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Retraction

Retracted: The Influence of Multidimensional Gray Theory on Higher Education Cooperation Projects under the Mobile Communication System

Security and Communication Networks

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Security and Communication Networks has retracted the article titled "The Influence of Multidimensional Gray Theory on Higher Education Cooperation Projects under the Mobile Communication System" [1] due to concerns that the peer review process has been compromised.

Following an investigation conducted by the Hindawi Research Integrity team [2], significant concerns were identified with the peer reviewers assigned to this article; the investigation has concluded that the peer review process was compromised. We therefore can no longer trust the peer review process, and the article is being retracted with the agreement of the Chief Editor.

The author does not agree to the retraction.

References

[1] W. Shang, "The Influence of Multidimensional Gray Theory on Higher Education Cooperation Projects under the Mobile Communication System," *Security and Communication Networks*, vol. 2022, Article ID 9118201, 11 pages, 2022.

[2] L. Ferguson, "Advancing Research Integrity Collaboratively and with Vigour," 2022, https://www.hindawi.com/post/advancing-research-integrity-collaboratively-and-vigour/.

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Research Article

The Influence of Multidimensional Gray Theory on Higher Education Cooperation Projects under the Mobile Communication System

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Gray system theory is a new field of control theory, which is the product of applying cybernetics and methods to social and economic systems, and is also the product of the combination of control theory and operations research. It takes the gray system as the research object. Whitening, desalination, quantification, modeling, and optimization are the core of the gray system, and it aims to predict and control the development of various gray systems. The purpose of this paper is to study how to analyze and study the impact of higher education cooperation projects with the help of multi-dimensional gray theory and describe the gray system theory. The problem of analyzing the impact of cooperation projects proposed in this paper is based on the gray theory, so it is elaborated around its concept and related algorithms, and a case design and analysis of the impact of higher education cooperation projects are carried out. The experimental results show that the institutions responsible for infrastructure at the top of the school have the greatest impact on infrastructure projects, accounting for about 70%, with 20% weight for communication with government agencies, and about 10% for communication with users.

1. Introduction

From the end of the 20th century to the 21st century, with the rapid economic growth, education has also set off a boom in the world. Various countries have shown the form of striving for local areas and are ready to adjust their education strategies at any time to gain a larger market share and more high-quality teaching resources. With the continuous development of economic globalization, the development of higher education has also been deeply affected. Every scale of "engineering" has been going on since the beginning of human organized activity, the Great Wall, the Pyramids, etc., are examples of great and complex works in human history. With the continuous expansion of the scale of modern projects, the continuous increase of investment, the increasing number of designers, and the more and more complex internal project relationships, the traditional management model can no longer meet the needs of good project execution. Therefore, it is necessary to establish a project management model, which has gradually evolved into one of the main management methods.

This research will systematically classify and organize higher education cooperation projects and sort out the general situation of cooperation, hoping to grasp the laws of higher education cooperation. It also looks forward to the development trend of future higher education cooperation and explores effective cooperation paths. It is helpful to enrich the research on higher education cooperation, to learn from experience, to draw lessons from it, to carry out education cooperation, and to have reference value for the development of higher education cooperation projects in the future.

The innovations of this paper are as follows: (1) this paper combines gray system theory with higher education project cooperation and introduces the theory and related methods of gray system theory in detail. (2) In the face of project cooperation, use indicator weights for analysis. Through the evaluation of the experimental results, it is concluded that the institutions responsible for infrastructure at the top of the school have the greatest impact on infrastructure projects, accounting for about 70%.

2. Related Work

If the third technological revolution centered on computer and Internet technology brought the global economy to the end of the 20th century, the rise of the mobile Internet since 2007 has marked the explosion of smart portable devices such as iPhones, Androids, and tablets. It will redefine various fields including education, thus providing great opportunities for the industrialization of mobile education. Kaleem et al. proposed the Neighbor Interference Situation-Aware Uplink Power Control (IA-ULPC) scheme to address next-generation mobile communication (5G) systems targeting very high data rates by deploying more small cells. But since the same frequency band is used, this deployment leads to the problem of high cross-layer interference. Compared with the traditional fractional power control scheme (C-FPC), this scheme almost doubles the average user throughput and reduces the interference by about 20% in a dense two-layer heterogeneous network environment. However, its performance is not high [1]. Rahman and Islam focused on the impact of mobile technology on Bangladesh. The results show that mobile phone technology and its suppliers make a significant contribution to GDP and directly and indirectly create 800,000 jobs in Bangladesh. The most important finding is that young people prefer the Internet or social networking sites to television, and that the Internet has a greater negative impact on young people than older people. However, his data are relatively scarce [2]. Khan and Shin investigated the problem of transmit power control in mobile communication systems and proposed a transmit power estimation scheme to maximize the overall system capacity, in which the user's transmit power control was studied using recurrent neural networks. His proposed scheme outperforms traditional power control techniques and other neural networks. However, his contrasting content is not prominent enough [3]. Haneche et al. proposed a new end-to-end communication system to improve transmission speed, robustness, and security. The proposed compressed sensing source coding method allows to reduce the complexity of speech coding by using simple quantization and binary coding, save communication system resources, and encrypt communication without additional cost. The results show that for a bit rate of 12.8 kbit/s, the proposed scheme achieves fair speech intelligibility demonstrated by a CSII value of 0.5, provides a good measure of output speech quality, and provides a PESQ of 3.33 at the same bit rate. However, his content is not novel enough [4]. Based on experimental measurements, Ma Y shows that MIMO has different feedback requirements when the receiver is rotated than when the receiver is in other moving scenarios. He shows the failure of existing motion sensing methods to distinguish between rotating and moving states, and to handle erroneous rotation detections and state transitions between rotating and static, RoFi uses the power of the strongest path computed from the PDP. However, it consumes a lot of energy [5]. Kim et al. studied that the continued development of fifth-generation (5G) mobile communication technology will be the cornerstone of information and communication technology (ICT) applications in various fields such as smart cities, smart homes, and connected cars. He introduced the architecture and functionality of the 5G mobile communication system recognized in the NextGen study. However, its practical significance is not very strong [6].

3. Multi-Dimensional Gray System Evaluation Method Based on Mobile Communication

3.1. Mobile Communication. Mobile Internet refers to a new mode of integration, mutual promotion, and common development of the Internet and mobile communication networks [7–9]. The Internet and mobile communications are two of the most modern and fastest-growing areas of technological change, and they have many similarities and their own characteristics [10]. Mobile Internet combines the advantages of both, which determines the huge number of users. The mobile Internet inherits the characteristics of the open Internet protocol of the desktop computer and also inherits its characteristics of real time, privacy, portability, etc., as shown in Figure 1.

In recent years, with the rise of smart terminals, the mobile Internet has experienced explosive growth, and the development of China's mobile Internet industry is also advancing rapidly. From basic network installation, smart terminals to mobile applications, the industrial chain has basically been formed. It not only changed people's way of life, but also changed the traditional business model.

With the rise of the mobile Internet and the rapid development of intelligent mobile devices, the mobile education industry is undergoing major changes from theory to practice, resulting in a new education model. The emergence of smartphones provides developers with an extremely flexible terminal platform, which is the current hot spot and future development direction of mobile learning applications and research technologies at home and abroad.

Mobile learning refers to an educational model in which learners use mobile devices and mobile Internet technologies to learn and communicate in different ways at different times and places [11, 12]. The goal of mobile education is to provide students with learning that can be assimilated anytime, anywhere.

In the information age where the mobile Internet dominates the development of science and technology, new knowledge and new things are changing with each passing day, providing smarter and more convenient services for the fast-paced life. Lifelong learning has become necessary and possible, and the development of the Internet of mobile devices provides a strong technical guarantee for lifelong learning [13–15]. In the near future, education will move from schools to communities, families, and poor and backward places, changing the predicament of unbalanced educational resources. The Internet has freed people from having to sit in classrooms for face-to-face training, and mobile Internet has allowed people to learn even when they are out and about, so

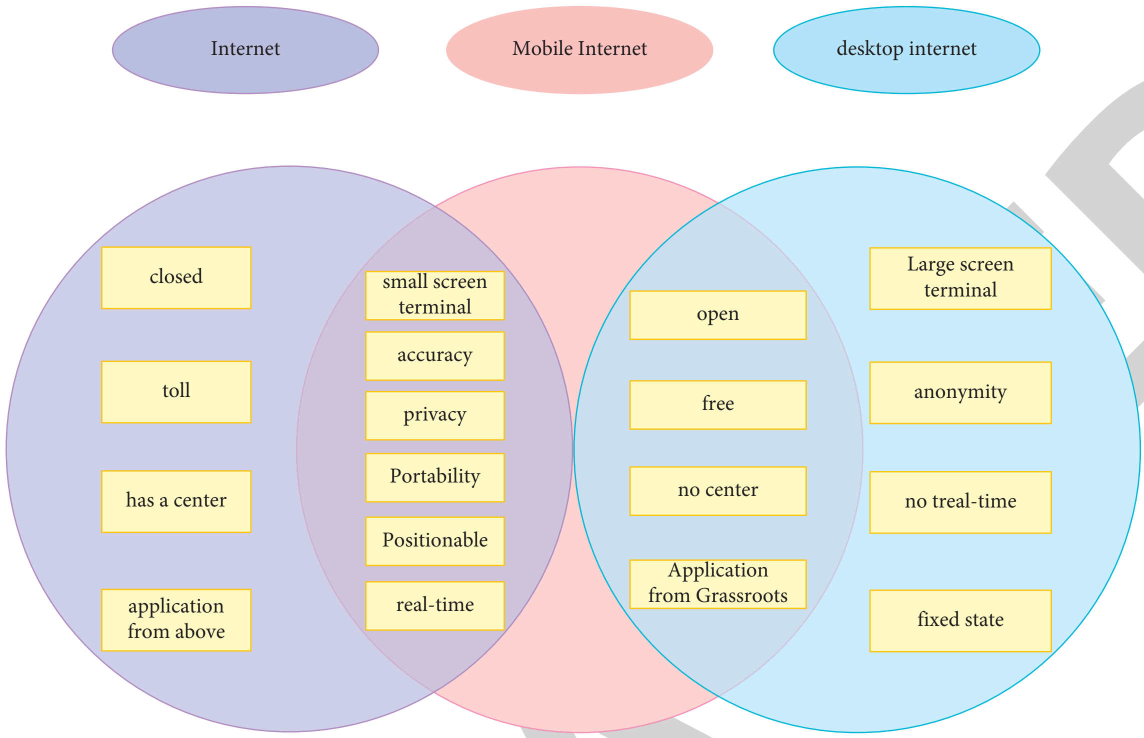

Figure 1: Features of mobile Internet.

they can learn anytime, anywhere. E-learning will become an indispensable part of people's daily life [16, 17]. In order to realize the real "Anyone, Anytime, Anywhere, Anystyle" (4A) in the field of education, a research direction based on mobile communication and the Internet has emerged, which is the so-called mobile education.

3.2. Higher Education Cooperation Project Management. Since the Third Plenary Session of the Eleventh Central Committee of the Communist Party of China, China's higher education international cooperation in running schools has formed an all-round development with international cooperation in running schools as the main form and a new situation in international cooperation in running schools. Cooperation in school operation has also gradually expanded. From 1978 to 1985, the Chinese government adopted a series of policies on international cooperation in running schools, including the Decision on Educational System Reform, "Several Opinions on Carrying out Inter-school Exchanges" and "Request for Instructions on Strengthening the Use of UNESCO in the Field of Science and Technology" and other policies related to international cooperation in running schools and exchanges. For the first time, the development concept and strategic importance of international cooperation in running schools were all confirmed. With rapid economic growth and political support, China is paying more and more attention to the development of higher education. The scale of international cooperation in higher education has been gradually expanded, and the quality of education has been continuously improved.

Modern project management is a new management branch developed in recent years, and the management theory it contains is very different from traditional project management [18, 19]. It is a general theory and management method for various projects in modern society, rather than the traditional project management method focusing on engineering construction projects. The theory and method of modern project management can be applied to the management of various projects in modern society, whether it is a technology development project or a real estate development project, whether it is a software development project or multiple service projects. Modern project management theories and methods are a set of management theories and methods established on the basis of summarizing the general laws of project management, so they are widely used.

3.3. Gray System Theory. In the 1980s, a burgeoning field was proposed and first founded by a professor, namely, gray system theory [20]. It is a branch of systems engineering based on mathematical theory, and it is a new method to study uncertainty with little data and poor information. It mainly solves some problems of unknown factors in specific fields and is widely used in agriculture, geology, meteorology, and other industries.

Comprehensive evaluation of complex systems requires multiple indicators to measure, and indicators can be divided into different levels, so multi-level evaluation is required. For subjective assessment of indicators, information is needed to draw conclusions. The completeness and accuracy of the assessment information are limited by the level of knowledge. Due to the cognitive ability and personal experience of the evaluators, it is difficult to exclude bias caused by human factors, which makes the rating information provided by reviewers less accurate, incomplete, or gray. Therefore, it is more appropriate to apply gray theory to such evaluation problems. If "black" is used to indicate lack of assessment information, "white" indicates adequate rating information, and "gray" between white and black indicates incomplete or inaccurate information; some information is known and is grayed out. Now, when using evaluation information describing different gray levels, the general evaluation method only considers the heaviest weight of the evaluation information on different weight vectors and ignores the rest. Therefore, a lot of information is lost in vain, resulting in poor evaluation results. Therefore, the gray theory is used to analyze and synthesize the implementation degree of each index of a specific evaluation system and draw a comprehensive conclusion to evaluate according to the evaluation standard [21, 22].

3.3.1. Determining the Evaluation Index System. According to the specific situation of the system being evaluated, the project management experts, after research and consultation, determine the first-level indicators, the second-level indicators, the third-level indicators, etc., the specific indicators, and draw the evaluation indicators. The classification and hierarchical structure design of the evaluation indicators are shown in Figure 2.

3.3.2. To Formulate the Grading Standards for Specific Evaluation Indicators Z_{ij}. The comprehensive evaluation index is a qualitative index, which can be quantified by forming index-level standards. If the score is "excellent," "good," "moderate," "poor" or "very good," "good," "better," "moderate," "poor," etc., it can be given according to the quality of the score [23]. A specific score is used as a scoring template for the index, and the higher the score, the better the grade.

Then, the analytic hierarchy process (AHP) method is used to determine the weight of each evaluation index.

3.3.3. Determining the Evaluation Value Matrix of the Evaluation Plan. There are o evaluators, namely, $k = 1, 2, \ldots, m$; there are n evaluation schemes, that is, $u = 1, 2, \ldots, m$. There are p first-level indicators, i.e., $i = 1, 2, \ldots, p$. There are b second-level (specific) evaluation indicators under the a category of indicators, namely, $j = 1, 2, \ldots, b$. Organizational evaluators rate each scoring index Z_{ij} of the evaluation plan according to the scoring level and set the score $c_{ijk}^{(u)}$ of each rating index Z_{ij} of the u-th rating mode of the k-th evaluator's rating at this level. Then, the u-th evaluation value matrix $C^{(u)}$ comes from:

$$C^{(u)} = \begin{bmatrix} c_{111}^{(u)} & c_{112}^{(u)} & \cdots & c_{11m}^{(u)} \\ c_{121}^{(u)} & c_{122}^{(u)} & \cdots & c_{12m}^{(u)} \\ \cdots & \cdots & \cdots & \cdots \\ c_{1b_11}^{(u)} & c_{1b_12}^{(u)} & \cdots & c_{1b_1h}^{(u)} \\ c_{221}^{(u)} & c_{212}^{(u)} & \cdots & c_{21m}^{(u)} \\ c_{221}^{(u)} & c_{222}^{(u)} & \cdots & c_{22m}^{(u)} \\ \cdots & \cdots & \cdots & \cdots \\ c_{p11}^{(u)} & c_{p12}^{(u)} & \cdots & c_{p1m}^{(u)} \\ c_{p21}^{(u)} & c_{p22}^{(u)} & \cdots & c_{p2m}^{(u)} \\ \cdots & \cdots & \cdots & \cdots \\ c_{pb1}^{(u)} & c_{pb2}^{(u)} & \cdots & c_{pbm}^{(u)} \end{bmatrix}. \quad (1)$$

3.3.4. Grayscale Indicator. According to the actual problem, determine the degree of evaluation gray level, the number of gray level, and the whitening function of gray level. Supposing there are h levels of gray levels, i.e., $e = 1, 2, \ldots, h$. The gray rating level is "high," "medium," "low" or "excellent," "good," "medium," "poor" four gray categories, etc. Gray is a number whose approximate range is only known, but not its exact value. It is not a number, but a set of numbers, a space of numbers, recorded as a gray number. In order to describe the class of gray, a whitening function must be determined. There are three commonly used whitening functions:

(1) Gray class 1 ($e = 1$), gray number $1 \in [c_2, \infty]$, and its whitening function expression and whitening function diagram (Figure 3) are as follows:

$$\begin{aligned} f_1\left(c_{ijk}^{(u)}\right) &= 0, \quad c_{ijk}^{(u)} \notin [0, \infty), \\ f_1\left(c_{ijk}^{(u)}\right) &= \frac{c_{ijk}^{(u)}}{c_1}, \quad c_{ijk}^{(u)} \in [0, c_1], \\ f_1\left(c_{ijk}^{(u)}\right) &= 1, \quad c_{ijk}^{(u)} \in [c_1, \infty). \end{aligned} \quad (2)$$

(2) Gray class 2 ($e = 2, 3, \ldots, -h - 1$), gray number $2 \in [0, 2c_2]$, and whitening function expression and function graph (Figure 4) are as follows:

$$\begin{aligned} f_2\left(c_{ijk}^{(u)}\right) &= 0, \quad c_{ijk}^{(u)} \notin [0, 2c_2], \\ f_2\left(c_{ijk}^{(u)}\right) &= \frac{c_{ijk}^{(u)}}{c_2}, \quad c_{ijk}^{(u)} \in [0, c_2], \\ f_2\left(c_{ijk}^{(u)}\right) &= \frac{c_{ijk}^{(u)} - 2c_2}{-c_2}, \quad c_{ijk}^{(u)} \in [c_2, 2c_2]. \end{aligned} \quad (3)$$

(3) Gray class 3 ($e = h$), gray number $2 \in [0, 2c_3]$, and its whitening function expression and whitening function diagram (Figure 5) are as follows:

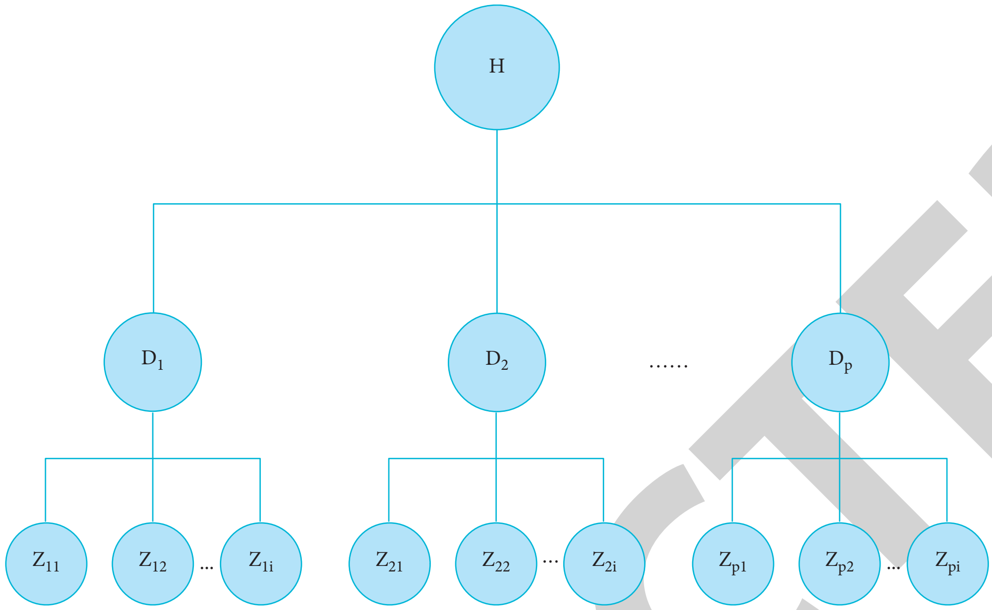

FIGURE 2: Multi-level evaluation index architecture.

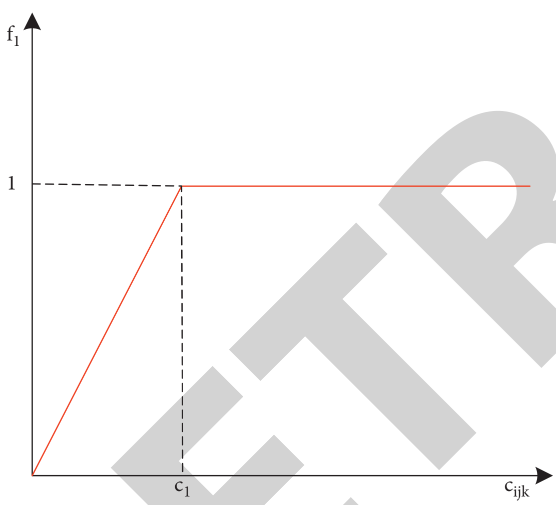

FIGURE 3: $e = 1$ whitening function diagram.

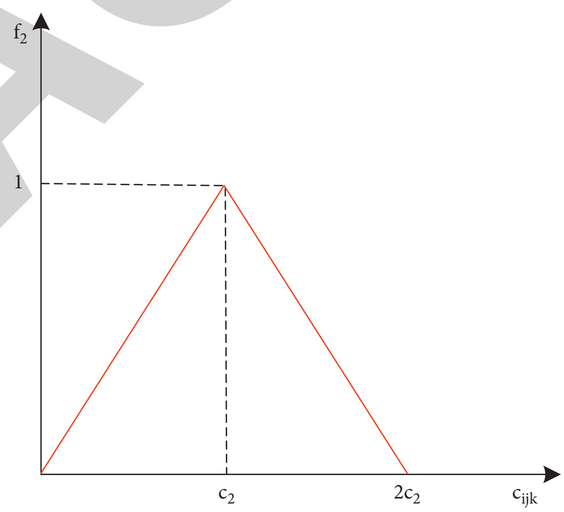

FIGURE 4: $e = 2$ whitening function diagram.

$$
\begin{aligned}
& f_3\left(c_{ijk}^{(u)}\right) = 0, \quad c_{ijk}^{(u)} \notin [0, 2c_3], \\
& f_3\left(c_{ijk}^{(u)}\right) = 1, \quad c_{ijk}^{(u)} \in [0, 2c_3], \\
& f_3\left(c_{ijk}^{(u)}\right) = \frac{c_{ijk}^{(u)} - 2c_3}{-c_3}, \quad c_{ijk}^{(u)} \in [c_3, 2c_3].
\end{aligned} \tag{4}
$$

The values c_1, c_2, c_3 of the turning points of the whitening function are called thresholds, and the target limits can be scaled according to specific criteria or experience; the maximum, minimum, and median values can also be found in the evaluation matrix $C^{(u)}$.

3.3.5. Evaluation Coefficient $\mu_{ije}^{(u)}$ of Gray Class. For the evaluation coefficient μ, according to the whitening function $f_e(c_{ijk}^{(u)})$ and the rating value $c_{ijk}^{(u)}$ of the rating scheme U, calculate the gray rating coefficient $\mu_{ije}^{(u)}$ of the rating scheme U belonging to the gray rating class e:

$$
\mu_{ije}^{(u)} = \sum_{k=1}^{m} f_e\left(c_{ijk}^{(u)}\right). \tag{5}
$$

3.3.6. Calculating the Gray Evaluation Weight $t_{ije}^{(u)}$ and the Gray Evaluation Weight Matrix. The gray e-class rating weight $t_{ije}^{(u)}$ of the evaluation index Z_{ij} to the U rating scheme is as follows:

$$
t_{ije}^{(u)} = \frac{\mu_{ije}^{(u)}}{\sum_{e=1}^{h} \mu_{ije}^{(u)}}. \tag{6}
$$

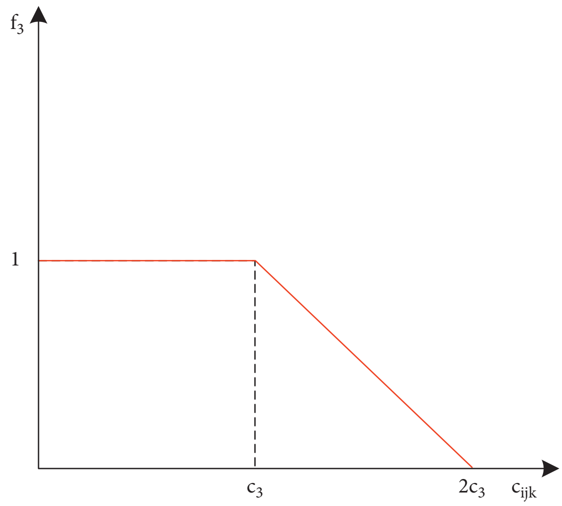

Figure 5: $e = 3$ whitening function diagram.

The gray evaluation weight vector $t_{ije}^{(u)}$ of the evaluation scheme U for the evaluation index Z_{ij} is obtained by synthesizing each gray class ($e = 2, 3, \ldots, h$):

$$t_{ij}^{(u)} = \left(t_{ij1}^{(u)}, t_{ij2}^{(u)}, \ldots, t_{ijh}^{(u)}\right). \tag{7}$$

Gray weighted vector $t_{ije}^{(u)}$ by synthesizing all secondary indicators Z_{ij} (1, 2, ..., b) of primary category indicators obtains the gray evaluation matrix ${T_i}^{(u)}$ of the U rating scheme of the D_i-th index for each gray category:

$${T_i}^{(u)} = \begin{bmatrix} t_{i1}^{(u)} \\ t_{i1}^{(u)} \\ \cdots \\ t_{ib}^{(u)} \end{bmatrix} = \begin{bmatrix} t_{i11}^{(u)} & t_{i12}^{(u)} & \cdots & t_{i1h}^{(u)} \\ t_{i21}^{(u)} & t_{i22}^{(u)} & \cdots & t_{i2h}^{(u)} \\ \cdots & \cdots & \cdots & \cdots \\ t_{ib1}^{(u)} & t_{ib2}^{(u)} & \cdots & t_{ibh}^{(u)} \end{bmatrix}. \tag{8}$$

3.3.7. Calculating the Gray Evaluation Weight $t_{ije}^{(u)}$ and the Gray Evaluation Weight Matrix. For the U rating scheme, the gray rating weight table of each gray rating category D_i is comprehensively evaluated according to the secondary rating index Z_{ij} of each gray rating category D_i and the relative weight vector $V_i = (v_{i1}, v_{i2}, \ldots, v_{ib})$ of the index, and the gray vector $R_i^{(u)}$ that obtains the overall rating of the D_i-th index of the rating system U is

$$\begin{aligned} {E_i}^{(u)} &= V_i \bullet {T_i}^{(u)} \\ &= \left(e_{i1}^{(u)}, e_{i2}^{(u)}, \ldots, e_{ih}^{(u)}\right). \end{aligned} \tag{9}$$

3.3.8. Comprehensive Evaluation. For the U rating scheme, the gray rating vector $R_i^{(u)}$ of different category indicators $D_i\,(i = 1, 2, \ldots, p)$ is composed, and the gray rating weight table $G^{(u)}$ of the U rating scheme is obtained for each gray rating category:

$$G^{(u)} = \begin{bmatrix} E_1^{(u)} \\ E_1^{(u)} \\ \cdots \\ E_1^{(u)} \end{bmatrix} = \begin{bmatrix} g_{11}^{(u)} & g_{12}^{(u)} & \cdots & g_{1h}^{(u)} \\ g_{11}^{(u)} & g_{12}^{(u)} & \cdots & g_{1h}^{(u)} \\ \cdots & \cdots & \cdots & \cdots \\ g_{11}^{(u)} & g_{12}^{(u)} & \cdots & g_{1h}^{(u)} \end{bmatrix}. \tag{10}$$

According to the weight distribution vector $V_i = (V_1, V_2, \ldots, V_b)$ of the main index $D_i\,(i = 1, 2, \ldots, p)$ category and the gray rating weight table $T^{(u)}$ of the U rating scheme, the comprehensive evaluation results of the U scheme are as follows:

$$\begin{aligned} P^{(u)} &= V_i \bullet G^{(u)} \\ &= \left(p_1^{(u)}, p_2^{(u)}, \ldots, p_h^{(u)}\right). \end{aligned} \tag{11}$$

3.3.9. Comprehensive Evaluation Conclusion

Method 1: according to the comprehensive evaluation result $P^{(u)}$ of the U evaluation plan, determine the level of the gray category to which it belongs according to the principle of maximum proximity.

Method 2: if the value of the evaluation result $P^{(u)}$ is not very different, the accumulation method can be used to determine the degree.

Method 3: calculating the overall rating value of each rating scheme with the threshold of each gray rating category as the rating value.

For example, the threshold for gray category 1 is W_1, the threshold for gray category 2 is W_2, and so on, the threshold for gray category h is W_h, and then the level value vector $W = (W_1, W_2, \ldots, W_h)$ for each gray rating category. Therefore, the total H rating value for the U rating scheme is

$$H^{(u)} = P^{(u)} \bullet W^{O}. \tag{12}$$

After finding the overall rating value $H_{(u)}$ of each rating scheme, sort its pros and cons according to the size of $H_{(u)}$. The whole procedure is shown in Figures 6 and 7.

4. Experiments on the Impact of Higher Education Cooperation Projects

4.1. Influence Indicator Weight. The divisions of departments in various colleges and universities are not the same, and the divisions in Table 1 can basically cover the daily work of various colleges and universities.

Figure 8(a) shows the weighting relationship among infrastructure department management, contractor management, and external communication under the overall evaluation index. The management indicators of the infrastructure department are shown in Figure 8(b), the contractor management indicators are shown in Figure 8(c), and the external communication indicators are shown in Figure 8(d).

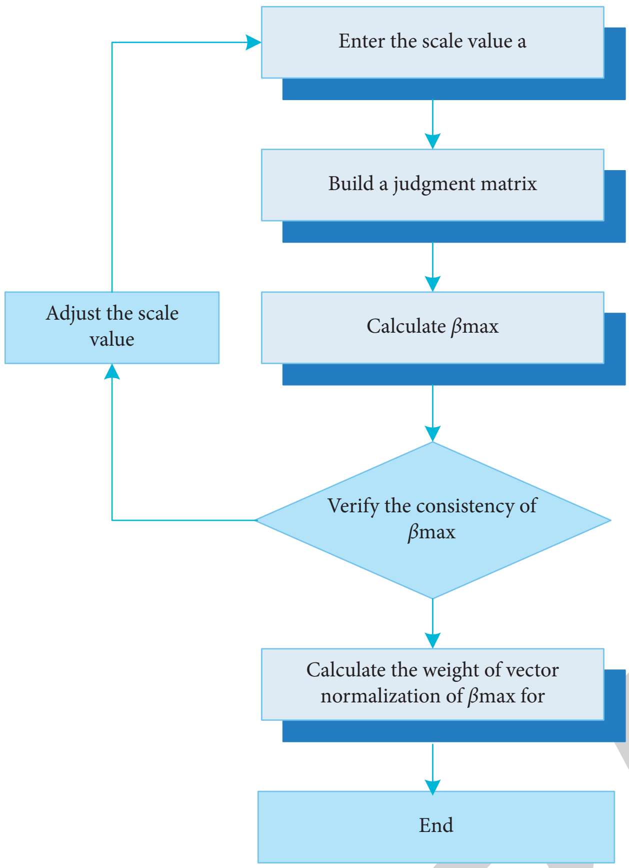

Figure 6: Weight calculation program frame diagram.

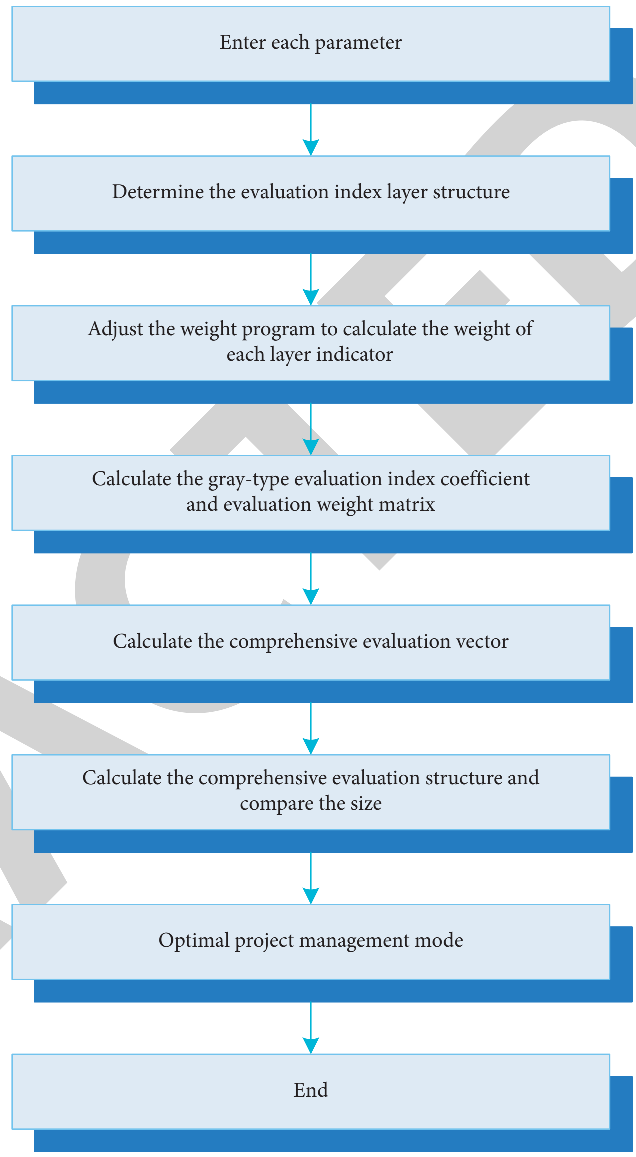

Figure 7: Optimal model program frame diagram.

4.2. Weights. From Figure 8(a), it can be clearly seen that the weight comparison between the first-level indicators that affect the management of infrastructure projects is contractor management > infrastructure department's own management > communication with the outside world.

This shows that the proportion of university infrastructure projects based on social forces is relatively large. After all, the university infrastructure department is only the institution that exercises Party A's rights, and its main task is to manage. After the infrastructure sector has formed a complete and mature management system, the resources invested in project management will be much less than in the initial stage. The relatively small weight of external communication reflects two problems. In the initial stage, the infrastructure department must fully communicate with the outside world, but once in the project implementation process, this communication consumes relatively few resources, and the implementation process takes more energy than the previous investment. The proportion of communication is less than 10%, which indicates that the infrastructure sector must properly strengthen communication with the outside world [24, 25].

As shown in Figure 8(b), among the weights of all secondary indicators that affect the internal management of the infrastructure sector, funding > regulations > organizational structure > information documentation > scheduling > routine meetings.

This shows that although infrastructure construction is in full swing in the current golden age of university construction, and many policies support the construction of university infrastructure, there are still many difficulties to be solved in terms of fund raising and fund use. The establishment of rules and regulations and the construction of organizational structure are the focus of the internal management of the Ministry of Infrastructure, which means that the construction of the infrastructure department of colleges and universities is not a project. Projects, maturing regulations, and organizational structures form the basis for the continued success of future projects. Information files, regular meetings, and programming account for 3%–5% of the weight, which does not mean that they are irrelevant [26]. In fact, with logical regulations and organizational structures, these jobs would certainly be well organized.

As shown in Figure 8(c), among the weights of all secondary indicators affecting contractor management,

Table 1: Division of departments and intelligence in colleges and universities.

Room division	Main function
General office	External contacts, daily administrative affairs, logistics support, office information document management, office expenses, and fixed asset management.
Planning room	Project planning and approval.
General labor office	Quality management, promotion and preparation of technical regulations for project design and construction
Pre-engineering department	For the proposal collection in the early stage of the project, contact the government and relevant institutions in the school to handle the preliminary project documents.
Cost management section	Estimated budget of the project, management during project operation.
Contract management section	Drafting and management of contracts, and cooperating with other departments to supervise the operation of contracts
Materials section	Material procurement management
Project management department	The direct management agency of the project, manages the whole process of the project

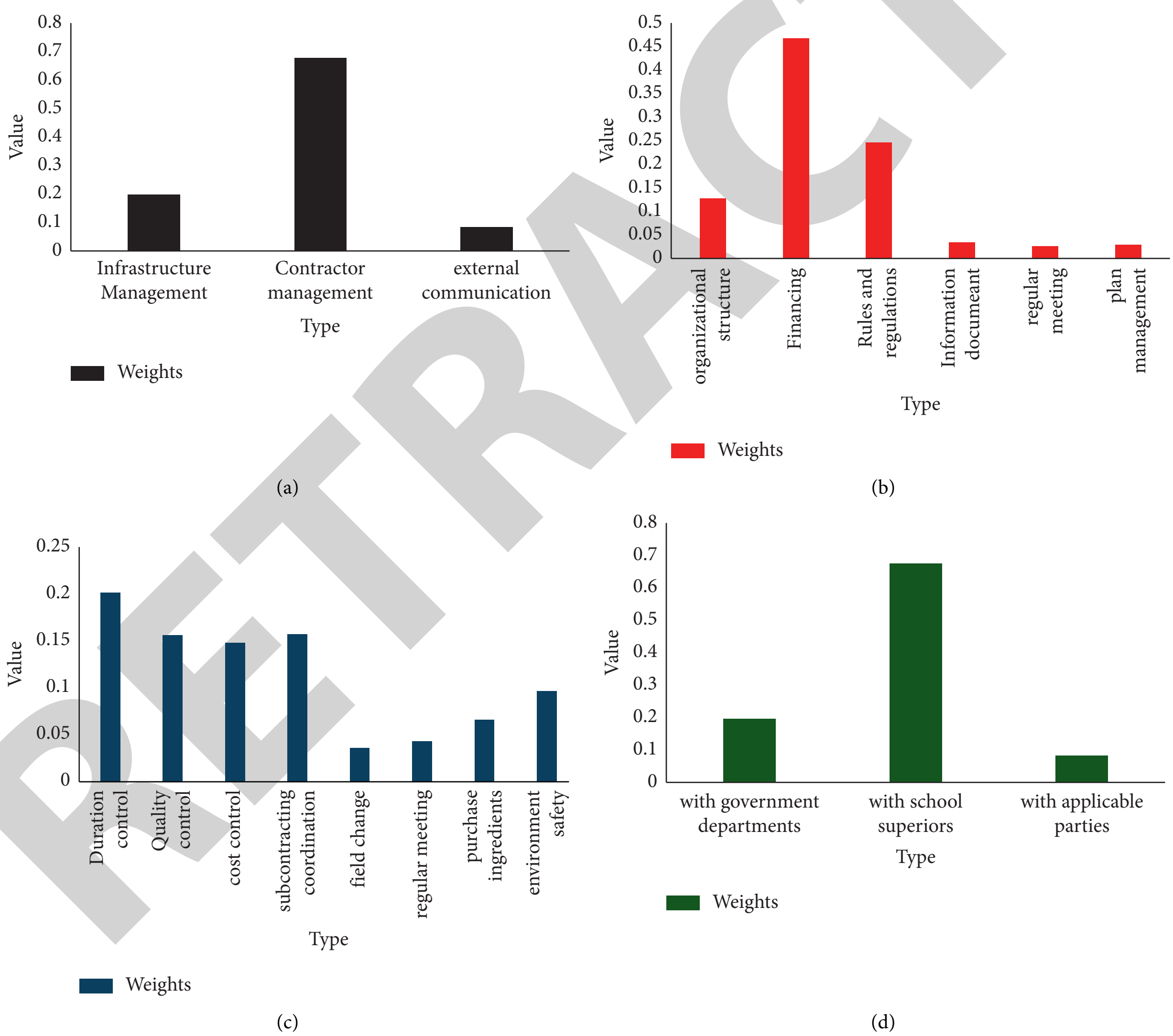

Figure 8: Data graph of weights of different management indicators. (a) Weights of primary indicators. (b) Weights of secondary indicators (managed by the infrastructure department). (c) Secondary indicator weight (contractor management). (d) Secondary indicator weight (external communication).

construction period control > subcontract coordination > quality control > cost control > environmental safety and health > material procurement > routine meeting > site change.

This shows that the importance of the three classic project management objectives in the control of university infrastructure projects is not absolute, and university infrastructure also has other characteristics. The basic

Table 2: Responsibility division table for each party involved in university projects.

Project management model	Scope of application
School parent body	Responsible for the overall infrastructure planning of the school, supervision, and review of infrastructure projects
Investor	Responsible for the preliminary evaluation of investment projects and supervise the use of funds
Infrastructure sector	Responsible for the management of the entire project, should have direct access to the available resources
Project user	Put forward detailed requirements for the project, and can participate in the project construction process
Project management company	If a project management company is introduced, the responsibilities and powers of the infrastructure department must be clearly divided, the work classification should be refined, and the specific points of responsibility for both parties must be clarified.
Contractor	After signing the contract with Party A, be responsible for the design, construction, supply, and other specific construction work of the project
Supervision	After Party A signs the contract, he is mainly responsible for project quality and construction period supervision

construction of colleges and universities must adapt to the requirements of the era of higher education, and the education and teaching of schools cannot be interrupted. It is often the deadline of the construction period. During the construction process, it is necessary to ensure the normal work, study, and life of school teachers and students, so that the control of the construction period and environmental safety and hygiene are placed in a more important position [27]. The weight of subcontracting coordination is about 17%, only second after checking the construction period. It shows that the current colleges and universities continue to generally adopt the management mode of Party A's project department with Party A as the main body, or a project management company, so managing one part in many places takes a lot of effort to manage the infrastructure.

It can be seen from Figure 8(d) that, among the weights of all secondary indicators that affect external communication, communication with school superiors > communication with government departments > communication with users.

This shows that the institution responsible for infrastructure at the top of the school has the greatest influence on infrastructure projects, accounting for about 70%. Many of the infrastructure department's decisions require approval from the university's higher education institutions. Communication with government departments accounts for 20% of the weight, mainly for various approval cases of mechanical construction [28]. While all line programs are established programs, they also require a lot of effort, equivalent to 10% in communication with the user.

The principle and primary task of coordinating projects is that during the course of the project, the rights and interests of each participant must be clearly defined and written in legally binding documents. A breakdown of the main responsibilities of both parties is shown in Table 2.

4.3. Prospects for University Project Cooperation. In the peak period of capital construction at the current stage, the infrastructure departments of colleges and universities have many effective management models and accumulated many successful experiences. Different modes suit different projects. According to research and analysis, the model of Party A's work department is still in the forefront. From the perspective of future growth, capital construction cannot always be in a rising period, nor will it always be in a stable period. Figure 9 shows a schematic diagram of the development of infrastructure construction in colleges and universities since the founding of the People's Republic of China.

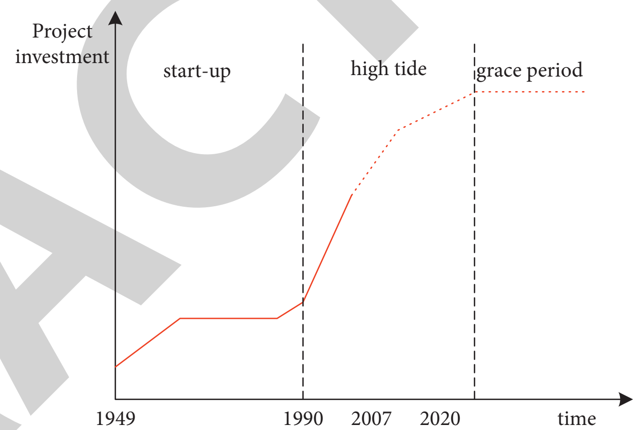

Figure 9: Schematic diagram of the development of university infrastructure since the founding of the People's Republic of China.

5. Discussion

First of all, through the study of relevant knowledge points of literature works, this paper initially masters the relevant basic knowledge and analyzes how to conduct research on the impact of higher education cooperation projects based on multi-dimensional gray theory. The concept of gray system theory and related technical algorithms is expounded, and the influence of higher education cooperation projects on the basis of gray theory is explored.

After more than 20 years of development, gray system theory has gradually matured in theory and basically formed a structural system of an emerging discipline. Its basic theoretical structure includes basic concepts such as the definition of gray theory, gray correlation degree, gray prediction model, and gray decision model, which is the deepening and development of systems thinking [29, 30].

This theory has aroused wide attention internationally and has been highly appraised. Today's theories and methods are widely used in research in various disciplines and fields, and many satisfactory results have been achieved.

Through the experimental analysis in this paper, we can see that the delivery with the user is only carried out at the beginning of the project. On the one hand, it is recommended that the infrastructure department communicates with users, after all, the project is ultimately delivered to users for operation, and it is the final customer. There are many institutions and departments involved in the construction of college and university infrastructure. Coordinating the relationship between all parties to achieve the best communication effect is a complex and delicate task. To achieve this, design, construction, and supervision are required. Turning the relationship between the parties into a resource that facilitates the success of the project is successful coordination; otherwise, a discordant relationship between the parties will become a burden that hinders the success of the project.

6. Conclusions

With the development of science and technology, human beings need not only qualitatively analyze social, economic, ecological, and other internal systems, but also quantitatively analyze them. People can only rely on logical reasoning, conceptual awareness, certain criteria, etc., to determine the structure, relationship, function, mechanism, etc. of these factors. Although this kind of argument can improve the depth of understanding of the system, it also has great limitations, so a relatively complete theory has not yet been formed. In order to further deepen the understanding of the gray system, it can be said that the formation and development of the gray system theory are in line with this need. After years of development, gray system theory has formed a complete set of forecasting theories and methods, and has drawn many valuable forecasting models. It has been widely used in various fields of social systems and achieved good results. Although the theory still needs to be further improved in many aspects, the scope of gray system theory is expanding to some aspects, and it shows superiority compared with traditional forecasting and decision-making methods. Based on the theory of gray system and AHP, this paper proposes a project evaluation method and also puts forward possible ideas for the transformation of the infrastructure construction work in universities in the future, hoping to provide some reference for practical work.

Data Availability

The data that support the findings of this study are available from the author upon reasonable request.

Conflicts of Interest

The author declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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