Research on collaborative governance mechanism of academic ecological environment under the background of crowd intellectual thinking

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Abstract

Purpose – This paper aims to use intellectual thinking to solve the problem of how to carry out collaborative governance of the academic ecological environment.

Design/methodology/approach – This paper selected academic ecosystem, academic ecological environment and academic ecological governance as three keywords to collect literature data. The hot issues on the academic ecological environment and its governance system in China are analyzed, with visualization software such as Citespace, China National Knowledge Infrastructure (CNKI) and other literature metrology tools.

Findings – The previous research literature cannot fully explain the governance mechanism of the academic ecological environment. In this paper, the authors use the way of group cooperation thinking in the crowd science category, to build a collaborative governance framework of the academic ecological environment from the national level, the institutional level and the individual level, taking full advantage of the in-depth analysis on crowd intellectual thinking.

Originality/value – The authors use the way of group cooperation thinking in the crowd science category, to build a collaborative governance framework of academic.

Keywords Collaborative governance, Academic ecological environment, Crowd intellectual thinking

Paper type Research paper

1. Introduction

There are many group cooperation phenomena in nature and human society, for instance, birds forming teams, ants nesting, processing and manufacturing, production and construction, brainstorming and, etc. Researchers refer to the above phenomena as crowd intelligence and devote themselves to exploring the emergence mechanism of crowd intelligence, designing various algorithms such as ant algorithm, establishing optimization algorithm models and applying them to optimizing various engineering practices, forming the research field of crowd intelligence. Compared to the traditional crowd intelligence phenomena, the crowd intelligence in the internet era is not only larger in scale, wider in range and closer in interaction. Moreover, the nature of crowd intelligence has also extended from homogeneous intelligence to heterogeneous intelligence and the range of activities has expanded to a ternary superposition space where physical space, consciousness space and information space are deeply integrated. Thus, the material, information and consciousness of different laws interact with each other in larger scale, deeper degree, further influence and unpredictable consequences.

It is particularly important that the behavior and results of the group activities show broader characteristics of opposition and unity, more specifically, characteristics of stability and mutation, order and disorder, certainty and uncertainty, other organization and self-organization, knowable and unknowable, which constantly lead to behaviors that subvert traditional theories and technologies, resulting in qualitative changes in crowd intelligence. The group intelligence emerged from a complex internet environment is defined as crowd intelligence.

In recent years, scandals in academic circles have been breaking out in China, such as the plagiarism of celebrities. Two core journals in China published articles on "teacher's praise" and "father and son's text." During the COVID-19 epidemic, some experts paid so much attention on SCI papers, instead of saving lives. More than 100 unqualified papers were sampled in Jiangsu and Guangdong provinces, which reflected that there was academic utilitarianism, academic ethics, academic dishonesty and other problems in the academic ecological environment. The government departments issued documents one after another to enhance the management and regulation of publication. However, the government alone is not able to achieve the governance goal of the academic ecological environment, all the participants of the academic ecological environment should work together with the corresponding operational mechanism. Therefore, based on the group cooperation thinking of crowd intelligence, this paper deeply discusses the research status of collaborative governance of academic ecological environment in China and its realization of collaborative governance and gives effective recommendations for building a healthy academic ecological environment in China.

2. Data resources

To deeply analyze the research status of collaborative governance of academic ecology in China and how to realize collaborative governance of academic ecological environment, first, this paper needs to explore the knowledge structure and hot issues of academic ecological environment, thus, "academic ecology" and "academic ecological environment" are two keywords in this paper, to clarify the current research situation and problems of academic ecological environment. Second, as this paper discusses the research hotspots of academic ecological environment governance, "academic ecological governance" is chosen as the third keyword, sorting out the governance measures of scholars on academic ecology, so as to clarify the research direction and countermeasures for the effective collaborative governance of the academic ecological environment. The literature data samples of this paper come from China Academic Journal Publishing Database [China National Knowledge Infrastructure

(CNKI) Database]. "Academic ecology," "academic ecological environment" and "academic ecological governance" are selected as three search items to collect literature data and the data are analyzed through Citespace, CNKI visualization software and other literature metrology tools.

In this paper, all the journals included in China Academic Journal Publishing Database are selected, and the repeated word cutting method is used. First, "theme = academic ecology" is set as the keyword, and 2,550 search results are found. To accurately focus on the research data, 460 search results are obtained by searching the literature with "theme = academic ecological environment" as the keyword. After sorting out the retrieval results, we deleted the irrelevant information such as the solicitation of papers, the preface, the introduction of personal academic achievements, the comments of manuscripts and the introduction of journals and finally got 195 research documents, covering the period from 1989 to 2021. The total number of references cited in these 195 papers is 1,268, with 844 citations and 45,812 downloads. The average number of references cited in each document is 6.5, the average number of cited times is 4.33, the average number of downloads is 234.93 and the cited proportion of downloaded documents is 0.02%.

In addition, this paper searches the literature with "theme = academic ecology" as the keyword and obtains 2,550 retrieval results. To focus on the research data accurately, 91 retrieval results are obtained by searching the literature with "theme = governance" as the keyword. After sorting out the retrieval results, we deleted the irrelevant information and finally got 65 research documents, covering the period from 1990 to 2021. The total number of references cited in these 65 papers is 979, with 258 citations and 24,771 downloads. The average number of references cited in each document is 15.06, the average number of cited times is 3.97, the average number of downloads is 381.09 and the cited proportion of downloaded documents is 0.01%.

3. Quantitative analysis of atlas
3.1 The amount and time of publication
As shown in Figure 1, the graph lines represent the annual trend of papers published in the field of academic ecological environment, in which red lines represent selected documents, dark blue lines represent references and light blue lines represent cited papers. The annual trend of paper publication refers to the research situation in the academic ecological environment field from 1989 to 2021, with a total of 195 papers. Figure 1 shows that the number of articles published is in a rising trend and the number of articles published during 1989–1997 is relatively small, which mainly concerns academic innovation and educational innovation in colleges and universities. During the period from 1998 to 2013, the references and citations have been rising continuously, papers in this period focus on the relationship between teachers and students in colleges and universities, the quality of student training,
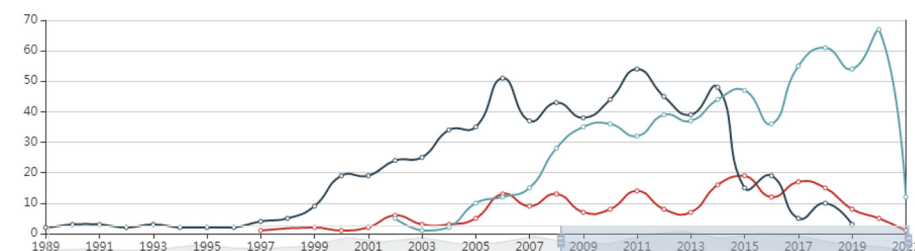

Figure 1.
Distribution of the
number and time of
papers on academic
ecological
environment from
1989 to 2021

academic misconduct and the academic responsibility of teachers and students in colleges and universities. After 2014, the number of papers published dropped from the peak to the trough, but the number of cited documents gradually reached the peak, indicating that most scholars' research perspectives and data sources have changed, such as paying attention to the construction of ecological civilization, the ecological environment of academic organizations and the establishment of scientific research evaluation system in universities, which shows that the research in the field of the academic ecological environment has gradually become a hot topic.

As shown in Figure 2, the graph lines represent the annual trend of papers published in the field of academic ecological environment, in which red lines represent selected papers, dark blue lines represent references and light blue lines represent cited papers. The annual trend of paper publication refers to the research situation of academic ecological environment governance from 1990 to 2021, with a total of 65 documents. Figure 2 shows that the number of articles published is in a rising trend and the number of published articles is relatively small during 1990–2005, which mainly analyzes academic ecological governance and academic corruption problems in universities. During 2005–2013, the number of selected papers, references and cited papers increased continuously every year and the research perspective was more detailed, focusing on the governance of academic corruption in universities, the autonomy of university interests, the imbalance of academic ecology in universities and the research of academic accountability mechanism in universities. After 2014, most scholars' research perspectives and data sources have become more refined, such as paying attention to the alienation of academic innovation incentive mechanism in universities, the governance of academic journal publishing fees, the administerization of academic power in universities, the analysis and governance of college students' academic morality problems and the exploration and practice of teaching style and study style construction in universities, which indicates that the research on the influence of academic ecological environment governance on scientific research development and talent training in universities has become a hot topic.

3.2 Keywords analysis

The core viewpoints of each academic paper are expressed by keywords, which cover the important contents of the paper theme. Therefore, the analysis of keywords in a certain field would quickly dig out the research viewpoints and contents in this field. With the literature metrology software, two keywords, "academic ecology" and "academic ecological environment" are explored in depth. All the literature data are imported into the software and the time span is set from 1989 to 2021. The length of a single time partition is 1a, the source of clustering words is "title," "abstract," "author keywords" and "keywords plus" and "burst plus" as clustering type, the "keywords" as node type. As the number of selected

Figure 2.
Distribution of the number and time of academic ecological governance papers from 1990 to 2021

papers is 195, the highest frequency of quoted words in each time zone is adjusted to 30 keywords. The keywords map is shown in Figure 3 with Citespace software. The reliability of data analysis (Q value) in the upper left corner is 0.8005, the structure value (S value) is 0.9524 and both Q value and S value are above 0.5, indicating that the analysis results are valid.

Moreover, the two keywords, "academic ecology" and "academic ecology governance" are also concerned, all the literature data are imported into the software and the time span is set from 1990 to 2021. The length of a single time partition is 1a, the source of clustering words are "title," "abstract," "author keywords" and "keywords plus" and "burst plus" as clustering type, the "keywords" as node type. As the number of selected papers is 65, the highest frequency of quoted words in each time zone is adjusted to 10 keywords. The keywords map is shown in Figure 4 with Citespace software. The reliability of data analysis (Q value) in the upper left corner is 0.8666, the structure value (S value) is 0.9805 and both Q value and S value are above 0.5, indicating that the analysis results are valid.

4. Literature review of previous studies

Two hot topics on the academic ecological environment issue are obtained through literature metrology software. One is the current situation of the academic ecological environment, the other is the governance of academic ecology. Obviously, both of these problems have affected the conservation and development of an academic ecological environment in China. Academic environment is the life foundation for the academy (Ji, 2015). The collection of environmental conditions of academic activities constitutes the academic ecological environment (Li, 2007). With the continuous emphasis on academic research in universities

Notes: 学术生态环境：Academic ecological environment，学术生态：Academic ecosystem，学术环境：Academic environment，学术期刊：Academic journal，生态环境：Ecological environment

Figure 3.
Structure diagram of
keywords in
academic ecological
environment research
field from 1989 to
2021

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May 30, 2021 4:10:57 PM CST
WoS: E:\BaiduNetdiskDownload\output
Timespan: 1990-2021 (Slice Length=1)
Selection Criteria: g-index (k=25), LRF=2.0, LBY=8, e=2.0
Network:: N=207, E=422 (Density=0.0198)
Largest CC: 109 (52%)
Nodes Labeled: 5.0%
Pruning: None
Modularity Q=0.8666
Weighted Mean Silhouette S=0.9805
Harmonic Mean(Q, S)=0.9201

Figure 4.
Structure diagram of keywords in academic ecological environment governance research field from 1990 to 2021

Notes: 学术生态：Academic ecosystem，学术治理：Academic governance，学术创新：Academic innovation，学术道德：Academic ethics，学术权力：Academic power，学术不端：Academic misconduct

and the expansion of research fields, scholars have made many achievements in the research field of the academic ecological environment. To understand the previous research context accurately and comprehensively, this paper reviews the studies on academic ecological environment and academic ecological governance separately.

4.1 Research on academic ecological environment

With the heavy reliance of society development on scientific and technological innovation, the maximization of economic benefits leads scientific research activities to short-term interests, researchers seek quick success and instant benefits (Li, 2017). What is more, academic evaluation is directly related to professional title, salary and reward, which leads to problems such as rigid academic interest, biased academic orientation and excessive economic pressure of researchers. Researchers emphasize on quantity instead of quality, on publication instead of its application. In addition, the objectives, funds and schedule of scientific research projects are too strict and the tolerance of failure is seldom, resulting in academic misconduct and academic dishonesty (Du, 2019).

The exploration of multidimensional evaluation mechanisms such as representative works and symbolic achievements will provide an important reference and basis for the construction of a scientific research evaluation system with Chinese characteristics. Improving the academic moral quality of university teachers, creating a good teacher-student relationship and effectively preventing graduate students' academic misconduct is the foundation of building a healthy academic ecological environment (Zhu, 2015).

4.2 Research on academic ecological governance
The research on academic ecological governance indicates that, on the one hand, the punitive measures, especially taking legal action to solve the academic ecological crisis in colleges and universities, are particularly important. On the other hand, cultivating a benign academic community and a clean academic evaluation system and enhancing the moral self-discipline of academic participants are the ways to achieve academic ecological governance in colleges and universities (Wang and Li, 2018).

The existing literature research has made some progress, but there are still two shortcomings as follows:

First, most studies have discussed the superficial causes of academic ecological environment, lacking the analysis of the root causes of unreasonable resource allocation and imperfect scientific research management system. Universities and research institutions rely on indexes, for instance, the number of SCI publications and major projects to improve their ranking and strive for more resources from the government and enterprises. However, their excessive enterprise performance assessment has changed the target and behavior of teachers and researchers, resulting in utilitarianism during the scientific research process. Under the impetuous atmosphere, the scientific research management system is, in turn, too rigid to prevent academic misconduct. Scientific research pursues more on efficiency and speed instead of quality and continuity. Therefore, it is extremely urgent to enhance academic ecological governance capacity.

Second, the current research only focuses on the governance mechanism of a single subject, while the collaborative governance mechanism of multiple subjects would largely improve the governance efficiency. As the influence mechanism varies in each section, relying on the governance of government and universities alone is not practical. In the contrary, collaborative governance would make full use of the governance mechanisms in the academic ecological environment. It combines governance mechanisms of different subjects, achieving win-win governance of multiple subjects through the coordination and cooperation.

5. Collaborative governance framework of academic ecological environment under the background of crowd intellectual thinking
The phenomenon of crowd wisdom reflects the cooperative development of nature and human society, which are mutually interact and interdependent. In the same way, interacting and collaborative governance among participants facilitates a healthy academic ecological environment. From the microstructure perspective of the academic ecological environment, it is composed of the internal environment and external environment (Wang and Li, 2018). The internal environment is mainly influenced by the academic evaluation in universities and scientific research institutions, while the external environment is mainly influenced by the external supervision of the government. From the macrostructure perspective, the academic ecological environment is interrelated, restricted and influenced by academic subjects and objects (Li, 2016). The academic subjects are teachers and researchers and the object is academic research. Therefore, the governance subjects of the academic ecological environment are mainly the government, universities and research institutions, teachers and researchers. In this paper, the government, universities and research institutions, teachers and researchers are taken as the research objects and the collaborative governance framework of the academic ecological environment is proposed. The governance mechanisms of each research object and the collaborative relationship between governance mechanisms are analyzed in depth and the corresponding governance countermeasures are put forward.

5.1 Framework analysis

Based on the collaborative governance theory, and the hierarchical relationship among the government, universities and research institutions, teachers and researchers, this paper proposes a "trinity" collaborative governance framework. The governance mechanism is divided into three key parts, namely, supervision mechanism, evaluation mechanism and incentive mechanism, as shown in Figure 5.

The "trinity" collaborative governance framework comes from the hierarchical relationship and governance method of each research object. Among them, the government section is the highest level and its governance method is administrative supervision, in ways of supervision, the universities and scientific research institutions are intermediate levels and their governance methods are scientific research evaluation rules formulated by Academic Committee, the last level is teachers and researchers, whose governance methods are mainly academic community autonomy.

The government's supervision mechanism directly supervises the academic evaluation mechanism of universities and research institutions and then the academic performance of teachers and researchers is evaluated by the evaluation mechanism and the evaluation results affect the incentive mechanism of teachers and researchers. In addition, the government's supervision mechanism can directly improve the effectiveness of the academic community's supervision of teachers and researchers' academic integrity. In the process of cooperative governance, the three mechanisms work together.

5.2 Support and supervision-oriented regulatory mechanism

In the traditional system, academic governance is usually realized by "resource allocation intervention" and "scientific research management intervention." These accountability-oriented regulatory governances resulted in unreasonable academic evaluation in universities and scientific research institutions and frequently dishonest behaviors of teachers and researchers. Thus, reasonable support and supervision in the new era make academic autonomy and effective supervision available, which enable more dynamic and effective government supervision. The aim of this section is to analyze supervision-oriented regulatory governance among different government supervision objects. The research steps to be carried out are as follows: summarizing the characteristics of several governance
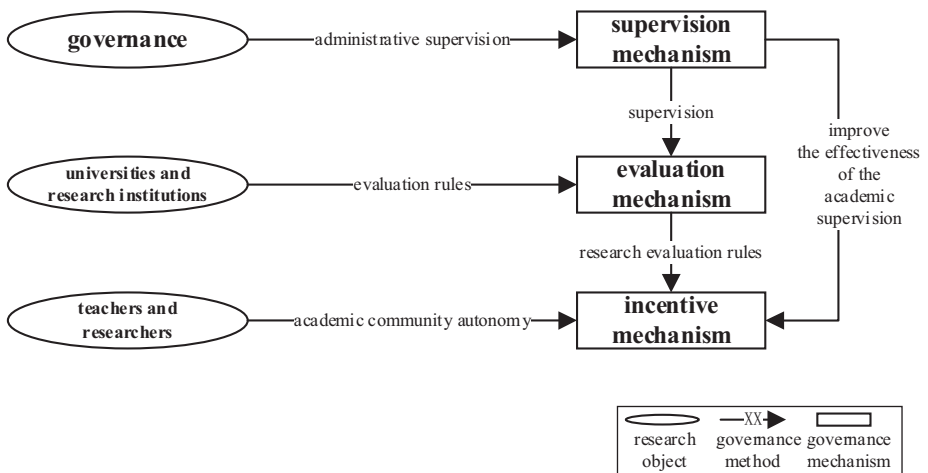

Figure 5.
Collaborative governance framework of academic ecological environment

models in China and abroad → qualitatively research on governance mechanism, which would enhance the efficiency of government supervision on academic committees, guiding academic evaluation system → constructing quantitative simulation models of government supervision policies, respectively, and testing the government supervision measures with different supervision objects → putting forward corresponding supervision countermeasures.

5.3 Quality and contribution-oriented evaluation mechanism

To resolutely overcome the stubborn problem of emphasis only on scores, studies, diplomas, papers and hats, the government departments have issued number of documents and guidance, which requires universities and scientific research institutions to establish an education evaluation system oriented by quality and contribution (Du, 2020). The academic committees should play a guidance role during academic evaluation, stimulating researchers to produce high-quality research outcomes and consider the degree of contribution to the country and the degree of recognition at home and abroad. The aim of this section is to find out proper evaluation indexes influencing the quality and contribution of research outcomes. The research steps to be carried out are as follows: summarizing the evaluation indicators that affect quality and contribution → sorting out the evaluation indicators at all levels that emphasize quality and contribution based on the research conclusion of supervision mechanism → applying grounded theoretical research and questionnaire survey to screen out the key evaluation indicators → building a theoretical model and verifying it through expert interviews → putting forward corresponding evaluation countermeasures.

5.4 The freedom and integrity-oriented incentive mechanism

Academic freedom refers to the freedom of academic exploration, academic expression and knowledge transmission (Li, 2018). Advocating academic freedom not only requires teachers and researchers to concentrate on learning but also to follow the integrity character of core science values, gradually leading academic activities to approach scientific truth-seeking. The aim of this section is to find out how to stimulate the academic freedom of teachers and researchers and how to supervise the academic integrity of the incentive policies. The research steps to be carried out are as follows: sorting out the main characteristics of academic freedom → matching the characteristics of academic freedom based on key evaluation indicators and summarizing the impact indicators of academic freedom of teachers and researchers → building a theoretical model, obtaining key indicators through expert interviews and empirical tests and proposing incentive measures → giving full play to the autonomous role of the academic community, judging the academic integrity risks of teachers and researchers in incentive measures through peer-reviewed questionnaire survey, and proposing prevention and control measures → formulating perfect incentive countermeasures.

5.5 Collaborative governance strategy of academic ecological environment

The aim of this section is to discuss ways of extracting effective collaborative governance strategies from different levels. The research steps to be carried out are as follows: implementing expert interviews and questionnaires, to formulate effective collaborative governance strategies from three levels, namely, government, universities and research institutions, teachers and researchers → the countermeasures are suggested to contain supervision countermeasures, evaluation countermeasures and incentive countermeasures.

6. Summary

In recent years, most teachers and researchers are willing to promote the evolution of the academic ecological environment. This paper aims at purifying the academic ecological environment from the perspective of collaborative governance, highlighting the adaptability of research. The literature research of academic ecological environment by domestic scholars mainly analyzes the present situation of academic ecological environment in colleges and universities from the aspects of unreasonable academic evaluation, academic integrity and academic dishonesty and discusses how to build an academic ecological environment and how to manage the academic ecological environment in colleges and universities. However, the previous research are not able to explain the governance mechanism of the academic ecological environment well under the current situation. In this paper, the cooperative governance framework of the academic ecological environment is proposed from the national level, the institutional level and the individual level, by analyzing the cooperation between different governance mechanisms in depth, so as to give full play to the maximum effectiveness of governance mechanisms and expand the theoretical system of collaborative governance.

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