIHL

When some internal or external conditions are insufficient, the process of information disclosure will be hindered. These conditions are the influential factors on IDIHL. Many scholars have studied them [9, 10, 11, 12]. In this paper, the influential factors on IDIHL were divided into four categories: institutional factors, cultural factors, technical factors and other factors.

1) Institutional Factors

China is a country with an adequate legal system. IDIHL, as a part of the administrative information openness system, the top-down policy system guarantees the effective promotion of information publicity in colleges, and solve the problems that may be encountered in the process of coordination. The institutional factors is divided into 6 items: policy guarantee, clear content, legalization, normalization, rationality and evaluation system.

2) Cultural Factors

The cultural factors here are the factors that affect people's subjective initiative in the cultural environment, which affects the development of IDIHL. The different cultural atmosphere of the college directly affects the production and disclosure of the information, while the external public opinion environment of colleges also plays an important role in the development of the internal cultural atmosphere. Therefore, cultural factors can be divided into 5 items: encourage effect, leadership will, audience demand, public opinion pressure and peer influence.

3) Technical Factors

The appearance of the Internet has greatly improved the efficiency of information exchange. The development of IDIHL is based on the progress of information technology. Only when information technology reaches the level, can information transcend the limits of space and time, break the barriers between the departmental levels, and then, complete the efficient disclosure of information. The technical factors can be reflected in 3 items: dissemination channel, technical level and information security.

4) Other Factor

In addition to the above factors mentioned, information resource is also one of the important factors. The existence of information which is real, complete, and processed is the most important prerequisite for the establishment of IDIHL system.

| NO. | Influential Factors | Meaning |
|-----|--------------------|---------|
| S₁  | policy guarantee   | Clear rules and regulations are come up with, which can guarantee the effective promotion of IDIHL |
| S₂  | clear content      | In the rules and regulations, the content of IDIHL should be clearly defined |
| S₃  | legalization       | The law provision set definite consequences to make sure that the rules and regulations will be carried out |
| S₄  | normalization      | Clarify the norms, processes, methods, etc. of IDIHL to improve the efficiency |
| S₅  | rationality        | The content of the policy is reasonable and complete, which improve the operability of the policy |
| S₆  | evaluation system  | Construct a perfect multi evaluation system of IDIHL to make it easy to be supervised |
| S₇  | encourage effecting | The impact of IDIHL itself on the subjective initiative of relative staff |
| S₈  | leadership will    | The willingness to carry out information disclosure policy of college leaders |
| S₉  | audience demand    | The audiences’ demand on IDIHL |
Build Interpretative Structural Model

Interpretive Structural Model

Interpretative structural modeling (ISM) is the most basic and characteristic model of system structure, which is widely used to understand and deal with various social and economic systems [13]. It’s a tool for system analysis. Through the corresponding matrix transformation, the complex system is decomposed into several subsystems. It uses people's knowledge, experience and with the help of the computer technology, eventually forms a multi-layer structure model, which will transform the fuzzy thought into a model with good structure relation [14]. Therefore, ISM is applied to analyze the influential factors on IDIHL in this paper.

Build Adjacent Matrix of Influential Factors

The factors that affect the IDIHL also have certain influence on each other (like cause, restriction, etc.). Adjacent Matrix is used to describe the relationship between the factors. For the system S (S₁, S₂, …, Sₙ) with n factors, its Adjacent Matrix is defined as formula (1):

\[
A_{ij} = [a_{ij}] = \begin{cases} 1, & s_i \text{ directly impact on } s_j \\ 0, & s_i \text{ doesn't directly impact on } s_j \end{cases}
\]

(1)

The Adjacent Matrix A is shown in Table 2.

| Factors | S₁ | S₂ | S₃ | S₄ | S₅ | S₆ | S₇ | S₈ | S₉ | S₁₀ | S₁₁ | S₁₂ | S₁₃ | S₁₄ | S₁₅ |
|---------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| S₁      | 0  | 1  | 1  | 1  | 1  | 0  | 1  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₂      | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₃      | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₄      | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₅      | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₆      | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 1  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₇      | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₈      | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 0   | 0   | 0   | 0   | 0   | 0   |
| S₉      | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0   | 0   | 0   | 1   | 0   | 0   |
| S₁₀     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1   | 0   | 0   | 0   | 1   | 0   |

Solve Reachable Matrix and Skeleton Matrix

Matrix (A+I) can be determined from the Adjacent Matrix A, in which I is referred to the Identity Matrix. According to the definition, the Reachable Matrix M can be acquired from the formula (2):
\[(A + I)^r = (A + I)^{r+1} = M\]  \hspace{1cm} (2)

It indicates whether there is a path from one factor to another. In order to simplify the calculation, the Reachable Matrix is reduced before next step. As the Adjacent Matrix A is considered as a digraph, it is easy to prove that this graph is a connected graph, which cannot be divided anymore. Gabow algorithm is used to find the strong connected component of the digraph, and find out the loop in the matrix. Then the loop is reduced, and the Reduced Matrix A’ of the system is acquired, which is shown in Table 3.

| factors | S₁₆ | S₇ | S₈ | S₉ | S₁₂ | S₁₃ | S₁₇ |
|---------|-----|----|----|----|-----|-----|-----|
| S₁₆     | 1   | 1  | 1  | 0  | 0   | 0   | 0   |
| S₇      | 0   | 0  | 1  | 0  | 0   | 0   | 0   |
| S₈      | 0   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₉      | 1   | 1  | 1  | 0  | 0   | 0   | 0   |
| S₁₂     | 0   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₁₃     | 0   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₁₇     | 0   | 0  | 1  | 0  | 0   | 1   | 1   |

Then the reachable matrix is acquired as Table 4.

| factors | S₁₆ | S₇ | S₈ | S₉ | S₁₂ | S₁₃ | S₁₇ |
|---------|-----|----|----|----|-----|-----|-----|
| S₁₆     | 1   | 1  | 1  | 0  | 0   | 0   | 0   |
| S₇      | 0   | 0  | 1  | 0  | 0   | 0   | 0   |
| S₈      | 0   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₉      | 1   | 1  | 1  | 1  | 0   | 0   | 0   |
| S₁₂     | 0   | 0  | 0  | 1  | 0   | 1   | 0   |
| S₁₃     | 0   | 0  | 0  | 0  | 0   | 1   | 0   |
| S₁₇     | 0   | 0  | 1  | 0  | 0   | 1   | 1   |

The relations among the elements of the system is expressed by the Reachable Matrix, and the Skeleton Matrix is its most simplified representation. Extract the skeleton matrix F’ of Reachable Matrix M’. Firstly, remove the skipped binary relations of the elements which have already had adjacent binary relations. Then remove the binary relations of each elements themselves, which means minus an Identity Matrix. At last, the Skeleton Matrix is acquired as Table 5.

| factors | S₁₆ | S₇ | S₈ | S₉ | S₁₂ | S₁₃ | S₁₇ |
|---------|-----|----|----|----|-----|-----|-----|
| S₁₆     | 0   | 1  | 0  | 0  | 0   | 0   | 0   |
| S₇      | 0   | 0  | 1  | 0  | 0   | 0   | 0   |
| S₈      | 0   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₉      | 1   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₁₂     | 0   | 0  | 0  | 1  | 0   | 0   | 0   |
| S₁₃     | 0   | 0  | 0  | 0  | 0   | 0   | 0   |
| S₁₇     | 0   | 0  | 1  | 0  | 0   | 0   | 0   |

**Build Interpretive Structural Model**

According to the skeleton matrix F’, the interpretation structural model is acquired as shown in Fig. 1. It is clear in Fig.1 that the factors in the first level of IDIHL were leadership will and dissemination channel. The system is divided into leadership will subsystem and dissemination channel subsystem. The second level of the system consists of 4 factors. The third level of the system consists of 8 factors. And there is only 1 factor in the last level.
Some conclusions could be brought after the optimized IDIHL model was analyzed:

(1) The output level is the top level of the system. There are 2 items, leadership will and dissemination channel, in this level, which were the most direct factors in this system. They may be affected by the factors in the next level, and other factors can directly or indirectly affect them to affect the whole system. In colleges, the stronger the wills of the leaders hold, the more various, fast and safe dissemination channel there will be, and the easier the information can be disclosed. On the contrary, it may lead to poor results or even fail on IDIHL. Therefore, the most direct way to improve the level of IDIHL is to improve the willingness of university leaders and to build a reasonable and efficient information disclosure channel.

(2) There are 9 items in the process level: encourage effecting, policy guarantee, clear content, legalization, normalization, rationality, evaluation system, public opinion pressure and peer influence, among which there are transmission relationships between the encourage effecting and other factors. These factors can directly or indirectly affect the leadership will. Factors in this level are...
key factors to leadership will. If they are strengthened, the leadership will can be promoted rapidly and effectively.

(3) Factors in input level are input variables in this system, which consists of audience demanding, information resource, technical level and information security. They are the fundamental factors of the system. These factors have existed before the system was established, so they are controllable to some extent. The input variables of the system determine the basis of the system. All factors in this level determine leadership will subsystem. Information security and technical level determine dissemination channel subsystem. If colleges want good output, they must provide good input, which is enough audience demand, abundant original information resources, excellent technical level and good information security environment.

Conclusion

The IDIHL system is a complex system consists of several key factors. All factors play different roles. The model of IDIHL system was constructed based on ISM in this paper. The model shows that audience demanding, information resource, technical level and information security are the fundamental influential factors on IDIHL, and leadership will and dissemination channel are the direct influential factors on it. The structural model shows that the key points of the IDIHL work: enough audience demand, abundant original information resources, excellent technical level and good information security environment.

15 factors are summed up from the analysis of all kinds of literature, but still the research scope is limited, and all the effects in the actual system cannot be covered completely. Therefore, there are still some limitations in this paper. There are various influential factors on IDIHL, each of which has different influence law and influence mechanism. The study of the coupling mechanism between these factors and the quantitative analysis of the impact of different factors on the IDIHL will be a research topic in the future.

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