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Retraction

Retracted: The Construction of Green Building Integrated Evaluation System Based on BIM Technology

Mobile Information Systems

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. Li and C. Wang, "The Construction of Green Building Integrated Evaluation System Based on BIM Technology," *Mobile Information Systems*, vol. 2022, Article ID 5906827, 12 pages, 2022.

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Research Article

The Construction of Green Building Integrated Evaluation System Based on BIM Technology

Hongwei Li and Chongyu Wang

Urban and Rural Construction Institute, Hebei Agricultural University, Baoding 071000, Hebei, China

Correspondence should be addressed to Hongwei Li; lihongwei@hebau.edu.cn

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In order to study the problems of information disconnection, poor coordination of project participants, design evaluation, and so on, in the process of green building evaluation in China, this paper proposes a construction method of green building integrated evaluation system based on BIM Technology. This method constructs the research framework through the research on green building evaluation and BIM (building information modeling), analyzes the whole life cycle of BIM in green building, solves the problems existing in green building evaluation in China through the application of BIM, expounds the green building evaluation process under BIM environment, and studies the information interaction of green building evaluation under BIM environment and the application of BIM in green building design evaluation and operation evaluation. The results show that by studying the application of BIM in green building evaluation, it is demonstrated that the green building evaluation based on BIM can effectively improve the evaluation efficiency and realize the informatization, integration, and high efficiency of green building evaluation.

1. Introduction

Since the rapid development of the construction industry, the development of the construction industry has driven the economy, but also caused environmental pollution, sharp increase in resource consumption and other problems. Architecture has relatively complex construction characteristics [1]. No matter any link of construction, it will consume a lot of resources. Green building advocates the use of new materials and processes, which can ensure the harmony and unity of people and society. The core of BIM Technology lies in informatization, which can create a core database based on green buildings, build an evaluation system, eliminate the information island effect, and ensure the quality of building construction. The core value subject of the evaluation is dynamic [2]. Only based on BIM Technology, we can achieve accurate evaluation and maximize the utility of BIM Technology in the building evaluation system.

2. Research Background

2.1. Green Building and Construction Industry. In today's increasingly severe situation of energy and environmental problems, the state adheres to the concept of green development. "Green development + ecological priority" has become the general direction of China's economic development [3]. As a pillar industry of the national economy, the construction industry has a huge negative impact on resources and environment. As shown in Figures 1(a)–1(c), the situation of building energy consumption is serious [4]. Therefore, developing green buildings; thoroughly implementing the concept of "four sections and one environmental protection"; providing healthy, comfortable, and efficient living space and living environment for mankind; and realizing the harmonious coexistence between man and nature are the fundamental ways to effectively improve China's living environment, reduce building energy consumption, solve energy

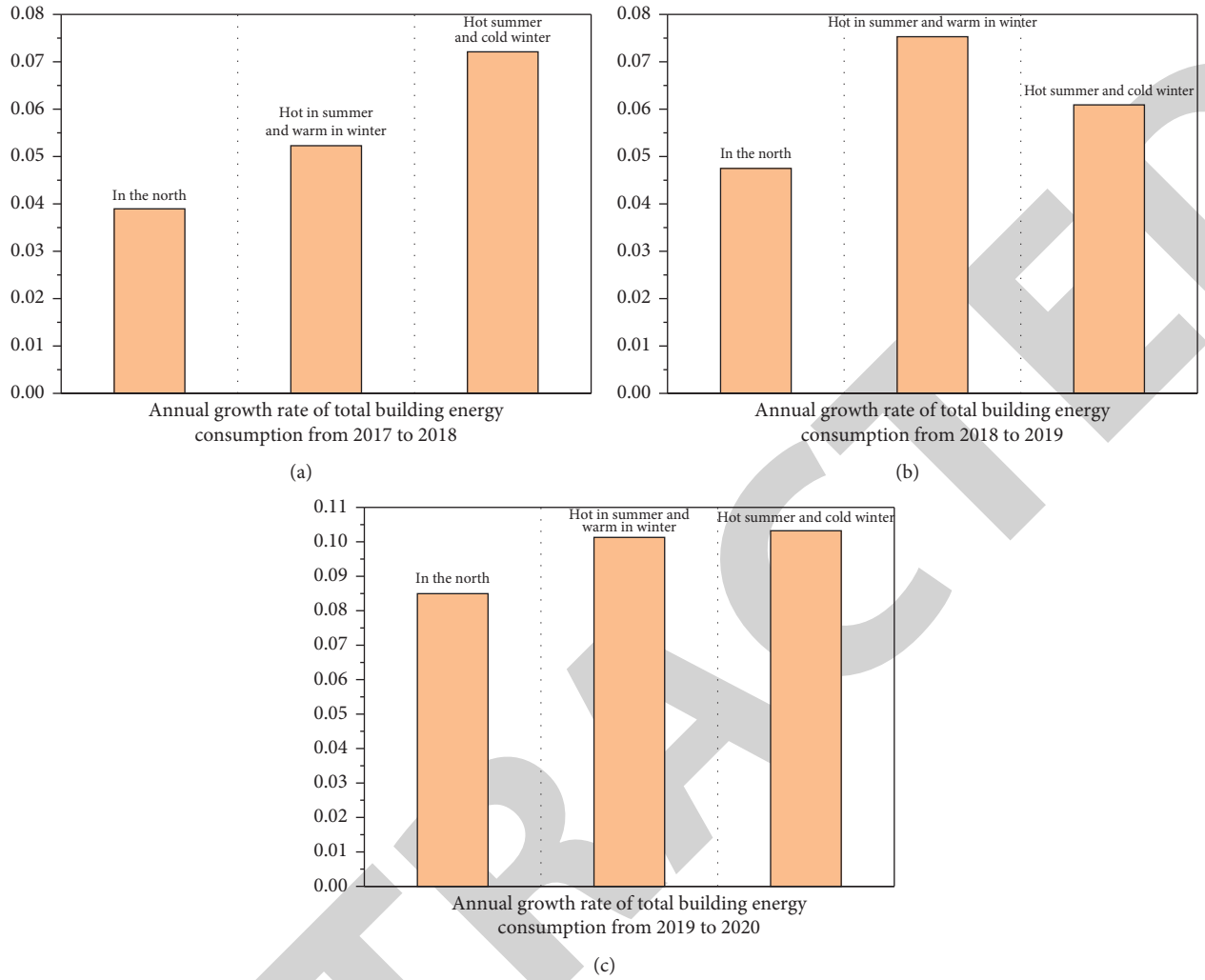

Figure 1: Average annual growth rate of total building energy consumption from 2017 to 2020. (a) 2017–2018. (b) 2018–2019. (c) 2019–2020.

problems, and realize the sustainable development of the construction industry [5].

2.2. BIM and Construction. The promotion of information technology in China's construction industry is slow, and the upgrading and transformation of industrial structure is seriously restricted [6]. Since the 1940s, most reports from the government and professional institutions show that the construction industry has the characteristics of decentralization, the participants lack efficient communication, the construction process lacks formal procedures, and the structure is chaotic [7]. Promoting industrialization through informatization can be an important way to transform and enhance the traditional construction industry. It can be seen that changing the way of information sharing and transmission in the construction industry is one of the important problems to be solved in the construction industry [8].

2.3. Green Building and BIM. Green building has the characteristics of large amount of information and complex types [9]. As an interactive platform for efficient transmission of information and management data, BIM Technology ensures the unity of information in the stages of building planning, design, and construction with digital technology. The application of BIM in green building can effectively eliminate the problem of "information island" between various stages and realize the balance between green management and green technology. It is embodied in the seamless connection of space dimension and time dimension. In terms of time dimension, the collection, sorting, summary, and analysis of green building design information can be realized through the parametric model of BIM. At the same time, it provides an intelligent data platform for later project post evaluation and even operation evaluation, so as to provide strong data support for green building performance simulation and be used in green building environmental performance analysis [10]. As shown in Figure 2, it

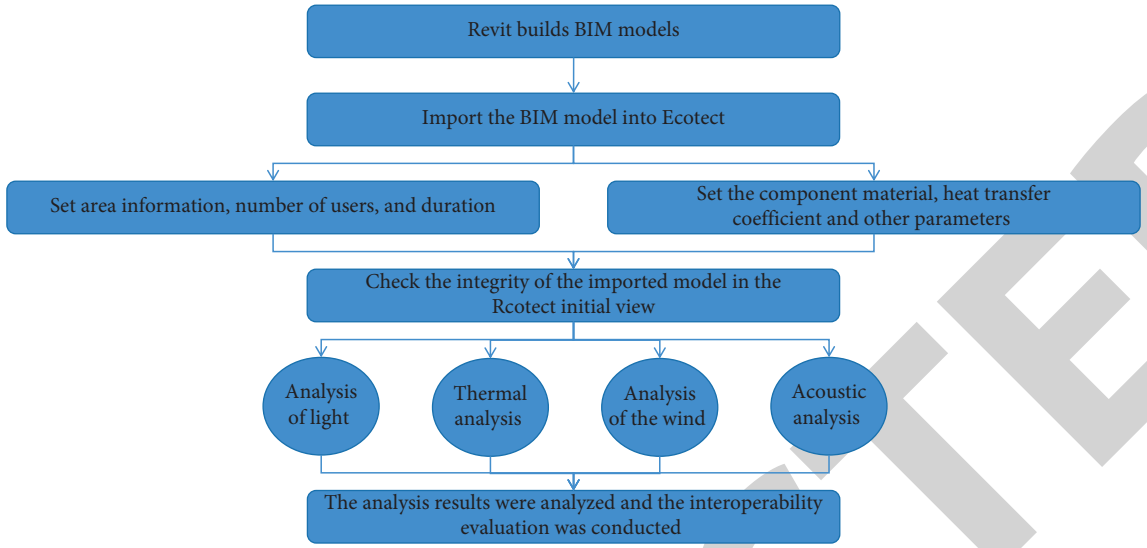

Figure 2: BIM simulation analysis data transmission process.

can realize the effective link between technology and building evaluation system.

3. BIM and Green Building Design

3.1. Life Cycle Theory and Green Building. Life cycle is important in construction engineering. On the premise of ensuring the construction objectives and meeting the mutual coordination between the functions of the building itself and the surrounding environment, it is necessary to ensure that all links of the life cycle are scientifically supervised [11]. The construction life cycle needs to be accurately controlled, so as to save the overall construction cost and ensure sustainability through technology and cost. At present, the energy consumption of building construction makes the ecological environment problem serious. In order to better implement the sustainable development strategy, it is necessary to change the previous development concept and promote the long-term development of the industry from the aspects of building ecological environmental protection and full cycle life [12].

3.2. Advantages of BIM Technology in Green Buildings. As an important supporting tool of informatization in the construction industry, BIM can realize technology integration with the help of software and ensure the engineering informatization level to a great extent and improve the economic benefits of construction projects [13]. BIM Technology can build an evaluation system around the whole building, analyze and integrate the existing problems, and obtain an ideal model. In addition, without the support of BIM Technology, green building analysis will only become a visual expression, which lacks some design relevance in practical engineering. It is not just a professional problem to modify the design of the problems existing in the analysis results of green buildings [14]. Usually, all majors should deepen the design of the problems that do not meet the standards. In this case, the integration of computer-aided simulation and architectural design will be more intuitive. BIM tool can not only provide more in-depth quantitative analysis for green buildings but also solve design problems more accurately, intuitively, and efficiently.

4. Theoretical Basis of BIM Technology Application Value in Green Building

By combing the theoretical basis of the whole process application value of BIM in green building, green building, BIM, value and its value evaluation, and the definition of the whole process application scope of BIM, this paper expounds the development and evolution of various theories in detail, pays attention to the systematicness of theoretical research, and lays a theoretical foundation for BIM in green building to build an evaluation system and ensure building quality [15].

4.1. Green Building Concept. Green building is a kind of high-quality building. Based on the people-oriented concept, it can better deal with the relationship between man and nature. It can protect the environment to the greatest extent, so as to meet people's pursuit of life [16]. Compared with ecological buildings and sustainable buildings, green buildings save resources to the greatest extent in their life cycle, so as to protect the environment and reduce pollution. Ecological architecture is the architectural system of group and single buildings and their surrounding environment based on the principle of ecology. Sustainable architecture is an environmental protection living architectural culture that needs to be completely shaped from the Earth scale such as ozone layer destruction, global warming, and biodiversity. Sustainable buildings, ecological buildings, and green buildings are energy-saving buildings. The three building types have different emphases. The relationship and comparison between them are shown in Figure 3.

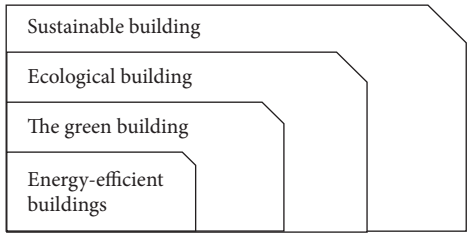

Figure 3: Relationship among sustainable buildings, ecological buildings, green buildings, and energy-saving buildings.

4.2. Value Evaluation Method. Value evaluation, also known as value cognition or evaluative cognition, refers to the cognition and evaluation of the value subject on the value attribute and value relationship with the value object. The value evaluation method refers to the means, tools, and methods used in the value evaluation of complex problems or integration problems. The main research object of this paper is the green building project. Considering its diversity, integration, and uncertainty, this paper selects the following four value evaluation methods to quantitatively evaluate the whole process application value of BIM in green building.

4.2.1. Factor Analysis. Factor analysis (FA) is based on the idea of multivariate statistical analysis. Its core is to find the relationship between variables and extract class variables through data dimensionality reduction. Its advantage is to reflect the evaluation content with a small number of comprehensive public factors after refining and processing, which is simple and objective.

(1) Factor Analysis Model. For factor analysis modeling, it is necessary to set up n sample companies and m indicators to build an original data matrix with $n * m$ order:

$$X = \begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1m} \\ X_{21} & X_{22} & \cdots & X_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ X_{n1} & X_{n1} & \cdots & X_{nm} \end{bmatrix}. \tag{1}$$

When m is large, it is necessary to reduce the dimension of the formula and extract P common factors for modeling and analysis. Assuming $Y = (Y1, Y2, Yp)$, the linear relationship is expressed as:

$$\begin{aligned} Y_1 &= a_{11}X_{11} + a_{12}X_{12} + \ldots a_{1P}X_{1P}, \\ Y_2 &= a_{21}X_{21} + a_{22}X_{22} + \ldots a_{2P}X_{2P}, \\ Y_m &= a_{m1}X_{m1} + a_{m2}X_{m2} + \ldots a_{mP}X_{mP}. \end{aligned} \tag{2}$$

(2) Factor Analysis Method. The indicators are treated in the same direction, and the original treatment is treated in the following ways:

$$X_{ij}' = \left| X_{ij} - k \right|, \tag{3}$$

where k is the mean value of the original data. Indicators need to be selected for indicator processing, but there will be differences in indicators, resulting in reduced comparability. Select:

$$X_{ij}' = \frac{X_{ij} - \overline{X}}{S_i}. \tag{4}$$

The correlation index verification will use SPSS software to extract the principal components and extract the common factors for the initial eigenvalues and variance contribution rate of various data [17]. After rotating the common factor, if the clear meaning of each factor cannot be obtained in a single rotation, the rotation process can be repeated until the ideal result is obtained, and the obtained common factor is named. The specific steps are shown in Figure 4.

4.2.2. Basic Structure of Convolutional Neural Network. Convolutional neural networks are derived from feedforward neural networks and generally include an input layer, a convolution layer, a pooling layer, an excitation layer, a fully connected layer, and an output layer. As shown in Figure 5, after inputting the original image data, after convolution, pooling, nonlinear activation function mapping, and other operations, the high-level semantic information is abstracted layer by layer, and then through the full connection layer and output layer, the image category is finally obtained.

Activation function is a nonlinear mapping, which is used to simulate complex nonlinear functions and enhance the expression ability of network model. The output of convolution layer and full connection layer usually needs to connect the activation function. ReLU function, Sigmid function, and Tanh function are nonlinear activation functions widely used in neural networks.

The expression formula of Sigmid function is: $\text{Sigmid}(x) = 1/(1 + e^{-x})$. The output response range of Sigmid function is [0, 1], which corresponds to neurons respectively. Tanh function is based on Sigmid function, and the output response range is [−1, 1]. In order to avoid gradient saturation effect, ReLU is introduced into the formula:

$$\begin{aligned} \text{ReLU} &= \max\{0, x\} \\ &= \begin{cases} 0, & x \langle 0, \\ x, & x \geq 0. \end{cases} \end{aligned} \tag{5}$$

As shown in Figure 6, based on the mapping from input to output of the algorithm, the error can be transmitted to the forward layer of the network by using directional propagation, and the actual value of the model can be obtained through calculation.

By combing the theoretical basis of BIM application value in green buildings, the basic theoretical system of BIM application value evaluation system in green buildings includes green building theory, value theory, the definition system of BIM application scope, and value evaluation methods. This paper makes in-depth research on the above contents; analyzes the existing relevant research results; and expounds the core concepts, development, and evolution of various theories and their application in the field of

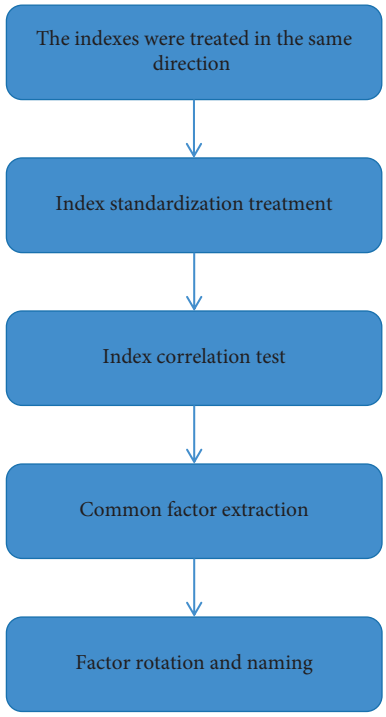

Figure 4: Steps of factor analysis.

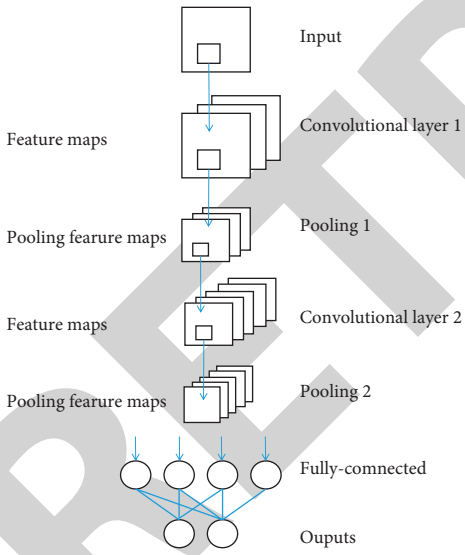

Figure 5: Basic structure of convolutional neural network.

construction engineering [18]. The relevant research results of this chapter can lay a theoretical foundation for the quantification of the whole process application value, economic benefit analysis, and value promotion of BIM in green building.

5. BIM Technology Green Building Assessment

5.1. Green Building Assessment. Green building evaluation system is the basis for the implementation and promotion of green building. A perfect evaluation process and system can better promote the development of green building and realize the application of green building from theory to practice. The development process of foreign green building evaluation is mainly divided into three stages: the first stage is the overview and evaluation of the building itself and construction technology; the second stage is the software simulation and evaluation of the building environment design stage, such as lighting, wind environment, building heat; the third stage is to integrate the concept of the whole life cycle of the building, and comprehensively review and pre evaluate the building environment, the surrounding environment, and the operation status of the building. Through these three stages of the evaluation process, each country has compiled similar evaluation tools on its basis and further improved the evaluation system through simulation auxiliary tools and network information technology [19]. The content of green building evaluation involves many fields, a wide range of specialties, and complex contents, so it is necessary to formulate scientific and advanced evaluation standards and systems, form an integrated evaluation system, play an evaluation role in actual projects and lay a foundation for improving building quality.

5.1.1. Contents of Green Building Evaluation Indicators. Due to the different conditions of various countries and the different understanding and requirements of architecture and environment, the content and weight of green building evaluation are also different. At present, based on the comprehensive contents of national evaluation systems, they can be divided into five categories of indicators, namely:

(1) The planning includes project site selection, surrounding environment, and traffic conditions.

(2) The design comprehensively considers the building performance indicators and architectural design characteristics.

(3) The impact of environmental buildings on the surrounding environment, including considering the pollution of buildings to water resources, land and air, and the damage to the surrounding ecology [20].

(4) Social and economic benefits, the impact of social development and construction, and so on.

(5) Healthy indoor environment quality, living comfort, and so on.

5.1.2. Green Building Evaluation Mechanism. First, determine the type of building and the use of the local environment (including the local climate) according to the evaluation of the project's development conditions, the construction practice, and other factors. The second is to determine the evaluation criteria for the above established index projects. Generally, the current national or regional norms and recognized international standards are used as the most important references and guidelines. At the same time, in some evaluation tools, the evaluation criteria are also set as a scale to dynamically reflect the best level and latest progress of regional time. Finally, the relevant projects are evaluated according to the standards.

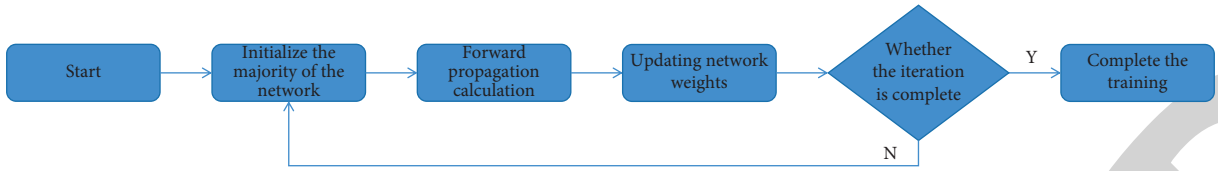

Figure 6: Training flow chart of convolutional neural network model.

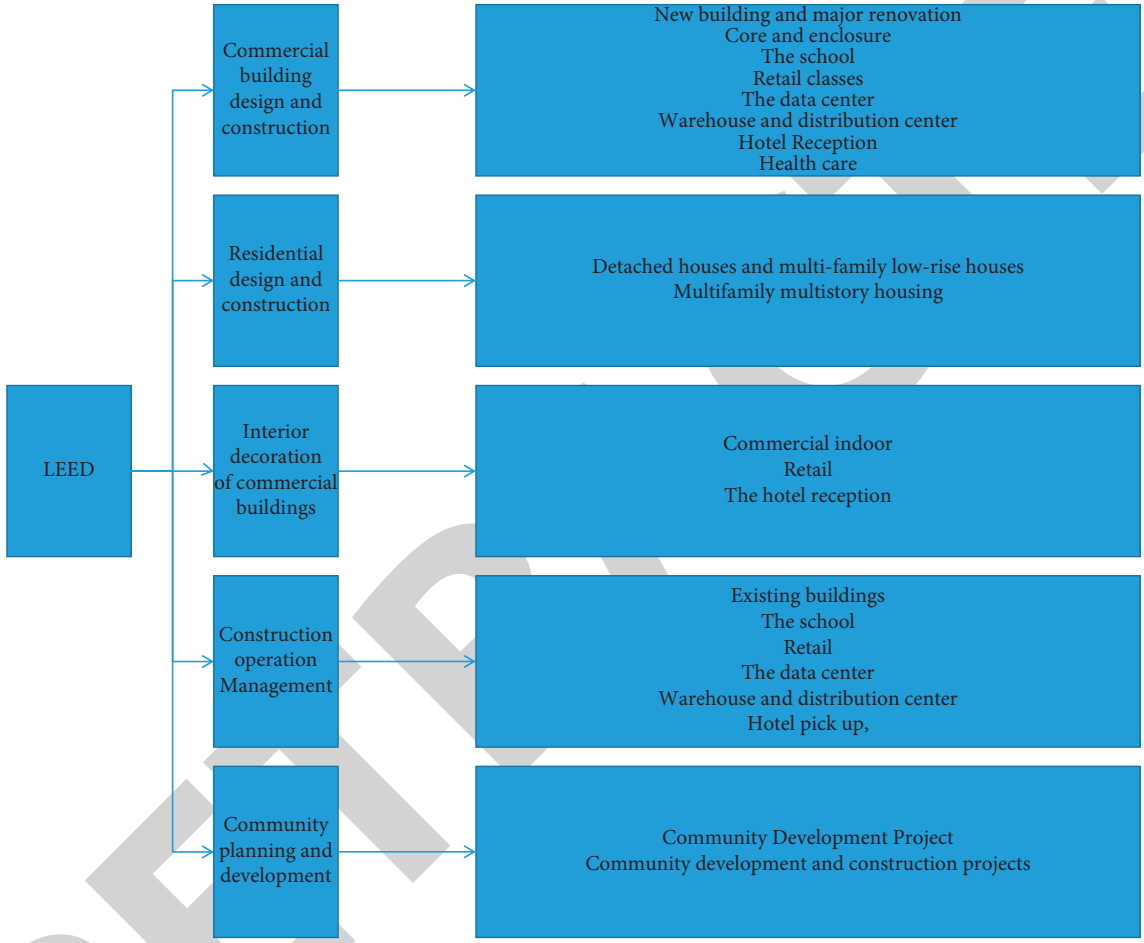

Figure 7: LEED evaluation standard classification.

5.1.3. Evaluation Process. The existing data of the building are substituted through the internal calculation method of green building evaluation, and the relevant design, planning, management, and operation data of the building are input, and then combined with its detailed documents to form the initial data [21]. The second is the comprehensive score, which is scientifically scored by special reviewers according to the green building evaluation standard manual, and the final score is obtained by weighted accumulation. Finally, according to its score, determine the level and issue the certification certificate.

5.2. Green Building Evaluation System

5.2.1. Foreign Green Building Evaluation System. Among many global evaluation systems, the LEED evaluation system of the United States is a representative system. This system is described below. LEED evaluation criteria include many types, covering not only the whole type of buildings but also different stages of the whole life cycle of buildings. Small categories are also set in different categories, and special scoring points are given according to the characteristics of building use functions, as shown in Figure 7.

LEED has been developed to version 4.0. In LEEDv4.0; there are nine evaluation indicators, each of which contains 1–20 evaluation subitems [22]. The specific scores are obtained according to the evaluation of subitems, and the specific evaluation information can be obtained by accumulating the scores of all subitems as shown in Table 1.

LEED does not adopt the weight system. For LEED certification of construction projects, it is necessary to accumulate the scores of various evaluation indicators to obtain the total score and judge the building grade according to the range of scores (see Table 2 for details).

Table 1: Score of LEEDv4.0 evaluation classification and number of scoring terms.

Index		Integrate project planning and design	Site selection and transportation	Water efficiency	Energy and atmosphere	Materials and resources	Indoor environmental quality	Innovate	Geographical priority
Commercial building design and construction	New buildings and major renovation	1	16	11	33	13	16	6	4
	School	1	20	12	31	13	16	6	4
	Data center	1	16	11	33	13	16	6	4
	Medical care	1	9	11	35	19	16	6	4
Residential design and construction	Independent residence and multifamily stratum residence	2	15	12	38	10	16	6	4
	Multifamily multistorey residence	2	15	12	37	9	18	6	4
Interior decoration of commercial buildings	Commercial indoor	2	18	12	38	13	17	6	4
	Retail	2	18	12	38	14	16	6	4
	Hotel reception	2	18	12	38	13	17	6	4
Construction operation management		-	15	12	38	8	17	6	4

Table 2: LEED certification level.

Fraction	40–49	50–59	60–79	80–110
Grade	Certification level	Silver grade	Gold grade	Platinum grade

5.3. Domestic Green Building Evaluation Indicators. In 2006, the Ministry of housing and urban rural development issued the green building evaluation standard GB/T 50378–2006. By the end of 2014, 2538 green building projects had been evaluated, with a total construction area of 290 million m^2. This standard is an important part of guiding the practice of green building in China. However, since the 12th Five Year Plan, China's green buildings have developed rapidly, and the evaluation standard for green buildings (GB/*T* 50378–2006) cannot fully meet the needs of green building evaluation. Therefore, the evaluation standard for green buildings (GB/T50378-2014) (hereinafter referred to as the standard) was prepared by China Academy of Building Sciences in conjunction with relevant units and implemented on January 1, 2015.

(1) Due to the different use functions of the buildings to be evaluated, there are great differences in their resource consumption and impact on the environment. The standard adopts specific provisions to divide the evaluated buildings into residential buildings and public buildings and also defines the evaluation of comprehensive single buildings [23].

(2) In the evaluation stage, the evaluation stage of the standard is mainly composed of two stages: design and operation. The design evaluation is carried out after the construction drawing is reviewed and approved, focusing on the green design and effect of the building; the operation evaluation is carried out one year after the building is put into use, focusing on the implementation and actual effect of building green measures. The division of stages is in line with the objective process of the construction industry and the actual needs of the evaluation work. The score calculation method of domestic green building evaluation indicators is to set corresponding weights according to the project scores specified in the standard and the importance of various indicators. Calculation formula of total score:

$$\sum Q = w1Q1 + w2Q2 + w3Q3 + w4Q4 + w5Q5 + w6Q6 + w7Q7 + Q8, \quad (6)$$

where Q1-7 = (actual score value/actual full score) ∗ 100 points. According to the actual full score- = theoretical Full Score - ∑ the score of articles not participating in the evaluation = ∑ the score of articles participating in the evaluation, and the weight is taken according to Table 3.

5.4. Comparison at Home and abroad. American LEED and domestic evaluation standards can find that American LEED has a more sound evaluation system for buildings, while domestic evaluation standards cover few contents. Moreover, in terms of the provisions of the evaluation object, LEED has a complete system, which can ensure the connection between various elements from technology to architecture to the overall area. However, the domestic green building evaluation system lacks relevant standards, and its application and promotion are poor. It is necessary to draw lessons from foreign standards and formulate a domestic integrated evaluation system.

6. Research on the Application of BIM Technology in Green Building Evaluation

6.1. Green Building Evaluation Process

6.1.1. Traditional Green Building Evaluation Process. The traditional green building evaluation is mainly composed of the application unit and the evaluation unit. The application unit issues the relevant preparation materials; the evaluation unit invites the experts of relevant disciplines for evaluation; and finally, the evaluation experts determine the evaluation results, publicize, and issue the registration certificate and logo according to the evaluation results. The traditional green building evaluation process is through offline application, and expert review is conducted according to the application materials composed of design drawings, on-site monitoring data, and calculation and analysis reports assisted by three-dimensional models [24]. The specific evaluation process is shown in Figure 8. There are some disadvantages in the evaluation process, such as cumbersome evaluation process, single evaluation method, poor model auxiliary effect, and so on.

6.1.2. Green Building Evaluation Process Based on BIM Technology. The green building evaluation based on BIM Technology can greatly optimize the evaluation process and integrate all building related information as the basis of evaluation. The whole process of green building evaluation can be completed with the help of BIM systematic information integration platform, and the whole process will become more compact and efficient. After using BIM Technology, all information related to the evaluation will be integrated into the BIM model. Both sides of the evaluation can analyze and process the data through the BIM model to reduce the evaluation error and improve the accuracy. The green building evaluation process based on BIM is shown in Figure 9.

6.2. Information Exchange of Green Building Evaluation in BIM Environment

6.2.1. Data Interaction Provided by IM Technology. The standard specifies the specific requirements and standards for buildings. From the development trend of information integration, although the models of each stage are established based on the same project, the single model cannot realize the information processing in the whole project cycle.

Table 3: Weight of various evaluation indexes of green buildings.

		Land saving and outdoor environment $w1$	Energy conservation and energy utilization $w2$	Water saving and water resources utilization $w3$	Material saving and material resource utilization $w4$	Indoor environmental quality $w5$	Construction management $w6$	Operation management $w7$
Design evaluation	Residential building	0.21	0.24	0.20	0.17	0.18	—	—
	Public buildings	0.16	0.28	0.18	0.19	0.19	—	—
Operation evaluation	Residential building	0.17	0.19	0.16	0.14	0.14	0.10	0.10
	Public buildings	0.13	0.23	0.14	0.15	0.15	0.10	0.10

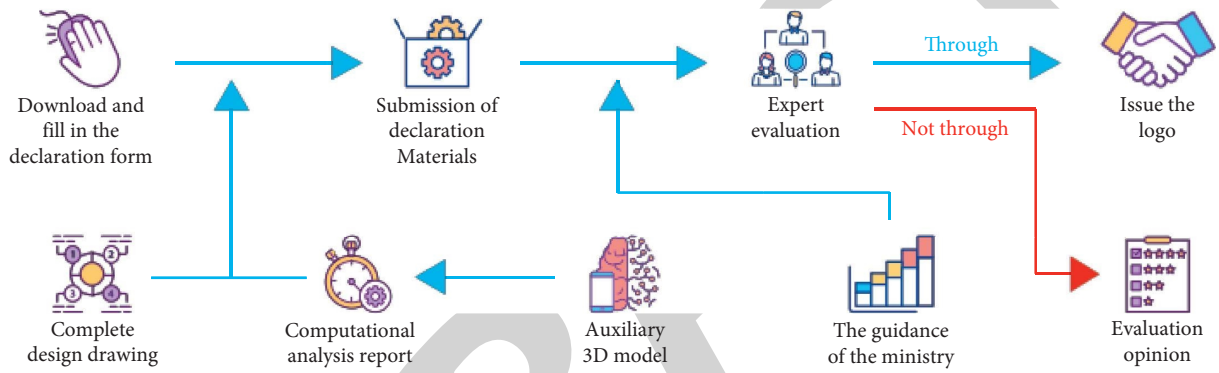

Figure 8: Evaluation process of traditional green building.

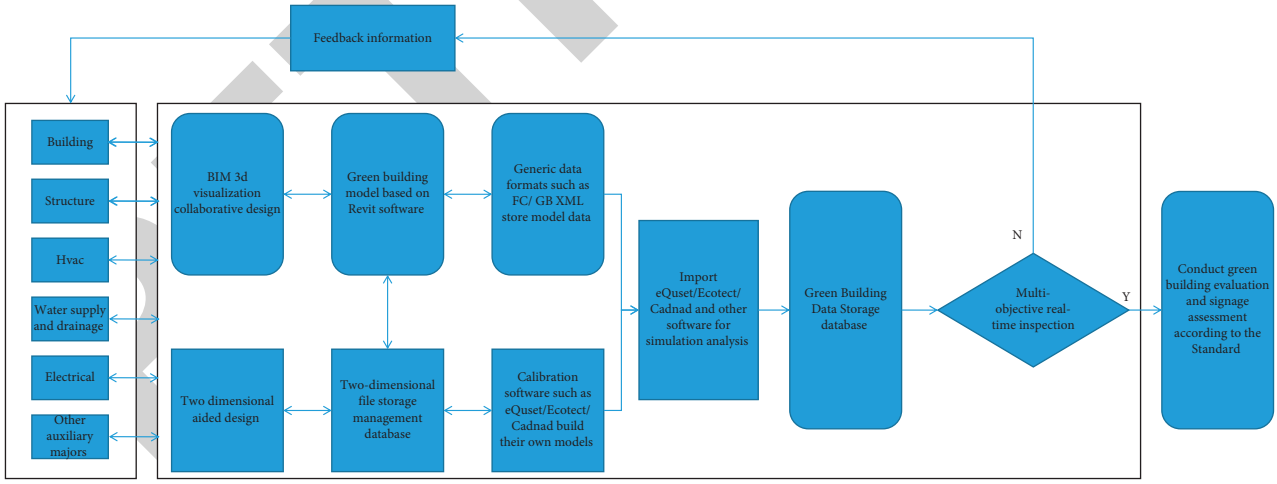

Figure 9: Green building evaluation process based on BIM.

If the model can realize data interaction, it can more effectively reduce repeated labor and improve the efficiency of information utilization. The data interaction between BIM and software can ensure the timeliness of information through the analysis of building environmental performance. BIM Technology can also provide various simulation data according to the building to create a real green building.

6.2.2. Collaborative Work of Project Participants in BIM Environment. "Owner," "design," "construction," and "property" as the four participants in the whole life cycle of green building, are important parts of the implementation of green building and shoulder different tasks and responsibilities. Due to the different objectives of the four participants, the degree of participation in the project is also

different. Therefore, the collaborative work between the project participants is particularly important. Based on the collaborative work of participants, BIM Technology is used to build integrated management, design each stage of the building, and ensure that there are more scientific schemes in the stages of building decision-making, design, construction, and operation and maintenance. Through the application of BIM in green building, it is ensured that the owner can linkage with the design unit in the decision-making stage, simulate the site situation, and conduct feasibility analysis. Before the implementation of the project, use the simulation technology to complete the virtual operation of the whole process of the building and further carry out the layout of streamline organization and functional zoning [25]. After the construction party is determined in the later stage, it can analyze the key and difficult points of construction through the simulation effect of BIM model and feed back to the design unit to improve the implementable design and reduce the risk of change. Through BIM information management platform, the three participants can monitor and inspect various indicators of green buildings before construction, eliminate potential safety hazards, and reduce construction risks. The linkage management of engineering information and project decision-making ensures that all parties can quickly obtain accurate information and make correct response, enhance interactive management, and carry out rational allocation and timely dynamic management of production factors.

6.2.3. Integrated Management of Green Building Evaluation Information Based on BIM. Green building projects need to be completed by multiple disciplines. Therefore, the integrated management of project information of various disciplines can effectively improve work efficiency, and BIM can provide good technical support for the integrated management of green building evaluation information. The evaluation information of green building can be divided into decision information, design information, construction information, and operation information according to the construction stage. The green building evaluation information based on BIM is shown in Figure 10.

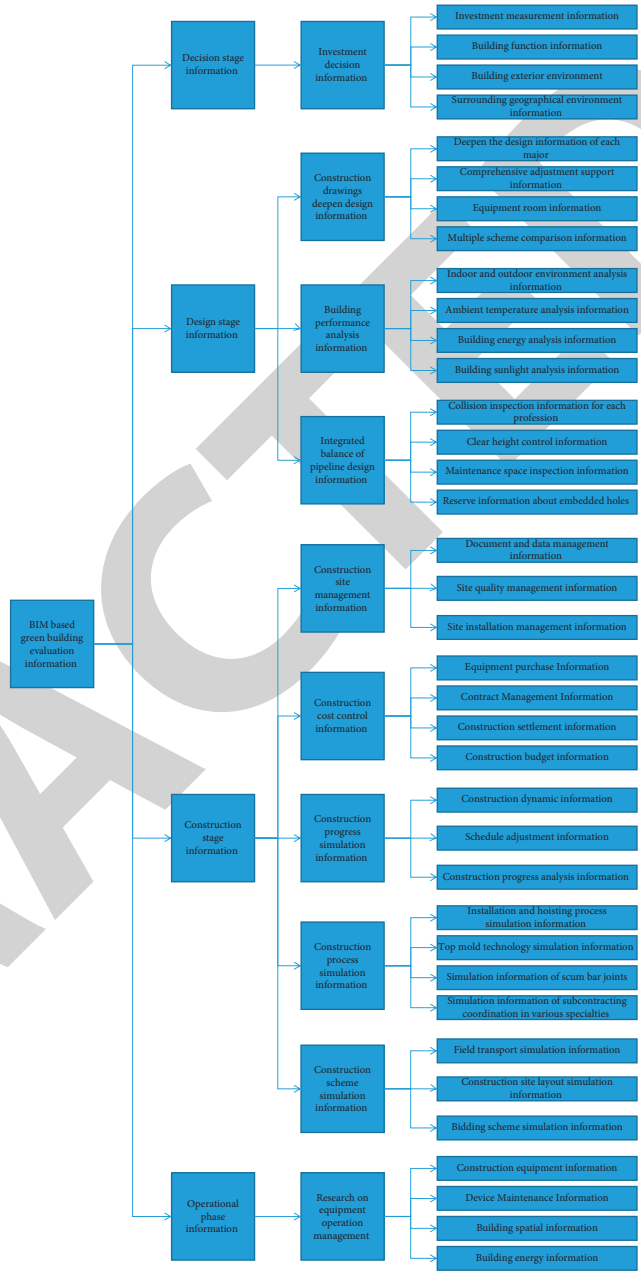

Figure 10: Green building evaluation information based on BIM.

In the decision-making stage, the owner should have a full understanding of the site selection, surrounding environment and internal conditions of the project, and BIM Technology can assist in green building ecological environment simulation, preliminary modeling, and preliminary planning, so that the owner can have a preliminary budget for the cost and construction period of the project. In the design stage, the main task is to transform the owner's construction concept into a specific description of the implementable object, and its design documents are the basis for later implementation. The key control point of green building evaluation in this stage is to integrate all building information management; extract comprehensive, clear, and accurate green building design scheme information; and import such information into BIM information management platform database for later use by all participants. Green building design is an integrated design process integrated by multiple disciplines, and BIM model can unify information on the data platform and link all parties to work together to form the final three-dimensional collaborative management platform. BIM model carries all kinds of accurate and detailed project information. It is the operation basis of green building simulation analysis software and the accurate guarantee of analysis results. The parameterization and component library of BIM can effectively feed back the later design results, making the analysis results more representative.

In the construction stage, the main task is to transform the abstract integrated information into concrete green buildings. This stage has many uncertain factors, such as heavy workload, complex process, many organizational

interventions, and so on. In order to eliminate adverse conditions, BIM Technology can realize virtual simulation sustainable management according to construction scheme, construction progress, construction quality, and construction cost and ensure more efficient information management. The split management concept of the construction unit will be transformed into the overall information sharing management based on BIM Technology to realize the emerging information management mode of information integration. In the operation stage, the contents involved include facilities and equipment management, energy management, monitoring management, space management, and other comprehensive management. The operation model is established by combining the data with the model, and the BIM operation model is used as the main basis for the daily operation and maintenance management of green buildings.

7. Conclusion and Prospect

This paper puts forward the viewpoint of using BIM Technology in green building evaluation, summarizes the shortcomings of green building evaluation system at this stage, and discusses the feasibility and necessity of BIM application in green building evaluation. This paper compares and analyzes the green building evaluation system at home and abroad from the aspects of evaluation object, evaluation process, evaluation method, and clause setting and puts forward modification suggestions for the integrated evaluation system of green building in China. This paper comprehensively expounds the application of BIM in green building evaluation, forms a complete research route, puts forward the green building evaluation process based on BIM, takes the evaluation information interaction under BIM environment as the starting point, expounds the necessity and specific methods of realizing collaborative work, and analyzes the application of BIM in specific evaluation provisions. Verify the theoretical analysis through actual cases. Based on BIM model and various analysis software as auxiliary tools, select representative green building provisions for statistical analysis and simulation analysis, test the effect of applying BIM to green building evaluation, and complete the evaluation of relevant provisions. From the perspective of application value, the application of BIM in the evaluation process shows that it plays an important role in improving building performance. However, as a new technology, it cannot guarantee the popularization and application of technology in the industry, and there are certain social challenges in the development process.

The characteristics of green building determine that it needs multistage and multidisciplinary building data information. In the future, a multidisciplinary collaborative work system covering all building information can be established to divide the BIM model for green building evaluation, construct a full cycle evaluation system, and conduct different in-depth research on the construction of various disciplines of green building. The application of this paper should be limited in length, lack of building types, and cannot perfect the green building evaluation system. However, we believe that with the high development of domestic informatization, various evaluation methods and relevant provisions and standards of green building evaluation standards will be further improved. In the future, we can try to introduce artificial intelligence and other technologies into green building evaluation to further improve the green building evaluation system.

Data Availability

The labeled data set used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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References

[1] C. Liu, "Energy consumption simulation of green building based on BIM system and improved neural network," *Journal of Intelligent and Fuzzy Systems*, vol. 29, no. 2, pp. 1–12, 2021.

[2] W. Sun, "Research on the construction of smart tourism system based on wireless sensor network," *Mathematical Problems in Engineering*, vol. 2021, no. 18, 8 pages, Article ID 9950752, 2021.

[3] Y. Sun, X. Yuan, and Q. Chen, "the construction and empirical research on the dynamic evaluation model of university science and technology output," *IEEE Access*, vol. 9, no. 99, pp. 57280–57290, 2021.

[4] E. Kamel and A. M. Memari, "Review of bim's application in energy simulation: tools, issues, and solutions," *Automation in Construction*, vol. 97, pp. 164–180, 2019.

[5] H. Bapat, D. Sarkar, and R. Gujar, "A sustainable approach to reduce embodied and operational cooling energy for an elevated metro rail station of ahmedabad, India, using building information modelling (bim) and factor comparison method," *Journal of the Institution of Engineers: Series A*, vol. 103, no. 1, pp. 115–128, 2022.

[6] Q. H. Han, "Research on the construction of cold chain logistics intelligent system based on 5g ubiquitous internet of things," *Journal of Sensors*, vol. 2021, no. 1, 11 pages, Article ID 6558394, 2021.

[7] R. Abdulla, S. Duraikannan, and V. Thiruchelvam, "Integrated BIM and energy tools with building certification system for sustainable building design and energy certification," *Solid State Technology*, vol. 63, no. 1s, pp. 981–992, 2020.

[8] N. Yang, Y. Huang, B. Dong, P. Xin, and H. Li, "Research on the joint planning method of electricity-gas integrated energy system based on multi-agent game," *Zhongguo Dianji Gongcheng Xuebao/Proceedings of the Chinese Society of Electrical Engineering*, vol. 39, no. 22, pp. 6521–6533, 2019.

[9] S. Gao and L. K. Bhagi, "Design and research on caddcam system of plane based on nc machining technology," *Computer-Aided Design and Applications*, vol. 19, no. S2, pp. 64–73, 2021.

[10] P. Wang, S. Gao, L. Li, S. Cheng, and H. Zhao, "Research on driving behavior decision making system of autonomous

driving vehicle based on benefit evaluation model," *Archives of Transport*, vol. 53, no. 1, pp. 21–36, 2020.

[11] X. Xie, Z. Ma, J. Ye, F. Zeng, W. Fan, and B. Chen, "Research and development of sound quality in portable testing and evaluation system based on self-adaptive neural network," *Applied Acoustics*, vol. 154, pp. 138–147, 2019.

[12] X. Ren, Q. Jiang, J. Jiang, Z. He, B. Ouyang, and B. Peng, "Evaluation of cabin energy consumption based on combination weighting and grey fuzzy comprehensive model," *EURASIP Journal on Applied Signal Processing*, vol. 2022, no. 1, p. 36, 2022.

[13] L. Wang, J. Liu, and J. Lan, "Feature evaluation of upper limb exercise rehabilitation interactive system based on kinect," *IEEE Access*, vol. 7, no. 99, pp. 165985–165996, 2019.

[14] Z. Dong, Q. Boyi, and W. Chunlong, "Energy-saving evaluation and control optimization of an ashp heating system based on indoor thermal comfort," *Solar Energy*, vol. 194, pp. 913–922, 2019.

[15] V. Christelis and A. Mantoglou, "Pumping optimization of coastal aquifers assisted by adaptive metamodelling methods and radial basis functions," *Water Resources Management*, vol. 30, no. 15, pp. 5845–5859, 2016.

[16] Z. Lu, J. Qi, B. Wen, and X. Li, "A dynamic model for generation expansion planning based on conditional value-at-risk theory under low-carbon economy," *Electric Power Systems Research*, vol. 141, pp. 363–371, 2016.

[17] M. Witte, U. Gerstmann, A. Neuba, G. Henkel, and W. G. Schmidt, "Density functional theory of the cu a -like cu 2 s 2 diamond core in cu 2ii(nguas) 2 cl 2," *Journal of Computational Chemistry*, vol. 37, no. 11, pp. 1005–1018, 2016.

[18] J. Guo, Z. Xie, Q. Li, S. Zhan, and J. Xu, "Railway passenger flow recognition algorithm for terminal station based on cost theory and automatic frequency control," *IEEE Access*, vol. 8, no. 992020.

[19] C. Xie, G. Zhang, W. Peng, and W. Wang, "The design theory analysis of the buried lifting integrated sprinkling irrigation device," *Shuili Xuebao/Journal of Hydraulic Engineering*, vol. 49, no. 4, pp. 439–445, 2018.

[20] F. J. Cheng, D. K. Sun, X. Dong, and X. F. Sun, "Prediction of stall inception in multi-stage compressors based on an eigenvalue approach," *Science China Technological Sciences*, vol. 60, no. 8, pp. 1132–1143, 2017.

[21] G. Li, F. Liu, A. Sharma et al., "Research on the natural language recognition method based on cluster analysis using neural network," *Mathematical Problems in Engineering*, vol. 2021, Article ID 9982305, 13 pages, 2021.

[22] M. S. Pradeep, P. Manimegalai, P. Ajay, and J. Amose, "Lipid data acquisition for devices treatment of coronary diseases health stuff on the internet of medical things," *Journal of Physics: Conference Series*, vol. 1937, no. 1, Article ID 012038, 2021.

[23] X. Liu, J. Liu, J. Chen, F. Zhong, and C. Ma, "Study on treatment of printing and dyeing waste gas in the atmosphere with Ce-Mn/GF catalyst," *Arabian Journal of Geosciences*, vol. 14, no. 8, p. 737, 2021.

[24] R. Huang, S. Zhang, W. Zhang, and X. Yang, "Progress of zinc oxide-based nanocomposites in the textile industry," *IET Collaborative Intelligent Manufacturing*, vol. 3, no. 3, pp. 281–289, 2021.

[25] H. Xie, Y. Wang, Z. Gao, B. P. Ganthia, and C. V. Truong, "Research on frequency parameter detection of frequency shifted track circuit based on nonlinear algorithm," *Nonlinear Engineering*, vol. 10, no. 1, pp. 592–599, 2021.