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Impact of Air Pollution on Human Health and Bodily Diseases Detecting by Exhaled Gas

Lead Guest Editor: Wen Zeng
Guest Editors: Tianming Li, Huiwu Long, and Lingling Qi

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Tongzhang Zheng, USA

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Retraction

Retracted: The Path Deduction from Folk Art to Stage Art in the Change of Geographical Environment: Take Anhui Flower Drum Lantern as an Example

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Retraction

Retracted: Labor Culture and Ecological Environment: The Renewing Path of the Nurturing Concept of "Nurturing Talents for the Country" in Labor Education

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Research Article

Analysis of Ecological Environment Problems and Countermeasures in Ideological and Political Education in Colleges and Universities

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At present, there are many problems in the mode and method of ideological and emotional education of college students. The state attaches great importance to this aspect and continues to increase investment, but the effect is not satisfactory. As an important field for cultivating high-level socialist talents, colleges and universities have played a huge role in promoting the ideological development and emotional education of college students. The emergence of this contradiction shows that traditional educational methods have their own shortcomings and need to expand their thinking and explore new research areas. Since the new era, the ideological education venues and teaching activities of colleges and universities have been greatly improved, but they are also facing many problems and challenges, which seriously affect the moral quality of college students and destroy the ideological education ecosystem of colleges and universities. From the perspective of the ecological crisis of education, this paper awakens and pays attention to the ecological problems of education, making it an inevitable trend of current education development and paving the way for future research. On this basis, the current situation of the ecology of political education of college students is analyzed, and the necessity of research is proposed. Analyzing the ideological and emotional education of college students from the perspective of ecology is essentially to regard the ideological education of college students as an ecosystem and deeply analyze the distribution of various components and elements of college students' ideological and political education. The ecology of college students' ideological education is the process, law, and overall ecological balance of various factors in the ideological education system of college students, as well as the methodological thinking and value orientation of the interaction between various factors and the environment. The changes of the ecological environment have a significant impact on people's state of mind. As college students growing up in the new environment, their thoughts, emotions, and values are all affected by the development of the ecological environment. Therefore, changes in the ecological environment, air quality, and water environment have increasingly obvious impacts on the living environment.

1. Introduction

1.1. Ecological Connotation of Classroom. State system refers to the combination of life subject and surrounding environment in a certain space. The same is true of classroom ecology, which is embodied in classroom space and the relationship between biology and environment. Doyle and Pound point out that "the context of every learning activity includes the student, the teacher, the background and the learning information, so learning takes place in an ecosystem." In this system, the interaction and positive influence of various factors form a unique classroom ecosystem (see Figure 1).

As a whole, teachers and students are in the ecosystem of the classroom [1]. This sentence has two meanings: one is the interactive relationship between teachers and students in the classroom ecological environment. The living state and development trend of classroom ecological subject are maintained and changed in various ways. They depend on each other and influence each other, constituting a whole classroom ecosystem. The second is the mutual reference between teachers

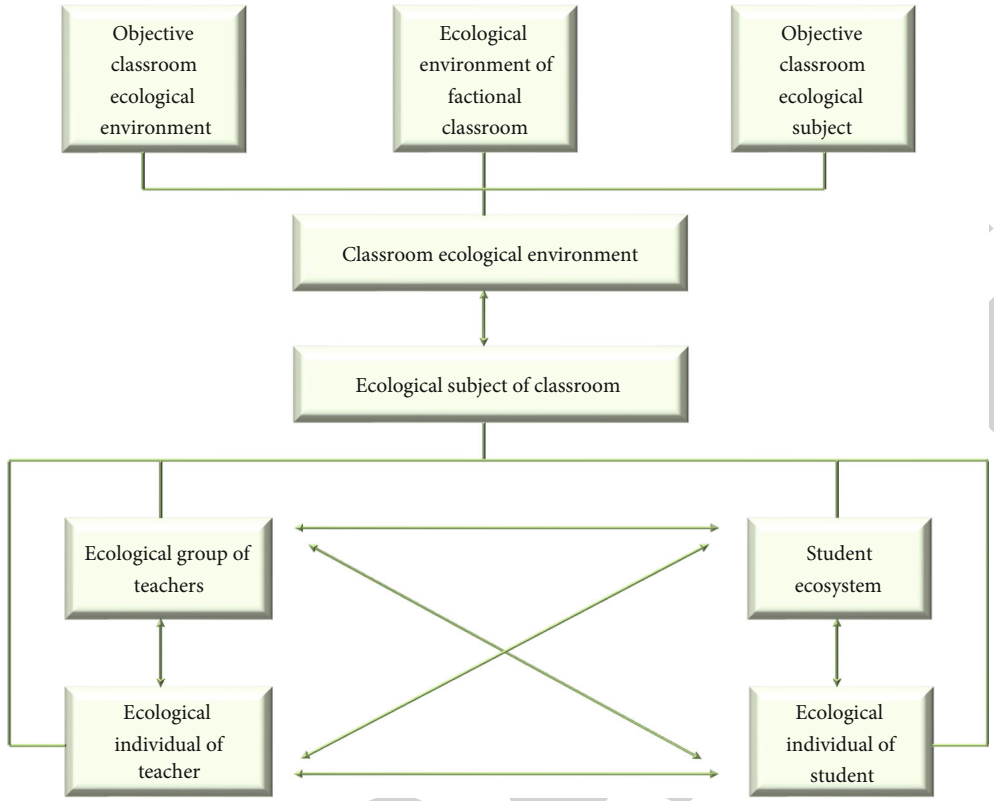

Figure 1: Classroom ecological structure diagram.

and students, forming two different classroom ecological subjects: teachers' ecological groups and students' lives. Teachers take students as reference in the teacher group and form a teacher ecosphere among themselves. There are a variety of formal or informal spiritual or material relations between teachers and groups. Under the guidance of teachers, students form a student ecosystem, which also includes individuals. Different relationships between groups in the progress of education information management was studied [2]. The relationship between the two is complex. They influence each other. They are interrelated. Classroom ecology is a unique ecosystem with integrity, openness, symbiosis, and balance.

First of all, classroom ecology is a whole. From the point of view of systems, an ecosystem is a real, not illusory, existence. The totality of nature is a higher organization than its own organic members, presenting beauty, stability, and integrity. It is a way of life. Secondly, the ecological environment of the classroom is open. Betalangfei, the founder of the generalized system theory, believed that the organism is an open system; that is to say, all organisms must survive under appropriate conditions and must be open; that is to say, only by constantly communicating with external matter, energy, and information can they survive. Symbiosis is a common characteristic in the evolution of organisms and an important link between organisms. Finally, the classroom ecosystem is balanced. From the perspective of ecology, ecological balance refers to the relative stability of the structure, function, material energy, and information input and output of an ecosystem.

1.2. Analysis of Basic Concepts of Ecology and Environment. In different backgrounds, people's understanding of ecology and environment is different. In biology, the term "living body" refers to "an organism and its surrounding structures that exhibit an association of energy (energy flow, matter flow, information flow)." In this system, there are many branching structures in the analysis of functional relationships [3]. In ideological education, "ecology" refers to the survival and development of students under specific natural conditions. Sustainable development of education. Environment refers to the space in which human beings live and various natural factors which can directly or indirectly affect human life and development. In this process, students are the main body; emphasis on the main body helps them become people-oriented, pay attention to humanistic care, and embody more the ecological benefits of ideological and political education.

1.3. Research on the Historical Background of Ecological Civilization Education. "Ecological civilization" raises the issue of "humans" to a new level, with higher requirements for "humans," which requires the all-around development of "humans," "all-around" promotion of "humans," and being "people-oriented." The formation of ecological civilization is closely related to people's bad behavior [4]. As shown in Figure 2, the emergence of ecological and environmental problems is the product of multiple factors. First, the rapid development of industrial civilization has greatly improved the level of industrial automation but also brought a lot of sewage and

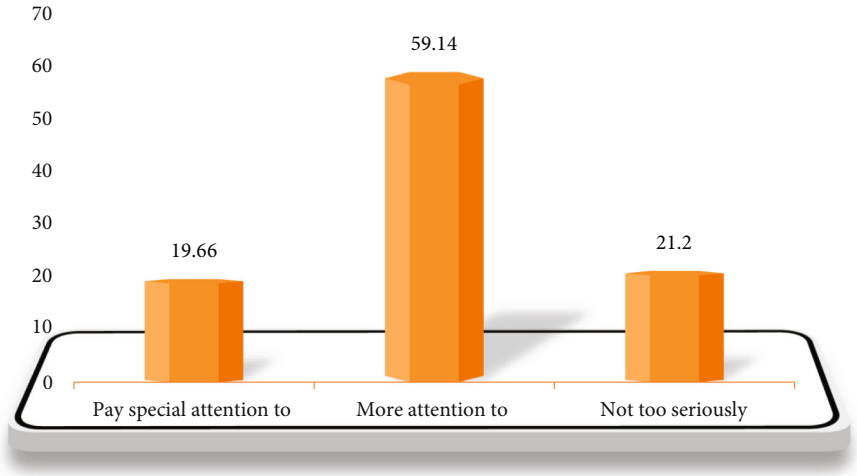

Figure 2: The importance of ecological civilization education in colleges and universities.

waste gas. Sewage discharge will not only pollute the environment but also cause certain damage to the natural inherent ecosystem, causing great damage to the ecological environment, and making it impossible to recover. People depend on the natural environment to live; we should protect the ecological environment and create a beautiful landscape. Second, human beings continue to plunder nature, resulting in a sharp decline in natural resources. The large-scale and unplanned exploitation of human resources leads to the exhaustion of various mineral resources, which leads to the frequent occurrence of various ecological disasters. We should set up the correct concept of interest and value, safeguard the ecological environment, and promote its healthy development. Third, the ecological carrying capacity has reached its limit. The carrying capacity of nature is limited; it must be in a relative balance; otherwise, it will endanger the survival and development of human beings. The frequent occurrence of natural disasters beyond the natural carrying capacity poses a great threat to human existence. College students should consciously realize the ecological concept of harmony between man and nature and realize the balance of all kinds of relations in nature, so as to realize the harmony of the biological world and thus form a new ecological concept.

1.4. Think about the Status of Education. The ecology of ideological education refers to the educational object around which the concept of ideological education is centered. Only on the basis of understanding this, can we prepare for the follow-up research. Some people believe that the ideological education environment is the objective reality that ideological education is surrounded by and affects the object of education. Some people put forward that it is the sum of all external factors that affect the formation and development of people's ideological and moral character and affect the operation of ideological education activities. Here is a typical point of view that many scholars have a consensus; different scholars may be slightly different in language expression, but it is always discussed that the influence of an external objective reality on people and ideological education and the dialectical relationship between ideological education environment and education object are standing in opposition. Domestic scholars hold different views on the ecological understanding of ideological education [5]. Some people think that "ecological ideological education refers to the use of ecological principles and methods to think about ideological education, thinking education as a system of state, a comprehensive analysis of the relationship between the internal and external elements of the system, to improve the effectiveness of thinking education to make it systematic, harmonious and sustainable development." Some others put forward that "based on the law of the development of thinking education and education, we should guide the work of thinking education and education in colleges and universities by the point of view of thinking, and optimize its structure with the help of the principle of thinking and method to promote the teaching and education of thinking and self. The harmonious development of nature and society shows the dynamic balance of the ideological education system."

2. Description of the Problem

2.1. The Fault between Ideological Education System and Ecological Environment in Colleges and Universities. The ecological environment of college students' ideological education is its external condition [6]. It is the objective basis for the formation and development of a person's moral character. The environment content is complex and multidimensional; multi-ideological education is constantly changing people's thinking and behavior and affecting their work effect and process. As shown in Figure 3, the ecological environment of ideological education can be divided into "external" and "internal" categories. The external environment of the school has a certain influence on students' thoughts, while the internal educational environment is the teaching environment of the school. At present, China's education is facing a great challenge, that is, the conflict between the external environment and the internal environment. Externally, from the environment, colleges and universities and even the whole university are in a high level of variability.

In this transformational social environment, the transformation is reflected in the following: the status of the

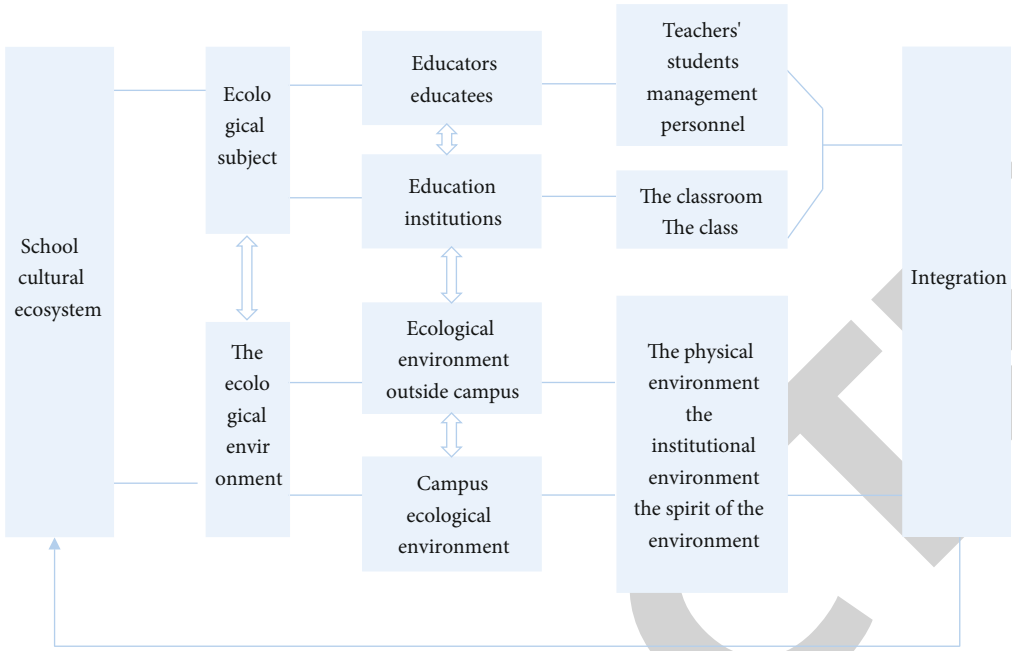

Figure 3: Schematic diagram of school cultural ecosystem.

transformation to the whole society. Economic development is also the transition from planned economy to socialist market economy; in this environment, cultural industry will inevitably embark on the road of diversified development. This external environment is full of various information, which is also used for transmission. Accordingly, the teaching contents and teaching methods of the inner teaching circle are the same. The frequency of strengthening with the external environment compared to the speed means that the content of strengthening the internal environment is simply out of reach. If he does not respond, he will not only be completely defensive in the battle of ideas but also face "information overload." No. The contradiction of the internal and external environmental factors is interwoven with the social and economic transformation, which easily makes the college students' lose self-control and the adjustment ability of thought, and then produce the dislocation of belief and life values, and then weaken its role.

At present, ideological work in colleges and universities is still a systematic project [7]. The ideological work of college students needs the support and cooperation from all aspects of family and society. Only by carrying out ideological work comprehensively can we create a good social environment and promote the physical and mental development of college students. But the truth is always disappointing [8]. First of all, due to the disconnection between family education and college education, some parents blindly pursue the intelligence and future of their children and neglect the moral education of their children. At the same time, due to the lack of communication between parents and schools, information exchange channels between schools and families are not smooth, which leads to the inability of family education and school education to form a joint force and promote the overall development of students. Secondly, due to the current social situation, especially the bad environment around the school, its role has been greatly weakened. In the transition period, the complexity and pluralism of social values, the bad social atmosphere and corruption, as well as the negative effects of western cultural trends have exerted an extremely negative influence on the overall development of college students, making social education deviate from its purpose.

2.2. Main Problems of Ecological Civilization Education in Ideological and Political Education in Colleges and Universities

2.2.1. The Supply of Educational Methods Needs to Be Innovated. First, strengthen innovative teaching methods [9]. In ecological construction, the method of educating objects is not novel enough. In the case of ecological civilization teaching for "current ideological and political course" teachers, only 28.46% choose actual experience, while the rest are 67.23%, 60.46%, and 29.69%, as shown in Figure 4. Therefore, in ecological humanities, knowledge education is still the mainstream, focusing on the transmission of knowledge, but ignoring the actual participation. In the classroom, due to the limitation of time and space, it is difficult to combine the static, dynamic, and value needs of the human ecological environment with practical education and ability education. Due to the lack of ecological practice and students' environmental protection practice activities, the negative effects of environmental protection consciousness of college students are desalted and blurred, and it is difficult to have a profound and lasting impact on the cultivation of students' ecological quality.

Second, strengthen the educational methods for students [10]. In China's ecological construction, there exists a binary opposition of subjectivity and passive acceptance. The teaching method based on "teaching" has difficulty in breaking through the traditional teaching mode, ignoring the students' subjectivity and the disorder of thinking, thus affecting the subjectivity.

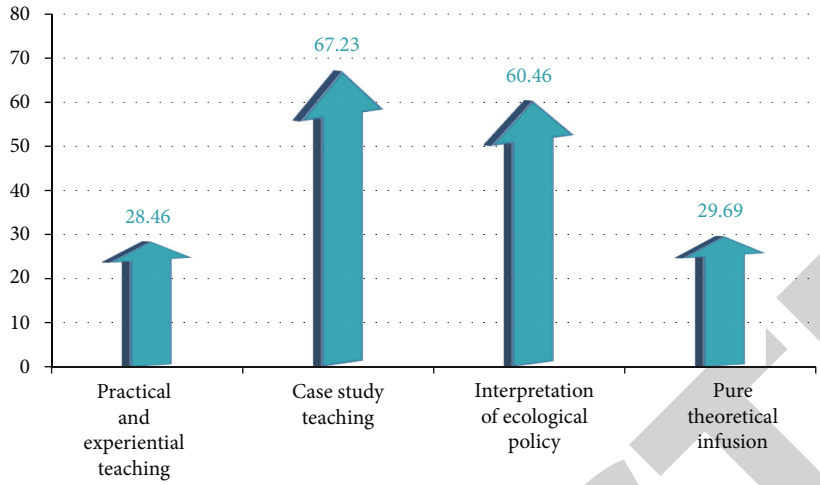

Figure 4: Teaching methods of ecological civilization.

Suhomlinsky believed that only through one's own efforts can one obtain and experience, which can be called true education. The self-education of S-level students is very important, which should move from heteronomy to self-discipline. A teacher's teaching is one, and thought is another. In the teaching process, teachers still remain in the sorting of the internal environment of education, so that students feel that teachers' teaching methods are not novel enough, their interest in the knowledge they have learned declines, and the learning effect is not good.

2.2.2. The Supply of Educational Efficiency Needs to Be Improved. Ecological education plays an important role in the ideological education of college students [11]. However, from the actual performance, the problem of ecological environment deterioration is "on-site," many ecological civilizations show that consciousness is an "empty field," the subject consciousness is not strong, ecological awareness and executive ability are far from people's expectations, and the cultivation of green living habits has not been formed.

First, we do not fully understand ecological civilization. You need to obtain new information through various channels on the basis of professional ability, so as to improve their ecological civilization quality. The majority of students (59%) are case by case. A small number of them think it is not necessary, because as can be seen from the chart, most students do not take ecological civilization as an important factor to cultivate but as an auxiliary factor or even optional (see Figure 5).

Second, the study of ecological environment knowledge is not complete and comprehensive. What was the meeting about "the first time governments have come together to discuss a global environmental protection strategy"? Of the world's three major holidays, the correct answer for Earth Day is 29.6.9. As shown in Table 1, when asked about the grammatical meaning of "environment," in terms of constructing "ecological" grammar and content, students are more inclined to choose "familiar" and "concise" under various circumstances where the "garbage classification" standard is strongly advocated, while less than 10% choose

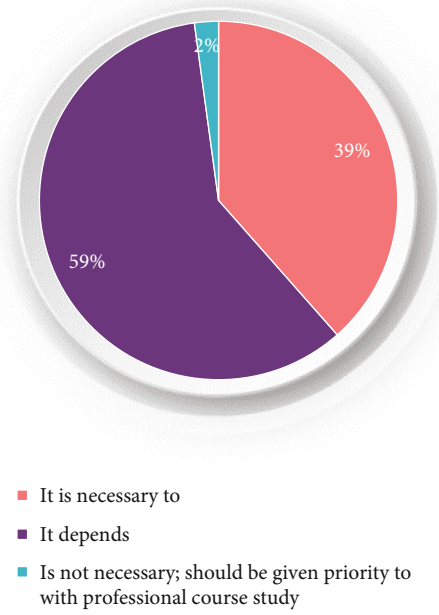

Figure 5: Emphasis on ecological civilization literacy.

"very good." It can be seen from this point that the current college students have not fully mastered the basic knowledge of ecological environment, some things taken for granted have not become real knowledge, and most of the knowledge is still at the most basic cognitive stage.

3. State of the Art

3.1. Current Situation of Ecological Civilization Construction of College Students. At present, the research on the construction of university ecological construction is not balanced enough, and the research focus is not prominent [12]. The paper points out that the current research on university ecological civilization is not comprehensive enough, and the

Table 1: Ecological knowledge mastery table.

The title	Correct
What was the first international conference where the world's governments discussed contemporary environmental issues and discussed strategies to protect the global environment?	29.69%
Which day is Earth Day, one of the three major environmental holidays?	53.85%

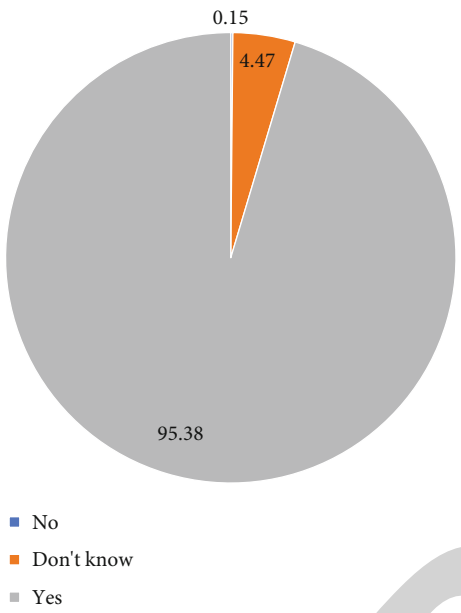

Figure 6: Support for national ecological civilization construction.

Table 2: Set up ecological civilization education courses.

Options	Students	Accounted for
Have the necessity of opening	207	42.00%
Do not know	128	26.00%
It is not necessary	98	20.00%
Other	59	12.00%

Table 3: Whether the school offers ecological civilization education courses.

Options	Students	Accounted for
Has a set-up	130	26.50%
Did not open	263	53.50%
Do not know	98	20.00%

attention to it is insufficient. As shown in Figure 6, at present, scholars at home and abroad have carried out a lot of discussions on ecological education for college students, but most of them lack practical significance and are difficult to apply in practice. Only in-depth discussion on its feasibility can effectively improve its teaching quality. Therefore, we must combine theory with practice and use theory to reveal problems, understand problems, solve problems, and actively solve environmental problems.

The research of ecological civilization education in foreign countries is earlier, and there are great innovations and achievements in methods. Environmental education was first developed in the West, and it was also the West that carried out environmental protection research and publicity, and achieved good results. Foreign countries have formulated environmental protection laws and regulations and carried out environmental protection propaganda in schools at all levels. In particular, in the United States, the characteristics of its environmental education is particularly prominent. In foreign countries, people have been strongly influenced by humanism. The transformation of anthropocentrism emphasizes the conquest and control of human beings over nature, which violates the operation law of nature to some extent, leading to the imbalance of ecological environment and serious ecological disasters and environmental problems.

3.2. The Significance of Classroom Ecology. From Confucius' "Apricot Terrace" to today's classroom, classroom has always been the main place for teachers and students to grow up and the inheritor of teachers and students. The quality of class ecological environment is directly related to the growth and success of students. God should proceed from the relationship between teachers and students, educational content, educational methods, and educational objectives.

3.2.1. The Development of Classroom Ecology Has Promoted the Reunderstanding of the Relationship between Teachers and Students. The traditional connection between teachers and students is a challenge [13]. The theory of "one yuan" and "two subjects" is closely related to the traditional teacher-student relationship theory. In the ecological environment of the classroom, neither the teacher-centered student subject nor the teacher-centered student subject can reflect the ecological concept of harmony and equality. The emergence of the theory of "intersubjectivity" opens up a new era for the teacher-student relationship in the classroom ecosystem. The interaction between teachers and students is interactive, such as the exchange of information and feelings. In teaching, teachers should convey educational knowledge and ability to students with vivid expression, rich content, diversified teaching methods, and equal attitude.

3.2.2. Promote the Rational Allocation of Teaching Content and the Ecological Construction of Classrooms [14]. The traditional task of classroom education is to transform knowledge into knowledge. It is reasonable for educators to teach it to the educated, including the quality-oriented education advocated today, but his original intention has not changed.

The question, however, is how you should interpret what you are teaching, which goes against the text. The classroom ecological environment requires interaction between students. The transfer of information and the exchange of energy—that information should be healthy and beneficial and help maintain and contribute to the smooth functioning of the ecosystem. Therefore, if you want to achieve a virtuous circle, the most important thing is the dissemination of information. Fluency, that is, the arrangement of teaching content, should be reasonable; there should be goals. First of all, knowledge cannot be completely objectified, especially ideological and political work. Secondly, the connotation of knowledge should not be too narrow.

3.3. The Enrichment of Ideological and Political Education in Colleges and Universities by Ecological Environment. The components of ideological and political education activities include educational objectives, educational tasks and educational principles [15]. On the basis of modern education, modern education is not only the cause of full-time institutions such as schools but also the cause of the whole society. It may not only be relevant to everyone's childhood, adolescence, and youth period but may also be relevant to people's life, not only to make a living but also to live a better life and develop themselves better. The openness, trapezoid and flexibility of the school system; Modernization of education. The modernization of education includes the modernization of the educational system, objectives, concepts, contents, methods, means, teachers, facilities, and management. The goal of educational modernization is to cultivate modern people. Universality and immediacy of social connection, as well as the setting of teaching contents and methods, are influenced by a variety of environments. First, we must strengthen ideological and political work [16]. The educational thought, educational goal, and educational principle established by the educational subject are all summarized and refined to the provided educational materials [17]. Secondly, the influence of the subject of ideological education on the object of education is correct. Materials provided by the environment have been carefully selected. In the process of education, the ideas and data sources and object environment to be conveyed, that is, the educational content, are the result of the independent choice of material provided by the education object in the teaching situation. Third, the ideological education situation is a kind of educational situation deliberately created by the implementation subject. Literary scenery, various scenes designed by educators, and special atmosphere are all important contents of ideological education. The "educational platform" works on goals.

3.4. Ecological Man: An Important Symbol of the All-Around Development of Human Beings in the New Era. The ultimate goal of ecological construction is "people-oriented," which has internal consistency with the overall development of human beings. At the same time, he is applying it to various societies and pushing it forward. The all-around development of human beings has the characteristics of the times, and its development emphasis has changed gradually in each historical stage. In the harmonious development of the relationship between man and nature, because the ecological needs of man have been put on the agenda, ecological construction must have a form suitable for the body. Therefore, in the new period, cultivating the value concept of "ecological man" with life rationality as the core is the need of the overall development of human beings. The all-around development of people is to constantly improve their physical fitness and constantly cultivate and develop their own abilities. This is not only to satisfy people's wishes but is also the foundation of a person, and he has an advantage over others. The goal of man's all-around development in the new era is not only to realize the "harmony" of man but also to realize the benign interaction and harmonious coexistence between man and nature. In this context, the ideological and political education of ecological civilization can help these children, who are the earliest to enter the ranks of "ecological people," who will better promote the improvement of human comprehensive quality and all-around development, thus accelerating the process of ecology.

4. Result Analysis

4.1. Optimize the School Environment of Ecological Education for College Students. We should start from creating a good classroom teaching environment and strengthen the construction of campus ecological civilization. The construction of ecological culture is an important part of colleges and universities. We create excellent campus culture from three aspects. The advantages and disadvantages of ecological campus environment directly affect the effect of ecological civilization education of college students and their learning enthusiasm.

4.1.1. Create an Excellent Classroom Teaching Environment. The education of ecological civilization is an important subject closely related to human living environment [18]. This is closely related to building a better China and a civilized ecological society, as shown in Tables 2 and 3. Universities are the main body of ecological civilization construction. At present, the overall level of college English classroom teaching environment in China is low, and students' learning enthusiasm is not high. Creating a good learning atmosphere is conducive to cultivating students' ecological consciousness. In order to cultivate students' subjectivity and initiative, we need to create a good classroom atmosphere through various ways. On the one hand, the state has issued a series of laws and regulations to protect the ecological environment and provide institutional guarantee for creating the classroom teaching environment. On the other hand, a publicity and education system led by the government, coordinated by official associations and individuals, has been formed to improve the enthusiasm and initiative of university students in protecting ecological civilization, from unidirectional to multidirectional expansion, forming a multidirectional joint force of various departments.

4.1.2. Strengthen the Construction of School Spirit and Study Spirit in Ecological Education for College Students. In order to realize ecological protection, in addition to establishing a good campus cultural atmosphere, there should be corresponding policies and severe punishment for the behavior of destroying the ecology. The school spirit, class spirit,

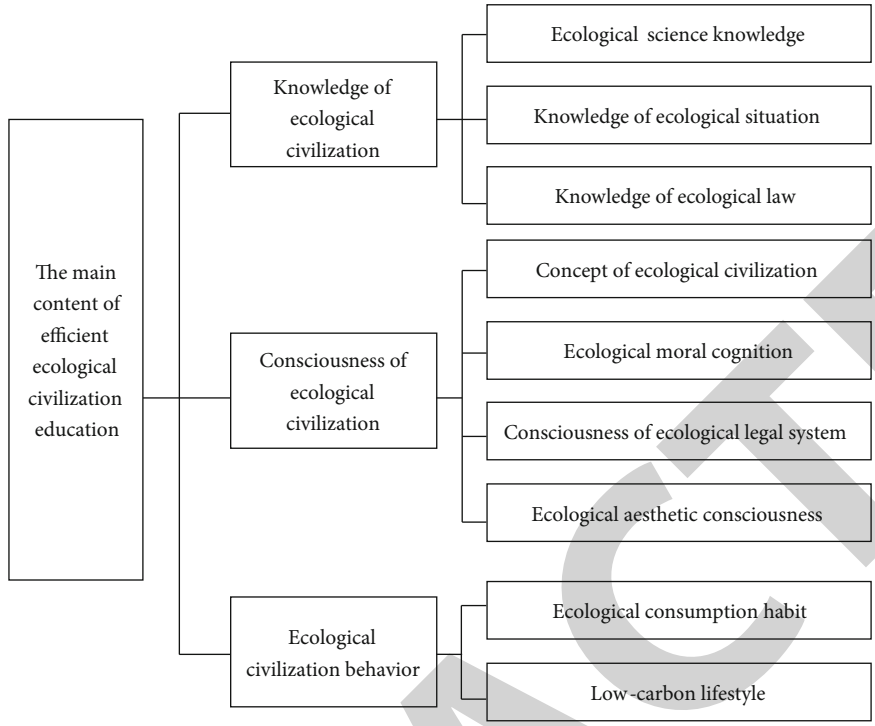

Figure 7: Schematic diagram of the main contents of efficient ecological civilization education.

and study spirit of colleges and universities are invisible systems, which profoundly affect the thought, behavior, and consciousness of college students as well as their ecological consciousness, thus enhancing the effectiveness and effectiveness of ecological education of college students. Colleges and universities should construct the ecological construction system which is suitable for the ecological practice of college students and strengthen the restriction between the education subject and the educatees, so as to form the resultant force of ecological protection and enhance the consciousness and consciousness of college students. Campus culture is a kind of spiritual outlook and the most precious spiritual wealth of colleges and universities [19]. Class style is a kind of learning habit and behavior formed in the class collective; this habit will have a certain influence on students' learning enthusiasm and initiative and then have a certain influence on their future. Class style is a class to develop a learning habit and behavior; it may affect their enthusiasm and initiative, so as to affect their future, so as to affect their growth. To strengthen the construction of ecological civilization in colleges and universities, we must establish good school spirit, class spirit, and study spirit. To strengthen the construction of the style of study, we should start with correct students' learning attitude and guide them to establish a correct concept of interests (see Figure 7).

4.2. The Optimization Strategy of Ideological Education of College Students in the New Era. The ecological problems of ideological and political education of college students in the new era have both internal and external causes [20]. College students' ideological and political education activities should give full play to the role of various factors on the basis of following the ecological law, adhering to the basic principles of comprehensive, being integral, coordinated, and sustainable, and strengthening the interaction of information and energy transmission. We explore from the following aspects.

4.2.1. Change Subject Cognition to Enhance Overall Awareness. The development practice is based on a certain development concept, and the correctness of the positioning concept directly affects the effect of the practice. In order to meet the needs of the new situation and the new period, we must thoroughly change the traditional way of thinking from the understanding and reality, so that the ecological idea of ideological education can be truly carried out in the whole teaching activities. Cultivate ideological education subject.

(a) The concept of "big ideological and political" mode is closely combined with the needs of the overall ideological education. It is necessary to comprehensively grasp and design at the top level the ideological and moral construction of students and solve the problem of unbalanced and inadequate development in a targeted way, so as to meet the requirements of the development of students' ideological education in the new era. We should attach great importance to the integration of education and teachers; strengthen exchanges and interactions from the party committee, student work, department leadership, subject teachers, counselors, and other aspects; do a good job of linking up, forming complementary advantages of the work situation; and really give full play to the strengths and characteristics of full-staff education

(b) To understand the ecological orientation of ecological subject scientifically is to correctly understand its role in education and teaching activities, so as to keep its dynamic balance in the new era

4.2.2. Deepen Theoretical Research to Enhance Theoretical Confidence. Only by fully affirming and trusting it, can it be better materialized into practice, and only by fully affirming and trusting the theory of state can ideological and political educators better materialize into practice and consciously realize the unity of theoretical logic and practical logic. To do a good job of ideological education in colleges and universities and strengthen theoretical research is directly related to the identity and belonging of the subject but also related to the validity and initiative of ideological education subjects to use theoretical knowledge to guide and improve educational problems.

4.2.3. Integrate Various Resources to Enhance the Resultant Force of Education. They are closely related to family education. To strengthen school education, one should establish a scientific and harmonious concept of family education, parents should take the way of education should be combined with the actual situation of children, starting from reality, reasonably learn from the education theory of education experts, really from the heart of children, concerned about their psychological development and ups and downs. The second is to strengthen the thought and guidance of family education. For scholars, the head of the family is more of a role of moral education and wisdom in life. Parents should guide the direction of ideological understanding, develop the influence and influence of parents, and create a warm education environment for scholars. The parents keep in touch and communicate with the school. Great scholars are the backbone of family education, and their educational practice can really solve their thinking problems of embodied reality. Home education is not only to improve the effect of ideological and political education but also to help scholars become talents, to benefit the infiltration of ideological and political education, so that ideological and political education can play a long-term role.

5. Conclusions

The ideological education ecosystem for college students is a complete system of interdependence and mutual openness. In the long process of development, each factor can form a harmonious, balanced, and complementary relationship and create a harmonious and stable social environment for the comprehensive and free development of people, thereby improving the teaching efficiency of the school. The thoughts and values of college students are important factors influencing social values. On the basis of adhering to being "people-oriented," we should strengthen the moral guidance of the ideological education of college students and establish and improve the ideological education system for college students. This paper mainly studies the basic issues of student ecological education, including the concept, content, and significance of student ecological education; problems and causes of student ecological education; and ways to solve problems in student ecological education.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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Retraction

Retracted: Analysis of the Relationship between National Image Building and International Communication Ability from the Perspective of Ecology under the Media Environment

Journal of Environmental and Public Health

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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.

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[1] Z. Zhu and C. Zhang, "Analysis of the Relationship between National Image Building and International Communication Ability from the Perspective of Ecology under the Media Environment," *Journal of Environmental and Public Health*, vol. 2022, Article ID 9393446, 10 pages, 2022.

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Research Article

Analysis of the Relationship between National Image Building and International Communication Ability from the Perspective of Ecology under the Media Environment

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With the gradual expansion of China's political, economic, and military strength, the rapid rise of China has become a globally recognized fact. At present, although China's international image as the world's second largest economy, military power, and political power has been increasingly accepted by the global community, China's image construction, as an important part of national soft power, is still facing many problems. This chapter focuses on defining the basic concepts of international publicity, China's soft power, and China's image construction in the context of new media integration, analyzes the international development trend of international publicity and the important functions and limitations of foreign publicity in establishing China's image construction, and analyzes the ecological environment of media integration development. Considering that there are great unfairness in the environment and the conflict of communication values is not conducive to the establishment of China's urban image, the article focuses on how to use global publicity values to establish China's national image and puts forward corresponding countermeasures.

1. Introduction

Entering the twenty-first century, the information media with the network as the media is further expanded and innovated. Various kinds of we media and emerging media represented by Weibo, WeChat, and short videos have gradually replaced traditional media such as newspapers, magazines, and radio and become the young people's access to various media [1]. The mainstream way of news information: in order to adapt to the new situation of media reform, authoritative media, mainly newspapers and periodicals, began to explore the path of transformation and development of electronic and networked paper media: from 2008, traditional media such as Southern Newspaper and other traditional media have tried new formats of all-media, to 2014. With the enhancement of our comprehensive national strength, China's global influence is becoming more and more important [2]. More and more countries and individuals in the world are paying attention to China's economic development. Because of its timeliness and interactivity, online media has become the most efficient channel to deliver national songs and tell national stories. Transmitting information and publishing news through online media has become an important way for governments around the world to establish and publicize the image of all countries [3]. The timeliness, interactivity, and leapfrogging of obtaining information in the Internet age all show that establishing and publicizing China's urban image through Internet media is an effective and fastest way to get recognition from other countries and improve China's popularity. Looking at the world, under the background of economic globalization, behind the economic prosperity and development, all countries in the world have paid a heavy ecological price, and the natural ecological environment is unbalanced. China and

even all countries in the world have begun to realize the importance of harmonious development and strive to build and spread a balanced ecology view [4]. Not only that, the "lucid waters and lush mountains are invaluable assets" advocated by President Xi Jinping has been written into the party constitution. Green has become the main color of the development of the current era, and ecological environment construction has become an important part of the Chinese dream [5].

In the past, China's image construction through online media has achieved laudable achievements and effects. Western media and the public understand China through online media. Therefore, this paper selects the research perspective of international communication ecology to take care of the construction of China's national image. This is because, firstly, international communication is the main way to shape a country's image; secondly, the systematic research method of ecology can not only give us a macroscopic and holistic research perspective but also help us to clearly understand the inner workings of the international communication system, laws, and their interaction with external systems.

This paper selects the research perspective of international communication ecology to take care of the construction of China's national image [6]. This is because, firstly, international communication is the main way to shape a country's image; secondly, the systematic research method of ecology can not only give us a macroscopic and holistic research perspective but also help us to understand the inner workings of the international communication system at a clear level, laws, and their interaction with external systems [7].

In terms of political ideas, the current domestic discussions on national image construction in China are relatively macro, and few people have combined the whole media and international communication capacity of China's image construction. From the research and collation of relevant books and articles, we can see that many academic achievements have been made in the independent scientific research of "Chinese English websites," "foreign publicity," and "Chinese brands" in China. However, it is rare to discuss the construction of "national image" from the perspective of global communication. In the books and articles sorted out by the author, the in-depth study of the connotation of "international communication" and "national image" focuses on the study of the current situation and strategies of international communication, as well as the analysis of the current situation and strategies of the overall construction of China's urban image. The overall construction of China's urban image is placed under the condition of global publicity of online media, and there is less research on the national image construction mode and construction path under the following conditions.

2. State of the Art

2.1. Convergence Media and Its Communication Environment Characteristics. The concept of Convergence Media is developed on the basis of all media communication formats [8]. It is a media organization taking the initiative to take advantage of the high quality of traditional media content editing and reviewing and the good effect of new media communication [9]. The communication advantages of the carrier have created a new media product that integrates "all media" and spreads through the Internet. On the whole, the fusion media is an intensive concept. The first is a concept, "taking development as the premise and promoting excellence as a means to maximize the advantages of traditional media and new media, so that the competitiveness of a single media becomes the common competitiveness of multiple media." The second is a new mode of operation. News media organizations establish the concept of convergent media, set up convergent media centers, use convergent media technology, launch convergent media products, and integrate and develop various media platforms. Converged media not only uses multiple media to enhance the communication effect of the same content, but more importantly, introduces the Internet thinking, integrates the editing process, content review, product form, and communication channels of different media into one platform to solve the problem, so that the product has the comprehensive advantages of all media, all functions, all time and space, and integration [10].

As a new media product that deeply integrates the advantages of traditional media and new media, the social information dissemination environment it creates has the following characteristics [11]. (1) It is the product of the combination of new and old media: the traditional media forms mainly include radio, television, and newspapers, while the new media mainly uses the Internet for information dissemination. Combining the two can complement each other, and the integrated media is also born. Its emergence can effectively integrate human and material resources in enterprises and save various costs in enterprise publicity work. Due to the advantages of new and old media, financial media can quickly and accurately transmit information to meet the needs of enterprises' own development [12]. (2) It is the product of the combination of content and service: with the rapid development of network technology, financial media uses big data technology to enrich the content of information dissemination and can also provide high-quality services according to users' needs. Therefore, the coverage of media communication is wider [13]. Whether it is the generation and processing of information or the use of traditional media platforms, financial media is the upgrading and transformation of traditional media [14]. Therefore, the convergent media communication environment requires that practitioners in all aspects of information processing must be able to proficiently use various digital information technologies to work. Figure 1 shows the basic structure of fusion media [15].

As far as the national image in the era of globalization is concerned, it is no longer just a one-way process of explaining itself to the international community from a subjective perspective. In the context of the era of media convergence, information transmission, and communication, sending and receiving have become a multidimensional process of flow. Only from "my perspective," in today's era of information

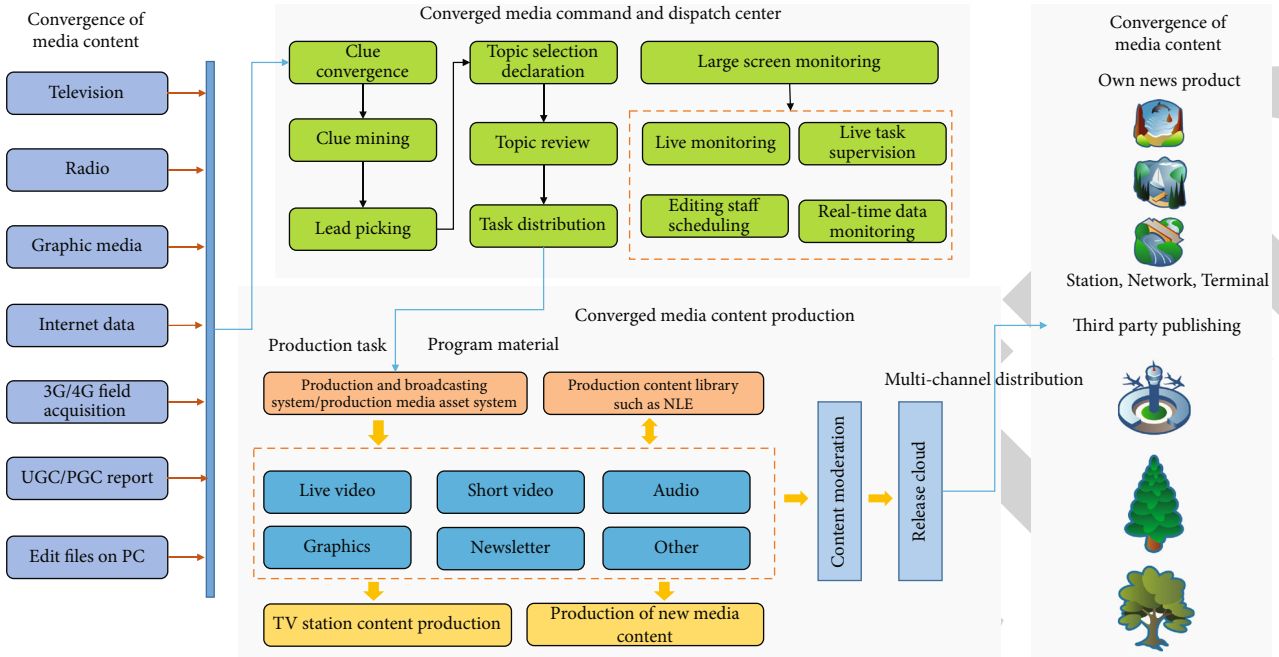

Figure 1: Convergence media structure.

explosion with highly developed Internet media, it is impossible to effectively accomplish the strategic goal of national image construction.

Specifically, the factors that constitute and affect the national image should also be comprehensively considered from three aspects: objective, subjective, and specific implementation methods. First, from an objective perspective, the influencing factors of its national image mainly come from the display of its strength, that is, the overall impression of a country's economic, military, cultural, diplomatic, and other aspects to the public at home and abroad. Second, from a subjective point of view, the manifestation of a country's national image also depends to a large extent on the cognition and interpretation of its audience, and this process often cannot be dominated by active national image construction and dissemination. Third, from the perspective of implementation, in the process of building and publicizing a country's national image, it is not only the public who have considerable ability to discriminate information and the media with established concepts, so the initiative to carry out the national image is not limited.

2.2. Definition of the Concept of International Communication and National Image. International communication refers to the phenomenon of cross-cultural information exchange and communication between individuals and organizations of different nations and countries in the world today [16]. It is the cross-border information exchange and communication between the subjects of international relations, especially the nation and the country as the subject [17]. It can include all-round, multilevel, and multichannel exchanges between countries, between regions, between various political, economic, and cultural groups, and between various ethnic groups [18, 19]. Its purpose is to strengthen communication and exchanges and enhance understanding. From the perspective of the publication time of master's and doctoral dissertations and journals, from 2011 to 2021, the research on national image has shown an upward trend, especially since 2020, the number of research has surged, reaching a number that is far from comparable in previous years. The specific data is shown in Figure 2.

The so-called national image refers to the subjective judgment and public opinion reflection of the history and reality of a specific country in the minds of the public and is an important content and concentrated expression of a country's soft power. Generally speaking, the national image has the following characteristics: first, diversity, because the national image is a complex and pluralistic complex, which includes the political, economic, cultural, social, technological, and other aspects of the country, so the national image in the minds of the public is only the right image of the country; the second is duality, because the relevant information actually obtained by the public and its observation perspective, personal experience, knowledge level, and emotion. There are differences in attitudes and other aspects, so the national image obtained may not be completely equivalent to the objective fact itself, which can be displayed as the objective reality of the country, or it can be displayed as a certain degree of illusion; the third is plasticity, the public's understanding of a country. A good national image is an extremely important strategic resource of a country and plays a vital role in promoting the realization of national interests. First, it is conducive to gaining the recognition and support of the domestic people and the international community, consolidating its legal status, inspiring people's morale, and enhancing national cohesion; second, it is conducive to influencing the behavior of stakeholders between countries, promoting international economic and trade

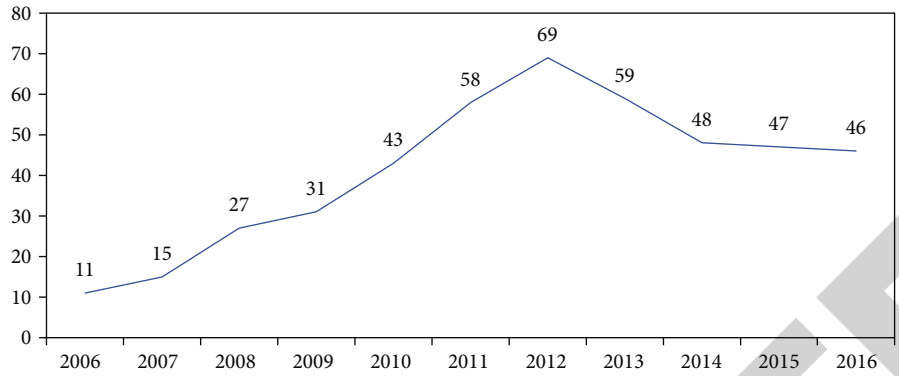

Figure 2: Number of international communication literature.

activities, and expanding international market space; third, it is conducive to creating an international public opinion environment for the development of the country, providing the most powerful legal defense for participating in international affairs, and improving the initiative to participate in international affairs. Therefore, when we shape the image of the country, we must not only pay attention to the reality and factual basis of the country itself, that is, the display of the real situation of the country, but also cannot ignore the subjective shaping. Table 1 shows the differences in the construction of national images [20].

3. The Current Situation and Problems of China's International Communication Development and the Division of International Communication Ecological Levels

3.1. Overview of International Communication Ecology. The so-called "ecology" is the natural way that hides behind the living world of human beings and other creatures, freely and spontaneously grows and functions, and quietly dominates the fate of species. Uncontrolled destruction and various environmental problems begin the first clues [21]. Table 2 shows the main ecological and environmental problems in different regions.

As a special form of mass communication, international communication also has an ecological relationship between its communication activities and the external environment, including the limitation of media technology, the control of political economy, and the influence of language and culture [22]. These aspects are counterproductive. So, what is the ecology of international communication? To apply Zhi Tingrong's definition of "ecology of mass communication," it refers to the study of international communication based on ecology [23].

Looking forward to the hotspots and trends of global communication ecology, the following four points deserve continuous attention: first, the in-depth innovation and reform of media communication terminals brought about by basic media innovations such as blockchain technology and 5G should be paid attention to; second, regional and country-specific media ecology changes urgently need to be refocused from the perspective of global politics and communication ecology. There are three levels (Figure 3): the original ecology of international communication—the international communication activities and phenomena themselves constitute an ecosystem. Specialized international communication activities are regarded as living and living individuals, with their own set of operating principles and survival rules, such as dependence on science and technology, own organizational management, and industrial chain structure.

3.2. Current Situation and Problems of International Communication Development in China. Since the 18th CPC National Congress, China is undergoing an extensive and in-depth social transformation. In this process, China's international communication can be said to be the coexistence of opportunities and challenges and the coexistence of achievements and problems.

In the new era, the state has launched a new round of media integration development and reform and innovation and strengthened the attention and support for comprehensively promoting media reform. Chinese media have made important achievements in the construction of "hardware" and "software."

From the analysis of the global policy environment of international exchanges, whether the United States and some western developed countries believe in the Soviet Union and China politically, the disintegration of the Soviet Union also led to the disintegration of the former "socialist camp" and led to the formation of unipolar forces between the country and some Western European countries. The United States is the strongest economic power in the world today, and its per capita GDP is 40 times that of China. This is equivalent to a 1% increase in US GDP. Politically, the United States has always adopted an attitude of distrust towards China, which is essentially the distrust of capitalist countries towards socialist countries. In international politics, the United States' consistent lack of confidence policy towards China essentially refers to the capitalist countries' lack of confidence in the democratic system. In this regard, the term "strategic partner" has become a superficial diplomatic term.

Table 1: Differences in the construction of national images.

Title	Date	Page	Remarks
571 Chinese citizens evacuated safely from Yemen	March 31, 2015, edition 03	Front page of a newspaper	Tabloid
Chinese citizens evacuate Yemen in an orderly manner	April 1st, 2015, edition 01	Front page of a newspaper	
571 Chinese citizens left Yemen safely and returned from Djibouti one after another "Thanks to the motherland, we can go home"	April 1st, 2015, edition 03	Front page of a newspaper	
China assisted in evacuating citizens of 10 countries including Pakistan from Yemen	April 3, 2015, edition 01	Front page of a newspaper	
For the first time, China has taken special action to evacuate foreign citizens from dangerous areas, which has been highly praised - "China is a real good brother"	April 4, 2015, edition 03	Front page of a newspaper	
We evacuated the last group of citizens in Yemen	April 7, 2015, edition 01	Front page of a newspaper	
Photo report	April 8, 2015, edition 03	Front page of a newspaper	Tabloid

Table 2: Ecological and environmental problems in different regions of China.

Natural background	Ecological environment problems	Main distribution area	Main prevention and control measures
Mid temperate and subtropical marginal mountainous areas	Forest destruction	Northeast, southwest, and South China forest areas	Closing mountains for afforestation, planned logging, combination of mining and breeding, returning farmland to forests, and changing the economic structure of forest areas
Arid and semiarid grassland area	Grassland degradation	Inner Mongolia, Qinghai, Ningxia, Xinjiang	Returning farmland to grassland, closing grassland, and raising livestock in sheds
Lowlands, lakes, and marginal areas of the sea	Wetland atrophy	Sanjiang lowland, lakeside, and seashore	Establish wetland nature reserves and stop reclamation and returning farmland to lakes

Secondly, as far as the language spread abroad is concerned, the main problem is Chinese. For foreigners who study with words as the basic unit, because Chinese is a very complex language, their acceptance of Chinese is also very low. Moreover, China has invested a lot in the introduction of Chinese. Compared with the introduction cost of tens of billions of dollars in advanced regions such as Britain, France, and the Americas, it can be considered as "insignificant." In addition, as shown in Figure 4, Chinese is widely used in major fields or important industries, such as diplomacy, economy, science, culture, and education.

According to the analysis of the current situation, the global communication conditions in which China is located are even worse. Therefore, the determined historical mission of the global promotion of Chinese language must be as follows: to make the world aware of China's economic and social development and world progress, understand China's history, understand the natural, economic, and development values of the Chinese nation, improve the global understanding of Chinese language, and promote the peaceful coexistence of Chinese and the world.

The human world is a complex society composed of diversity, and the existence of different civilizations forms a colorful world. In international communication, news is one of the most basic information circulating in the world. Through news, we learn about changes in the environment and the world around us, forming our impressions and attitudes towards things. News in international communication is not purely objective information; it is the reporting of newly occurring facts. Since it is a report, it is a human activity, which inevitably involves human consciousness for processing and human cognition and judgment.

Table 3 lists the top ten newspapers in the world by circulation. This has resulted in the result that countries with strong information and weak information do not pay attention to information from developing countries. Due to this interference with mainstream media, it is difficult for information from developing countries to spread to the outside world, which is very unfavorable to development of China's national image building.

Figure 5 shows the United States and the world information trends. In theory, this communication environment can give the world public more complete and objective information. However, this is not the case. Because the US media occupies an absolute dominant position in the international communication system, not only the US audience accepts the reporting position of the domestic media, but most audiences in other countries are also affected by the US media reports, and even some Chinese Audiences will also actively seek relevant information in the US

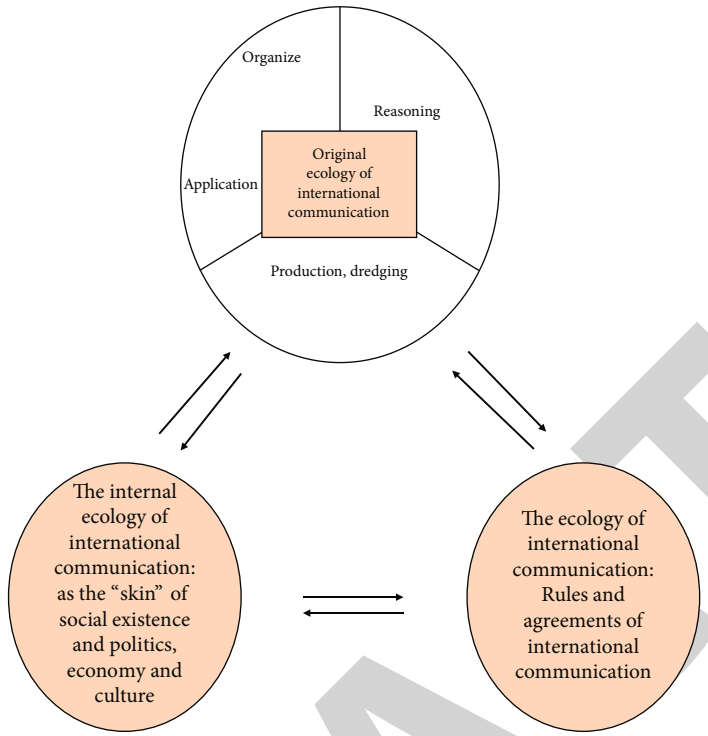

Figure 3: Three levels of international communication ecology.

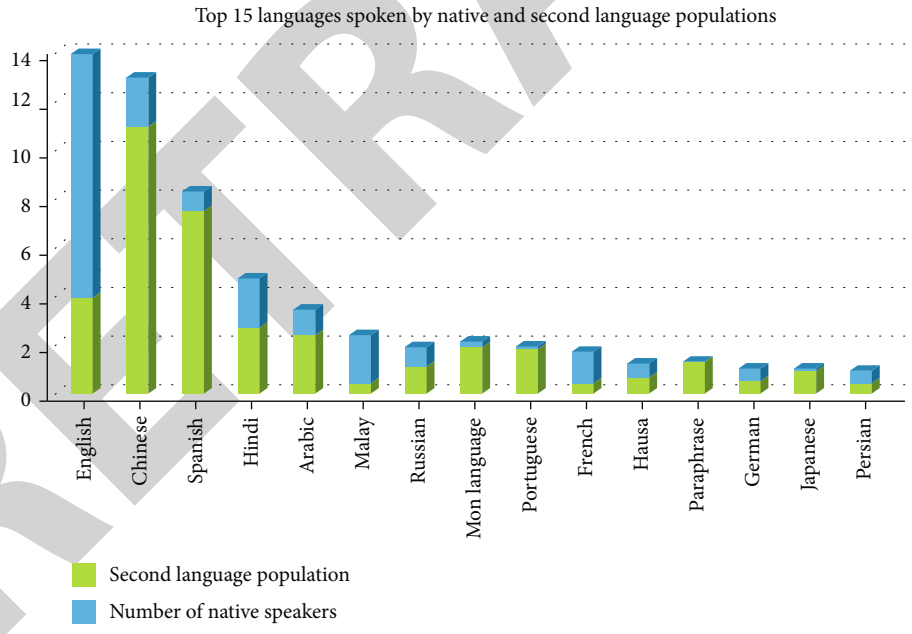

Figure 4: Chinese usage.

media. As a result, American public opinion was accepted by some Chinese audiences, while Chinese voices failed to effectively spread.

Second, there are great inequalities in the context of international communication. The main tool for shaping a country's image through international communication is the media. However, the current distribution of mass communication resources in the entire international community is extremely unequal.

As the main force of China's foreign reporting, Xinhua News Agency can only broadcast more than 800,000 words of news in 7 languages every day. There are only 13,091 news users, of which only 4,144 are overseas users; while Reuters uses 24 languages every day for 151 countries. Figure 6 shows the scale of the five major media advertising markets in China from 2002 to 2012.

Third, the overall image of developing countries is distorted. Although the use of foreign media to shape a

Table 3: The world's top ten newspapers by circulation.

Newspaper name	Sales volume (million copies)
Yomiuri Shimbun, Japan	14.5
Ashahi Shimbun, Japan	12.6
Sichuan Ribao, China	8
Mainichi Shimbun, Japan	5.8
Bild, Germany	5.6
Chunichi, Shimbun, Japan	4.3
The Sun, Britain	3.7
People's Daily, China	3
Sankei Shimbun, Japan	2.8
Nihon Keizai Shimbun, Japan	2.7

country's national image is now a common method, in essence, the fundamental purpose of international communication is still to serve the country's politics and ultimately safeguard the country's political interests. Correct understanding will in turn lead to a stereotyped image of a big country, that is, people's stereotype of a big country, because Western powers always "shape" news in China based on their own interests, and the content of the reports is all news that is beneficial to their national political interests. This monopolistic coercive method makes it extremely difficult for developing countries to try to shape their country's image through media communication.

4. The Concept of Developing International Communication and Shaping China's National Image

4.1. The Shaping of China's National Image. The rapid development of China in the mid-1990s has attracted the attention of some Asian countries, especially the United States. Since 1996, China's diplomatic strategy has been adjusted to focus on domestic development in order to improve overall national strength and maintain appropriate international conditions and minimize the possibility of the United States and other countries using their advantages to contain China's development. This strategy helps China unite other great powers as partners, while also curbing the formation of potentially hostile alliances to a certain extent.

While continuing economic development, we must spare no effort to continue promoting the process of political civilization and change the social phenomenon with many social and legal problems and low government participation; earnestly respect human rights and strengthen the concept of human rights; adhere to the sustainable scientific outlook on development and enhance environmental protection awareness and intensify efforts in environmental protection; take the scientific outlook on development as the guiding ideology, take economic development as the foundation, and promote the all-round social progress and the all-round development of people; and actively solve the outstanding problems of China at the current stage that are concerned by the international community, especially the hot issues. This will give the international community an opportunity to fully understand China.

Can actively strengthen people-to-people exchanges. In the process of shaping its national image, China needs to actively cultivate the participation of diverse actors, strengthen nongovernmental exchanges and cooperation, deepen nongovernmental understanding, and consolidate the social foundation of friendship and mutual trust. It is necessary to intensify economic cooperation. Promote exchanges between youth, women, media, and other NGOs with foreign countries and deepen nongovernmental understanding.

In the era of peace and development, along with the pace of reform and opening up, China has gained a more comprehensive and profound understanding of the international community and international system and has begun to handle international affairs and interstate relations from the perspective of national interests. Actively and fully integrate into the international community with respect, understanding, support, cooperation, cooperation, and utilization, and highlight the importance and urgency of seeking survival and development. Therefore, we must actively carry out public diplomacy. Public diplomacy has become an important means for countries to shape and disseminate their national image and thus effectively exert "soft power." Diplomacy has an impact on public opinion, and public opinion also has an adverse effect on government decision-making. Public diplomacy has achieved certain results.

4.2. Policies and Means to Shape National Image through International Communication. The concept of international communication currently existing in China is relatively backward, and this imperfect international communication system has led to the formation of a wrong national image in the eyes of other peoples. From a global perspective, environmental problems have gradually emerged in the process of human understanding and transformation of nature.

"The solution of ecological environmental problems not only depends on the progress of technology but also on the improvement of ecological civilization awareness." Human production and life cannot be far away from nature, nor can it not be affected by nature. Man and nature are closely linked and inseparable. Regarding the relationship between man and nature, Xi Jinping emphasized that man and nature are closely related, and between man and nature, nature is the first, and the relationship between man and nature belongs to the relationship between the large system of nature and the people it contains; between nature and nature, human beings depend on nature and need to use and transform nature. However, no matter how high human production progresses, human beings cannot surpass nature. There is no human being above nature. Human beings are always a part of nature.

Secondly, in overseas exchanges, we have paid attention to the great power of humanistic diplomacy, nongovernmental diplomacy and film and television diplomacy, as well as the need to highlight the common will of mankind and reduce unique political propaganda and large and empty grand narratives, and stereotyped positive reports. Turn to

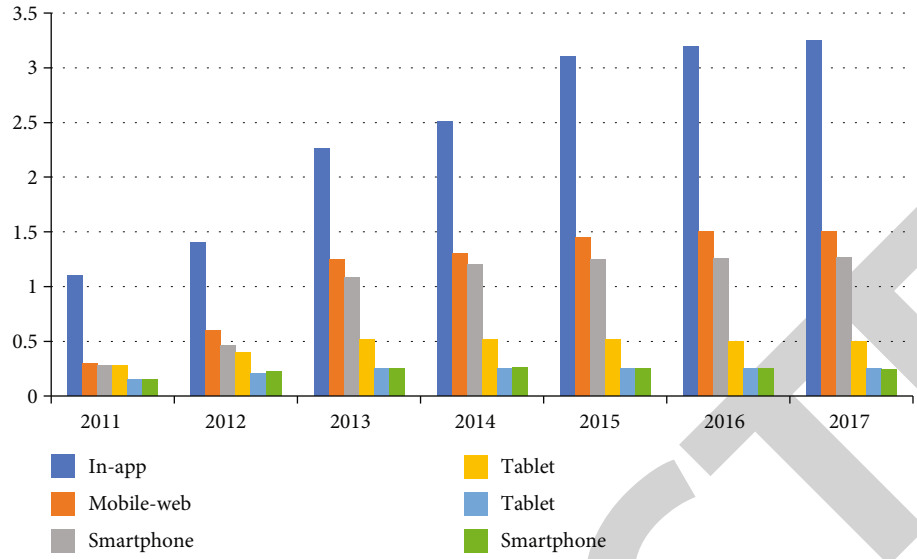

Figure 5: Information development trends in the United States and the world.

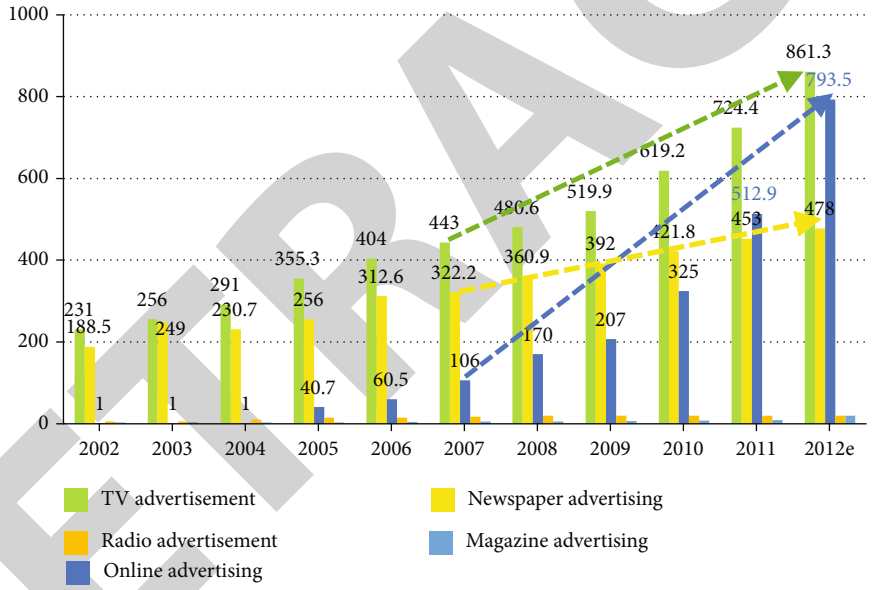

Figure 6: 2002-2012 China's five major media advertising market scale.

more active and specific people and listen to their needs in order to enhance the permeability and effectiveness of communication. We should be soberly aware that the strength and status of domestic social media in the global development cannot be compared with Twitter and Facebook. At the same time, the influence of CCTV's English channel overseas is also very limited, and the audience's language needs are greater than information needs.

The use of media events to construct a national image reflects the comprehensive planning and agenda setting functions of the media. Mannheim pointed out that if a country is to seek admiration and a positive image on the world stage, it must find ways to host global media events. As long as this event can firmly attract the world's attention, it will help improve the country's image. In the international communication system, more and more countries have realized the importance of media events in building a national image. They usually choose news that foreign governments and international audiences are interested in to report and integrate their subjective consciousness and political stance into the news information and adopt a way that is easily accepted by the international community to spread, so as to shape its ideal national image. The following aspects should also be considered in the communication. First, the strategies, methods, and methods of communication should be continuously improved to realize localized communication, precise communication, global communication, and story-based communication, interesting in human. Secondly, it is necessary to strengthen the innovative use and full utilization of new technologies and new platforms and

plan news reports according to the different characteristics of different platforms.

5. Conclusion

Today, with the integration of media information, the deterioration of the ecological environment, and the increasing globalization of international communication, it has become an important issue that we must face up to by developing international communication to create a good national image. This paper analyzes the current situation and existing problems of China's international communication and national image under the ecological environment and puts forward corresponding suggestions accordingly. It aims to achieve the purpose of shaping China's national image through the continuous improvement of international communication in terms of awareness, technology, means, and skills. Establishing an ideal national image is not something that can be achieved overnight. It must be through our continuous exploration and efforts, a lot of hard work and material investment, and the development of a good ecological environment. Only by strengthening this belief can we compete in the increasingly fierce international communication. Only by gaining a place in China can the national image of China be continuously improved in accordance with our expectations. The continuous evolution and integration of media with the support of technology has created extremely favorable conditions for the transnational dissemination of information. On the one hand, domestic public opinion needs to use information transmission channels to say good things; however, they must spare no effort to establish a local global flagship media, as the most important source of information in the world today, establish a national brand, interact with mobile networks, organically integrate into social media, and form a comprehensive three-dimensional all media publicity matrix, and lay a solid foundation for the realization and dissemination of national image. We should be more aware that it is a difficult and long project to establish an ideal national image of China from the perspective of global communication, so we need to have more perseverance, patience, and courage to achieve this goal.

Data Availability

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

Conflicts of Interest

There are no conflicts of interest.

Acknowledgments

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Research Article

Nonenzymatic Glucose Sensor Based on Porous Co_3O_4 Nanoneedles

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Herein, porous Co_3O_4 nanoneedle arrays were synthesized on nickel (Ni) foam (Co_3O_4 NNs/NF) by one-step hydrothermal method. Some electrochemical methods were used to investigate its nonenzymatic glucose sensing performance in alkaline solution. The results show that the sensitivity of Co_3O_4 NNs/NF electrode to glucose is 4570 μA mM^{-1} cm^{-2}. The linear range is 1 μM-0.337 mM, and the detection limit is 0.91 μM ($S/N = 3$). It also displays good selectivity and repeatability for glucose. The good electrochemical sensing performance of Co_3O_4 NNs/NF based sensor for glucose can be attributed to interconnected porous structure and large specific surface area of Co_3O_4.

1. Introduction

Rapid and accurate detection of blood glucose concentration is very important for the diagnosis and treatment of diabetes. Although graphene oxide based glucose sensor dominates the market, it has some defects, such as high cost, limited stability, and complex enzyme immobilization process [1, 2]. In recent years, nonenzymatic glucose sensors have attracted the attention of a large number of researchers because of their advantages such as low cost, good stability, fast response, and simple fabrication [3].

Electrocatalytic active materials modified on the electrode surface have a great impact on the performance of nonenzymatic glucose sensor [4]. So far, a series of nanostructured materials based on precious metals and their alloys (such as Pt, Ag, Pd, Au, Pt-Pd, and Pt-Au) have excellent electrochemical catalytic oxidation activity, which has been proved to be used for the electrocatalytic oxidation of glucose [5–8]. However, due to the scarcity and high cost of these precious metals, the surface of precious metal based materials is usually easily polluted by adsorbed intermediates and chloride ions, which greatly affects the stability and sensitivity of the sensor [9, 10]. In view of this, researchers try to develop electrode materials with high performance and low cost for nonenzymatic glucose sensing. In particular, transition metal oxides have the advantages of low price and high conductivity. They are regarded as the ideal electrode active materials for nonenzymatic glucose sensing [11, 12]. Among them, Co_3O_4 is an ionic semiconductor with both polar positive electrodes (two Co^{2+}, two Co^{3+}, and four O^{2-}) and polar negative electrodes (two Co^{3+} and four O^{2-}). It has excellent electrochemical performance and has been widely used in photocatalysis, supercapacitors, lithium-ion batteries, electrochemical sensors, and other fields [13]. Therefore, Co_3O_4, which has good lasting stability and electrocatalytic activity in alkaline medium, is also one of the most promising materials for electrocatalytic oxidation of glucose.

As we all know, different morphologies and microstructures of materials would produce substantial differences in their surface area, particle size, pore structure, mass transfer, and electron transfer efficiency, which will affect their electrochemical sensing performance [14]. Therefore, construction of Co_3O_4 with excellent microstructure can effectively enhance the electrocatalytic performance of glucose. If the Co_3O_4 catalytic material is directly grown on the conductive substrate in the form of well-arranged nanoarrays, the

performance of the catalytic material can be effectively improved. In this work, one-step hydrothermal method was used to prepare porous Co_3O_4 nanoneedle arrays (Co_3O_4 NNs/NF) in situ on Ni foam. With the help of the three electrode system, the electrochemical performance of the self-supporting electrode in situ was tested. The results show that Co_3O_4 NNs/NF exhibits higher sensitivity, lower detection limit, good repeatability, and good excellent selectivity for common interfering substances.

2. Materials and Methods

2.1. Preparation of Co_3O_4 NNs/NF. Pretreatment of Ni Foam: firstly, an area of $2 \times 4\,cm^2$ Ni foam was sonicated in the HCl solution (2 M), anhydrous ethanol, deionized water for 15 min, respectively, and then, the cleaned Ni foam was dried at 60°C.

Preparation of Co_3O_4 NNs/NF: 5 mmol of $Co(NO_3)_2 \cdot 6H_2O$ and 4.5 mmol of urea were solved into 30 mL of deionized water. After stirring, 2 mmol of cetyltrimethyl ammonium bromide (CTAB) was added into the above solution and stirred at 45°C for 30 min. Subsequently, the uniform solution was transferred into the Teflon-sealed autoclave, and the cleaned Ni foam was inserted into the inner container by tweezers, and the Ni foam was completely immersed in the solution. Then the autoclave was sealed and placed in the electric hot air drying oven, and then heated continuously for 6 h at 120°C. When the autoclave naturally cooled to room temperature, the autoclave was opened, and the Ni foam with precursor was collected by tweezers and washed repeatedly with ethanol and distilled water. Then, the Ni foam was put it into a drying oven with a temperature set at 60°C for 8 h. Finally, the Ni foam with precursor was placed in a clean crucible and then baked in a muffle furnace. The heating rate was set at 1°C/min, heated to 350°C, and continuously calcined 2 h.

2.2. Electrochemical Performance Test. In current work, we prepared the sensing material on the surface of Ni foam. The thickness of sensing film is about 0.1 mm. During the electrochemical test, the RST-5000F electrochemical workstation was used for electrochemical test. The freshly prepared NaOH (0.1 M) solution was served as the electrolyte. Cyclic voltammetry and chronoamperometry were performed at room temperature. Co_3O_4 NNs/NF ($1 \times 2\,cm^2$), Ag/AgCl electrode, and Pt sheet electrode were used as working electrode, reference electrode, and counter electrode, respectively. The humidity in current work is 30 RH%.

3. Results and Discussion

The prepared sample was obtained from the Ni foam by ultrasonic wave, and the composition of the sample was studied by XRD. The XRD pattern of Co_3O_4 arrays on Ni foam is shown in Figure 1. The obvious diffraction peaks at 19.0°, 31.2°, 36.8°, 38.5°, 44.8°, 55.6°, 59.3°, and 65.2° are corresponding to (111), (220), (311), (222), (400), (422), (511), and (440) planes of cubic phase Co_3O_4 (JCPDS No. 42-1467). Moreover, no other impurity peaks are found in the pattern, which indicates that the as-prepared Co_3O_4 sample has good crystallinity and high purity.

Figure 2(a) displays the SEM image of Co_3O_4 NNs/NF electrode at low magnification. It can be seen that Co_3O_4 nanoneedles are evenly covered on the conductive substrate, and there is a gap between the nanoneedles, which is conducive to the diffusion of electrolyte and the escape of bubbles on the electrode surface, so as to improve the catalytic activity. From the high magnified SEM image in Figure 2(b), it can be found that the diameter of Co_3O_4 nanoneedles is about 80-100 nm, and its surface is rough and uneven, which may be porous structure. Subsequently, Co_3O_4 nanoneedles were dispersed in ethanol by ultrasonic method and characterized by TEM technique. Figure 2(c) shows that the nanoneedles with a diameter of about 100 nm are actually composed of interconnected single nanoparticles, which is consistent with the SEM observation. Such highly porous nanoneedle structure is helpful for the rapid diffusion of electrolyte ions in the electrode and accelerates electron transfer, so that the as-prepared Co_3O_4 electrode may have good electrochemical performance. Additionally, the HR-TEM image of Co_3O_4 nanoneedles (Figure 2(d)) shows that there are two groups of clear lattice fringes. It is found that their fringe spacing is 0.242 nm and 0.465 nm, respectively, which exactly corresponds to the (311) and (111) crystal planes of Co_3O_4 standard diffraction spectrum (JCPDS 42-1467). These results further confirm the successful synthesis of porous Co_3O_4 nanoneedles on Ni foam.

Using a typical three electrode system, the electrocatalytic activity of Co_3O_4 NNs/NF for glucose oxidation was investigated by cyclic voltammetry. Figure 3(a) shows the CV curve of Co_3O_4 NNs/NF in the absence and presence of 0.6 mM glucose at a scanning speed of $10\,mV\,s^{-1}$. Obviously, the oxidation peak current of Co_3O_4 NNs/NF at 0.55 V increases significantly after the addition of 0.6 mM glucose. In addition, Figure 3(b) shows the CV curve of Co_3O_4 NNs/NF when the glucose concentration in 0.1 M, the NaOH solution is 0 mM, 0.2 mM, 0.4 mM, and 0.6 mM, respectively (the scanning speed is set to $10\,mV\,s^{-1}$). With the increase of glucose concentration, the peak current also increases. The above results show that the prepared Co_3O_4 NNs/NF has good electrocatalytic activity for glucose oxidation, and the specific process can be described as [15, 16]

$$Co_3O_4 + OH^- + H_2O \longrightarrow 3CoOOH + e^-, \quad (1)$$

$$CoOOH + OH^- \longrightarrow CoO_2 + H_2O + e^-, \quad (2)$$

$$2CoO_2 + \text{glucose} \longrightarrow 2CoOOH + \text{gluconolactone}. \quad (3)$$

Figure 3(c) shows the CV curve of Co_3O_4 NNs/NF electrode at different scanning rates (5-50 $mV\,s^{-1}$) in the presence of 0.8 mM glucose in 0.1 M NaOH. The peak current of anode and cathode increases with the increase of scanning rate. It can be seen from Figure 3(d) that the peak current of anode and cathode has a good linear relationship with the square root of scanning rate, and the correlation coefficients are 0.99381 and 0.99893, respectively, indicating that the

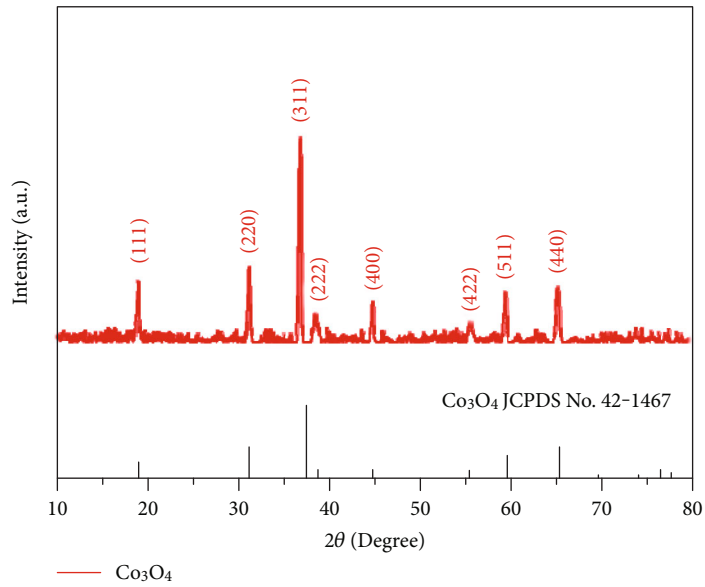

Figure 1: XRD pattern of Co_3O_4 NNs.

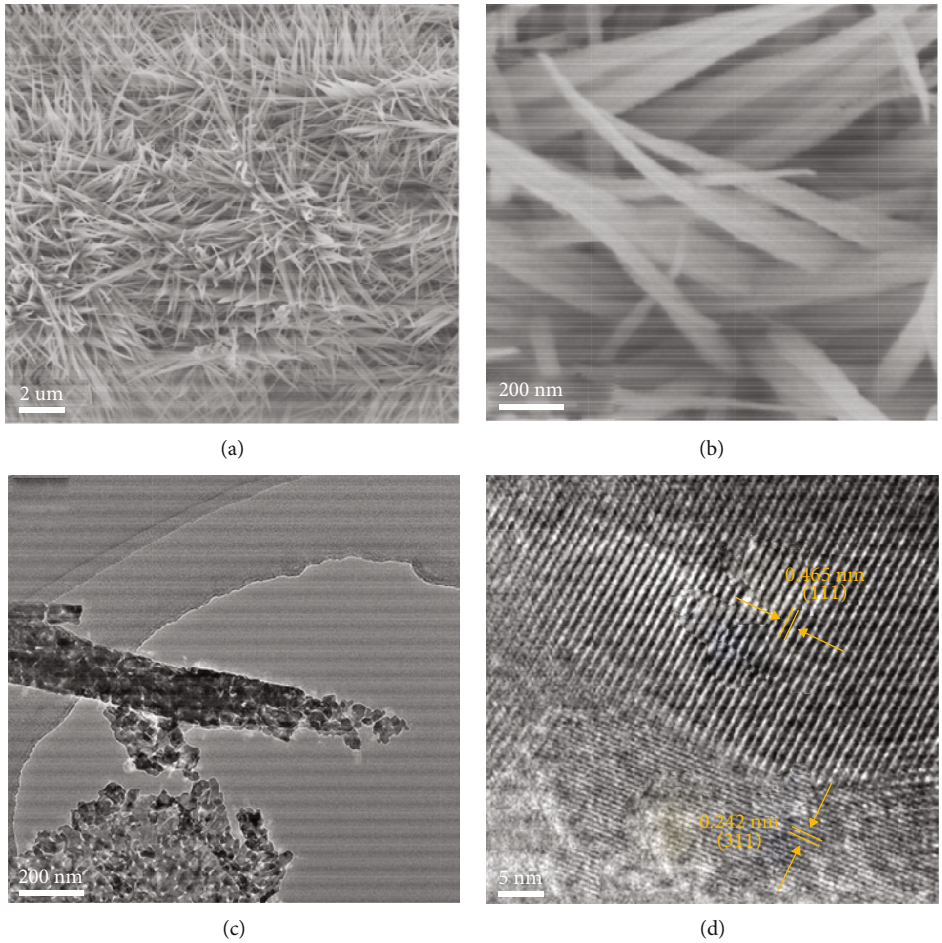

Figure 2: SEM images of Co_3O_4 NNs/NF at (a) low magnification and (b) high magnification. (c) TEM and (d) HR-TEM images of Co_3O_4 NNs.

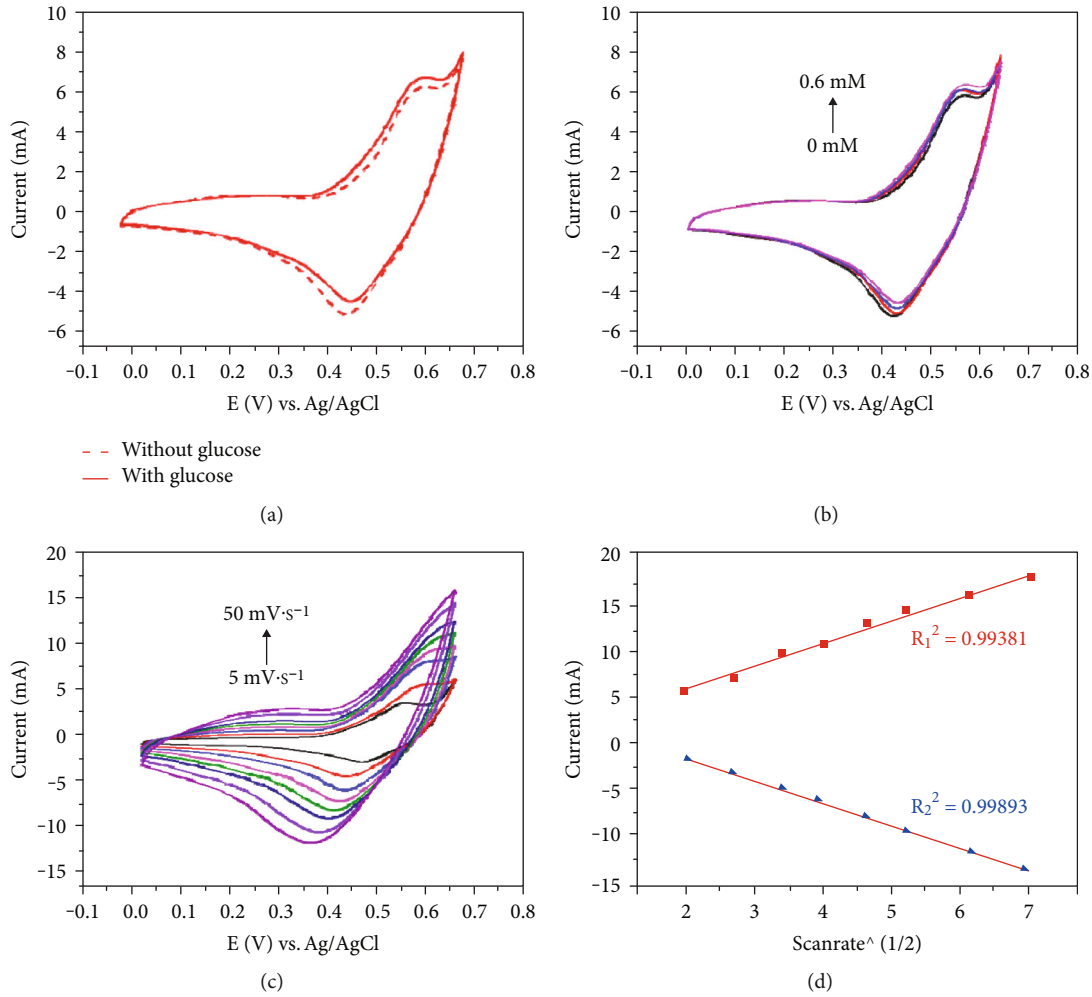

Figure 3: CV curves of Co_3O_4 NNs/NF (a) with and without glucose, (b) at different glucose concentration, (c) at different scan rates, and (d) the corresponding linear relationship between the anodic/cathodic peak currents and the square root of scanning rate ($v^{1/2}$).

oxidation process of glucose on Co_3O_4 NNs/NF is a diffusion controlled process [17].

Chronoamperometry technology was carried out to evaluate the sensitivity, detection limit, and selectivity of the electrode to glucose. Under the condition of working voltage of 0.55 V, Co_3O_4 NNs/NF electrode was tested, and glucose solutions with different concentrations were gradually added to 0.1 M NaOH solution. As shown in Figure 4(a), when glucose of different concentrations is added to the alkaline solution in the state of uniform stirring at an interval of 50 s, it can be seen that the current response is relatively rapid and the curve is similar to a ladder. In addition, Figure 4(b) shows the corresponding relationship between glucose concentration and current in this process. In the range of 1 μM-0.338 mM, the concentration and current have good linear correlation. Its linear regression equation can be expressed as $I\,(\mathrm{mA}) = 9.14\mathrm{C}\,(\mathrm{mM}) + 0.097$ ($R^2 = 0.99017$), and the sensitivity is 4570 μA mM^{-1} cm^{-2}. The detection limit (LOD) for glucose is about 0.91 μM ($S/N = 3$), and its response time is about 8 s (Figure 4(c)).

Since there are other interfering substances in real human serum, which may also be oxidized, it is necessary to test the anti-interference ability of Co_3O_4 NNs/NF electrode. Here, the typical disruptors were selected, such as uric acid (UA), ascorbic acid (AA), fructose, and sucrose for electrochemical detection by chronoamperometry. Because the concentration of blood glucose in normal human serum is 30-50 times that of these interfering substances [18], 1.0 mM glucose and 0.1 mM interfering substances were added for testing. It can be seen from Figure 4(d) that the current density increases significantly after adding 1.0 mM glucose, but there is no significant change in current density after adding other interferents. Therefore, Co_3O_4 NNs/NF has good selectivity for glucose detection.

Repeatability and stability are also important indicators to evaluate the operability and durability of the prepared nonenzymatic glucose sensor electrode. Five Co_3O_4 NNs/NF electrodes were prepared by the same method, and the prepared electrodes were tested by cyclic voltammetry under the same conditions. Their respective peak oxidation

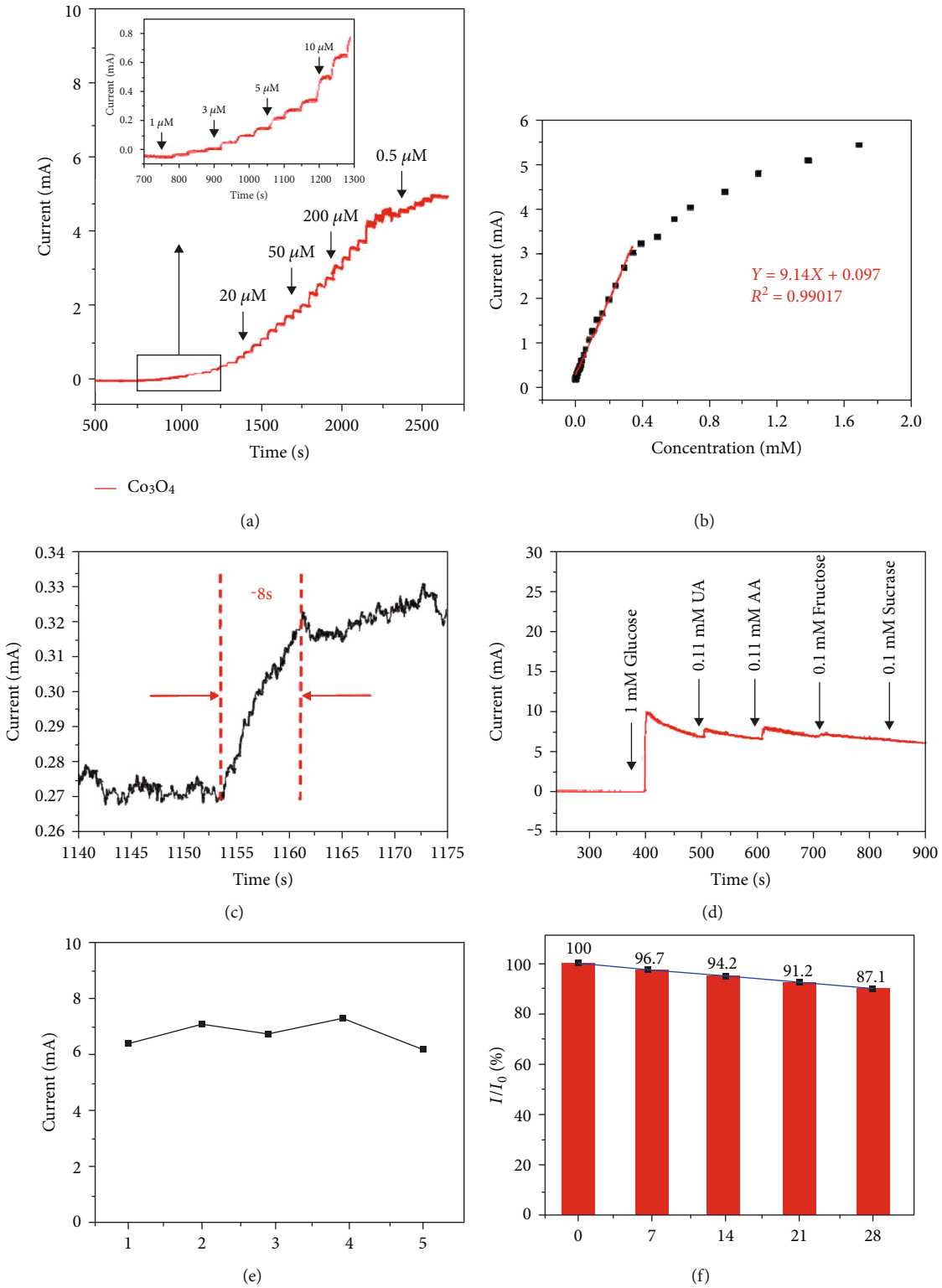

Figure 4: (a) The amperometric response of Co_3O_4 NNs/NF when glucose was continuously injected into 0.1 M NaOH solution at 0.55 V; the inset showed the enlarged response curve from the black rectangle. (b) Calibration curve between current response and glucose concentration. (c) The response time of Co_3O_4 NNs/NF. (d) The amperometric response of Co_3O_4 NNs/NF to the sequential addition of 1 mM glucose and 0.1 mM different interferents (UA, AA, fructose, and sucrose); Potential: 0.55 V. (e) The peak oxidation currents of Co_3O_4 NNs/NF fabricated in five batches via the same method. (f) Storage stability of Co_3O_4 NNs/NF tested by CV.

currents were recorded. As shown in Figure 4(e), its relative standard deviation (RSD) is 7.1%, which has good repeatability. In order to study the stability of the electrode, the Co_3O_4 NNs/NF electrode was placed at room temperature for 28 days, and the cyclic voltammetry test was carried out every 7 days. The oxidation current of the electrode maintains 87.1% of its initial value on the 28th day (Figure 4(f)), indicating good stability of the Co_3O_4 NNs/NF electrode. It can be attributed to that the active material is evenly and firmly grown on the conductive Ni foam, leading to the stable structure. It is not easy to collapse or agglomeration, so it has good repeatability and stability.

4. Conclusions

In this work, a simple one-step hydrothermal synthesis method of Co_3O_4 NNs/NF is proposed for the detection of nonenzymatic glucose. The sensor based on Co_3O_4 NNs/NF has good sensitivity to glucose (4570 μA mM^{-1} cm^{-2}) and low detection limit (0.91 μM). The linear detection range is 1 μM-0.337 mM. Moreover, it has good selectivity and stability for glucose. At the 28th day, its oxidation response current still maintains 87.1% of its initial value. The good electrochemical sensing performance of Co_3O_4 NNs/NF based sensor for glucose can be attributed to the following factors: on the one hand, the firm and evenly arranged Co_3O_4 nanoneedles grown directly on the conductive substrate can prevent the blockage of active sites caused by additional adhesives, so as to ensure efficient electron transfer. On the other hand, the ordered and interconnected porous structure and large specific surface area can not only provide more active sites for electrochemical reactions but also enhance the contact between active substances.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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Retraction

Retracted: On the Visual Construction of Environmental Factors in Modern Art Works from the Perspective of Painting Art

Journal of Environmental and Public Health

Received 20 June 2023; Accepted 20 June 2023; Published 21 June 2023

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] S. Gong, "On the Visual Construction of Environmental Factors in Modern Art Works from the Perspective of Painting Art," *Journal of Environmental and Public Health*, vol. 2022, Article ID 5922048, 12 pages, 2022.

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Journal of Environmental and Public Health
Volume 2022, Article ID 5922048, 12 pages
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Research Article

On the Visual Construction of Environmental Factors in Modern Art Works from the Perspective of Painting Art

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Since the twenty-first century, with the continuous improvement of economic life, people have higher and higher requirements for life at present. Therefore, exploring better environmental art design has become a key concern of many people. This kind of environmental design can rely on the development of modern art in China. By analyzing the atmosphere of environmental factors and visual construction methods in modern art works, it can be integrated into the geographic positioning and map construction of slam in artificial intelligence. After analyzing the flavor of the times and visual construction of modern art, it is believed that SLAM algorithm can be combined with full convolution network FCN and superpixel CRF and can better estimate the position in many dynamic scenes. Therefore, we should explore in different ways, integrate the art culture in modern art works with modern social science and technology, and realize the modernization of environmental art design. It can be seen that the slam system formed by combining with the visual construction of environmental factors in modern art works is more suitable for people's life at the current stage.

1. Introduction

From the late Ming Dynasty to the Qianlong period of the Qing Dynasty, the development of relevant regional art schools and the interaction between the court and local artists facilitated and promoted the introduction of western modern art into the folk and the court to a certain extent [1]. This kind of introduction was mainly through missionaries and later gradually through commercial channels. The influence of art styles in different regions of Europe was also played in different situations where China and the West intersected. Through the fusion of the SLAM algorithm, the basic matrix is calculated through the IMU preintegration results, and the distance from the characteristic points to the epipolar line is calculated according to the basic matrix, and the points with large errors are eliminated. Finally, the random sample consistency algorithm is used to eliminate the mismatching points, which effectively improves the mismatching problem.

Since the seventeenth century, European perspective and copperplate have developed on the basis of modern mathematics and industry and Commerce [2, 3]. Because of their close relationship with the basic language of art, such as composition and sketch, they can be "internalized" into a more universal and civilian basic way of viewing and visual language communication, gradually breaking through the shackles of Baroque and the magnificent style of French Academy. However, in the seventeenth and eighteenth centuries, the western art contacted by the Chinese upper class and the intellectual class mostly belonged to the part related to missionaries and with court color. The new development of Western art modernity represented by the innovation of perspective and copper engraving was difficult to have a deep impact on Chinese local art. Even later, the influence of foreign art on the folk through commercial and other channels increased, leaving the initiative and systematic cognition of the local intellectual class; these influences often stayed at the external superficial level.

The development of modern factors of European art is also related to the growth and decline of different regions, national cultures, and corresponding art schools, and the development of art style schools is closely related to art education and communication. Starting from this idea, taking into account cultural geography and historical evolution,

the following discusses the basic clues in the development and dissemination of style schools and modern visual methods in the early spread of western modern art in China [4].

Aiming at the problem that the 3D dense map constructed by the traditional slam system usually contains only low-level information such as color, depth, and brightness, this paper constructs an environmental semantic map based on the traditional 3D dense map, associates the 2D semantic labels in multiple frames, transfers them to the 3D point cloud through Bayesian update, and obtains a preliminary 3D semantic map [5]. On this basis, this paper proposes a global optimization algorithm of 3D semantic map based on high-order CRF. The algorithm establishes the high-order term of CRF through the spatio-temporal-consistent 3D superpixels, increases the constraint relationship between the point cloud and its 3D region, realizes the boundary consistency of the category of the point cloud in semantic segmentation, alleviates the influence of excessive smoothing caused by the binary term, and improves the segmentation accuracy. Experimental results show that this algorithm can obtain a globally consistent semantic map and effectively improve the semantic segmentation accuracy of a single frame image.

2. Literature Review

The early visual simultaneous localization and mapping (VSLAM) was achieved through filters. The widely used filter-based VSLAM is MonoSLAM proposed by davison3 in 2007 [6]. MonoSLAM is the first monocular real-time slam system based on feature point method. Its basic idea is as follows: extract Shi-Tomasi corners for each frame of image, assume that each corner follows Gaussian distribution, express its mean value and uncertainty through ellipse, and complete feature matching in projection ellipse. The mean and variance of the state vector are obtained by iterative updating. MonoSLAM only considers the state of the current frame and has nothing to do with the state of the previous frame, and the front end only tracks very sparse feature points, so the amount of calculation is small, which initially solves the problem of real-time. However, the error of the previous frame is transmitted to the next frame as a priori, and the error in the prior information cannot be eliminated, resulting in cumulative error. MonoSLAM is a milestone in the history of slam development, which has laid a solid foundation for the development of slam (as shown in Figure 1) [7, 8].

Wang proposed a semantic slam system based on deep learning and monocular visual slam in 2016. The system is combined with CNN on the basis of LSD-SLAM. It only performs semantic segmentation in key frames and selects adjacent frames to enhance the reconstruction effect. Therefore, it has good real-time performance and strong robustness in outdoor large scenes [9].

The 3D dense map constructed by the traditional visual slam system usually contains only low-level information, which cannot meet the intelligent requirements of robots. Based on the traditional three-dimensional dense map, this paper constructs the environmental semantic map and gradually transfers the two-dimensional semantic labels to the three-dimensional point cloud through Bayesian update. Aiming at the problem of fuzzy segmentation of object edges in 3D semantic map, a global optimization algorithm of 3D semantic map based on high-order conditional random field is proposed to optimize the semantic map and finally obtain a globally consistent semantic map (as shown in Figure 2) [10].

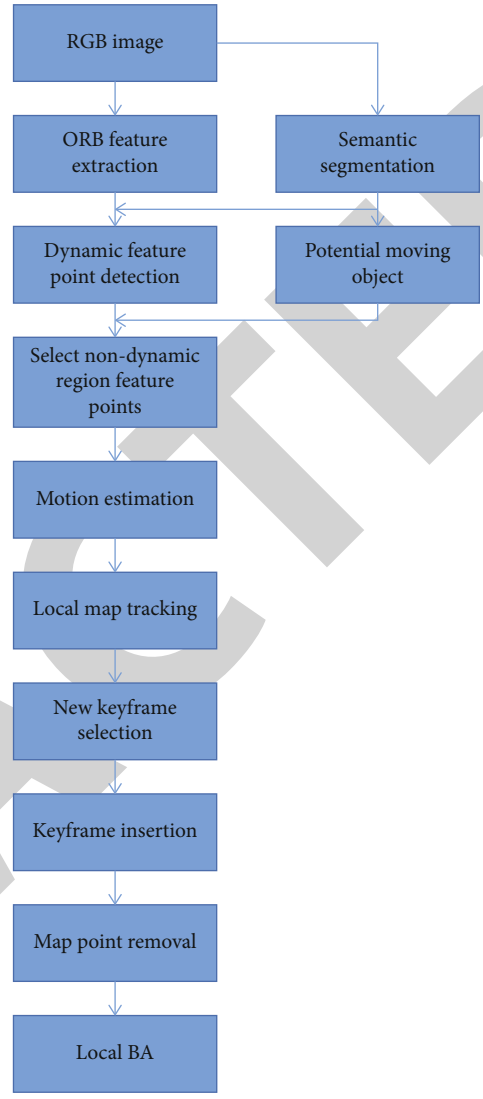

Figure 1: Frame motion estimation block diagram based on semantic information.

3. Atmosphere of Environmental Factors in Modern Art Works

3.1. Social Suffering. Looking at the modern history of the world, many countries have undergone major social changes. Among them, the most prominent is the gradual end of feudal society [11]. However, compared with many other countries, China's feudal society ended later. At the same time, China lags behind many countries in many

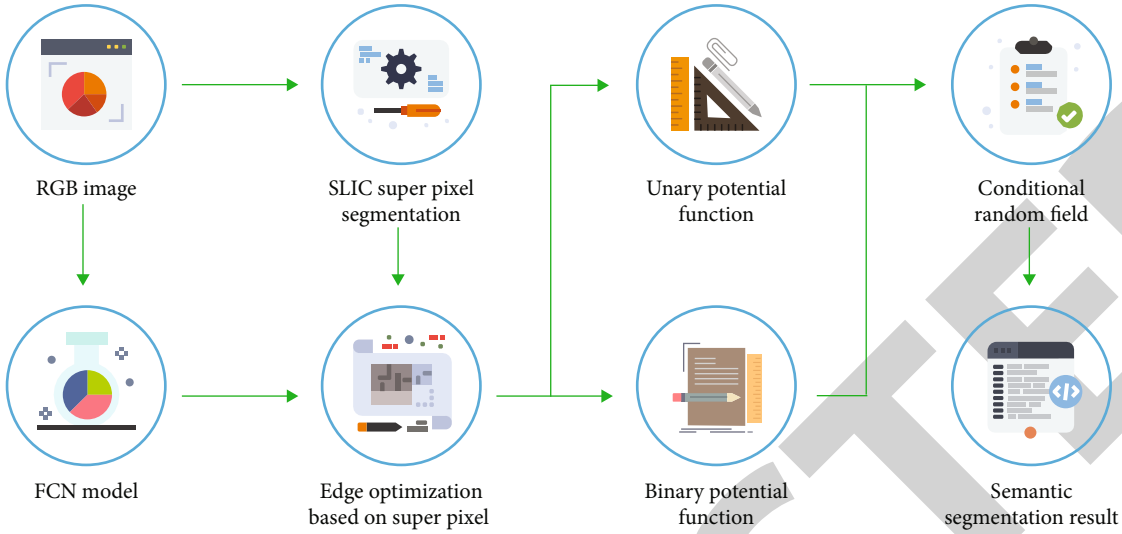

Figure 2: Semantic segmentation system diagram.

aspects due to its long-term isolation from the outside world. Even after the end of the Qing Dynasty, Chinese society was still full of war and poverty, and people's lives had not been fundamentally improved. In the backward social environment, many Chinese artists expose social contradictions and criticize the dark phenomena in society through their works, to express their thoughts and feelings of longing for progress and calling for social change (see Figure 3) [12].

Printmaker Jiang Feng depicted a group of stevedores walking along the Huangpu River in the form of black-and-white woodcut in the woodcut "dock workers" [13]. Through the color change from black to white, people cannot help thinking of the scenes of tired workers who go out early and return late and work hard. The complex facial depiction highlights the workers' traumatic sense of vicissitudes in labor and clearly shows the author's deep sympathy for workers. As a common people group in the dark social environment, there were a considerable number of art works with the theme of workers at that time. Zhang Wang's work "injured head" depicts the image of a wounded worker. The roughness of the face is in sharp contrast to the firmness of the eyes, which makes people directly feel the valuable spirit of the characters' tenacious survival in suffering. At the same time, the bandaged eyes implied his miserable experience, reflecting the sharp social contradictions at that time.

In addition to printmaking, comics were also a common type of Chinese art in that period. Many cartoonists are good at creating satirical cartoons, attacking many negative phenomena in society and the difficulty of people's life with exaggerated and vivid nonrealistic techniques. The famous cartoonist Zhang Leping had the experience of being an apprentice in different places and also had a profound experience of the bitterness of the world in the difficult living environment. In his works, through the experience of the character "San Mao," he showed the hardship and sadness of the people at the bottom of modern Chinese society in many ways, which aroused the sympathy of many people. However, grief is not the only thing in his works. In many comic strips, the characters are always exaggerated and lively. "San Mao," as an urchin, also shows a lot of fun consistent with his age. This also highlights the valuable optimism of the people at the bottom represented by "San Mao" who are still strong in facing life after suffering discrimination and setbacks and also helps people alleviate their inner depression.

3.2. Resistance to Aggression. In the early twentieth century, China experienced many large-scale wars represented by the Second World War [14]. In the process of resisting Japanese aggression, China lost many resources and land, and countless innocent people died in the war. Facing the crisis of the country, many Chinese people also showed unprecedented unity. In addition to the army, the role of art works in the war cannot be ignored. Through their works, many artists express their strong feelings of resisting aggression and worrying about the country and the people, causing people to pay attention to the fate of the country (see Figure 4).

Long before the beginning of the war of resistance against Japan, Lu Xun, as a revolutionary, advocated new prints in China, believing that "when the revolution, prints were most widely used, although in a hurry, they could be done in an instant." As Lu Xun expected, during the war, printmaking almost became the mainstay of Chinese art. Many artists directly publicized the anti-Japanese war in the form of prints, calling on people to defend and fight for the motherland. This is extremely valuable in an environment where painting tools are very scarce. Printmaker Li Shaoyan has left many works on the theme of the war of resistance against Japan. His works such as "landmine warfare" and "120th division in North China" vividly show the tenacity and heroism of the Chinese Army during the war of resistance against Japan, in sharp contrast to the enemy troops fleeing in haste in the picture, which not only reflects history, but also inspires all patriotic people.

While printmaking developed, other kinds of paintings also embodied their own role during the war. The famous painter Xu Beihong's masterpiece "Yu Gong moving

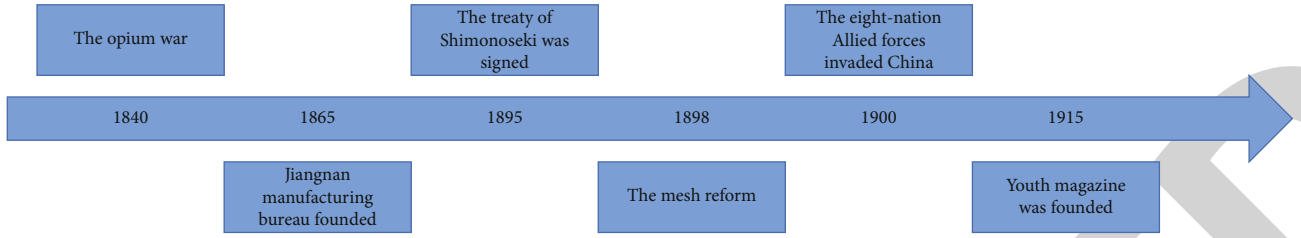

Figure 3: The timeline of modern China.

Time	1924–1927	1927–1937	1937–1945	1945–1949
Relationship between	Cooperation revolution	Confrontation war	Cooperation in the anti-japanese	Split the enemy
Why	We fought against the Northern warlords	The Kuomintang mutinied to revolution	The ethnic conflict between China and Japan has become the principal contradiction	Class contradiction has become the principal contradiction in Chinese society

Figure 4: China's anti-Japanese war route.

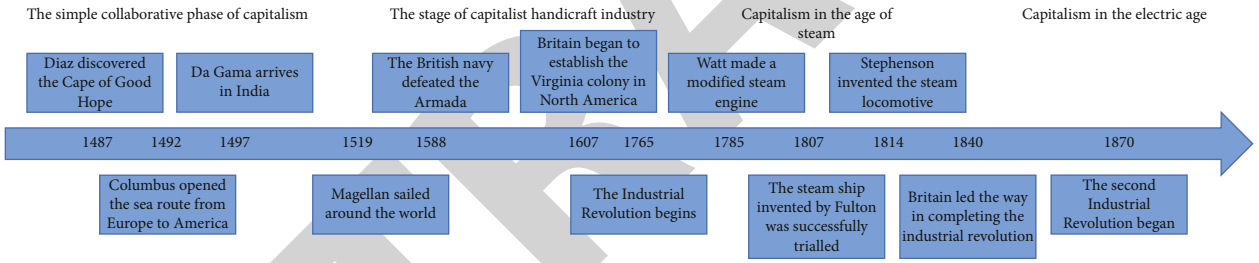

Figure 5: Modern world development.

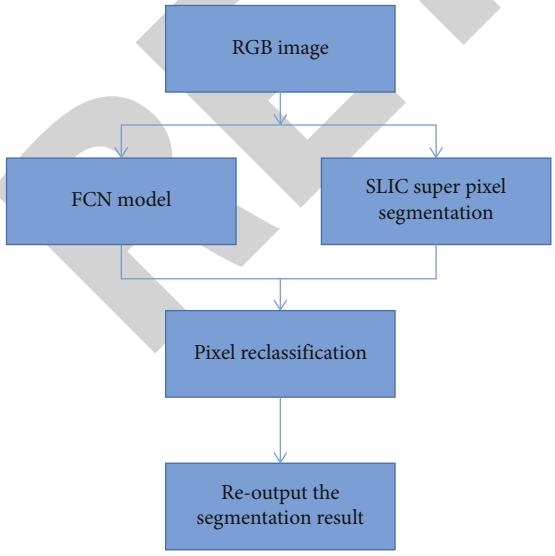

Figure 6: Block diagram of edge optimization based on superpixels.

mountains" was created during the most difficult period of the anti-Japanese war [15]. This work borrows the allusion of Yu Gong's removal of mountains, implies the importance of people's unity during the war of resistance against Japan, and appeals to the Chinese people to work together to win. It is a work of precious contemporary significance. During the war, the propaganda work of Chinese art never stopped. With the deepening of the war, the location of the Chinese art exhibition has shifted from the bustling downtown to the more remote countryside. This has given more people from rural areas the opportunity to appreciate revolutionary art and understand the environment of the times. Viewing art works does not require necessary skills such as literacy, which also highlights the strong tendency of Chinese art creators at that time to make art popular and folk.

4. Visual Construction in Modern Art Works

4.1. Regional Style Schools. Before the twentieth century, the "international style" in the Late Middle Ages was the last international style. Since then, the competition between European Nation States has even been reflected in the art

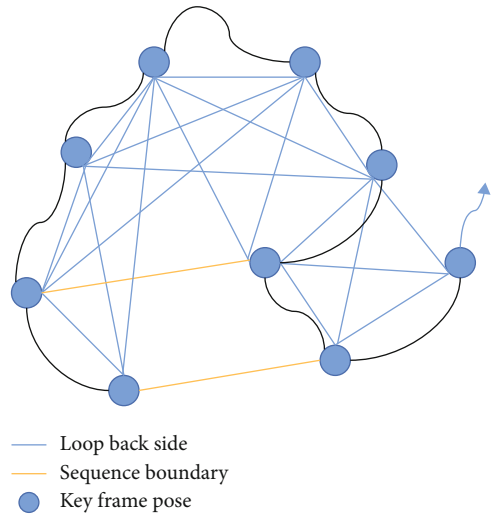

Figure 7: SLIC algorithm clustering.

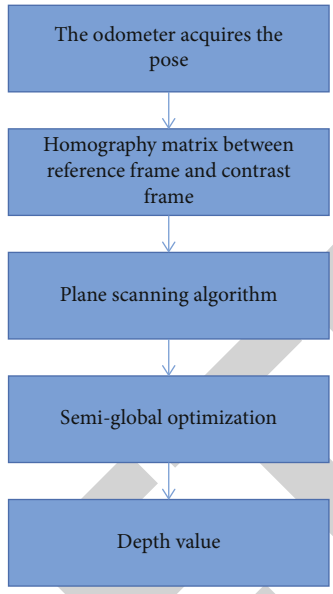

Figure 8: Image semantic separation and combination process.

activities of missionaries in China. The Netherlands has developed a unique populist style and commercial art and has launched commercial competition with both old and Protestant countries in the East. In the long-term confrontation between "pure art" of grand style and industrial and commercial art of citizen interest, the efforts to seek new unity even continued until the early twentieth century. Guo and Zhang got rid of the confrontation between salon art and handicraft and sought the unity of elite and mass, art, and technology. Modernist art in the twentieth century, especially the "international style" of architecture, can represent a new round of the pursuit of universality [16].

Tian and others "transported the gullies of Song people with the charm of popularity in the Yuan Dynasty," which is based on professional painters and represents the trend of North-South integration [17]. Based on the enhancement of craftsmanship and visualization, the art in the early Qing Dynasty also showed a systematic and integrated trend. For example, the official sample system of porcelain in the Qing Dynasty reflects the management and systematic standardization of rival industries and also reflects the interest of scholars. The intervention of rival industries tends to be strengthened. The Qing emperor even supervised the process flow of ceramics and enamel. In the early Qing Dynasty, while strengthening the "pure art" to reflect the humanistic order, art also paid attention to its mutual penetration with craft categories. In the arts and crafts of the Ming and Qing Dynasties, the interaction between folk and official increased. In the Ming Dynasty, many painters and decorators were promoted to officials. With the development of China's hierarchy, from the enfeoffment of aristocracy to the military upstart and then to the imperial examination, the variable factors of social rank have increased. After the middle of the Ming Dynasty, the role of economic factors in social status increased, and China thus had more modern social factors. These are also what we should consider when we investigate the early spread of western modern art to China. Since the late Ming Dynasty, the regional shaping and cultural infiltration have also been interwoven with the efforts of art systematization.

Xu and Li believe that the Yangzhou Slender West Lake white tower, which was borrowed from the north in the late Qianlong period, "has left its original geographical background and removed its original religious significance." These carefully crafted exhibits which can be regarded as local participation in a culture [18]. Astafiev and others used the extreme dramatic example of Zhang Dai's performance in Jinshan Temple in the middle of the night to illustrate that the cultural infiltration of Buddhist temples by the gentry in the late Ming Dynasty was almost unimaginable at any other time in Chinese history. He is not a devout believer, but expansively infiltrates religious places in the form of art. The expansionary expression of this "Baroque" artistic emotion, the dilution of religious doctrines, and the infiltration of cultural consciousness into regional space are also a reference for investigating the ideas of scholars on foreign cultures and religions, including Catholicism, since the end of the Ming Dynasty [19].

4.2. Development of Modern Visual Mode. Italian Renaissance art is complex. Poetic symbolic language and mathematical-based scientific language coexist with grand style and civic style, but poetic symbolic language and grand style later prevailed [20]. Russell pointed out that Renaissance Italians did not respect science except Da Vinci and others. After the eighteenth century, the industrial and commercial color in art, the interest of citizens, and the development of scientific visual language are related to some potential tendencies in the development of northern European culture. After getting rid of the guild with the help of the college, painting and sculpture art became "pure art," and the handicraft category that used to belong to the guild is now facing the depreciation of "pure art" (in addition to perspective teachers, boss also has an identity as a printmaker regarded as a craftsman). Even Bauhaus in the early twentieth century needs to work hard to get rid of the

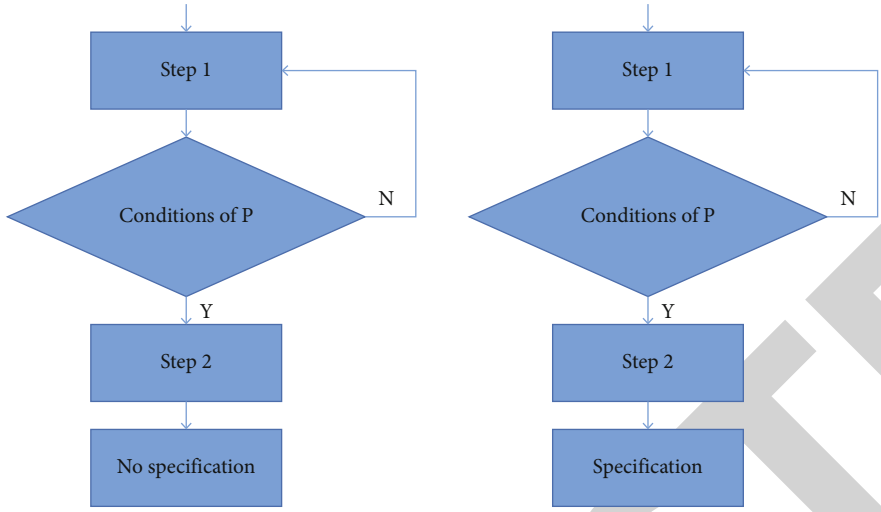

Figure 9: Repartition cycle.

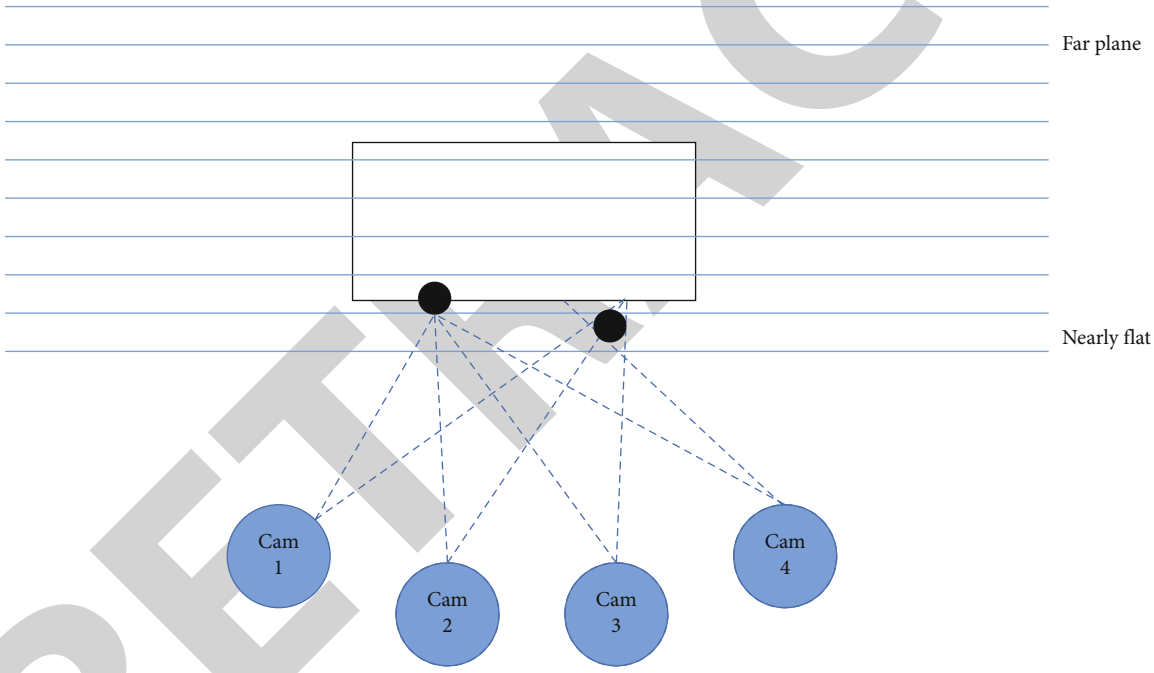

Figure 10: Multiscale light tracking.

influence of "salon art." The classical perspective theory of pursuing magnificent style represented by LeBlanc and the perspective theory of emphasizing mathematics represented by boss extend to the East, represented by Nian Xiyao's "vision" and boss' book on the dissemination of Deszag theory imported from the Netherlands. Although the extent to which Japan can absorb Deszag's theory is still worth further discussion, Japan gradually began to learn western modern painting from the perspective of technology and service industry and commerce through books imported from the Netherlands (see Figure 5) [21].

At the same time, the folk painting formula reflects the confidential nature of similar guilds. This summary has not changed or even confirmed the social status and knowledge closeness of craftsmen [22]. In addition to social reasons, this is also determined by the internal nature of the organization and dissemination of Chinese visual art knowledge. In Europe, the formation of a subjective, objectified, and generalized visual way such as perspective is conducive to the potential systematization and generalization of visual art knowledge, just as the further development of perspective and the "internalization" of the visual way of print printing are reflected. In the Qianlong court, some Chinese and Western painters combined their brushwork for other purposes, but there were aesthetic inconsistencies. At the end of the Ming Dynasty, Dong Qichang's landscape contained irony. Some of the combined strokes in Zeng Jing's and Chen Hongshou's figure paintings, even if they contained

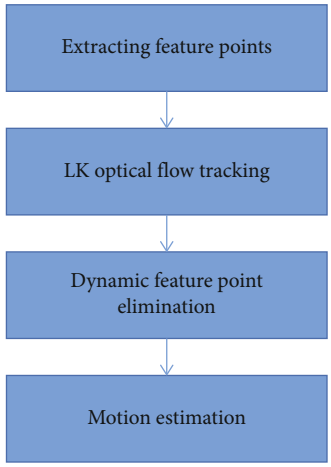

Figure 11: Dynamic feature elimination algorithm.

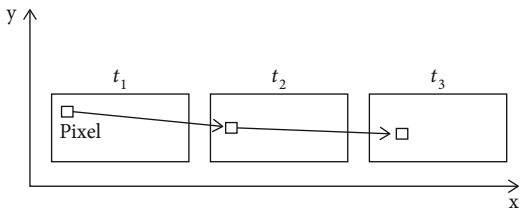

Figure 12: Optical flow tracking.

realistic factors influenced by the west, and reflected and deepened the spiritual separation between the Literati's ideal and social reality through the comparison with the Literati's pen and ink. Pu Andi linked the visual art in the late Ming Dynasty with the "irony" in the "four wonderful books" of Literati novels. Behind the self-consciousness embodied in this irony is still the Confucian ideal, which is different from the civil culture since the European Renaissance [23].

5. Analysis of Visual Fusion Algorithm Based on Art Works

5.1. Superpixel-Based Edge Optimization. The superpixel segmentation algorithm can be divided into graph-based superpixel segmentation algorithm and gradient descent-based superpixel segmentation algorithm [24]. The graph-based superpixel segmentation algorithm takes pixels as the basic nodes in the graph, gives different weights to the edges according to the similarity between adjacent pixels, establishes an undirected graph objective function, and minimizes this objective function to obtain superpixels. The superpixel segmentation algorithm based on gradient descent randomly initializes a cluster center and makes the cluster center tend to be stable by gradient descent method. At present, superpixel segmentation algorithm is widely used in the field of computer vision. Considering that the superpixel can better fit the edge of the object and establish a constraint relationship between the pixels of different objects, this paper uses the superpixel to optimize the semantic rough segmentation image extracted from the front end to improve the segmentation accuracy of the object edge (as shown in Figure 6) [25].

SLIC algorithm is a local clustering algorithm based on k-means. Its main idea is not complex, its implementation is relatively simple, and its calculation efficiency is high. It can better maintain the edge information of objects and generate superpixels of various sizes to adapt to the system. It is widely used in image preprocessing in image processing. SLIC algorithm clusters pixels through five 14 dimensional feature vectors, which include two-dimensional spatial position information represented by x and y and three-dimensional color information represented by CIELAB (see Figure 7).

Its main ideas are as follows.

The first step is to initialize the seed points. The initial seed points are C, the number of pre segmented superpixels is K, and the number of pixels is n. The image is divided into grids, each grid contains N/K pixels, and the step size between seed points is:

$$S = \sqrt{\frac{N}{K}}. \tag{1}$$

The second step is clustering. Sobel filtering is used for the pixels in the neighborhood of the initialized seed point $n * n$, and the point with the smallest gradient is selected as the new seed point to avoid the seed point falling to the edge. After reselecting the seed points, calculate the similarity between the seed points and the pixels in the $2S * 2S$ neighborhood. M is the balance parameter, d_c is the color similarity between the seed points and the pixels in the neighborhood, and d_1 is the position similarity between the seed points and the pixels in the neighborhood and is the similarity measure after combining the distance between the two:

$$\begin{aligned} d_c &= \sqrt{(l_j - l_i)2 + (a_j - a_i)^C + (b_j - b_i)^C}, \\ d_1 &= \sqrt{(x_j - x_i)^C + (y_j - y_i)^C}, \\ D &= d_c + \frac{m}{s} d_1. \end{aligned} \tag{2}$$

Then, for iterative optimization, the second step can be repeated until each seed is no longer changed. Finally, relatively isolated points are removed to enhance the connectivity of the whole segmented image. So far, the superpixel segmentation of the image is completed. After the completion of image semantic rough segmentation and image superpixel segmentation, the results of the two will be combined. The effect of image edge optimization depends on the effect of the combination of superpixel edge and image semantic rough segmentation (as shown in Figure 8).

If the segmentation of superpixels and semantics is accurate enough, the pixels in each superpixel belong to the same category, but the segmentation of semantic rough segmentation at the edge of the object is relatively fuzzy, which cannot guarantee error free segmentation. Due to the error of

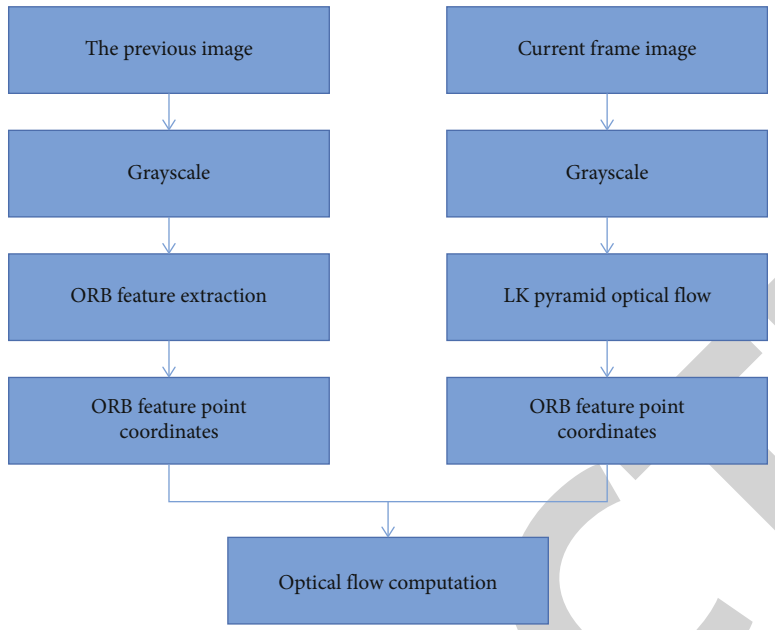

Figure 13: Pyramid optical flow algorithm under ORB feature.

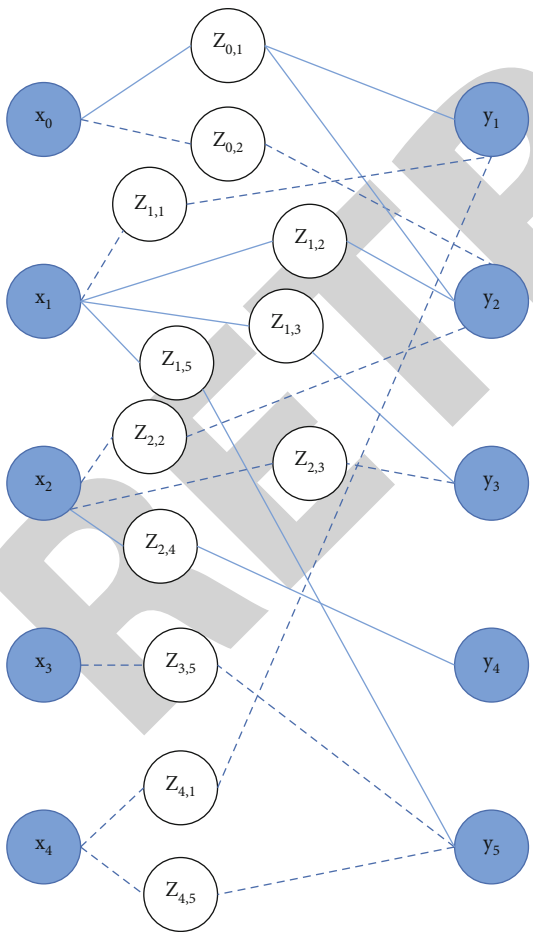

Figure 14: Retention of each static point.

semantic segmentation, a superpixel may contain multiple categories of pixels, which can be passed through:

$$P = \frac{1}{K}\sum_{i=1}^{K} p_i. \tag{3}$$

where K represents the number of pixels in the superpixel block; p_i represents the probability distribution of the category of the ith pixel obtained from FCN and then calculates the entropy value corresponding to each superpixel. If the segmentation result is more accurate, and the pixels in the superpixel contain only one category, the corresponding entropy value is small, and there is no need to re segment. If there is an error in semantic segmentation in a superpixel, the pixels in the superpixel contain multiple categories. If two different probability distributions are fused together, the corresponding entropy value is large and need to be resegmented (as shown in Figure 9).

5.2. Feature Extraction and Tracking. Visual odometer can be divided into odometer based on descriptor feature matching and odometer based on optical flow tracking according to different implementation methods. For odometer based on descriptor feature matching, first extract feature points from the image, then calculate the descriptor, and then match the features according to the descriptor. This method can obtain more accurate data association, but the process of feature extraction and matching requires a lot of computing resources, and the real-time performance is poor. The real-time performance of optical flow tracking is good, but there are also some limitations. The premise of optical flow tracking is that the motion between two consecutive frames is small. If the optical flow method is no longer applicable in the fast-moving scene, the optical flow method can be used

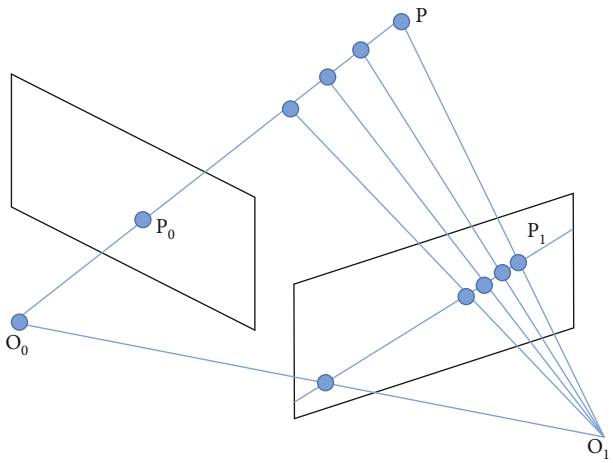

Figure 15: Polar geometry diagram.

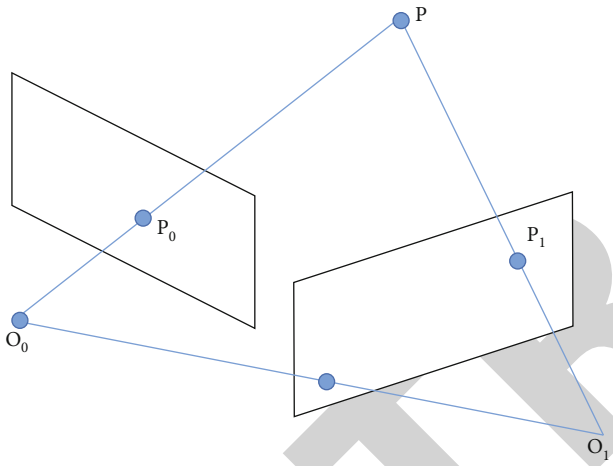

Figure 16: Triangle measurement diagram.

to track feature points, which can combine the advantages of both. To solve the above problems, this paper introduces a multiscale optical flow tracking algorithm based on orb characteristics and LK optical flow method (as shown in Figure 10).

The traditional slam system completes pose estimation under the assumption that the scene is fixed, ignoring the impact of dynamic objects in the scene on pose estimation. Aiming at the problem that dynamic objects reduce the accuracy of pose estimation of slam system, this section proposes a dynamic feature point detection algorithm based on semantic information and polar constraint. The dynamic feature points in the scene are eliminated through the relationship between semantic information and polar constraints, so that the slam system can build geometric position constraints according to the static feature points in the scene and solve the relative motion of the camera (as shown in Figure 11).

5.3. Optical Flow Tracking. When the camera moves in the scene, the acquired image changes, corresponding to the

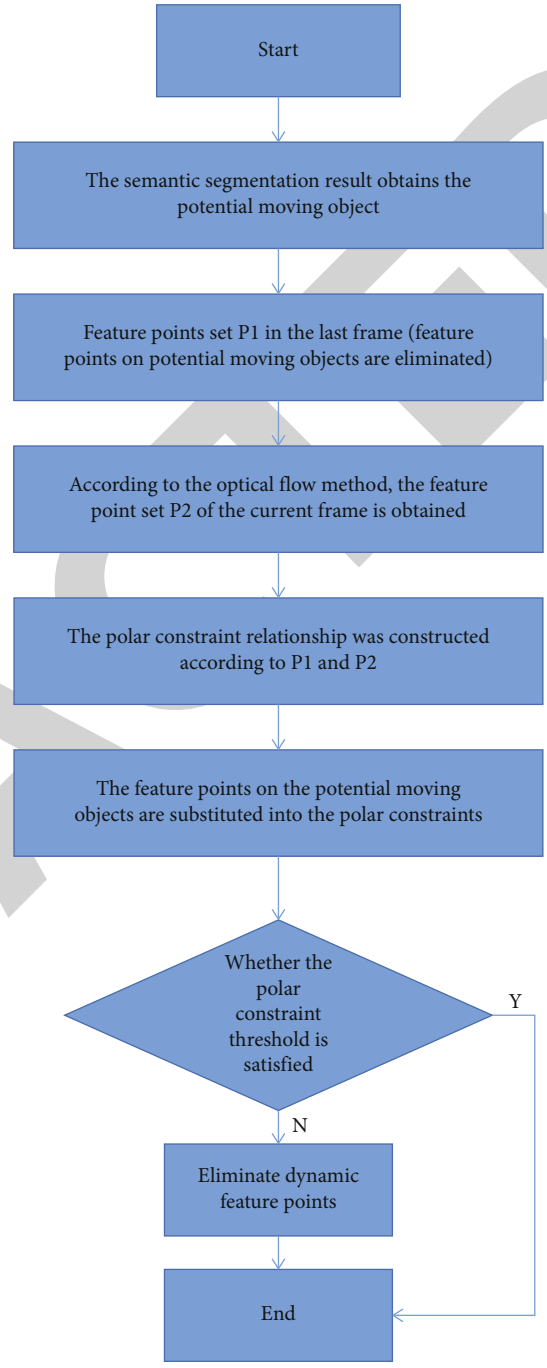

Figure 17: Dynamic feature point removal process.

change of optical flow field in the image. Optical flow is a method to describe the movement of pixels in the image with time. Optical flow method is divided into sparse optical flow method and dense optical flow method. Dense optical flow tracks all pixels in the image, while sparse optical flow tracks some pixels in the image. The extracted ORB feature points are evenly distributed on the image, which can better reflect the transformation relationship between the two images. Therefore, using sparse optical flow can well meet the requirements of the system.

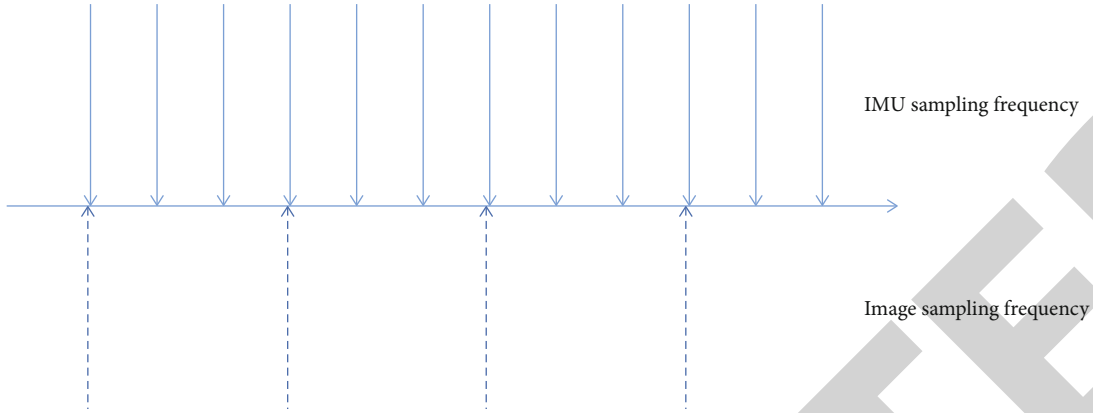

Figure 18: Camera timing of IMU.

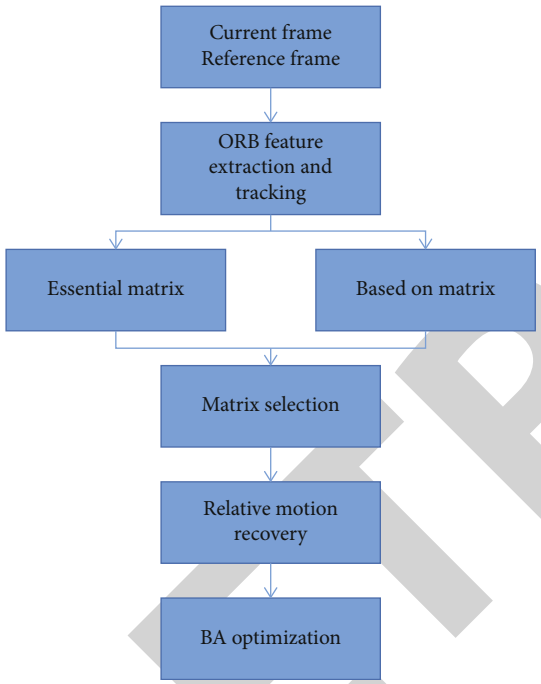

Figure 19: Visual initialization process.

LK optical flow algorithm is a classic sparse optical flow tracking algorithm, which is constructed by the following assumptions.

First, the assumption of gray level invariance, that is, the pixels of the same spatial point in any frame of the image remain gray level invariable.

Second, "small motion" hypothesis, that is, the camera is moving slowly, that is, the transformation between two frames of images is small.

Third, the neighborhood consistency assumption, that is, a pixel and its neighborhood pixels have consistent motion (as shown in Figure 12).

When optical flow tracking is performed between two consecutive images, ORB feature points are first extracted from the previous image, and the coordinate values of these ORB feature points are used as the initial values of the pyramid optical flow algorithm. Then, the coordinates of these feature points in the current frame are obtained through the pyramid optical flow algorithm. The difference between the two coordinates is the optical flow value corresponding to the feature point. Calculate the optical flow value of all feature points and take the mean value, that is, the optical flow between two consecutive frames of images (as shown in Figure 13).

5.4. Dynamic Feature Removal. After the feature point tracking between two consecutive frames is completed, it is necessary to build a geometric constraint relationship for the matching feature points between two consecutive frames to recover the relative motion between the two frames. The traditional slam system estimates pose under the assumption that the scene is fixed, ignoring the impact of dynamic objects in the scene on pose estimation. The feature points on dynamic objects will seriously affect the accuracy of pose estimation. To solve the above problems, a dynamic feature point detection algorithm based on semantic information and polar constraints is proposed. The potential moving object is obtained through the semantic segmentation results, and the feature points on the object are judged whether they are dynamic feature points. If they are dynamic feature points, they are eliminated, and if they are static feature points, they are retained (as shown in Figure 14).

Finally, the position and attitude of the camera are estimated by using the dynamically eliminated feature points, which improves the robustness of the SLAM system in the dynamic environment. Therefore, the essence of epipolar geometry is the geometric constraint relationship between the image plane and the plane bundle with the baseline as the axis. The epipolar constraint relationship can be established between the corresponding points in different frames at the same spatial point (as shown in Figure 15), and it can also be carried out through triangle measurement (as shown in Figure 16).

The two pixels P are the projection points of P in the two images. The plane composed of O and P is the polar plane and intersects with the L polar line, and the intersection e of the two images is the pole. In the process of elimination, relevant standard processes should be followed (as shown in Figure 17).

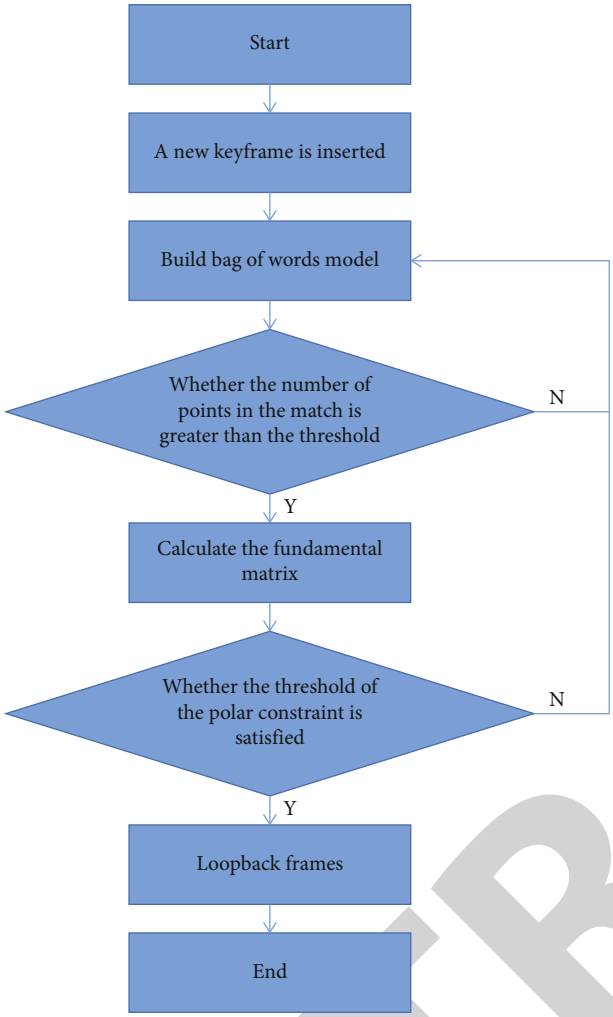

Figure 20: Overall process.

5.5. IMU Motion Model and Preintegration. In the visual inertial odometer, the sampling frequency of IMU is much higher than that of the camera. The sampling frequency of the camera is 20~30 Hz, and the sampling frequency of IMU is 200 Hz or even higher. In the timing relationship between IMU sampling frequency and camera sampling frequency (as shown in Figure 18), therefore, there are often many IMU measurements between two consecutive frames of images. Correct processing of IMU data between two frames of images is a crucial step in the visual inertial odometer. IMU preintegration can effectively fuse high-frequency IMU data with low-frequency image data, and is widely used in visual inertial odometer. The main idea of IMU preintegration is to integrate the IMU measurements between two consecutive frames into a relative motion constraint only related to the IMU measurements. When the state quantity is iteratively updated, the integral value is approximated by first-order Taylor, to prevent repeated calculation.

The visual inertia joint initialization is completed on the basis of obtaining the visual initialization results and IMU preintegration results, so the method can design the visual initialization part, and the accurate visual initialization results can provide accurate parameters for the visual inertia initialization (as shown in Figures 19 and 20) for the overall process.

6. Conclusion

Although the social environment in China in the early twentieth century was very bad, it failed to prevent Chinese artists from exploring art, and countless setbacks eventually became the source of inspiration for artists. Aiming at some defects of the traditional SLAM algorithm, this paper integrates the environmental factors and visual construction in different periods, puts forward some improvement schemes, integrates the semantic information into the slam system, and preliminarily achieves the expected goal. Semantic reprojection error can be introduced to strengthen the constraints of semantics on pose estimation, so as to improve the accuracy of pose estimation. Slam system obtains a large number of globally geometrically consistent image information, which can provide some support for deep learning model training.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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Research Article

Analysis of the Questioning and Dialectical Relationship between the Pursuit of Intensity in School Physical Health Education

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In the rapid development of the country and schools, physical education and health programs have gradually become an essential part of schools in order to improve students' core physical education skills and literacy, and have a very important role and impact on students' physical and mental health development. The school P&H program not only conveys to teachers and students the knowledge and training skills to improve school sports and enhance physical fitness but also fully develops the awareness and ability of teachers and students to work hard and collaborate with each other. This paper examines and analyzes the problems and dilemmas associated with the pursuit of health and sport-specific intensity in school sports and combines theories of health and exercise, physical education, training, and moral education through literature review, logical analysis, and value analysis. The purpose of this paper is to clarify the different logics and orientations of specific sport intensity regulations, school sport health pursuits, and school sport teaching and to clarify and correct related issues, so as to provide theoretical and practical support for school sport to better implement the concept of "health first" and further promote school sport reform and sound development. In this paper, we analyze the relationship between exercise and health in physical education programs of teachers and schools from the perspective of natural dialectics and find out some outstanding problems that may exist in them, so as to effectively promote the development of students' physical and mental health.

1. Introduction

1.1. Health Education. Health education, as we are promoting it, is an education that requires the transmission of health knowledge to students and the establishment of hygienic behaviors, while making environmental improvement a central part of the education [1]. The reason why we are promoting health education in schools is to enable people to have healthier lifestyles and behaviors, so that through each individual's improvement, the health of society as a whole can be improved. Health education, fundamentally, is an educational promotion and intervention activity that allows people to have a healthier philosophy through purposeful intervention in schools, so that they can have healthier behaviors and habits, which will enable them to prevent diseases, then, improve their physical and mental health and finally improve their quality of life as shown in Figure 1.

Currently, there is no clear definition of the concept of health education. In China, the concept of health education refers to the planned educational and social activities organized by health education-related departments to disseminate health-related knowledge, strengthen people's health awareness and concepts, and promote the conscious adoption of health-friendly lifestyles and behavioral habits.

Tomokawa et al. mentioned that the World Health Organization considers health education as a way to better guide people to adopt health-friendly behaviors [2]. Health education is a way to better guide people to adopt healthful lifestyles by inducing and encouraging them to do so. People can take the initiative to understand and value health, and then maintain their own health. People learn to use existing resources and facilities in a rational way to improve their health. Martinsen viewed health education as a science to help people change unhealthy behaviors and establish healthy behaviors to achieve the purpose of promoting people's health [3]. Its research includes health knowledge, technology, education, and intervention methods, involving various disciplines such as education, psychology, sociology,

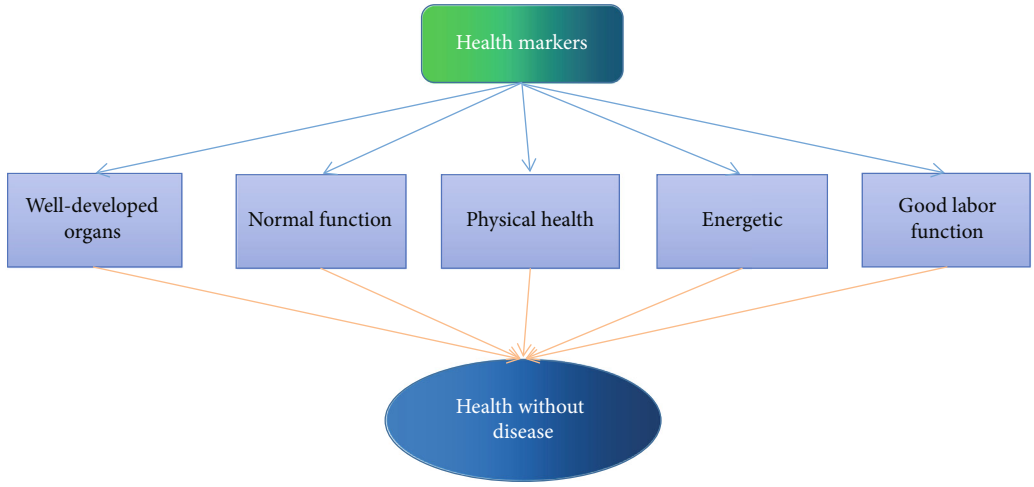

Figure 1: No disease and health.

and behavioral science. According to Huang et al., health education is the dissemination of health care knowledge and skills to people and the influence on their cognitive attitudes and values. It cultivates people's health awareness, positive attitude towards society and the ability to maintain their own health, and motivates them to actively implement health-friendly lifestyles and behaviors to reduce the influence of risk factors.

1.2. Physical Education Instructional Design. Physical education is a complex collection of teaching phenomena, which is a purposeful and organized process of teaching by teachers and students according to certain plans and curriculum standards, called physical education. In view of the increasing trend of deepening the reform of school physical education curriculum in China, the process of scientific research and planning to optimize the work according to different teaching purposes and conditions is physical education teaching design. The complete physical education design involves such aspects as making a reasonable teaching plan, designing a teaching mode suitable for students' physical and mental characteristics, and using teaching equipment and devices as shown in Figure 2.

1.3. PRECEDE Model Theory. The core of the PRECEDE model is the educational organization diagnosis, which consists of three important influences: dispositional factors, contributing factors, and reinforcing factors [4]. The dispositional factors, which usually precede the occurrence of a behavior, are the motivation, desire, or factors that induce a behavior, such as knowledge, attitude, or beliefs. The health education knowledge rate is a survey of the existing health education knowledge of physical education teachers and students to detect the current level of knowledge of physical education teachers and students in Kaifeng urban high school health education module. In addition, students' knowledge and attitude toward health education determine the quality of health education they receive, and the importance of health education by school leaders is an important guarantee for health education implementation. In this study, the awareness rate of physical education teachers and students about health education and the knowledge of physical education teachers, students, and supervisors about health education were taken as the tendency factors for implementing health education modules as shown in Figure 3.

2. Description of the Probiem

2.1. Problems of Health Education in School Sports

2.1.1. Formalization of Health Education Process. Health education is not only the education of basic health knowledge but also the combination of acquired education and nurturing education [5]. The nurturing nature of health education in school physical education means that students should gradually improve their health and develop regular health behaviors through physical education courses and in their daily lives; only when students have a correct understanding of health will they form an awareness of the importance of sports, and only when students have an understanding of the importance of health will they form a health consciousness or a sense of participation in sports and will actively participate in sports activities [6]. Therefore, the subjects of health education are not able to deeply understand the inner relationship between these three levels, which leads to the formalization of the process of health education for students in the practice of physical education. The acquired nature mainly refers to the teaching of basic health knowledge through physical education, and the latter is the object of focus in school physical education. The latter is the focus of physical education in schools. In reality, the main body of health education in school physical education understands health in the process of teaching practice as promoting students' health as long as they participate in sports, which is a superficial understanding, not that students can be formed by participating in sports, but involves students' understanding of health, students' health awareness, and students' health behavior.

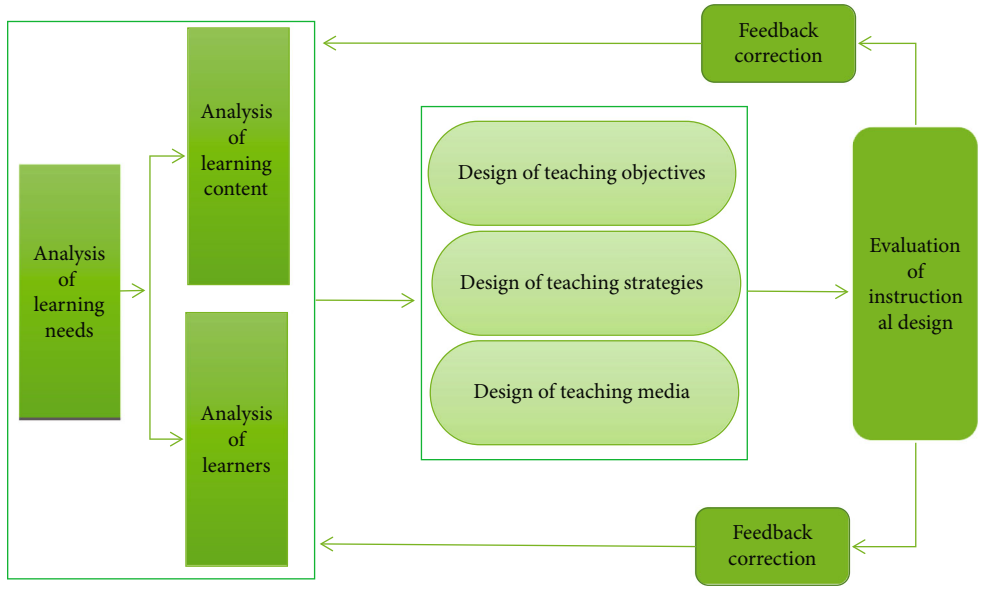

Figure 2: Flow chart of instructional design.

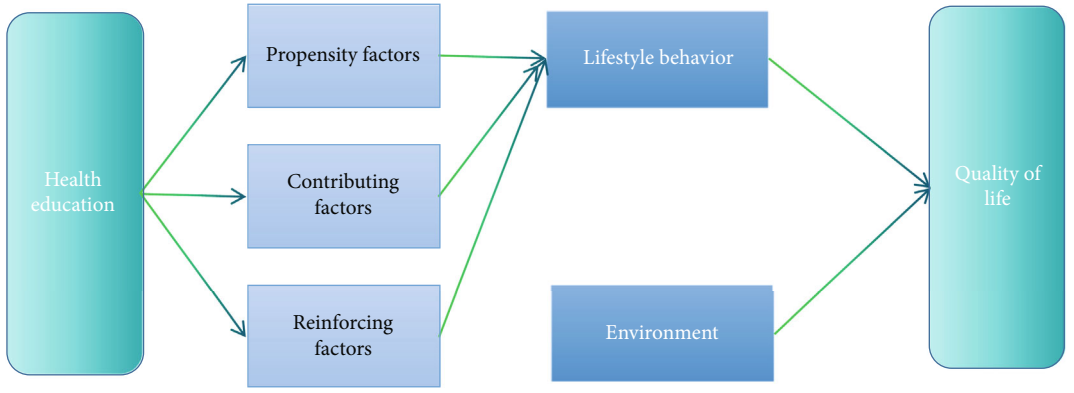

Figure 3: PRECEDE model theoretical architecture.

2.1.2. Lack of Clear Direction for Aid Health Education. School sports cannot take all the responsibility of health; physical education as the core part of school sports is the implementation of sports-related health education through the teaching of sports programs and some indoor health education classes [7]. So, what are the health education goals? However, the complexity of the content and the emergence of health knowledge not related to physical education make the health education in physical education generalized, such as understanding the danger of drugs to individuals, families, and society, and the health education in the general high school physical education and health curriculum standard proposes to understand the risks of Internet dating and to understand the risks of AIDS and other diseases. For example, in the health education in the general high school physical education and health curriculum, it is suggested that understanding the risks of online dating and understanding infectious diseases such as AIDS and tuberculosis could be more appropriately covered by nonphysical education courses in school [8]. The content of health education listed in the curriculum standards is undoubtedly correct, but some health knowledge that is not directly related to physical education can lead to a generalization of health education goals, resulting in a lack of clear goal guidelines for health education.

2.2. The Current Situation of Integration of Physical Education and Health Education. As shown in Figure 4, due to the specificity of the current educational background in China, there is no template for the integration of physical education and health education, and there is only a genuine physical education and health teaching model with Chinese characteristics that can be developed in conjunction with the current teaching level.

There is not enough time to teach the theory of the curriculum, and some schools do not even teach the basic theory of classroom teaching to students; most of the physical education equipment in schools are various kinds of physical education equipment needed to teach physical education skills, and the area of sports fields that can be used is small. These factors limit the development and teaching of physical education and health courses.

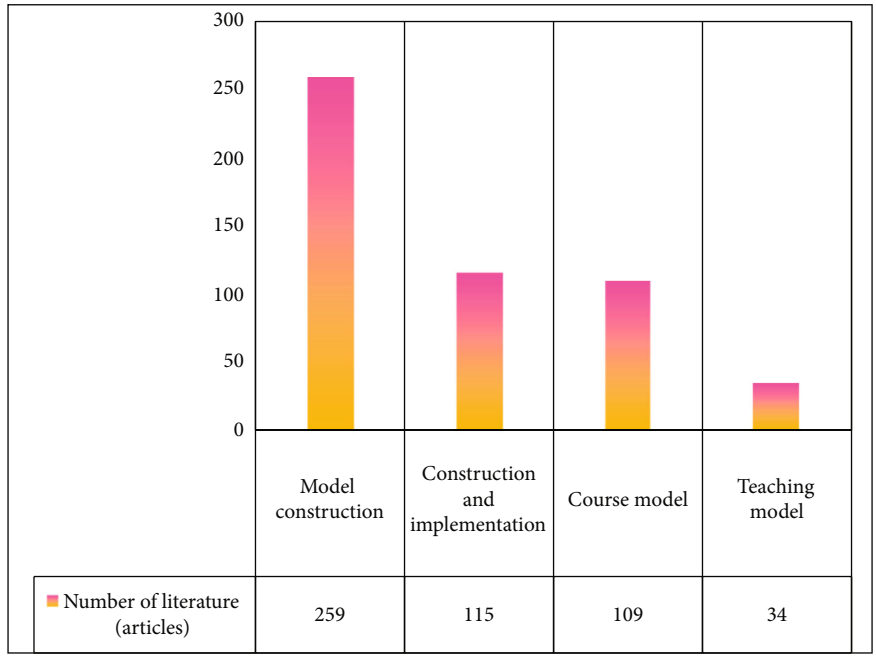

Figure 4: Curriculum model development research hotspots.

Education administration departments at all levels have yet to improve their knowledge of "physical education" in their teaching work, and health education accounts for a smaller proportion of the practical teaching activities in physical education [9]. Knowledge and skills to carry out health education, school physical education workers have not established a modern view of health integrated with social development, and many schools' training personnel specialties have not become a training base for training health education, and the integration of physical education and health education has not yet attracted the attention of the whole society.

2.3. Problems in the Integration of Physical Education and Health Education

2.3.1. Insufficient Attention to Work. Teachers' knowledge of physical education and health education, parents' ideological perception of physical education and health education, and students' curricular understanding of physical education and health education all constrain the development of physical education and health education. At the same time, students do not pay attention to health education, their half knowledge of health education and weak health consciousness, which invariably affect the development of students' physical health [10]. We should strengthen the ideological awareness of students, carry out the popularization of health education knowledge, and also strengthen the relevance of the physical education curriculum to the standards, popularize students' health education, promote the importance of health education, improve students' awareness cognition of physical exercise, and improve students' physical fitness test scores. Physical education and health education are mutually collaborative and codeveloping, strengthening the integration and development between physical education and health education, forming a systematic and interpenetrating teaching arrangement, and promoting students' physical fitness and health development as shown in Table 1.

2.3.2. Management Mechanism Is Not Perfect. The integration of physical education and health education in China needs a longer-term development to achieve a higher level of connection [11]. The government's education administration department has not formed a more systematic and standardized guidance system for the development of physical education and health education and lacks the knowledge of physical education and health education in theoretical integration. For this course is the lack of teaching, lack of assessment, lack of supervision phenomenon, the integration of physical education and health education should establish a sound management organization, improve management regulations and systems, and effective evaluation and supervision system. Integrate social resources, strengthen the links with social welfare organizations, and invite students' parents to participate, so as to create an evaluation and supervision system that combines school, society, and parents to better develop physical education and health education.

3. State of the Art

3.1. Low-Intensity Characteristics of Physical Education Process. From the definition and composition of teaching, it includes two parts: "teaching" and "learning" [12]. In addition to general teaching, physical education also highlights the teaching of skills (mainly techniques) in each sport, with the specific focus on "teaching" and "learning" of skills and "practice" and "competition" throughout. This is also the basic way of teaching physical education in primary and

Table 1: Classroom teaching model concept of physical education combined with health education.

Lesson module	Design content	Design ideas
Preparation activities	Explain the significance of doing warm-up activities before exercise	Health education is included in the preparation activities section, the basic section, and the ending section.
Basic section	Basic theoretical knowledge such as rules and developmental functions is taught according to sports	
Closing section	Explaining the role of postexercise relaxation activities	

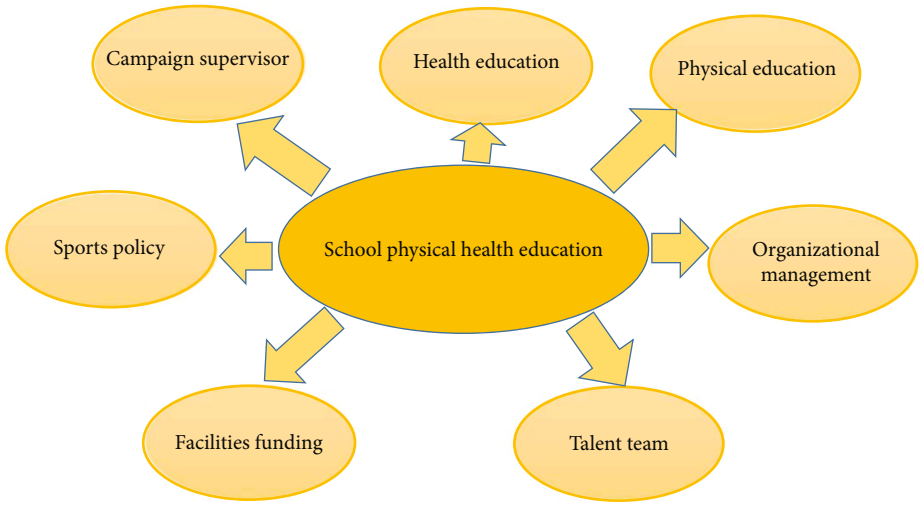

Figure 5: Dimensional relationship of school physical health education scale.

secondary schools, which is usually referred to as a "new lesson" (or new content) [13]. This is also an adaptation to the current requirements for teaching multiple sports in primary and secondary schools, the basic level of most students, and the fact that it is difficult for most students to learn and master many sports in a limited number of class periods (except for options and special improvement classes). In the teaching cycle, only some sports, such as basketball and soccer, students only learn single or partial techniques to compete and reach a high level of athletic intensity in chasing and grabbing (even then, such sports should not emphasize athletic intensity at the expense of learning and improving each technical aspect). For many sports, especially those that are technically difficult or require a high degree of technical articulation, the main task, content, and important feature of physical education is the gradual mastery and proficiency of skills through a relatively low-intensity teaching, learning, and practicing process. If students do not learn progressively, it will be difficult for them to complete the subsequent complete technique or have some negative consequences as shown in Figure 5.

In terms of the specific arrangements for technical learning, some individual sports are subject to constraints such as single exercise intensity, technical difficulty, safety, space, and teaching organization, so students need to rotate through the exercises in a sequence [14]. For reasons of necessary learning observation, attention maintenance, interval rest, safety, etc., it is not appropriate to arrange other or excessive physical activities during many rotations, which will also lead to a decrease in the intensity and density of exercise in a single period. First, during individual student practice, the teacher may provide individual instruction, protection, or assistance, while other students observe or learn. Second, because technology learning is different from physical practice, students' learning of a particular technology in a given unit of instruction should be integrated and continuous, and their attention should be focused on the specific learning task for a long period of time without frequent interruptions and distractions from other irrelevant stimuli and information. Again, breaks in practice are a necessary rest and recovery [15]. Therefore, even if there are sufficient venues and equipment, it is not advisable to increase the intensity and density of exercise through other physical exercises or excessive group exercises during the rotation of the technique learning and improvement phase, otherwise, the teaching process of specific techniques will be fragmented and fragmented, or not conducive to students' physical recovery, thus reducing the effectiveness of learning and practice. For example, the intensity of single exercises is high for events such as box jumps, vaulting, single and double bars, and throwing, etc. The process of waiting in line after the exercises is not only a time to rest and

recover but also a process to observe and listen to the teacher's comments and experience other people's technical movements. In addition, for some events, it is not advisable to schedule other exercises during the rotation (to increase intensity) for safety reasons.

3.2. The Way to Develop Moral Education Based on Physical Education. The reason why "physical education" is different from "sports" and "physical activities" is largely due to the fact that moral education can be consciously infiltrated in physical education. Compared with other courses, physical education has a more prominent "literacy" moral education value. As an important part of school education, physical education should not be self-relegated to mere sports and fitness activities. However, in order to increase the intensity and density of sports, the "noneffective sports" time of physical education classes is being consciously compressed, and the moral education contents and elements in them are also unconsciously ignored and excluded.

As far as the development of moral education activities in physical education is concerned, it has little to do with intensity or is mainly characterized by low intensity [16]. First, in terms of the composition of moral education-related qualities (e.g., physical education moral character), it involves elements of knowledge, emotion, intention, and action, of which only "intention-will" is directly (and not necessarily) related to high-intensity sports. Second, in terms of the content of moral education, it includes political, ideological, moral, and psychological aspects, except for some psychological qualities that can be strengthened by some high-intensity sports, others such as rules, aggressiveness, and cooperative spirit are related to different programs and not necessarily related to intensity, while ideological and political aspects are not even related to sports. Moral education in physical education can be divided into sports-related character and general social character, the latter involving, for example, classroom routines, discipline education, and other nonsports, intensity elements in the teaching interaction. Thirdly, from the viewpoint of moral education methods, including encouragement, praise, criticism, guidance, persuasion, case education, and typical education, all of which are mainly related to the use of language and need to be carried out in conjunction with various times of physical education, such as before, during, between, and after sports. Some practical activities of moral education also need to be penetrated with the help of various kinds of colorful and diverse nonintense activities. Fourth, from the distribution of moral education value, many low-intensity projects and low-intensity projects in unit time, such as martial arts, extended sports, track and field, gymnastics, games, and other activities, have unique moral education value. Fifth, in terms of the transformation of sports moral character to social moral character, some of the moral values embedded in sports programs, if they are only spontaneously participated by students, are more reflected in the sports context, while to transform into social character beyond specific sports, teachers still need to consciously conduct nonsports educational guidance. These moral education activities are either not related to intensity or occur more often in low-intensity teaching (sports) scenarios or even in "noneffective sports" time, as shown in Figure 6.

3.3. Analysis of the Effect of Integrating Health Education into Secondary School Physical Education. According to the physical health status of the students in the two classes before the experiment (Table 2), we can conclude that the physical health score of the boys in the experimental class (70.45) before the experiment was better than that of the boys in the control class (67.43), and the T value was -1.476, and the P value was 0.143, indicating that there was no significant difference in the physical health scores of the boys in the two classes before the experiment at the 5% significance level. The mean physical fitness score of girls in the experimental class before the experiment was 76.43, while that of girls in the control class was 73.21, and there was no significant difference between them at the 5% level of significance ($T = -1.646$ and $P = 0.104$). This shows that there is no significant difference between the physical fitness scores of male and female students in the experimental and control classes before the experiment and the randomness of the experimental class sampling [17].

According to the table of physical health status of students in the two classes after the experiment (Table 3), we can conclude that the physical health score of male students in the experimental class after the experiment was 77.38 and that of male students in the control class was 70.07, and the T value was -3.476, and the P value was 0.000, indicating that there was a significant difference between the physical health scores of male students in the two classes after the experiment at the 5% significance level. The mean physical fitness score of the girls in the experimental class was 80.96 and that of the girls in the control class was 75.83, and the P value was much less than 0.05, indicating that there was a significant difference between them ($T = -2.95$ and $P = 0.004$). It can be seen that the physical fitness scores of both male and female students in the experimental and control classes improved after the experiment, but in terms of absolute values, the experimental class improved more than the male and female students, indicating that the implementation of the "Health + Physical Education" teaching mode probably had a positive effect on students' physical fitness.

3.4. Low-Intensity Programs Based on Physical Education Unit Periods. In contrast to the specific intensity requirements, the following types of sports (complete practice and even game sessions) exhibit relatively low average intensity characteristics during the instructional unit periods (within a given practice or game time) [18].

(i) Short duration and high intensity-long interval programs. In terms of each practice, this type of program is more intense but not longer in duration. Due to the higher intensity, longer intervals and recovery time are required between multiple practices or games. In between each practice or competition, it is advisable to arrange rest or low-intensity activities; if there is not enough interval time for such projects, students will not only fail to play at

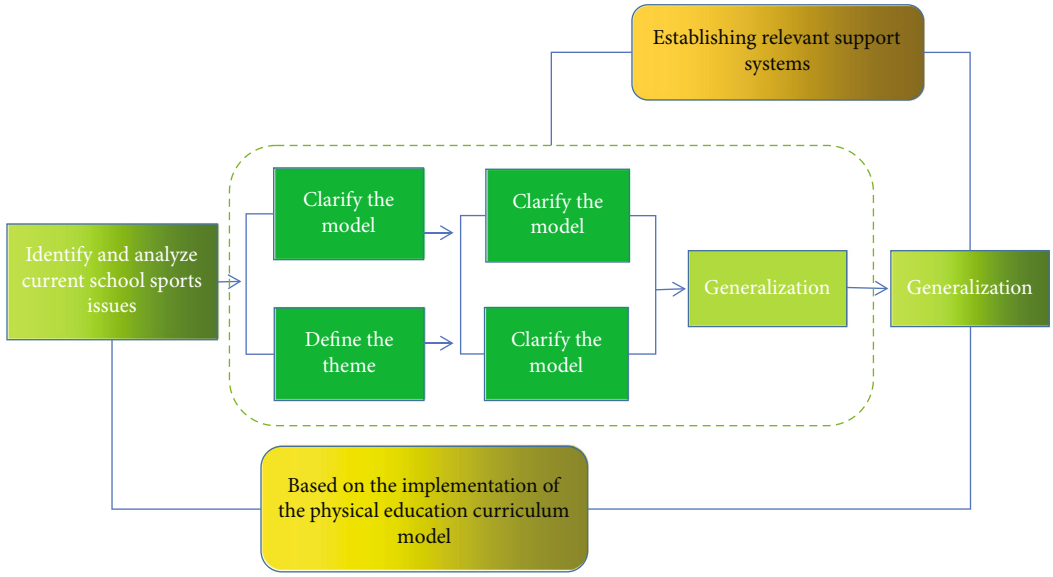

Figure 6: Physical education curriculum model development pathway map.

Table 2: Comparison of students' physical fitness scores in the two classes before the experiment.

	Experimental classes	Control class	T value	P value
Male	70.45 ± 8.747	67.43 ± 11.782	-1.476	0.143
Female	76.43 ± 8.785	73.21 ± 11.141	-1.646	0.104

Table 3: Comparison of students' physical health scores in the two classes after the experiment.

	Experimental classes	Control class	T value	P value
Male	77.38 ± 8.896	70.07 ± 11.055	-3.647	0.001
Female	80.96 ± 7.435	75.83 ± 9.581	-2.95	0.004

the proper level but also damage the technical form and may easily lead to injury. Related events mainly include athletics (such as high jump, long jump, sprint, middle run, etc.), swimming and other physical events as well as gymnastic events that favor physical fitness (such as vaulting, box jumping, goat jumping, etc. that require running assistance) [19]. This interval and rhythm are determined by the characteristics of these programs (it is not advisable to arrange other exercises or sports of higher intensity during the interval), and they may be at a lower average intensity and density level during the unit period

(ii) Continuous low-intensity program. These programs are of lower intensity and longer duration and can be maintained at a lower intensity for a longer duration, such as yoga, archery, shooting, taijiquan (noncompetitive routines), curling, air bamboo, some unarmed (apparatus) gymnastics, and specialized jogging. For example, the more skilled the practitioner, the lower the average heart rate level during practice. The average heart rate during practice (including multiple practice sessions) was about 126 beats/min, 110 beats/min, and 95 beats/min for general college students, professional students, and skilled adults, respectively

These programs not only have unique sporting, humanistic, and educational values but also their health values, as different forms of sports should not be neglected, either in terms of promoting physical and physical health indicators or in terms of promoting psychological and social health. For example, short-time, high-intensity, and long-interval programs emphasize physical fitness, while low-intensity programs such as taijiquan and yoga have a wide popular base, and their health value has been confirmed by modern science. Although some of these programs have not yet been widely promoted and popularized in schools, the relevant systems, policies, and requirements should leave room for their expansion.

4. Results Analysis

4.1. Considerations for Exercise Intensity Requirements and Application. School physical education has multidimensional values, goals, and inherent regulations, and different content may have different intensity requirements, even independent of intensity, and it is not appropriate to uniformly implement solid physiological-exercise intensity requirements or indicators (e.g., it is not appropriate to use this as a uniform requirement for the entire class or each class). The intensity requirements should take into account the sport, physical education, and humanistic values to reflect different teaching goals, rhythms, and styles. Even for the pursuit of health, it should go beyond its association with a specific intensity and be related to the multidimensional composition of health and the type of exercise [20].

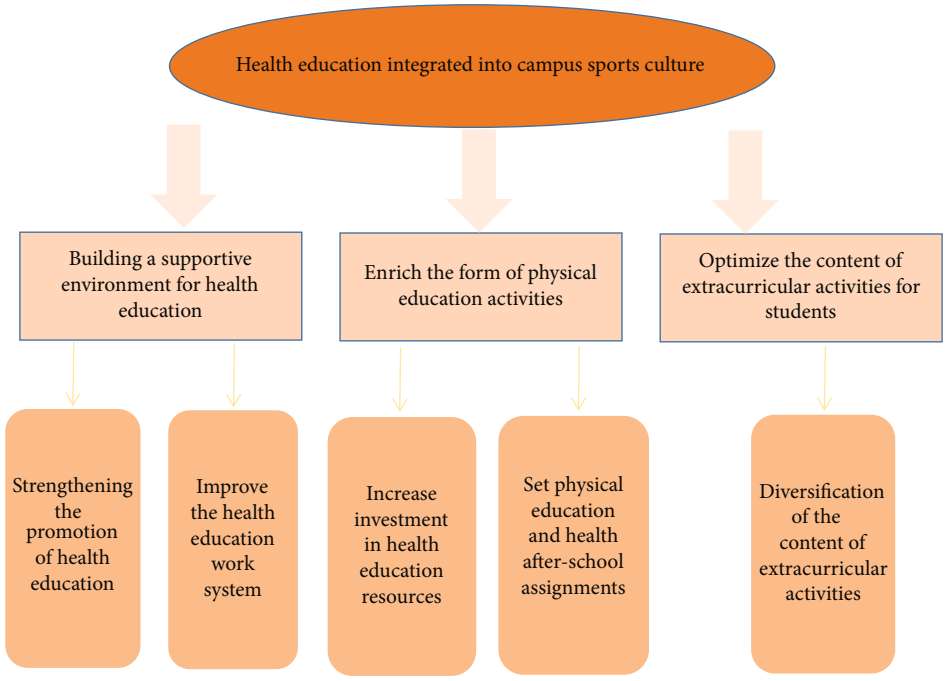

Figure 7: Ways to integrate health education in campus physical culture.

The following factors should be taken into account when determining the intensity of sports in physical education: first, the intensity of a particular sport is usually associated with a sport competition, and it is important to prevent the intensity of the competition from interfering with skill learning or destroying the rules of the sport and to prevent the selection of high-intensity competitions. It should not be generalized or overused to increase intensity and should be considered in the context of its application. Second, intensity requirements in specific exercise situations should not be based on "low and high" intensities and "all" averages, but should be "appropriate" and individually tailored. Third, in the sense of "healthy" pursuit and "appropriate" intensity, the requirement of specific average (medium-high) intensity is more applicable to physical education activities and physical education classes or parts of classes in which the intensity varies in a certain appropriate range, so it should be more. The requirements should be used as an optional model or in specific contexts. Accordingly, physical education should not be pursued as a "comprehensive class" associated with intensity, thus diluting the distinction between the different objectives, tasks, and content of the class, or even falling into a solid pattern.

4.2. Improving Physical Education Teachers' Health Education Competence in Multiple Ways. The realization of the weakened health education function of physical education requires physical education teachers to have health education ability, which requires attention to three kinds of ability: first, the ability to design and teach health knowledge, which is the ability of physical education teachers to design basic knowledge such as infectious diseases, reasonable diet, and safety and risk avoidance based on the content of health education, and to design and organize it using network and multimedia means to teach students; second, the ability to generate health education content during the teaching of motor skills, which is part of the implicit psychological and social adaptation ability of health education [21]. The second is the ability to generate health education content in the process of teaching motor skills. Part of health education is the implicit content of psychological and social adaptability, which is formed through students' participation in sports learning, student cooperation, and team dialogue. The teacher should encourage the students if they can actively complete the exercise, and if they have to give up, the teacher should actively intervene with the students to regulate their psychological state, as in Figure 7. Third, the ability to integrate health content across disciplines, health education has content beyond physical education itself; physical education teachers need to selectively integrate the content of other disciplines related to it to enrich the teaching content, such as the integration of physical education and physiological health class related knowledge, through the form of indoor physical education theory class to explain to students the impact of physical education on physiological health.

4.3. Implementing Health Education Teaching Using Different Teaching Methods. Different health education teaching methods are used for different types. One is indoor health education class; the content of the explanation is based on the health knowledge that students better grasp and understand, such as the haze weather awareness of sports protection measures, the impact of the environment on students' sports, the harm of bad emotions on the human body, how to carry out a reasonable nutritional diet, etc., the teaching of health knowledge that is based on students' understanding and awareness. The second type is the health

education teaching in skills teaching, focusing on students' physical health, mental health, and the cultivation of physical exercise awareness and habits, focusing on creating a variety of physical education learning situations to shape students' physical and mental experiences, simulating scenarios of students' sports injuries for physical education teachers to demonstrate scientific methods of dealing with injuries, so that students have a more intuitive understanding of the handling of that sports injury; the third category is the cooperation with school medical and nursing forces, or the establishment of cooperative relationships with professional medical and nursing forces outside the school. The third type is to cooperate with the school's medical forces or establish a partnership with professional medical forces outside the school, so that professional medical forces can be incorporated into the health education for students. For those operational and professional health knowledge such as artificial respiration and cardiopulmonary resuscitation, the teaching of professionals is more convincing and intuitive, and will deepen students' understanding and application of health knowledge.

5. Conclusions

The dialectical relationship between sports and health and the practice of dialectics tell us that everything should have certain two sides, to use the dialectical scientific eye to correctly view the problems that exist and to correctly understand and view the health of school sports, which bring teachers and students a variety of benefits and its drawbacks. The same is true for school sports. Properly conducted sports greatly promote the development of students' physical and mental health, but in any case, without a rational use of scientific methods to conduct sports, there is a risk of unnecessary psychological damage to students. Using the scientific dialectic of nature accurately analyzes all the relationships between sports and health, proving that the relationships between all things are interconnected, constantly changing, and developing, and that correct scientific judgments can be made in practice, so that new scientific methods or new means can be adopted to guide students in various sports, improving the psychological and physical qualities of students, and achieving the physical and psychological well-being of teachers and students' overall healthy development. In the future, the integration of health education into secondary school physical education will be beneficial in promoting students' health knowledge and helping them to develop healthy behaviors, with a more significant impact on students' eating habits in the short term, while the impact on their lifestyle habits may require more sustained intervention.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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Retraction

Retracted: On the Feasibility of Integrating the Concept of Contemporary Green Environment Development in Creating Screen Prints by Digital Means

Journal of Environmental and Public Health

Received 20 June 2023; Accepted 20 June 2023; Published 21 June 2023

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.

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[1] L. Xue, "On the Feasibility of Integrating the Concept of Contemporary Green Environment Development in Creating Screen Prints by Digital Means," *Journal of Environmental and Public Health*, vol. 2022, Article ID 3938915, 10 pages, 2022.

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Research Article

On the Feasibility of Integrating the Concept of Contemporary Green Environment Development in Creating Screen Prints by Digital Means

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In the 21st century with the popularization of digital technology, as a printmaking born out of industrial printing, it has undergone a revolutionary evolution. Silkscreen printmaking is a type of print with high technology content, strong dependence on media, and no traditional load. Thirty years ago, as soon as silkscreen prints settled in China, they began artistic exploration and experimentation with a brand-new attitude. Several generations of screen print workers have achieved it, expanded it, and made it independent in the fusion of modern language methods and oriental cultural spirit, and in the exploration of screen vocabulary, characteristics and character, it has an independent status and ranks among the international elite qualifications. This paper analyzes the root problems of high-tech printmaking tools, materials, technical principles, and causes of aesthetics. Starting from the background of the concept of green development, it expounds its related concepts, analyzes the theoretical origin of green development, and clearly recognizes the high-tech. The limitation of printmaking in the development space—that is, the expression language of digital plate making, is relatively correct in theory, so as to carry out step-by-step exploration and practice.

1. Introduction

In the printmaking family, silkscreen prints are a type of painting with high technology content and strong dependence on media [1]. The expression form is relatively free, with a strong sense of the times and design [2]. Like the generation and development of other types of prints, the development of silkscreen prints has also gone through the process from practical printing to artistic creation [3]. The forms of images are rich, and there are various image processing methods such as hand-painted, produced, copied, and digital computer synthesis. Painters choose and arrange pictures according to their own creative ideas, so that the images can better express the personality and thinking of the works and more closely express the theme of creation. The advantages of screen prints are reflected in the processing and control of color, which determines the unique limitation of the expression language of prints [4].

In this sense, the color of screen printing is not the color overlapping and mixing in the general sense, but the combination and composition of the overall pattern color [5]. First of all, under the guidance of creative ideas, the color and structure of the graphics can be judged after referring to the materials, clarifying the expression method, and determining the modeling mode of the graphics [6]. The color here refers to two levels: one is the overall effect of color juxtaposition and superposition of images; the second is the color contrast, which is divided into cold and warm, light and dark, purity and grayscale [7]. The structural relationship refers to the cooperation relationship between the picture and the image and refers to the organic combination relationship of the points, lines, planes, bodies, and other elements that constitute the image, that is, the overall structure of the interrelationship between the picture and the image [8]. The visual effect brought by the sense of artistic form is the embodiment of the artist's ideas [9]. With the

development of the times, high-tech digital technology has greatly facilitated the production of screen prints and also enriched the expression language of screen prints [10]. With its strong industrial and design sense, screen prints naturally integrate digital technology. Absorb it as its own expressive technique [11].

A variety of application software can be selected in the digital production process, such as image processing application software: Adobe Photoshop, paint, Corel photo paint, etc.; and famous graphics processing software: Adobe Illustrator, CorelDRAW, etc. In addition, 3D modeling and rendering software such as 3DMAX can also be used [12]. Take advantage of with the support of many application software, the powerful functions of computers can be described as all-encompassing, but the process of digitization belongs to the process of logical thinking after all. What it lacks is the abstract thinking ability of human beings. Fortunately, computers are controlled by us. It is our tool for artistic creation—just a tool, a super tool driven by human creative thinking, which is the beauty of digital art.

With the rapid development of the economy, excessive energy consumption has caused a shortage of various resources, resulting in "ecological problems" [13]. This problem manifests itself primarily through the buildings and environments in which we live [14]. In order to save energy, relevant scholars put forward the concept of green building, that is, buildings should reduce environmental degradation through technology. It is a new architectural model of symbiosis, coexistence, and sustainable development of people, environment, and architecture and has the characteristics of sustainable development. In order to build an ecological civilization, the party's "Ten Great Goals" put the building of an environment-friendly, energy-saving, and emission-reduction society at a prominent position in the modernization and industrialization development strategy. Promoting green urbanization and building an innovative city is an important measure for my country to implement the scientific concept of development and sustainable development. Building energy consumption, industrial energy consumption, and transportation energy consumption are the main components of total social energy consumption. Therefore, in order to implement the spirit of the national energy conservation and emission-reduction policy, it is imperative to develop green buildings [15]. The so-called green building refers to saving resources (land saving, energy saving, water saving, and material saving) to the greatest extent, protecting the environment and reducing pollution during the whole life cycle of the building, and providing people with healthy, applicable, and efficient use of space architectural forms that coexist in harmony with nature. Green building emphasizes "four sections and two environmental protection" [16]. The so-called "two environmental protection" includes the following two meanings: the first is to protect the external ecological environment to minimize the disturbance to nature; the second is to protect the indoor environment and improve the health of the occupants [17].

Designing a sustainable and low-energy living environment is the development trend of today's interior design [18]. The realization of sustainable development is usually achieved through the following two ways: (1) improving the energy efficiency by improving the infrastructure construction; and (2) changing the behavior of the occupants through interior design [19]. To achieve this goal of green interior design, interior designers need to have a new way of thinking to conduct research and practice for our next generation of interior designers [20].

2. Current Situation of Silkscreen Printmaking

2.1. The Ecological Environment of Contemporary Chinese Silkscreen Printmaking. The creation and spread of blackboard writing has a long and glorious history in the history of Chinese art. The rise and fall of Chinese fine arts have a direct and inevitable relationship with the social and economic development of various countries and local governments in the world. With the development of industrial science and technology and the gradual improvement of the country's comprehensive national strength, silk screen printing art was born on the art stage of China with the bell of China's reform and opening up. Good social conditions and open-minded cultural attitude have created an infinite and broad living space for its vigorous development. Chinese screen printing is a kind of printing with high technical content, strong dependence on media, no cultural precipitation, and no cultural load. When screen printing was just settled in China's domestic universities, it was carrying out cultural innovation and development in a brand-new state. Therefore, although China's silk screen printing has a history of more than 30 years, they can be said to be colorful from their inception to the present.

With the struggle of a generation of silk screen printing workers, China's confidence, courage, and strength have been developed and developed in the integration of modern language technology and oriental culture and art, making it independent. In the field of screen vocabulary and language research, China has its own advantages and international qualifications. Digital technology and other emerging media have opened a new era of their development. With the development of science and technology, the improvement of production equipment and conditions, and the entry of a large number of foreign media, screen printing has changed its environment, changed its communication methods, and improved its production level, thus promoting its own modernization development.

However, after all, the history of silk screen prints is still short, and the research on its ontology language characteristics, advantages, and creation laws is not enough. In addition, in the traditional Chinese art education system, there are still some problems in the teaching content and social needs. Barriers to teaching or printing still exist; there is a lack of academic research on how to take the pure print technology as the social needs of their own growth after graduation; the school has no conditions for professional print studio; based on the social characteristics of print works, college students who are separated from the school working environment cannot create print; because the students' personal creative value is high, they do not have a school working environment, or they do not have enough

understanding of print works, so other print artists rarely consider creating prints; the basic industries such as galleries have biased understanding of printmaking products, while the industry's understanding of printmaking technology is imperfect, and the loss of production talents is also caused by social conditions; the distinction between original print works, copy print works, and decorative paintings is also vague; under the guidance of the artist studio system, there is a lack of multitype and multilevel print creation activities in international professional large-scale exhibitions; and the lack of printmaking materials. A series of social problems have formed the main obstacles to the development of printmaking art and also caused the slow development of contemporary Chinese printmaking art while flourishing in social culture and economy as shown in Figure 1.

2.2. The Technical Characteristics and Language Expression of Digital Technology Prints. The creation of digital plate making faces two extremes. First, digital technology plate making has the basis of delicate expressiveness, which makes it extremely capable of reproducing figurative themes. However, many authors seem to treat high-tech prints with traditional printmaking concepts. For example, in silkscreen prints, they confuse the concept of imprint and print mark and think that as long as the traces formed on the paper by the paint leaked through the silkscreen are silkscreen prints, they have embarked on the idea of reproducing the image of the object, but this way going down, whether it is the color gradation version or the CMYK film version, it is limited to the concept of replicating objects, and in the era of digital products, any mobile phone is equipped with a camera of 1 million or 10 million pixels. The advanced computer makes it easy for people to be satisfied with the aesthetics that exist in the objective image. Therefore, the visual works that over-reduce the image are unbearable in terms of efficiency and price.

Secondly, the delicate expressive power of digital technology plate making makes it omnipotent, and omnipotence also means at the same time nowhere. Therefore, the youngest silk screen prints seem to inevitably go to another creative extreme on the road of exploration—pure. The combination of principled visual mode, abstract image, and new sense of form is refreshing, but today, 70 years after the death of Kandinsky and Mondrian, is this creation or repetition? Screen printers are a lonely group, and there is a certain distance between screen prints and contemporary cultural forms, which makes screen prints seem to be talking to themselves. As a result, the aesthetic value of silkscreen prints returns to its unique language limitations without any suspense: namely, texture expression, and the special superposition method that exists in conjunction with texture expression, as shown in Table 1.

2.3. Concept of Green Development. China's green development concept is put forward on the basis of conforming to the inevitable law of human development. It is a comprehensive summary of global development and determines the new goals of China's ecological and social development, as shown in Figure 2. The idea of green civilization is mainly to encourage human beings to establish green values, green culture, and survival mode. Its ultimate goal is to make human beings achieve natural harmony. Our values are the foundation of green economy. The concept of green development is based on respecting and understanding nature and its laws. The main purpose is to serve people's future development. It is no longer at the cost of damaging the natural environment, but for common development—mutual harmony. Under the environmental requirements of continuous adaptation and survival and development, people will develop resources according to the social reality and will strive to maintain resources, so that human beings can achieve the broadest development in society both materially and spiritually. The concept of green development advocates harmonious social values in all aspects, which is an important theoretical cornerstone and spiritual power to promote human green development.

In May 2017, during the forty-first collective study of the Political Bureau of the CPC Central Committee, Xi Jinping proposed that to provide people with an excellent environment for people to produce and live in, it is necessary to promote green development and life ways. The concept of green development requires a change in the way of development and must give up the form of development that is harmful or even damaging to the environment. It is wrong to not only see temporary benefits and go for a short-term economic rise to infringe on the ecological environment. (1) Adhere to the people as the main body, the concept of green development is to achieve people's ecological happiness as the goal and to improve people's living standards and quality through green development. "The environment is the livelihood of the people, the green mountains are beautiful, and the blue sky is happiness." (2) The purpose is to allow the people to obtain ecological happiness and achieve social benefits.

The final result of green development should benefit the general public. To effectively promote green economic development, we should start with the vital interests of the people, create a good living environment for the people, ensure the basic living requirements, and improve the people's living taste and quality of life. Make it the foundation of a good life for people. The concept of green development adheres to the fundamental aspirations of the people, what kind of living environment the people pursue, and what kind of ecological guarantee the concept of green development should provide. Feature the characteristics that conform to the human's expectations for a better life and realizing their ecological happiness is the value purpose of the green development concept. It is necessary to always take people's requirements as the goal and way of development. The goal is to enable people to live an ideal life and satisfy people's pursuit and yearning for a happy life. This is also the value characteristic of green development.

3. The Application of Digital Technology in the Creation of Silkscreen Prints

3.1. Sketching Stage. When we have an idea, we need to visualize the thinking image. Usually, we describe it on paper,

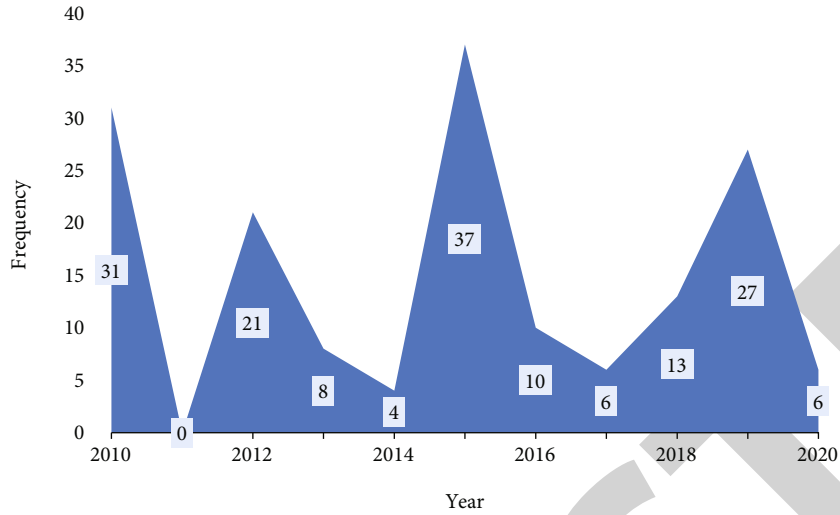

Figure 1: Research trend of silkscreen prints.

which is a "sketch". We can also introduce digital technology, use digital cameras, scanners, and other digital devices to digitize hand drawn sketches and other digital materials, and then use powerful computer adjustment and editing functions for digital reconstruction, or draw directly with a mouse or light pen.

Compared with traditional creation methods, digital creation has many conveniences: (1) the traditional tools such as paper, ink, pen, and color are omitted, and everything is on the screen. The powerful brushes and palette tools provided by the drawing software can be used as it is more convenient. (2) Tone adjustment, color conversion, and adjustment tools such as copying, stretching, moving, rotating, and cutting provided by the drawing software can modify the drawing at will, which is faster. (3) The drawing software has rich special effects. The filter tool allows us to make more attempts and display the results directly on the screen, what we think is what we see. (4) It can make full use of the massive material resources provided by the image CD and the Internet, which greatly expands the creative space. (5) We can save any display result as an electronic drawing file, which is convenient for future reference, comparison, and modification and can also be printed out on paper to turn it into an actual, traditional "sketching." (6) For printmakers, the advantages of digital technology do not stop there. The specific process is shown in Figure 3. There are many functions of the drawing software that are specially designed for the printing industry. The final result of printmaking is also realized through printing. The settings of layers, channels, and spot colors are used for the printing of prints and have special meaning.

3.2. Creation Stage. The digital creation stage of silkscreen prints is to use digital means to deeply describe the selected drafts, determine the number of sets, printing sequences and printing processes (paper, ink, plate making methods, mesh specifications, etc.), and print them in accordance with the whole process of color separation processing on the image file, and finally, outputting the required positive image transparencies. Most of the work in the stage of printmaking is to make printing plates for printing, and different types of plates use different materials, tools, and production methods. Screen prints use the silk mesh cloth taut on the frame as the printing plate, use various plate making methods to consciously block the partial mesh holes, and use the pressure of the squeegee to make the ink leak through the unblocked mesh holes to the screen imprints form on the paper.

Among the many plate-making methods of screen printing, the photosensitive plate-making method is currently the most widely used. After that, the screen plate required for printing is obtained, and the black positive image part on the transparent film that blocks the light is the final imprint. Therefore, the creation of silk screen printing is largely the production of the positive image transparent film used for plate making. The production of positive image transparencies can be done digitally.

3.3. Printing Stage. The printing of silk screen prints is mostly manual, and the printing process itself is also a process of continuous creation, as shown in Table 2. Because automatic equipment is generally not used, the use of digital technology is less, but we can still use the predictive function of the computer to provide some useful help for the printing of prints. In the printing process of screen prints, due to uncertain factors such as the characteristics of paper, the characteristics of ink, the addition of auxiliary materials, the conditions of the printing environment, and the size of manual pressure, the final result will be slightly deviated, sometimes even have some unexpected special effects that will appear. Use the computer to adjust the results in real time according to the actual situation and make real-time predictions for the next printing plate, which is of great help to improve the quality of the work.

Table 1: Comparison of technical parameters of various prints.

Category	Requirements of the environment	Environmental requirements	The technical requirements	The cost	The efficiency	Artistic reproduction effect	Repeatability
Silk screen print	The print is made into a screen in which the blank part is blocked, and the text part is ink-permeable	The production technology and conditions are higher	Have certain printing background, can operate all kinds of equipment skillfully	Low	High	Rich color and strong display	High
Black and white woodcut	The blank part will be removed on the board, leaving the raised text part	Moisture proof	Pay attention to three tastes (knife taste, wood taste, and seal taste)	The cost of general	Middle	Black and white composition	Middle
Woodcut tinted	Multicolor engraving and printing	Less demanding	Weaken knife technique and pay attention to color harmony	The cost of general	Middle	Color coordination, strengthen gray bar application	Low
Watermark wood	Using cellophane paper to transfer the original manuscript to a wooden board in the process of engraving	High requirements for air humidity	The layout cannot water, paper to maintain a certain humidity	The cost of general	Middle	Elegant, solemn, strong tone	Middle
Copperplate engravings	Etching or engraving of copper or zinc plates	Special tools and facilities are needed	Paper required 180-250 grams, pay attention to ink viscosity	The cost is high and the process is tedious	Low	Soft, delicate, strong visual impact	High
Lithographic prints	The original manuscript was painted on a stone slab and corroded to form a stone plate	A dedicated lithographic studio is required	Corrosion control, ink balance in the printing process	The cost is high and the process is tedious	Low	Artistic reproduction effect	High

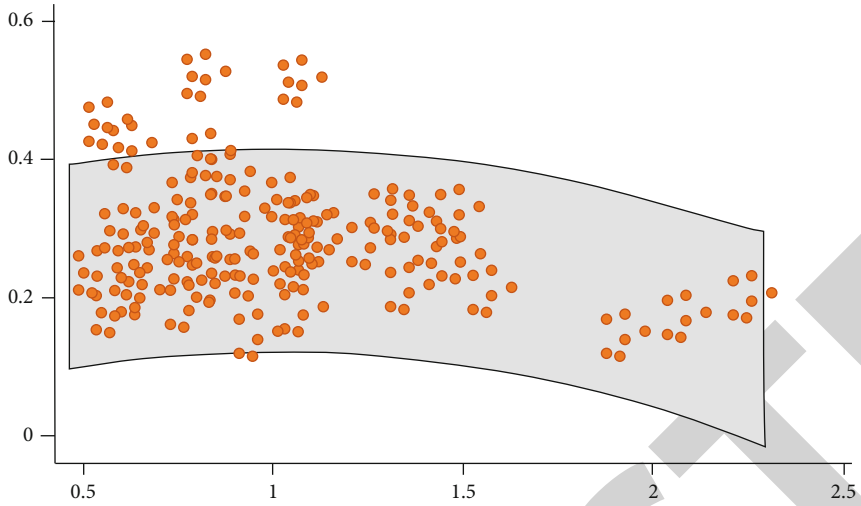

Figure 2: Scatter plot of environmental decentralization and green development.

Using the photosensitive method for plate making, first convert the original into an electronic manuscript. Color originals should be screened by C, M, Y, and K. Generally, refer to Table 3 for the screening angle, which can effectively eliminate moiré. Then output the negatives, respectively, check the discrepancies with the originals, and use them as printing plates after trimming.

The practical significance of computer application is to make digital technology produce artistry, so as to serve the creation of silk screen art, so as to achieve the practical value of digital technology in silk screen printing. According to the first draft, plate making, printing in order on this basis, and finally make appropriate adjustments. In the design of the entire operation process, try to be reasonable and scientific. Therefore, the first draft of creation should be carefully prepared, the space division and printing sequence should be organized, and the artist's creative thinking and writing motivation should be fully expressed as far as possible; in the printing process, the gap should be adjusted in time to master the best accidental results; in the adjustment stage, the integrity of the image should be taken into account as much as possible to highlight the core of the image and make the painting rich and harmonious.

Although silk screen printing has a development history of nearly 20 years in China, it promotes China's own modernization with brand-new concepts, rapid contact with new things, emphasis on physical discovery, three context transformation, pattern innovation, and skill improvement. However, after all, the development history of Chinese silk screen prints is still very short. In addition, the in-depth study on the characteristics and advantages of its ontological language and its creation laws is not enough. This new type of print has always been in a plain state. How to deal with the relationship between thought transmission and artistic feeling, knowledge and creation, printing effect and reproduction tendency, how to give full play to its modeling and design function, and how to deal with the relationship with general art and fine arts, put it in front of the screen printing industry.

4. Reflections on Screen Prints under the Trend of Green Development Concepts

The natural environment is the basis for people's survival and development, and cannot be replaced by any item. The green environment in a broad sense refers to the sum of environmental elements composed of material and nonmaterial factors. Among them, the material factors refer to such naturally existing factors as the atmosphere, soil, water, animals, and plants, while the nonmaterial factors refer to some ideologies, mainly the concepts and laws of the environment. In a narrow sense, green environment refers to factors that can meet people's requirements for survival, and can be in harmony with ecology and the environment, such as clean land, clean air, and water resources. The combination of these factors is a green environment, such as Figure 4.

The concept of green environmental development emphasizes the protection of the natural environment and the earth's creatures and advocates that by using natural resources effectively and to a certain extent; we can further improve the environment for people to live in nature and promote human activities to be compatible with nature. The environment in the environment checks and balances each other to achieve a stable state, so as to achieve the effective common development of any natural whole. Nowadays, the problem of ecological environment is becoming more and more serious, and it is more urgent to strengthen the ecological awareness of the people and establish a correct concept of green environmental development.

4.1. Will the Development of Digital Prints Replace Silkscreen Prints? Digital printmaking is developed in a specific scientific and social environment and can also be called digital printmaking and computer printmaking. The language of artistic expression is different from the imprint language of screen prints. The artistic creation of digital prints mainly relies on computers and printers, and the ontology language of screen prints is the artistic expression based on prints, which is also different from the basic language of digital

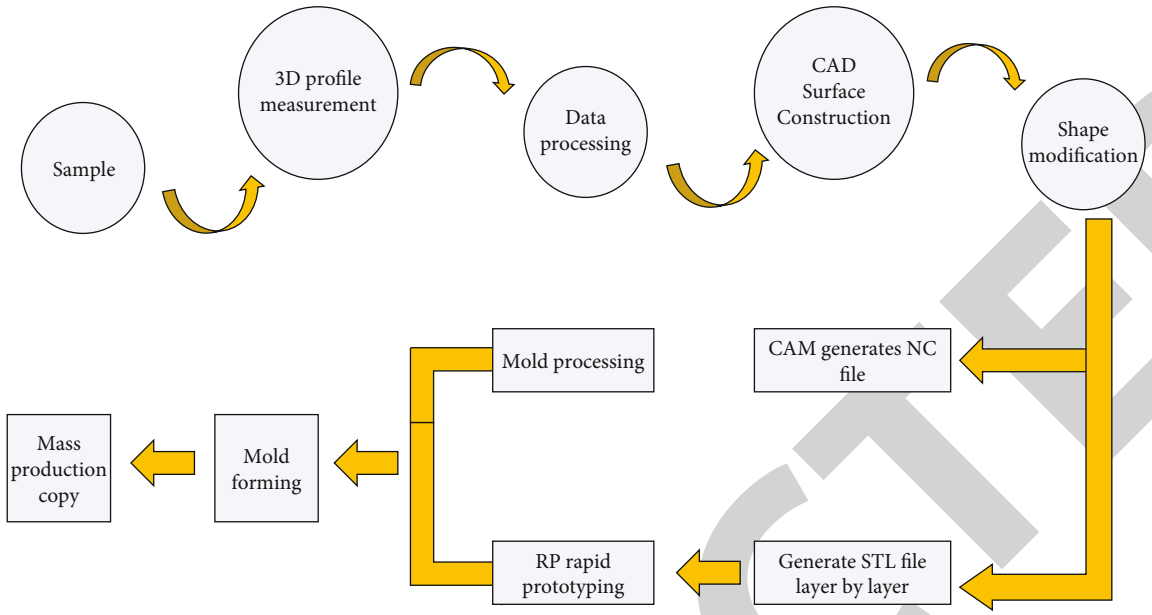

Figure 3: Flow chart of digital technology for making silkscreen prints.

Table 2: The plate-making process of the three major plate-making methods.

Category		Plate-making process
Manual imaging plate making	Hand-painted legal version	In the clean screen, the use of Arabic gum is directly painted, dry after the full plate coated with shellac, and then the printing plate immersed in the temperature of 50-60°C in water, after the Arabic gum melted, the graphic part is exposed, blank part of the mesh is shellac-blocked
	Plate making by cutting	On the paper or transparent plastic evenly coated shellac thickness in 3-5 mm, dry in the film to depict the manuscript, and then through overheating, transfer the manuscript to the net cloth
	Sealing method version	Draw the drawing ray wants to print on the stretched mesh, and then use the pen to fill in the blanks
Photosensitive imaging plate making	Engraving film and plate making	A hollow-out mold is carved on the film, and then the mold is pasted on the screen to form a printing plate
	Direct plate-making method	In the stretched net cloth coated with photographic glue, and then paste on the film, exposure, development, drying, and other processes, the final formation of a printing plate
	Indirect plate making method	Using positive negative for exposure and development, and then transferred to the mesh, plug hole, sheet base stripping, and forming of a printing plate
Digital imaging plate making	Straight plate making	In the dry mesh on the photosensitive film, and then coated with photosensitive adhesive, film base stripping, combined with positive negative exposure and image production plate

Table 3: Screening angle reference table.

Type	C (○)	M (○)	Y (○)	K (○)
Monochromatic	45	45	45	45
Double color		Dark 45, light 75		
Three color	45	75	15	
Four color	75	15	0	45

prints feature. Although, some new features produced by the application of digital technology to the creation of silkscreen prints are similar to the basic characteristics of digital printmaking, the unique language charm of silkscreen printmaking is missing from the context of digital printmaking itself. The soul of the screen print. The artist Xu Bing believes: "Printmaking is an indirect painting, it is through the artist's intention to prescribe the treatment of the medium, and

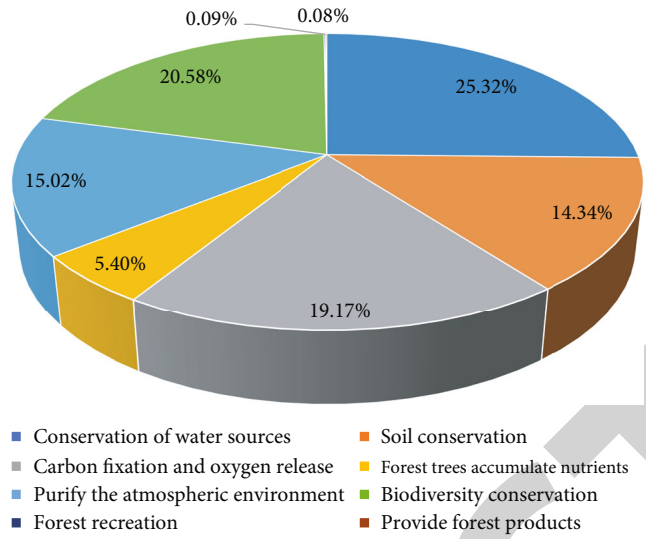

Figure 4: Composition of the natural environment.

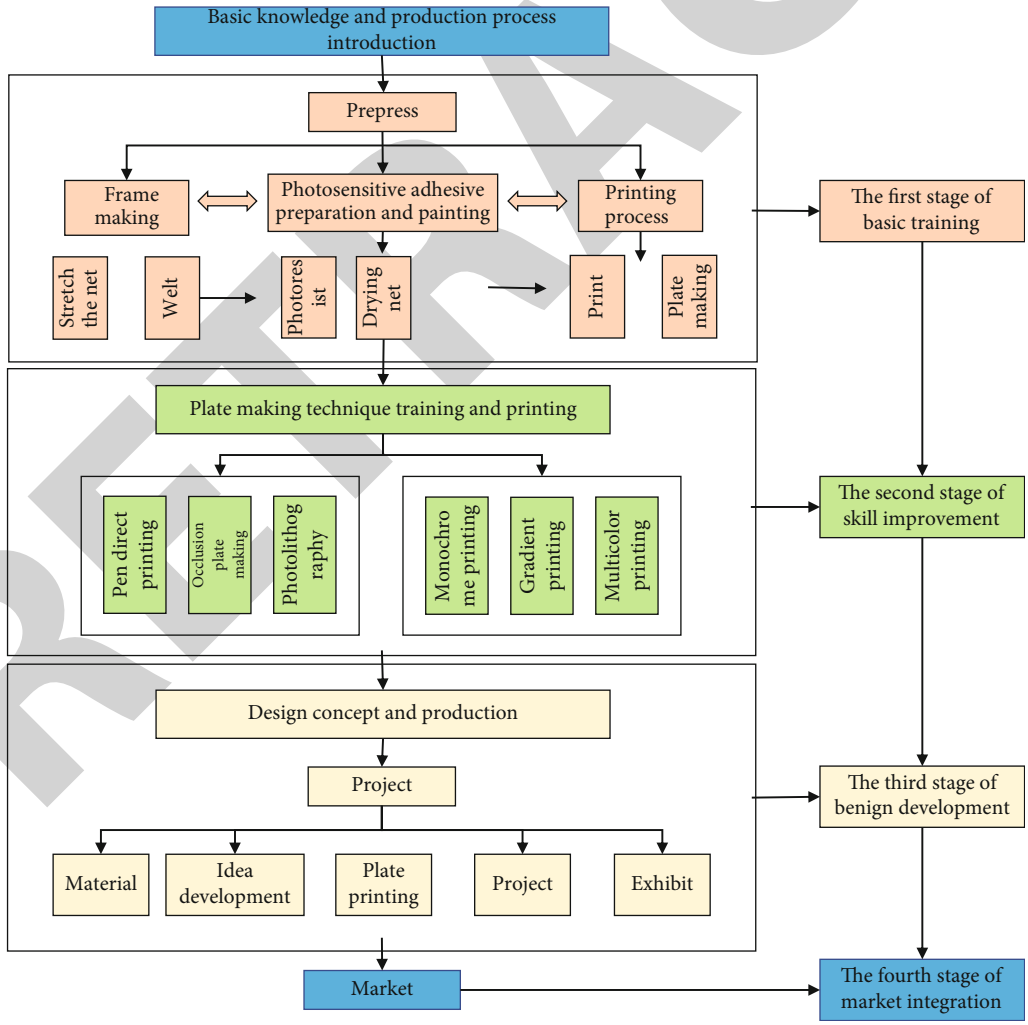

Figure 5: The basic process and market trend of silk screen printing.

through the indirect process of printing, the medium is transformed into traces and presented as a picture."

The performance of the screen print is presented through the imprints of various techniques. It can be said that without the existence of the imprint, the charm of the screen print will cease to exist. The expressiveness of digital prints is completely presented through high-tech digital language, and the level of pixel quality naturally becomes the unique digital language charm. In terms of artistic charm, digital prints and screen prints do not conflict. The rapid development of science and technology and the continuous innovation of art make it easy for some artists to lose their original intention of creation, and it is easy to go into misunderstandings in terms of techniques. Too much pursuit of schemas and too much catering to the society will lose the value of art. Digital prints and screen prints have their own characteristics. Digital technology plus screen prints and digital prints are not equal. Whether you choose screen print creation or digital print creation, they should be different from the art of the work. Expressive and unique printmaking charm make full use of their respective language characteristics to create printmaking works full of era significance.

4.2. Can Silkscreen Prints Usher in New Business Opportunities under the Integration of Digital Technology and Green Development Concepts. Green environment is the soul of green development. It revolves around green development from beginning to end and is an aspect of green development that cannot be ignored. In the process of green development, green environment exists as a guiding function, as shown in Figure 5. Green environment is the environmental premise of green development. Without it, green development cannot be mentioned. Green environment is such a harmonious relationship that reflects any nature, which contains a variety of ways and concepts etc. People live in the environment and want to get good development and living space, then they must rely on the green environment as if the ecological environment is damaged, the resources and environment will also become an obstacle to green development, which hinders the overall construction of a well-off society and basic modernization.

Green development is a sustainable development. Its central meaning is to put the environment in the most prominent part and integrate it into all aspects of society according to its requirements, so as to gradually realize the common progress of both the environment, ecology, and society. This is also green. The importance of the environment in development. If the green environment is lost, the green development will be lost, let alone the continuous development of the society. With the development of economic society, aesthetic economy, and commodity economy, silk screen prints were originally a category of art, but today they have quietly infiltrated into commerce and created more value than themselves. In today's era of the prevalence of e-commerce, the emergence of various self-media has increased the activity of silk screen prints in the business world. In today's developed Internet, how to integrate the combination of art and business and effectively give full play to them, the real value of each other to achieve the maximum benefit of the combination of the two is a question worthy of our consideration. Today, in this fast-developing era, silkscreen prints are widely used in our lives. The reason why printmaking is widely used in modern life is that printmaking has characteristics that other types of painting do not have, such as the reproduction characteristics of printmaking. As an art painting, it can have many original works. A painting is the original version, such as oil painting, Chinese painting, and watercolor, which do not have such advantages.

5. Conclusion

Green technology plays a pivotal role in development. It must comply with the requirements of green development, promote development in an all-round way, and at the same time, keep pace with the times and possess advanced green technology. With the support of green technology, the green economy can better provide impetus for green development and promote the process of green development. Whether it is the social structure form or the artistic culture form, its essence is an organic natural pattern. Each form of artistic expression needs to grow reasonably and rapidly in a suitable natural environment, and in a natural environment that does not have reasonable growth requirements, people must make corresponding adjustments and adaptations to their own development. From the spontaneous individual development in the past to the development of the overall growth in the future, as well as the development of modern silk screen printing, such collision and correction will inevitably occur, so as to meet the ever-changing needs of the development of information media technology.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

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Research Article

Probe into the Low-Carbon Economic Environment Challenges and Opportunities of Textile and Garment Export

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Ecological and environmental protection is the main problem of China's economic construction. As one of the high-energy-consuming industries, the traditional textile printing and dyeing industry has led to great concern from all walks of life in the context of the country's in-depth promotion of energy conservation and consumption reduction. The comprehensive development of a low-carbon economy is the fundamental guarantee for China to solve the problem of climate warming and complete the sustainable development of economic development. The traditional textile printing and dyeing industry should also change its development mode to meet the standards of low-carbon economy. Here, the connotation of low-carbon economy and the significance of promoting the low-carbon economic reform of the textile printing and dyeing industry are described, and the current situation and development trend of the low-carbon economy of China's textile printing and dyeing industry is deeply analyzed. Taking the basic theory of garment trade and low-carbon economy as the carrier, the application of low-carbon development mode in China's textile and garment export business process is expounded. According to the fundamental goal of sustainable development of low-carbon economy and related objectives, the adverse impact on the domestic textile and apparel export business process was discussed and eliminated from three aspects: improve the relevant legal system, enhance the development of new energy, and enhance the importance of enterprises in the relevant whole industry chain.

1. Overview

Affected by global warming, the Chinese government attaches great importance to the rapid development of the low-carbon economy and regards it as a key step for China to achieve sustainable economic development [1]. At this stage, many enterprises in China still adopt the development model of high-energy consumption and obtain overall economic benefits at the cost of destroying the ecological environment. The literature analysis method is selected for this body activity, which is committed to making the energy consumption mode of factory production more integrated into the requirements of the times, integrating into the reform of the system in our country, accelerating the pace of social reform, and ensuring the main reason for energy conservation and consumption reduction in China. The achievement of this task and overall goal will ultimately ensure the steady development of the physical and mental health of the low-carbon economy in our country. The agricultural emission reduction method is shown in Figure 1 below.

The concept of a low-carbon economy is based on the concept of sustainable development of China's social and economic development. According to a series of countermeasures such as the reform and innovation of industrial production river demonstration points, the application of new energy technologies, and the independent innovation of technologies, fossil energy consumption, carbon emissions, and energy consumption levels can be reduced. This is the overall goal of coordinated development of economic and social development and natural ecological environment [2]. Therefore, from this perspective, the low-carbon economy is not only a new modern economic model but also a strategy to alleviate energy problems and global warming. With the rapid development of the Internet, artificial

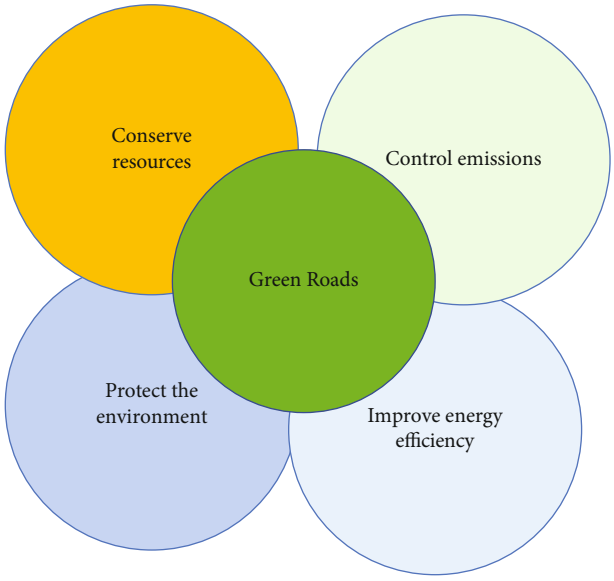

Figure 1: Green emission reduction methods.

intelligence, and other technologies, the connotation of low-carbon economy will be further optimized and expanded in economic development and development, covering all aspects of production and manufacturing, commodity circulation, trading, etc.; according to policy innovation, technological reform, and system improvement, the development into a sufficient emphasis on the market economy, to achieve the economy necessary for economic and social development, the key to China's low-carbon economy covers the following aspects [3]. (1) The market model of high energy and low yield in the traditional production industry has been criticized. (2) The low-carbon economy is conducive to the implementation of the clean-up development trend model. The traditional production industry takes fossil raw materials as the basic power energy and a low-carbon economic model with strong carbon emissions, not only to control the consumption of fossil energy but also to develop clean energy technologies and products, actively apply and promote, and balance the relationship between energy consumption and environmental protection. (3) The low-carbon economic model not only needs to use the government to respond to the current policies but also the company needs to improve awareness and increase investment in technical research, in order to obtain the application of the public and change the past high-carbon steel living habits and consumption concepts, so that the low-carbon environmental protection model penetrates into the daily life of the public [4]. In the context of low-carbon emission reduction, the relationship between resources, environment, and economy is shown in Figure 2 below.

2. China's Low-Carbon Economy

2.1. Development of China's Low-Carbon Economy. In China's government departments, we feel that the green and low-carbon economy is the main step to promote the sustainable development of economic development. As a developing country, China's carbon dioxide emissions are second only to those of the United States, ranking second in the world [5]. In China, due to the lack of related technologies, managers usually choose high-energy consumption methods as the company's development methods from the perspective of funds and network resources. This phenomenon has greatly increased the carbon emissions of Chinese companies. China's ecological environment has long led to nonnegligible destruction. This is also a relatively serious contradiction with the scientific outlook on development that our country has always adhered to. From 28 November to 9 December 2011, the 17th Assembly of States Parties took place in Durban, South Africa. The meeting decided to run the "Emerald Green Climate Equity Fund." With the development of global climate change negotiations and regular and close cooperation between international economic organizations, China, as a responsible development trend country, should once again assess the carbon emissions of domestic companies and use scientific and technological innovation and industrial structure upgrading to achieve sustainable development of enterprises, reduce carbon emissions, and contribute to the infrastructure of the "global village." The internal relationship of building a new eco-economic system is shown in Figure 3 below.

China's export commodities have the characteristics of "production and processing" and "low added value" and cannot be linked to the growth rate of import and export trade. The implementation of a low-carbon economy can solve this dilemma and deal with the import and export trade and export problems of enterprises themselves. In the process of energy consumption and ecological environmental protection, China's import and export trade has developed rapidly [6]. The number of commercial disputes arising from environmental pollution problems is increasing. In order to achieve a single ecological and environmental protection purpose, many countries have adopted relevant countermeasures to restrict imports. Relevant trade barriers are more seriously constraining the socioeconomic development of countries in the development trend. Therefore, the development trend of low-carbon economy and the solution of trade barriers are important for Chinese textile trade export companies to gain commercial advantages.

The textile industry is relatively highly dependent on the value of the relevant customers. In China, the textile and garment industry is a labor-intensive field. The industrial model of the "capitalist state factory" [7] is as follows. Through surveys and studies, overseas experts and scholars have shown that China has become one of the important victims of global "economic globalization." According to the data survey report, in January 2010, under the premise of the smooth recovery of China's textile trade export business process, it was also damaged by the countermeasures related to international economic globalization. In addition, with the trend of economic development globalization and the development of product social division of labor, the improvement of related profits in China's textile industry has shown a weak trend. Experts said that China's textile industry should accelerate industrial transformation and upgrading, promote the transformation and renewal of

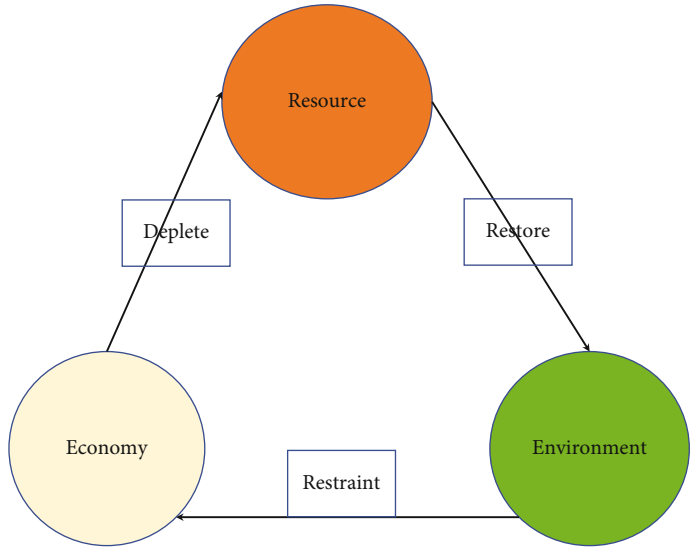

Figure 2: Relationship between resources, environment, and economy under the background of low-carbon emission reduction.

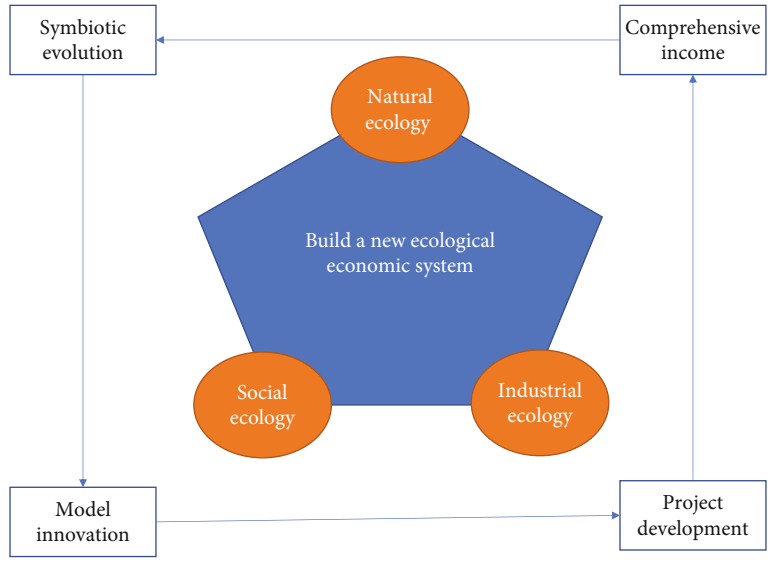

Figure 3: Internal relations of building a new ecological and economic system.

industrial structure, transform from traditional extensive economic development to green and environmentally friendly low-carbon economic mode, further improve competitive advantages, and enhance trade barriers. The construction of low-carbon ecological cities under the leadership of the government is shown in Figure 4 below.

2.2. The Importance of the Textile Printing and Dyeing Industry to Achieve Low-Carbon Economic Development. Due to the aggravation of global warming, the core concept of green economic development must be deeply implemented in the strategic deployment of sustainable development of enterprises [8]. The concept of a green and low-carbon economy includes not only the completion of low environmental standards but also the creation of a low-pollution manipulation management system.

2.2.1. Reduce Production Costs and Improve the Economic Benefits of Enterprises. Energy conservation and emission reduction is an effective way to reduce costs and economic benefits. With the help of cutting-edge technology and equipment, we will integrate technical strength and management capabilities to promote energy conservation and emission reduction and resource utilization and obtain more rights and interests.

2.2.2. Improve the Core Competitiveness of Enterprises in the Market. According to the energy conservation and emission reduction work of the textile industry, some old equipment has been further upgraded and transformed to a new production level. At the same time, the development strategy of energy conservation and emission reduction has been completed, and the overall competitiveness of the textile

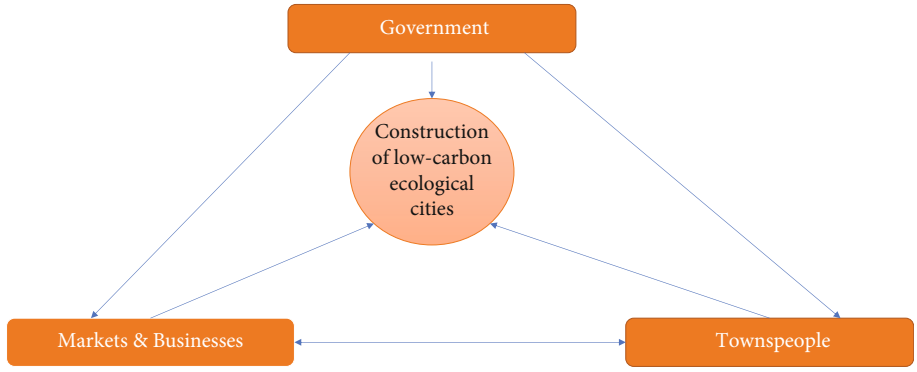

Figure 4: Construction of low-carbon ecocities under the leadership of the government.

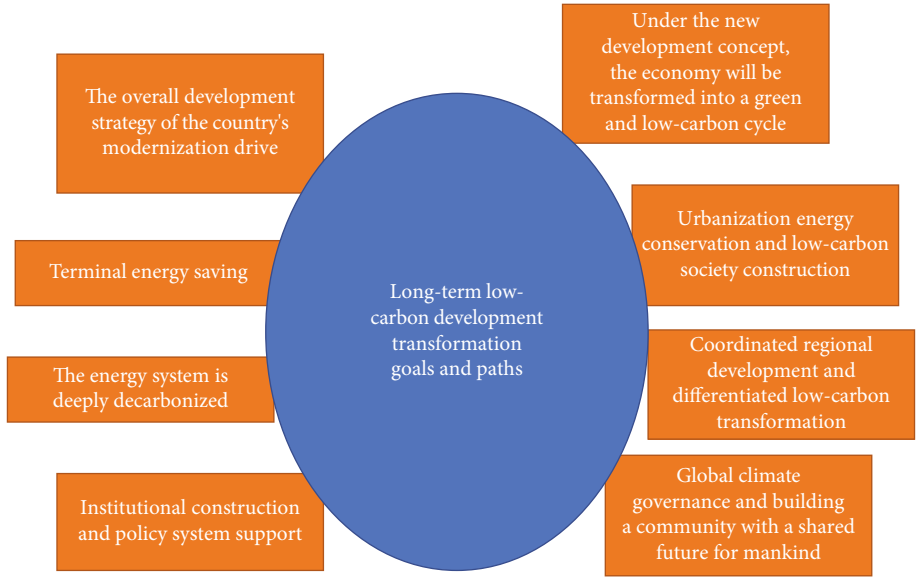

Figure 5: China's long-term low-carbon development transformation goals and paths.

industry has been obtained in all aspects [9]. At the same time, it is necessary to keep pace with the times to print and dye goods, improve the dyeing and finishing process of textiles using new chemical fibers and new technologies, and improve the postprocessing process such as embroidery patterns, hot stamping, mold making, calenders, bacteriostatic, ultraviolet shielding, coolness, and other multipurpose processes. Implement the fine management of enterprises to cultivate management methods, product added value and market share, enterprise competitive advantages, and competitiveness.

3. Low-Carbon Economic Environment for Textile Printing and Dyeing Industry

3.1. The Current Situation of Textile Printing and Dyeing Industry in Low-Carbon Economic Environment. The development trend of low-carbon economy and the completion of the modernization and development of "green life and production process" are the goals that all manufacturing enterprises in China need to strive for, and the textile industry is no exception. At this stage, China's textile industry has not been comprehensively rectified. Some small and medium-sized enterprises still use high-energy production and processing technology, but the production volume is low, which is inconsistent with excessive energy consumption, which will cause a major waste of human resources. This objectivity reflects that the slogan of "low-carbon economy" has long been spoken, but it has not really been implemented by printing and dyeing companies [10]. Therefore, China's textile industry has only achieved partial results, and there are a series of problems in the development trend of low-carbon economy. China's long-term low-carbon development transformation goals and paths are shown in Figure 5 below.

3.1.1. Enterprises Have Insufficient Awareness of Low-Carbon Environmental Protection. At this stage, the concept of green environmental protection of enterprises is not enough, and green life is still on the surface. In the raw material supply, manufacturing, marketing, and other aspects, enterprises still use traditional management mechanisms and do not really integrate the core concepts of a low-carbon economy [11]. Therefore, in the field of foreign printing and dyeing, the relevant indicators of the low-carbon economy lack unified standards, and the rational layout of the textile industry

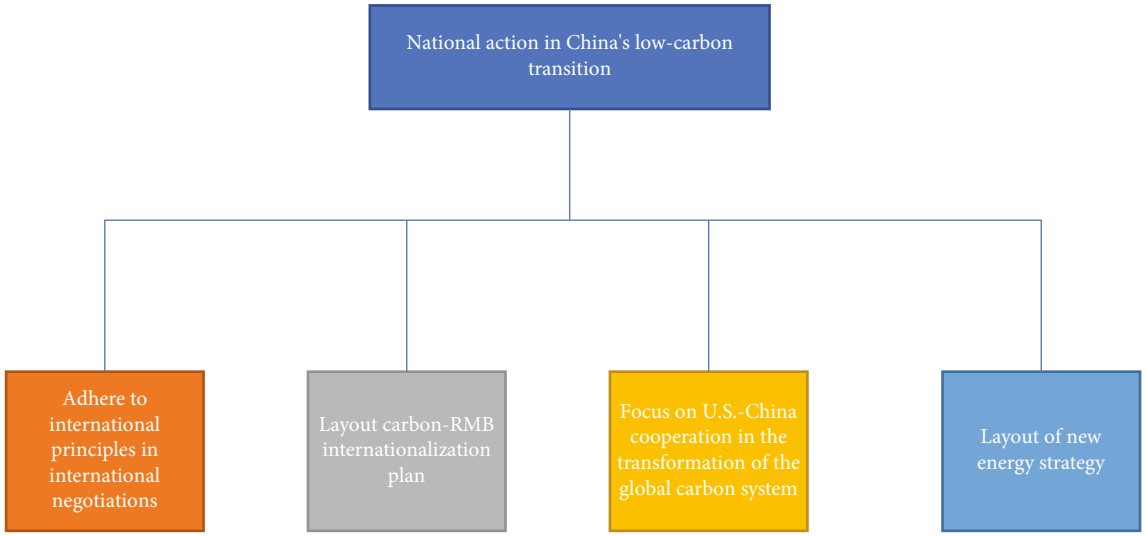

Figure 6: National actions for China's low-carbon transition.

is not scientific. In the production system, because of the lack of specific carbon emission indicators and incomplete information, some enterprises refuse to introduce environmentally friendly and low-carbon technology equipment from the first line in order to improve efficiency. The shortage of professional talent pools in the internal structure has constrained the rapid development of the low-carbon economy of enterprises.

3.1.2. Unreasonable Industrial Structure. Since China's reform and opening up, the development concept of giving priority to coastal areas and inland development has won the hearts of the people. Coastal cities are stimulated by the export of foreign trade assets, the economic system is gradually improved, and the range of integrated resources exceeds that of inland areas. Under the premise of promoting regional economic development, it has also caused serious air pollution [12]. Therefore, in response to the key issues at this stage, it is necessary to accelerate the transformation of enterprises, complete the migration of the textile industry in coastal areas to the inland, reduce the development differences in the central and western regions, and promote the transformation and improvement of enterprises. From the perspective of the development of China's central and western regions, there are more natural gas and electricity energy that can be developed in this region, but the development of high-tech and informatization is relatively backward, and the indoor space for development is relatively large. How to make use of the advantages of the central and western regions, develop new energy dominated by photovoltaic and wind power, and improve the rational layout of machinery and equipment of textile printing and dyeing factories are the key development direction, mainly because it can greatly improve product quality and reduce resource consumption. China's national actions in the midst of a low-carbon transition are shown in Figure 6 below.

3.1.3. High-Energy Consumption. China has taken the initiative to remediate its own companies, but it consumes more electricity and energy than more developed countries. In China's textile industry, there are many problems such as long industrial chain, long production and manufacturing time, high-energy consumption, and long-term wastewater treatment, which seriously endanger the energy consumption of industrial production in China. China's low-carbon environmental protection development has encountered new challenges, and the development of green and low-carbon economy in the textile industry is more difficult [13] At this stage, many countries have implemented "carbon tariffs." In the future, in China, we will conform to the trend of the times and use corresponding countermeasures to manipulate the utilization of coal energy and further restrain the development of the textile industry.

3.1.4. Oversupply in the Textile Industry. Chinese mouths are very large, but there is always an unbalanced system between the manufacturing system and the trading system of the textile industry, that is, oversupply. In order to obtain relevant profits, it is necessary to export a lot of textile products [14] Part of the textiles is the domestic resources produced and manufactured, many of which consume limited resources. The state has introduced the current policy of accelerating the replacement of some backward production capacity enterprises and technologies, but the corresponding problems such as outdated machinery and equipment, low production and manufacturing efficiency, and insufficient staffing have not been dealt with in essence, which limits printing and dyeing: the development of the industry and the pace of China's development trend towards a "green and low-carbon economy".

3.2. Development Trend of Textile Printing and Dyeing Industry under Low-Carbon Economy

3.2.1. Enhance Enterprises' Awareness of Low-Carbon Environmental Protection

(1) Executives of textile printing and dyeing enterprises should fully understand the necessity of developing a low-carbon economy. In order to achieve the goal

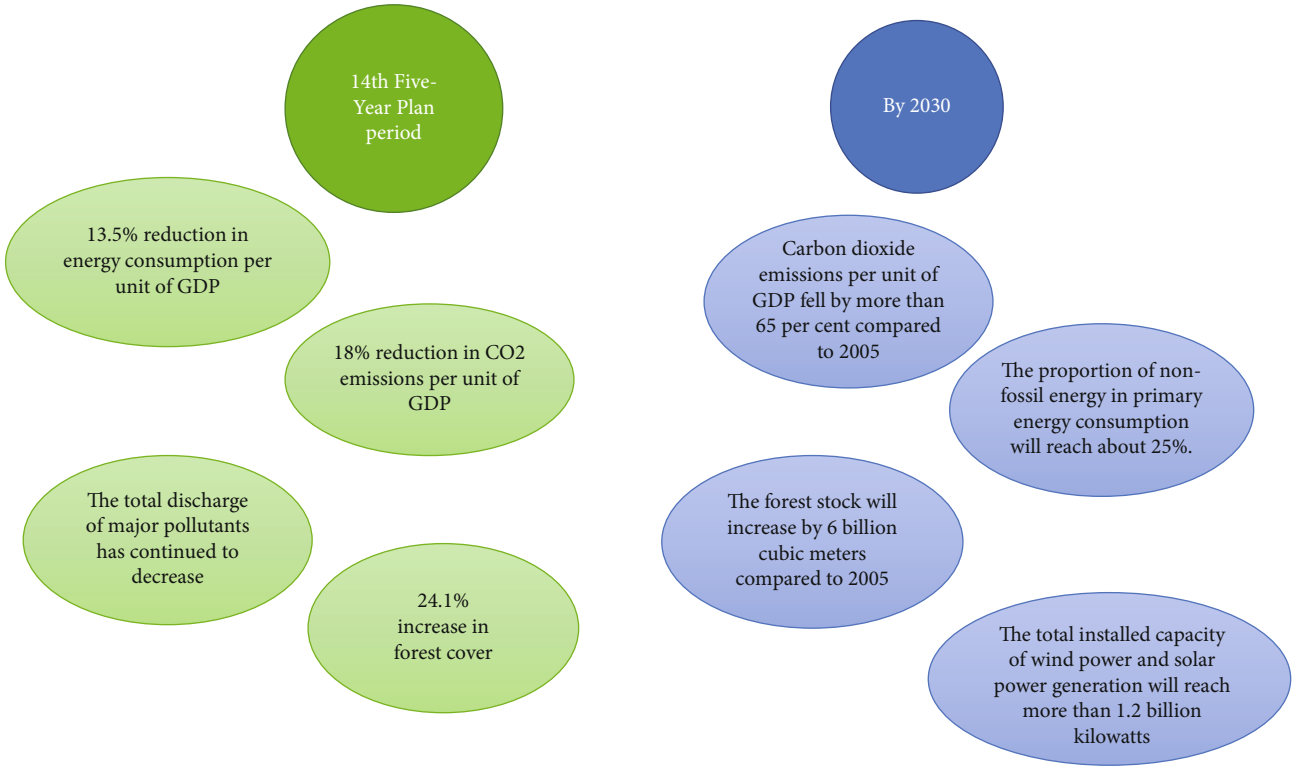

Figure 7: Timeline of carbon reduction in China.

of low-carbon economy, enterprises must draw low-carbon economic concepts from the level of research and development technology, manufacturing, marketing, etc. and follow the low-carbon economic norms promulgated by the national and local governments to promote the development of the entire textile industry in a green and healthy direction. From the perspective of short-term economic benefits, this transformation is a huge project investment, which brings huge financial and human resources pressure to large, medium, and small textile printing and dyeing enterprises [15]. However, with the times, under the concept of low-carbon economy, the energy consumption of enterprises continues to decline, and various costs are also reduced accordingly, coupled with the development and marketing promotion of new low-carbon textile products, which can meet the market's needs for low-carbon textile products. The demand for new carbon products will drive the company's sales and profit growth, laying the foundation for the company's long-term steady development based on the market share of the product

(2) The rise of textile printing and dyeing enterprises: in the process of changing to low-carbon and efficient production methods, it is necessary to strengthen the low-carbon economy publicity and planning of the bottom employees and shape their scientific and reasonable low-carbon concepts, so that employees in all positions of the enterprise in the premise of mastering low-carbon production and manufacturing, starting from themselves, in the work and life of the serious implementation of the low-carbon concept are as follows. At the same time, enterprises can also cooperate with industry associations to enhance the publicity of low-carbon knowledge and low-carbon environmental protection quality of employees

(3) In order to enhance the low-carbon environmental awareness of textile enterprises, government departments can give certain financial subsidies in policies to reward those enterprises that meet the standards in low-carbon technology research and development and production and enhance their enthusiasm for developing a low-carbon economic model. China's carbon reduction plan is shown in Figure 7 below

3.2.2. Improve Industry Laws and Regulations. At this stage, the relevant laws and regulations of the textile printing and dyeing industry in China's green and low-carbon economy are not perfect, and many enterprises in the industry are deeply trapped in the dilemma of basing on the current policies and norms [16]. Therefore, the relevant departments should create a policy system according to the specific development orientation of the industry, implement the energy-saving and emission-reduction measures of the textile printing and dyeing industry, comprehensively test the low-carbon and environmental protection development of textile products, and encourage the development of textile products to the direction of high efficiency and low consumption [17].

The printing and dyeing industry is relatively developed, and some local governments in Zhejiang have introduced new policies to promote the overall transformation and development of enterprises in the region and develop towards ecology, intelligence, and branding. The government department first set up a new platform for cooperation and innovation. The changes in the printing and dyeing industry "take the pulse", provide solutions, cultivate a large number of well-known and excellent enterprises at home and abroad, and strive to create a modern industrial cluster of "emerald green high-grade and leading technology."

3.2.3. Trends in Change. The textile industry has played an extremely important social role in China's green environmental protection industry and shoulders a huge corporate social responsibility. Under such circumstances, in China's large, medium, and small textile printing and dyeing companies, it must use the relevant national policies and the use of national project investment, to achieve their own technical equipment requirements and product quality. Some small and medium-sized textile enterprises can learn from large- and medium-sized textile enterprises about textile printing and dyeing technology and cooperate with well-known enterprises to complete intelligent production and manufacturing. According to China's "Belt and Road" initiative, it can shape well-known brands with Chinese characteristics and produce distinctive well-known brands such as Chinese qipao skirts, Zhongshan costumes, and ancient clothing and grow the brand. In this regard, we have actively promoted the application of energy-saving and consumption-reducing methods in the chemical fiber printing and dyeing industry, created a green economic management system, improved the production technology of the factory, and overcome many difficulties faced in the field of chemical fiber printing and dyeing.

3.2.4. Attach Importance to Talent Development. To implement the concept of low-carbon economy into the production and marketing of printing and dyeing enterprises, it is necessary to support high-quality talents. High-quality talents are the energy of internal reform and development of enterprises, which means that the image of enterprises opening up to the outside world is the meaning. Under the premise of vigorously investing in new environmental protection equipment and innovative production processes in projects, textile enterprises must control and supervise the literacy of employees in the internal structure, organize employees on time, and build a key cohesion within the enterprise, so that employees can fully use their own value under the concept of low-carbon economy. Companies must also provide employees with a different and innovative environment, so that employees can independently and freely express their ideas and opinions, and show their own level according to their own understanding of the low-carbon economy. On this basis, an incentive mechanism can be adopted to motivate employees to actively carry out the basic construction of the enterprise, improve the internal structure of the enterprise, and attract talents with generous remuneration. In addition, enterprises should also dig deep into the development potential of employees and give employees green environmental protection professional skills on time, so that employees can grasp the latest low-carbon economy manufacturing concepts and better integrate into their posts.

3.2.5. Increase Support for Low-Carbon Emission Reductions

(1) For textile printing and dyeing enterprises, the development trend of low-carbon economy is not only the banner of reform and innovation but also the inherent requirement of industry development. Therefore, government departments should increase support for low-carbon, energy-saving, and consumption-reduction. First of all, the government should guide tester printing and dyeing enterprises in a key and correct manner, stimulate the research and development of low-carbon technologies and low-carbon products, encourage active funds to invest in new technology applications and new product research and development, and implement a series of incentive mechanisms [18]. Second, government departments should give full play to their own advantages, through collaboration with low-carbon technologies in developed countries, introduce the most advanced low-carbon technologies, promote the development trend of China's low-carbon economic mode, and correctly guide China textile printing and dyeing companies to move towards a low-carbon economy. The changes in China's carbon dioxide emissions from 2016 to 2020 are changed in Table 1.

(2) The research and development of low-carbon technologies and products must be applied with a large amount of funds, but in the field of textile printing and dyeing in China, small- and medium-sized enterprises are the core, and the profitability is medium. Therefore, government agencies must take corresponding countermeasures to help enterprises carry out the financing process and reduce financing costs. For example, for the textile industry, which has a better effect on energy conservation and consumption reduction, government departments can provide relatively high belief lines and obtain information appropriately to help enterprises implement low-carbon reform and innovation. In recent years, many regions in China have established emerald green carbon funds, the purpose of which is to promote the flow of market funds to projects such as carbon sinks, afforestation, and forest resource protection in the forest and fruit industry. At the same time, it can also promote the capital construction of low-carbon textile industry securities funds, manipulate the flow of funds, improve the concept of carbon sinks of the masses, and provide financial support for the development trend of low-carbon development in the field of textile printing and dyeing

(3) Government departments can carry out pilot work with symbolic companies with strong overall

Table 1: CO_2 emissions in China from 2016 to 2020.

Year	2016	2017	2018	2019	2020
China's carbon dioxide emissions (100 million tons)	92.74	94.63	96.69	98.06	98.94

Table 2: Estimation of China's decarbonization path in 2060.

Year	2020	2030	2040	2050	2060
Carbon removal rate (gigatons)	11	11.5 _ _	8	5	2

strength. The textile printing and dyeing mill industry has established low-carbon product verification standards, covering all stages of textile printing and dyeing products from raw material production and manufacturing to market consumption. The specific quantitative analysis of carbon emission standards in the whole process is conducive to improving the operation and management of enterprises in the industry in the production, supply, and marketing stage, achieving the specified energy conservation and emission reduction standards, and controlling air pollution. After the establishment of industry verification standards for low-carbon products, it meets the international high standards for low-carbon products and domestic textile printing and dyeing industry standards, which can promote low-carbon social and economic development. The estimation of China's decarbonization path in 2060 is shown in Table 2 below

3.2.6. Optimize the Energy Structure and Improve Energy Utilization. Because coal energy is rich and colorful in China, it is impossible to change the current situation of energy consumption in most industries in China in a short period of time, and it is impossible to improve the energy consumption structure of China's textile industry.

First, it is necessary to control the total consumption of high-carbon fossil fuels (usually coal carbon) and develop clean coal technologies. Therefore, we should attach great importance to scientific research and development and coal-based fossil energy efficiency and make the application of fossil energy more clean and efficient, so as to achieve the effect of energy saving and consumption reduction [19]. Secondly, because fossil energy is nonrenewable, in response to the reduction of nonrenewable resources, the research and development of renewable resources have also become the focus of human attention, which is related to the future survival and development of mankind. Renewable resources such as wind speed, solar power generation, and hydropower projects are mostly found in clean energy, and China's undeveloped renewable resources have great potential. Therefore, it is beneficial to enhance the automation development, design and utilization of clean energy, enhance the relevant industrial equipment of the textile industry, complete the industrialization of clean energy as soon as possible, gradually replace fossil energy, and promote the rapid development of the green and low-carbon economy in the textile industry.

Ultimately, in order to promote the development and utilization of clean energy, it is necessary to accelerate the operation of China's carbon emissions trading market. After the market-oriented operation, the carbon emission quota of textile enterprises will be combined with the energy consumption structure of enterprises and new energy technology to accelerate the energy conservation and consumption reduction of textile enterprises. On the one hand, improve the structure of energy consumption, promote textile enterprises to introduce the technicality of cleaning up fossil energy, control air pollution, promote transformation and development, and reduce costs. On the other hand, reduce the transaction cost of carbon emission allowances, save the quota system according to the sale and purchase, and improve the economic benefits that George brings to the enterprise. This will well stimulate the enthusiasm of textile enterprises to develop a low-carbon economy.

4. The Impact of Low-Carbon Economy on China's Textile and Garment Exports and Countermeasures

4.1. Low-Carbon Economy Puts Forward Strict Requirements for the Costs Related to China's Textile and Garment Exports. Affected by the low-carbon economic plan, the Chinese government has given low-carbon regulations on the whole process of exporting garment and textile products, that is, to reduce the carbon emissions of such commodities in the production, application, and disposal process in an all-round way, so that the discharge of pollutants can meet relevant national standards. However, in the practice of reducing the carbon emissions of related processing processes, many Chinese companies have found that they lack sufficient low-carbon machinery and equipment. The main reason is that due to the impact of the financial turmoil, the wages of employees, the cost of renting venues, related raw materials, and other factors have increased. The relative cost advantages of new products in China's textile trade have weakened. Responding to the financial crisis has consumed a lot of time and energy of Chinese textile export-related companies. Therefore, if we invest in the project to increase capital to purchase "low-carbon" hardware allocation and reduce related carbon emissions, it will further reduce the cost advantages of China's textile and apparel export business. Therefore, how to maintain the cost advantage has become an urgent problem to be solved in China's textile and garment export companies.

Table 3: Regional comparison of national carbon emissions trading prices from 2013 to 2018.

City	Beijing	Shanghai	Shenzhen	Guangdong	Tianjin
Transaction Price (RMB)	8.87	2.44	20.00	8.97	11.18

4.2. The Low-Carbon Economy Puts Forward Higher Requirements for the Relevant Technologies of China's Textile and Garment Exports. Green and low-carbon economy harms the cost of textile and apparel commodities in China, but more importantly, to achieve technological progress in production. According to the relevant basic theories of development economics, the technological progress of enterprises is often closely related to the stimulation of environmental factors. Without external stimulus, the technology development trend of enterprises is generally gradual. The introduction of external pressure such as market competition can well stimulate the enthusiasm of enterprises in work and innovation and promote the development trend of enterprise technology to complete leapfrog development. In China, the relevant production line equipment of textile and garment production and manufacturing enterprises often needs to be imported from other countries; so, the overall production and manufacturing level and production technology lag behind capitalist countries to a certain extent. The birth of this phenomenon shows that the production technology of textile and garment in China needs to be developed.

4.3. Countermeasures to Address the Adverse Effects of a Low-Carbon Economy

4.3.1. Improve the Relevant Legal System. The government's overall planning for national development can provide the necessary for the sustainable development of the low-carbon economy to ensure that China's current relevant laws and regulations on energy conservation and consumption reduction mainly include the Energy Conservation Law and the Renewable Energy Law. However, these existing legal systems are not enough to meet the development provisions of a low-carbon and environmentally friendly society. Therefore, the government should appropriately learn from the successful cases of capitalist countries in solving related problems, further promulgate major policies related to the low-carbon economy, create efficient laws and regulations and policies in many aspects such as enterprise environmental protection, environmental protection and energy conservation, and new energy technology, and closely integrate them. The specific development trend of relevant enterprises in China has given a higher demand for corporate carbon emissions specifications [20]. On the other hand, the government should educate and guide relevant enterprises through macroeconomic policy countermeasures, increase capital investment, and encourage textile export and garment enterprises with economic strength to accelerate the introduction of new technology applications, purchase of new machines and energy-saving technologies. Related enterprises that are not basically competitive should be appropriately replaced. For a regional comparison of national carbon emissions trading prices from 2013 to 2018, see Table 3.

4.3.2. Strengthen the Development and Utilization of New Energy Sources. With the times, measures such as low-carbon energy conservation and emission reduction regulations and carbon tariffs will stimulate the production processes of export enterprises to use cleaner energy-saving and emission-reduction technologies for production and trade. At present, many textile and garment production enterprises in China use traditional network resources such as coal as the only power energy source in the production process, which has led to serious environmental pollution to the environment. Therefore, China will fully implement the utilization of new energy technologies, increase the capital investment of relevant government departments, actively develop the development trend of solar power, wind power, solar power, tidal power and other clean-up environmental protection energy, and correctly guide China's textile and garment production enterprises to use carbon emissions from traditional network resources such as coal and crude oil. On the basis of understanding the low-carbon economy, China's textile and garment production enterprises should strengthen scientific research on machinery, equipment, technology, and processes in textile and garment production. The company can improve the production process by introducing new technologies and adjusting the industrial structure. According to the data survey report, most of the clothing imported and exported in Europe and the United States is the commodity entrusted by investors to process materials, and more than 80% of the profits are still obtained by buyers in Europe and the United States. Coupled with the impact of the low-carbon fortress, the profits of China's textile and garment companies in this process will be reduced. Therefore, the company can only give full play to its own advantages, introduce new technologies, develop new power energy, formulate new standards, develop new commodities, and build competitive advantages in order to gain a firm foothold in global competition.

4.3.3. Improve the Position of Enterprises in the Relevant Industrial Chain. Domestic textile companies are mainly processing companies, which are at the low end of the industrial chain and obtain relatively low production costs in the production and installation of commodities. During processing, commodities generally have greater air pollution.

What is more serious is that the carbon emissions are larger than other links, and the benefits are smaller than other links. In contrast, high-end products such as design solutions and marketing have basically no carbon emissions and are more profitable. Therefore, in China's textile export and garment-related enterprises to accelerate the transformation of industrial structure and heightened footsteps and actively carry out the design of products, marketing, and other aspects of the industrial chain-related work, from the low-end link of the industrial chain to the high-end link, international government departments between the

negotiation and consultation must win the company's development dominance, to complete the green barriers.

5. Summary

In the process of China's textile export and garment, according to the sound of the corresponding legal system, they must encourage outstanding enterprises to develop technology, according to the comprehensive utilization of new energy technology and new technologies, reasonably reduce the carbon emissions of Chinese enterprises, get rid of green barriers, enable enterprises to further solve the dependence on alternative fuels, reduce the pressure of increasing costs of enterprises affected by the financial crisis, escort enterprises to exert their own advantages, create competitive advantages, and provide technical support for enterprises to cope with more fierce global competition. The rapid development of the low-carbon economy has added great pressure to the survival of printing and dyeing enterprises in China, which is a key opportunity for development and reform. Textile enterprises want to achieve long-term development in the market economic system and must follow the trend, in line with the development trend of China's green development infrastructure, in all aspects of the internal structure of the enterprise and management mechanism to seriously implement the concept of low-carbon economy, with the help of research and development technology to create their own brand, in order to occupy a place in the market.

Low-carbon environmental protection and ecological environmental protection have become the trend of social development and development. Actively implementing the current policy of low-carbon environmental protection can enable textile engineering enterprises to keep up with the pace of the times and actively act. Textile enterprises should improve technology and production processes, take the initiative to develop and design new sustainable energy and raw materials, and promote independent innovation while generating the core competitiveness of textile floor tile project enterprises. Under the concept of green environmental protection, textile engineering enterprises can not only reduce energy consumption, emissions, and environmental pollution but also enable textile engineering enterprises to effectively save costs in the development process and at the same time pass on the concept of green environmental protection to the masses.

Data Availability

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

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Acknowledgments

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Retraction

Retracted: The Path Deduction from Folk Art to Stage Art in the Change of Geographical Environment: Take Anhui Flower Drum Lantern as an Example

Journal of Environmental and Public Health

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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.

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[1] J. Gao, "The Path Deduction from Folk Art to Stage Art in the Change of Geographical Environment: Take Anhui Flower Drum Lantern as an Example," *Journal of Environmental and Public Health*, vol. 2022, Article ID 4179116, 9 pages, 2022.

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Research Article

The Path Deduction from Folk Art to Stage Art in the Change of Geographical Environment: Take Anhui Flower Drum Lantern as an Example

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Anhui flower drum lantern, as a folk dance in the Huaihe River Basin, exudes the local cultural atmosphere and expresses the cultural color of song and dance drama incisively and vividly. At the same time, it is a sacrificial activity with social belief. As a typical example of the development of folk activities in Anhui, it is an important intangible cultural heritage. With the accelerating construction of economic globalization and social innovation, the pursuit of "cultural confidence" has gradually become the belief of a country, a nation, and even everyone. More and more attention is being paid to the protection and dissemination of national intangible cultural heritage. The paper takes Anhui flower drum lamp as the research object, combined with the characteristics of the regional nature, performance form, content, and cultural connotation of Huagu Lantern, by reading the social activities of the people on both sides of the Huaihe River Basin and using literature data, field visits, interviews, logical analysis, and other research methods. The origin, living environment, development historical context, cultural value, existing confusion, and development countermeasures of Huaihe River are analyzed and discussed. This article helps to spread to the people the understanding of the evolution law of the traditional projects with the characteristics of generational attack. At the same time, it is also helpful to grasp the understanding of Hua Gu Deng and the social life, social beliefs, social relations, and other factors on both sides of the Huaihe River. This also make people further understand the social status and value function of the flower drum lantern along the Huai River and it is of great practical significance to the dissemination of the same type of intangible cultural heritage.

1. Introduction

The art of Anhui flower drum lantern fully integrates the folk songs and dances of the Huaihe River Basin and fully reflects the spirit and material culture of the region [1]. Flower drum lantern has dance, song, drums, and other percussion performances, simple plot of the drama. It is the most complete and systematic folk song and dance art form created by 900 million Han people in China. It is the most representative and typical folk dance of the Han nationality. It has the richest and most systematic dance language system in the world and is one of the folk dances in the world that can express complex plots and characters with body language. It is an expression of emotion and the demand for a better life. With the accelerating construction of economic globalization and social innovation, the pursuit of "cultural self-confidence" has gradually become the belief of a country, a nation, and even everyone [2]. Taking Anhui flower drum lantern as the research object, combined with its regionality, performance form, content, and cultural connotation, this paper interprets the social activities of the people on both sides of the Huaihe River Basin and analyzes and discusses the origin, living environment, historical context of development, cultural value, existing confusion and development countermeasures of Huaihe flower drum lantern by using the research methods of literature, field investigation, interview, and logical analysis [3]. This paper studies the perplexity and development countermeasures of Huaihe flower drum lamp. This is not only conducive to understanding the evolution law of the traditional flower drum

lantern project which is passed on to people and has the characteristics of being handed down from generation to generation but also conducive to understanding the functional value of the flower drum lantern and the flower drum lantern on both sides of the Huaihe River [4] and can further enrich the research theory of the sports culture of the flower drum lantern. The study confirms that Anhui flower drum lantern is not also a regional sacrificial activity. People's worship of life reproduction, totem, and nature as well as their yearning and pursuit for a happy life will be fully demonstrated in the activities [5]. Anhui flower drum lantern is a kind of sacrificial activity with social belief, which expresses people's worship of life reproduction, totem, and nature, and also reflects their yearning and pursuit for a happy life. The changes in its dance form have also effectively responded to the development of social civilization and personality characteristics of different ethnic groups in the Huaihe River Basin. To a large extent, it has promoted the relationship between education, health, economy, culture, social life, social beliefs, social relations, and other factors on both sides of the river, so that people can further understand the development of Huaitong and self-confidence. However, the issue of its protection and inheritance has become the focus that cannot be ignored.

2. Relevant Theoretical Basis

2.1. Folk Dance. Folk is also referred to as official in modern Chinese dictionary. Based on the modern Chinese dictionary, folk dance can be divided into two parts, namely, ethnic minority dance and Han folk dance. In Cihai, the definition of "folk dance" is "a traditional dance form that is widely spread among the people and has distinctive national style and local characteristics" [6]. Many scholars have concluded through summary and research that folk dance is a form of folk art expression and a product of the spiritual and material aspects of the development of the times. It basically comes from the social people's experience and perception of life, and its regional characteristics and national characteristics are prominent. To some extent, it can respond to the regional cultural background [7]. With the rapid development of social economy, many elements of the times are integrated into it and are also inherited and popular in different regions. It is a rare cultural treasure of the nation [8]. At present, folk dance rarely appears in the form of blessing and sacrifice, but is more in a form of artistic expression. In fact, it also reflects the development of society and people's ideas [9]. The expression of individual deity is actually the essential attribute of folk dance. Through dance, people can reflect their yearning for a better life and better release the worries and pressures of life and work. Only then can folk dance continue among people [10]. Folk dance is one of the most closely related dances to people's lives. It directly reflects the life and struggle of the working people and expresses their thoughts, feelings, ideals, and aspirations. Due to the differences in the social history, cultural mentality, labor and lifestyle, natural environment, and customs of various nationalities and regions, different national styles and regional characteristics have been formed.

2.2. Anhui Flower Drum Lantern. Flower drum lamp, also known as red light, is widely spread in urban and rural Fengtai. According to the reputation of old artists, Fengtai Flower Drum Lantern has formed a complete performance form before the Emperor Guangxu of the Qing Dynasty, with relatively rich dances, gongs and drums, and the performance scale is huge. In the Spring Festival, the working public uses the lights to express their yearning for a better life, the pursuit of love, and the attack of the feudal rule. In addition, the flower drum lamp performance is also closely related to activities such as seeking rain and wishing. Flower drum lantern is the quintessence of Han folk song and dance art. It is called "Oriental ballet". It is popular in the middle reaches of the Huaihe River and has a long history [11]. Anhui flower drum lantern, as a folk song and dance art created and developed by the working people on both sides of the Huaihe River on the basis of inheriting the traditional art of the Han nationality and absorbing the strengths of hundreds of families, has not only made outstanding contributions to the treasure house of Chinese folk song and dance art but also went abroad many times, setting off bursts of "China fever" of folk song and dance art in Europe, America, and Asia and had a positive and far-reaching impact on folk culture and art all over the world. It can be called "the essence of the country". The flower drum lantern dance "hometown charm" selected by Anhui Province participated in the warm-up performance before the opening ceremony of the 2008 Beijing Olympic Games—"Celebrating the Olympic Games with joy" [12]. The artists fully displayed their artistic talents in the performance and showed the passionate and unrestrained spirit of the people of Jianghuai incisively and delicately, adding a point of celebration to the Beijing Olympic Games. "The flower drum lantern is not only Chinese art but also belongs to the world, " Ponteheig, president of the World Council of dancers, said after watching the flower drum lantern performance Niu Longfei, a famous music historian in China pointed out: "the so-called" folk music "is precisely in the process of civilization transmission, with a certain" master music civilization "as the center, gradually spread and retain the" sub music civilization "which is often highly developed in the past in the marginal areas." Therefore, Anhui flower drum lantern is a precious music cultural heritage created by the working people living in the natural ecological and geographical environment of the Huaihe River Basin. In this chapter, the author mainly discusses the art of Anhui flower drum lantern and its living background [13].

2.3. Flower Drum Lantern Is Closely Combined with Farming Culture. The Han people in China have been engaged in agricultural production for a long time. It is precisely because of this that the Han people have a pragmatic and simple spirit and character. Anhui flower drum lantern, with farmers as the main body of creation and performance and farmers' daily life as the creative material, is the product of agricultural civilization. During the Spring Festival, farmers

use bamboo poles to light red lanterns in the threshing field or field and dance with the sound of clanging gongs and drums in the warm atmosphere of the scene. They sing and dance from dawn to dusk, from night to day, so as to express their joy after the harvest [14]. This is a unique scene. Since then, after development, it has evolved into a ceremony for weddings, funerals, temple fairs, festivals, and customs. It is also a form for the people to vent their emotions and a mass song and dance activity. A large number of folk myths and legends in China are closely related to agricultural culture [15]. Traditional culture can also be regarded as a carrier, which can respond to people's life and production, and its agricultural cultural characteristics are relatively strong. In the aspect of agricultural cultural value orientation, it has a more profound reflection. The legend of flower drum lanterns spread in the Huaihe River Basin, which in fact fully demonstrates the life and production of the people in this area. It is not difficult to see that the people in this region are simple, hardworking, kind, and optimistic, and their dance form, content, and activity time are reflected in the cultural form [16]. In terms of dance structure, flower drum lantern dance is mainly divided into "big flower field" and "small flower field" which are closely combined with farming life. At the beginning, the "big flower field" mostly carries orchids on the drum stand, that is, the dance skill of flower drum lantern "standing on the shoulder", followed by dancing bifurcated umbrellas, and finally the collective dance of changing different formations. The "small flower field" is generally performed by two to three people. The small flower field is the core part of flower drum lantern dance [17]. If the "big flower field" is a passionate poem jointly created by many "Orchids" and "drums" and the collective "Ode to joy" and "Carnival dance" of farmers, then the dance performance with simple plot such as "grab handkerchief" and "grab bench" in the "small flower field" is the love story or lyric prose of one or two or three farmers [18]. The performance is usually performed on the threshing ground or grassland. Not only the actors and villagers of the village but also the villagers of other villages who come to watch can perform at will, and the atmosphere is very warm. Affected by the epidemic, the current art market fluctuates to a certain extent, as shown in Figures 1–2. As can be seen from the chart, the number of my former art performance groups is increasing year by year, with the highest growth rate in 2017, reaching 27.64%.The youth art market reached its highest peak in 2015, at 237.83 million yuan, and then began to show a downward trend, which is directly related to China's art environment.

2.4. The Development of Flower Drum Lantern Dance. The flower drum lantern dance has experienced many years of development and experienced maturity and prosperity in its inheritance. From the original Feng style flower drum lamp, to its maturity and recognition, and then to large-scale inheritance, it has gone through several decades [19]. From the early 1930s, the dance art of flower drum lantern gradually reached a climax in rural areas to the late 1930s and the art of flower drum lantern gradually declined in rural areas and rose in cities and towns. From its resurgence in rural areas after the founding of the People's Republic of China to its peak nationwide in the mid-1950s, it experienced a silence during the "Cultural Revolution", forming the protection, arrangement, and development of flower drum lantern from the 1970s to the early 1990s. Although the development of flower drum lantern art has experienced ups and downs, on the whole, in the first 90 years of the 20th century, flower drum lantern reached the stage of prosperity and a hundred flowers in full bloom. There is a saying of "one thousand gongs and drums and one hundred lanterns" along the Huaihe River. Feng Guopei's "Feng school" flower drum lantern dance art is produced, matured, and developed in this important historical period and special cultural background. Since, the area along the Huaihe River has had good weather and bumper agricultural harvest. With the continuous improvement and improvement of people's living standards, various villages scrambled to make flower drum lanterns. In those years, almost all villages had gongs and drums, and villages had lamp classes. Almost everyone in their teens and twenties can also play flower drum lanterns [20]. .Artists of the older generation are often invited to "operate lights" everywhere, resulting in more excellent artists and lamp teams. Feng Guopei, Chen Jingzhi, Zheng Jiuru, Shi Jinli, and other outstanding artists all emerged in this period, and the flower drum lantern art activity entered the climax stage of this period. The dance movements of flower drum lantern are more abundant, and the expression of "xiaohuachang" is strengthened, and the content is gradually becoming complete. There are programs with simple plots such as "grab the bench" and "grab the fan". There is a lantern song that sings "there are tens of millions of people on both sides of the Huaihe River playing lanterns", reflecting the lively scene of people "playing lanterns" at that time. The Japanese army occupied the Huaihe River Basin. When the Huaihe River floods again, the people cannot make a living. Many flower drum lantern artists were forced to work hard in nearby Bengbu, Huainan, and other places, bringing the flower drum lantern art once popular in rural areas into cities and towns. During this period, the flower drum lantern almost disappeared in rural areas, but the optimistic Huaihe people enjoyed themselves, regarded the flower drum lantern as the best means to vent their inner feelings and gathered together to "play the lantern" in their spare time, which promoted the development of flower drum lantern art activities in cities and towns. After the founding of the new China, people lived and worked in peace and contentment. Rural life gradually stabilized, and farmers' living standards improved accordingly, so the art of flower drum lantern began to be active in rural areas. According to the statistics of Huaiyuan County Cultural Center, there were nearly 1000 flower drum lanterns, Gong, and drum groups, and almost all large villages had lamp classes. On the square at the foot of Jingshan Mountain in the west of the city during the Spring Festival, dozens or even hundreds of flower drum and lantern classes often gather for competitive performance. At this time, famous experts, veterans, and rookies gather to perform and exchange. Silk fans and dances are everywhere, singing is flying, the scene is spectacular, the

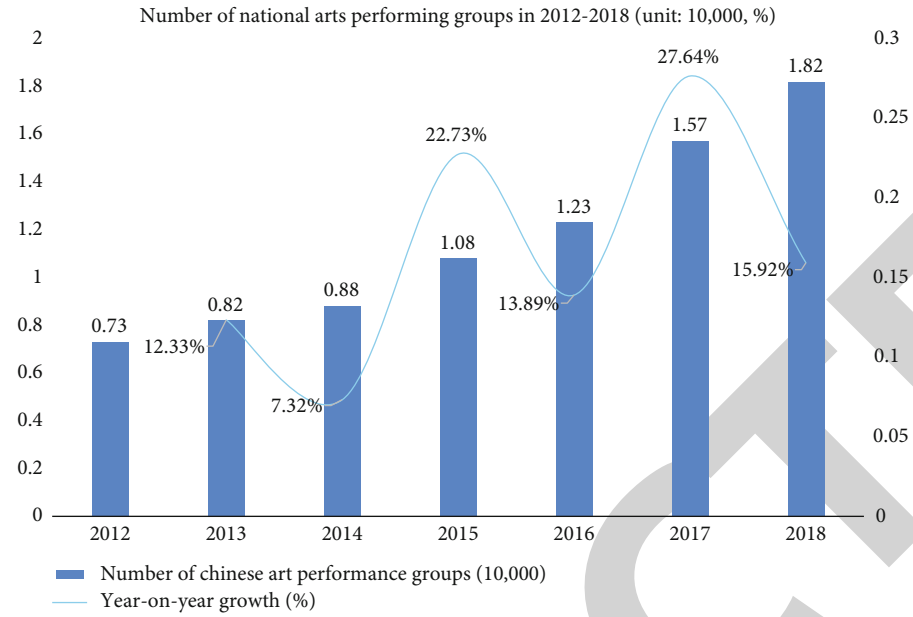

Figure 1: Number of art groups.

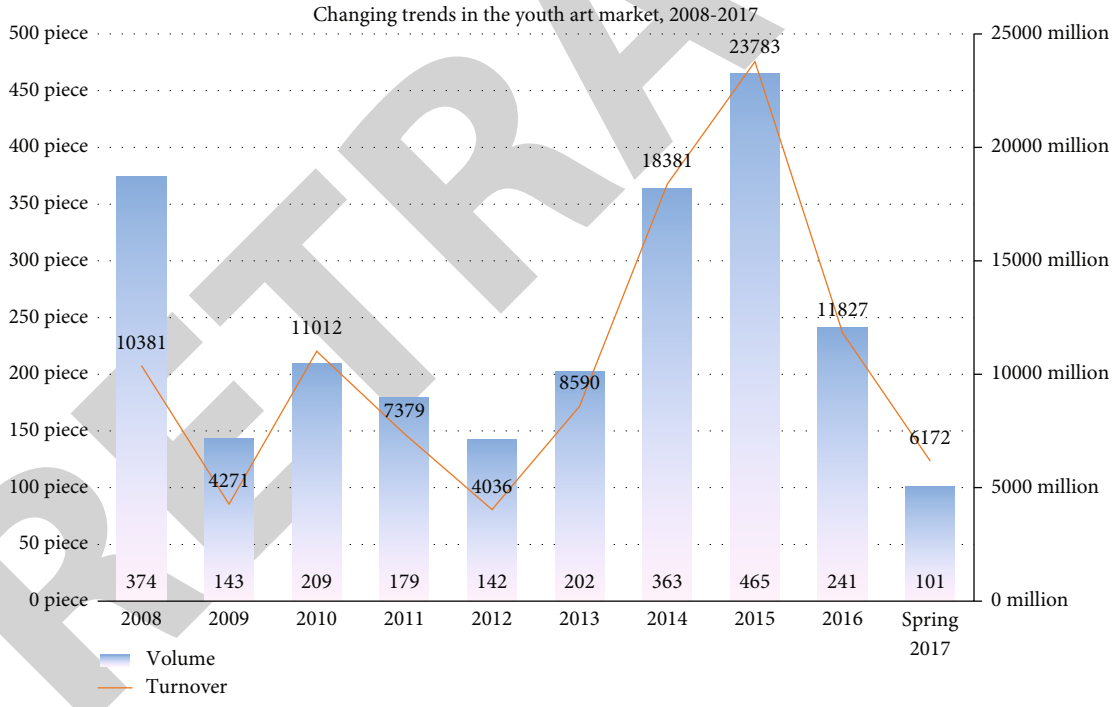

Figure 2: Changes in the art Market.

audience is like a tide, and the sound of gongs and drums is constant for days and nights. In the first national folk music and dance festival in 2015, the flower drum lantern performance shocked four people and was selected as a program to Beijing. A group of artists represented by Feng Guopei went to Huairen Hall to perform, which had a wide influence among dancers everywhere. For a time, professional groups in Beijing, Shanghai, Nanjing, Xi'an, and other places invited artists to teach or sent people to Anhui to study. There was an upsurge of learning flower drum lantern dance all over the country. The most significant change during this period was that with the Chinese peasant class becoming the master of the country, the political status of a large number of artists had undergone fundamental changes. Some of them joined the Communist Party of China, some worked in professional organizations, and some became people's

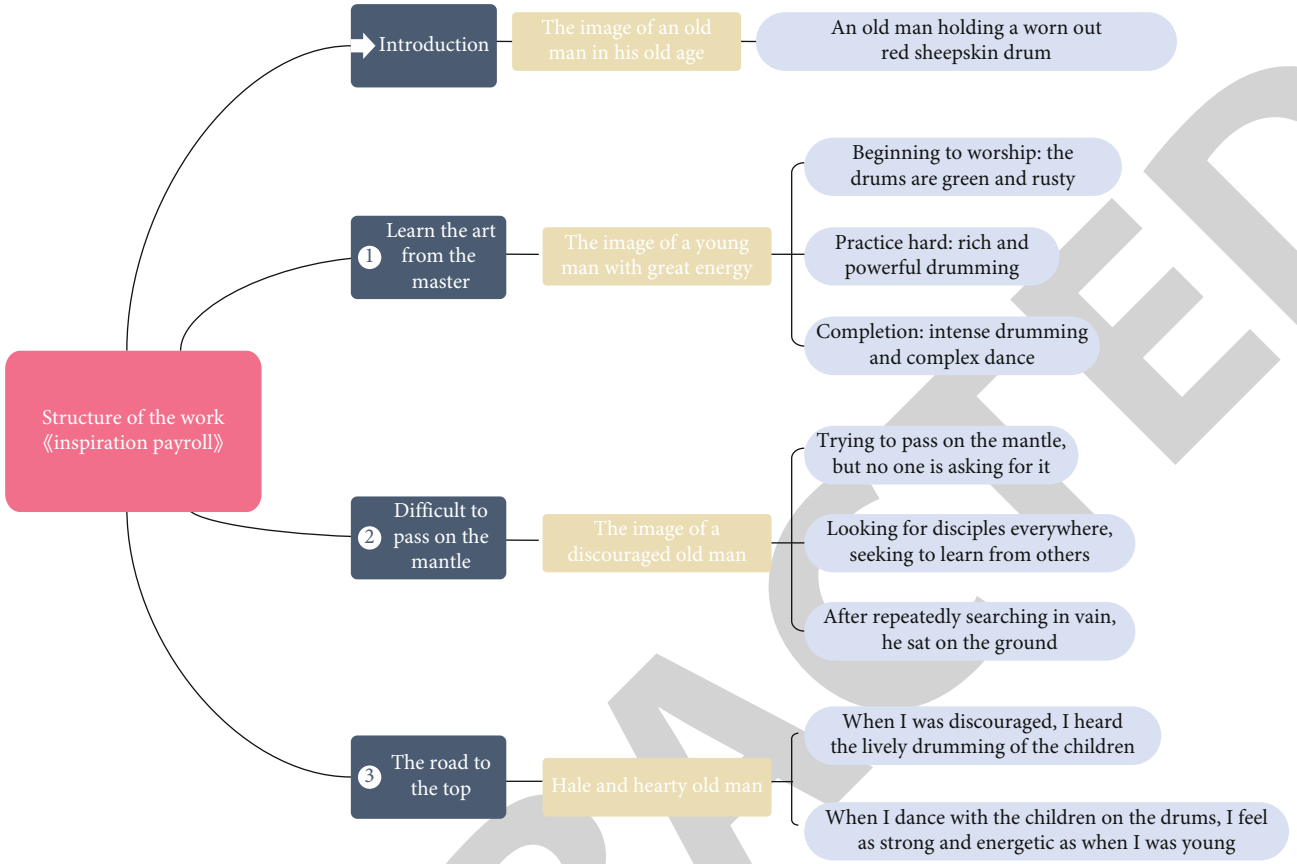

Figure 3: Structure of the works.

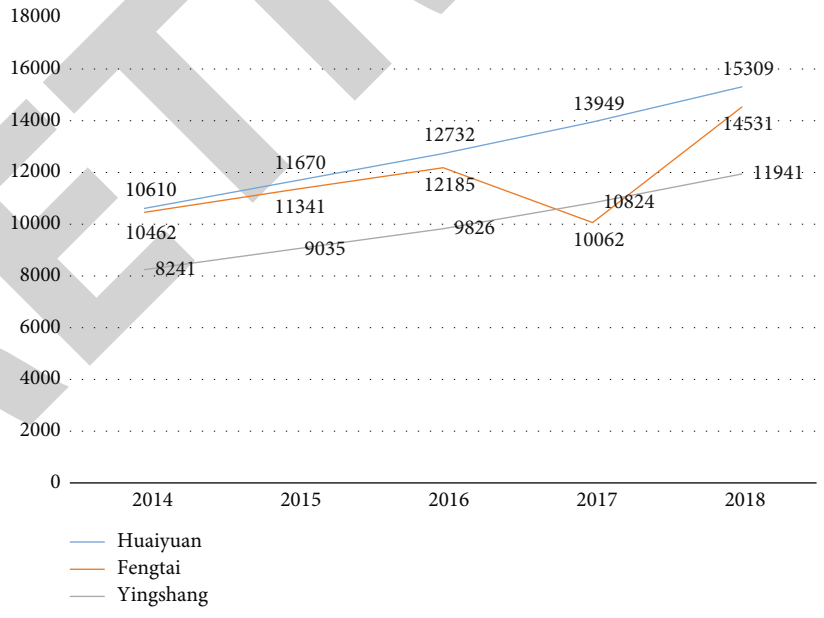

Figure 4: Per capita disposable level.

representatives and members of the CPPCC, which greatly aroused their enthusiasm and political enthusiasm for emancipation and fully integrated this enthusiasm and enthusiasm into the performance, inheritance, and development of flower drum lanterns. Works reflecting new life and new themes emerge in endlessly, and some even become reserved programs of some professional groups. Moreover, with the help of Mr. Wu Xiaobang, the former president of the

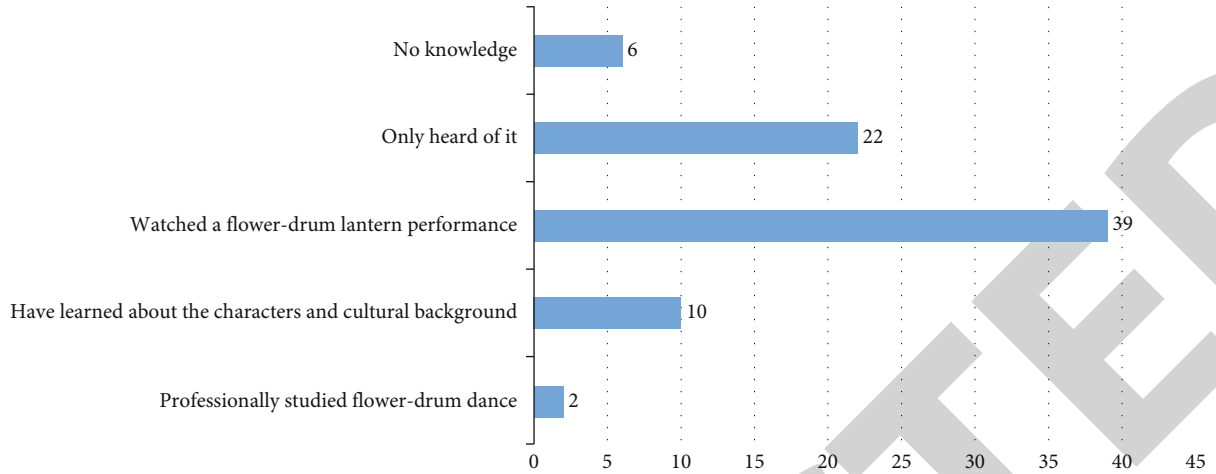

Figure 5: How much do you know about Hua Gu Deng before entering the school?

Table 1: Schedule of professional skills courses in folk music and dance majors.

	Weekly class schedule of each semester					
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Anhui flower drum lantern	60	60	60	60	60	Practical teaching
Gihon	80	80	80	80	80	
Body	32	32	32	32	\	
Blanket technique	60	60	60	60	60	
Repertoire	\	\	80	80	80	
Chinese folk dance (including Anhui flower drum lantern)	80	80	80	80	80	

Table 2: Schedule of Folk Music and Dance.

	Offering courses	Semester weeks (weeks)	Weekly class hours (section)
First semester of grade two	The Zang or Tibetan people	18	4
Second semester of grade two	Northeast Yangko	18	4
First semester of grade three	Yunnan lantern	18	4
Second semester of grade three	Mongol ethnic minority	18	4
First semester of grade four	The Uygurs	18	4
Second semester of grade four	Anhui flower drum lantern	18	4
First semester of grade five	Anhui flower drum lantern	18	4
Second semester of grade five	Jiaozhou Yangko (female), GuZi Yangko (male)	18	4
First semester of grade six	Comprehensive exhibition course	18	4

Chinese Dancers Association, the flower drum lantern got rid of the phenomenon of men playing women for a long time, restored the true face of history, opened the vigorous pace of women in the new era, and greatly expanded the expressiveness of flower drum lantern dance. During this period, the dance art of flower drum lantern was not only prosperous in rural areas but also widely carried out in factories and other places as a kind of self-entertainment of the masses and developed into a popular stage performing art. The great stride forward of flower drum lantern dance art promoted the creativity of artists to give full play. For a time, there were various schools, and artists appeared the characteristics of professionalization and semi professionalization. The flower drum lantern dance, which is deeply loved by international friends, has finally conquered the world with its unique artistic charm and stands tall on the international stage. Nowadays, with the development of society, people's living conditions have changed greatly. The emergence of a series of modern social products such as television, radio, and network has constantly impacted people's aesthetic standards. Because of the impact of modern culture and western culture on Chinese traditional culture, most people now praise modern culture more than the traditional culture, on the contrary, the acceptance of

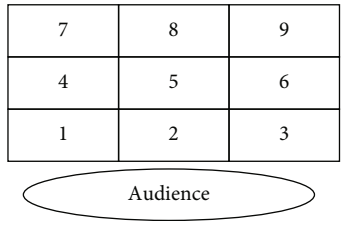

Figure 6: Audience arrangement.

traditional culture is relatively low. To the earth shaking changes in the social background of flower drum lantern dance, there is a crisis in the inheritance and development of flower drum lantern art. The structure of traditional works is shown in Figure 3.

3. Interview Survey on the Basic Status Quo of Anhui Huagu Lamp

3.1. Basic Information. In order to investigate the basic status of Huagu lanterns in Anhui province, Huaiyuan County, Fengtai County, and Yingshang County, where Huagu lanterns were relatively concentrated, were selected for analysis. By comparison, the economy determines the cultural development to a certain extent, while the per capita disposable income reflects the local economic level of cultural performance, as shown in Figure 4. Yingshang County, secondly, as an important part of the three regions, Yingshang Huagu lantern is an indispensable part of the small fields and performance styles of other two places. Therefore, take Fuyang Yingshang as the entry point to explore the inheritance and protection measures of Huagu lantern.

3.2. Current Situation of Students Learning Anhui Flower Drum Lantern. As a kind of folk dance, the basic status of students' learning of Huagu lanterns can understand the spread and inheritance of Huagu lanterns in China. Anhui flower drum lantern is an important part of Han folk dance. Learning flower drum lantern dance requires not only solid basic dance skills but also a certain understanding of the culture contained in flower drum lantern dance. Therefore, the author set up two questions in the questionnaire to understand the students' dance foundation and their cognition of flower drum lantern. The first question is "did you have a professional dance study before entering the school?"

According to the survey results, 50 people have never studied dance, accounting for 77% of the total survey. Among the students who have studied dance, only two have studied for more than three years. This means that the school needs to pay attention to students' basic dance skills in curriculum arrangement and give students more practice time. The students' understanding of flower drum lantern is not very optimistic. The second question is "how much did you know about flower drum lanterns before entering school?" As shown in Figure 5 it can be seen from the picture, 39 people said they had seen the performance, 22 people said they had only heard of it, but only 2 professional people have learned the dance, which shows that students have a better understanding of the flower drum lamp, but they are not optimistic about the grasp of the flower drum lamp.

It can be seen from Tables 1 and 2 that the skills courses of Anhui flower drum lantern talent training include folk dance, basic dance skills, and Anhui flower drum. Anhui flower drum lantern, as a characteristic core course for training professionals, is very different from Anhui flower drum lantern courses in other regions. The core difference is that the curriculum learning of other schools is the flower drum lantern of the Academy, while the flower drum lantern curriculum of Huaiyuan Normal University presents obvious original ecological characteristics. Secondly, Anhui flower drum lantern, as a folk dance of the Han nationality, was included in the Chinese folk dance curriculum by ordinary colleges and universities. Huaiyuan Normal School opened this major. Anhui universities will appropriately increase the proportion of Anhui flower drum lanterns in Chinese folk dance courses. Take the Chinese dance performance major of Anhui Academy of fine arts as an example. The professional academic system is six years. In the course of Chinese folk dance, you need to learn seven kinds of Chinese folk dances. Among them, Anhui flower drum lantern starts two semesters a year. The rest of the semester is dance class. Other colleges and universities outside the province will also extend the class hours of local representative dance according to local characteristics. In the process of training Anhui flower drum lantern talents in Huaiyuan Normal School, the school will teach the academic Anhui flower drum in the Chinese folk dance class and set up the Anhui flower drum Lantern Festival course separately. This will last for two and a half years and run through the whole technical secondary school stage to learn the original Anhui flower drum lantern dance.

4. Suggestions on Promoting Anhui Flower Drum Lantern Stage Art

4.1. Explore the Relationship between Dancer Personality and Character Image. When dancers perform dance works and shape character images, in addition to a comprehensive understanding and mastery of national style, action characteristics and national emotions, the imagination and extension of the theme connotation of the works, character, inner world, and environmental atmosphere in the process of shaping roles should be based on the accumulation of multiple knowledge of the performers. This accumulation of diversified knowledge helps dancers better mobilize their inner experience and feelings and produce rich imagination and emotional resonance. It mainly includes the accumulation of history and culture, literary works, sister art, and life. It is necessary to form a certain self-cognition and understanding of the relationship between man and nature, man and society, man and man, and man and self. It is also helpful for the dancers to understand and practice the image of the stage, so as to improve their understanding of the basic image and resonance of the stage. Art comes from life and is higher than life. Dancers must increase their tentacles to explore the world and be a dancer who is good at observing,

capturing life, diligent in learning and willing to use his brain, which will benefit dance performance talents for life.

4.2. Build a Platform for Inheritance and Development for Inheritors. Most of the inheritors are local old people, who entertain themselves in their daily life. They sing folk songs during the slack season. Through the oral instruction of the older generation, many original Fengyang folk songs are in their hearts. They also want to pass on the traditional Fengyang folk songs. Therefore, it is urgent for the government to build a singing platform for them, such as a singing center similar to folk song kara0k, Let these old people bury the seeds of harvest for the inheritance of Fengyang folk songs while singing heartily. At the same time, we can also hold more literary and artistic performances and other activities to expand the social influence and create a good atmosphere for the inheritance of Fengyang folk songs. Arrange audience seats reasonably, as shown in Figure 6:

Folk artists and inheritors are the main body and main force of their publicity. They master the source of cultural output. They have great responsibility and pressure and have been constantly enriching themselves for these responsibilities, even giving up a lot of their own time and other plans. The government must pay enough attention to these artists and inheritors, give strong support in economic policies when necessary, and pay more condolences to the inheritors at ordinary times, which will also strengthen the enthusiasm of the inheritors, keep the responsibility, ability, and culture. "Dance is the most direct, substantive, intense, sharp, simple, and sufficient expression of the mood of life." "On the one hand, in the rhythm of height, dancers themselves get a sense of reality of life, a feeling that they are alive, which is a kind of satisfaction. On the other hand, the audience also gets the same sense of reality of life from infection, which is also a kind of satisfaction. The practical significance of dance is here." Gao Xiaoping regards dancing flower drum lantern as a kind of enjoyment and an indispensable part of life. "As an artist of the people, you should not perform just for performance. It is a natural expression of pure and true feelings. If you are like ice, how can you make the audience resonate with your breath? Flower drum lanterns should dance with your heart to create artistic conception and dance 'truth, goodness and beauty'. 'truth' is the 'goodness' of true feelings. It is a harmonious, open, kind and clear expression. Beauty' is the dance posture and movement that people enjoy very much. It can purify people's hearts." during the interview, Gao Xiaoping said emotionally. Indeed, only when the action can play the role of emotional communication to the audience, it is the most moving language in dance. Gao Xiaoping has conquered the audience with her unique performance style. Similarly, the audience is often attracted by her warm and wonderful performance and involuntarily affected by her smiles.

Give full play to modern science and technology, and now the network is developed, which not only spreads fast and widely, but also has a relatively low cost. Whether individuals or the government, they often spread the information about Fengyang folk songs through the Internet, television and other media, and timely release videos of the performance activities of Fengyang folk songs, or even live broadcast on mobile phones. The performances of folk artists in life are also disseminated in time to let everyone see the most simple and grounded singing details.

5. Conclusion

We know that everything has the process of happening, growing, and dying. Cultures collide and attract strong and high-quality cultural factors like obtaining new blood and continuing the growth period of culture. Folk dance has always been spread since ancient times that the reason of "natural selection" is also applicable to culture. From the perspective of diachronic and timeliness, it has never deliberately arranged the communication with other sister arts. The paper in Anhui flower drum lantern as the research object, combined with the regional, performance form, content, and cultural connotation, interprets the social activities of the Huaihe River Basin, and the literature, field investigation, interviews, logical analysis, the origin of Huaihe flower drum lamp origin, living environment, historical context, cultural value, existing confusion, and development countermeasures, with the characteristics of traditional project evolution law, can promote the spread and inheritance of traditional culture.

Data Availability

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

Conflicts of Interest

There are no conflicts of interest.

Acknowledgments

This work is supported by Chuzhou University.

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Retraction

Retracted: Analysis of Regional Economy Development on Local Environmental Protection and Natural Resources Utilization from the Perspective of Big Data

Journal of Environmental and Public Health

Received 20 June 2023; Accepted 20 June 2023; Published 21 June 2023

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] Y. Wen, "Analysis of Regional Economy Development on Local Environmental Protection and Natural Resources Utilization from the Perspective of Big Data," *Journal of Environmental and Public Health*, vol. 2022, Article ID 9461377, 12 pages, 2022.

Hindawi
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Research Article

Analysis of Regional Economy Development on Local Environmental Protection and Natural Resources Utilization from the Perspective of Big Data

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The ecological restoration and civilization construction is one of the key tasks in China. The economic development of different regions has different effects on the resource protection and utilization. In the face of complex natural conditions and resource-rich areas, how to carry out the ecological environment promotion work is put forward. The urbanization level of the Yangtze River region increases from 17.9% to 60.6%, showing the characteristics of rapid expansion. In the face of urban diseases such as unreasonable industrial layout, it is urgent to improve regional economy and promote green urban development from the perspective of big data. Adhering to the concept of ecological priority, the development of digital technology drove the development of local economy in 2019, accounting for 43% of the national population. While promoting the economic development, it is of great significance to ensure the efficiency of resource utilization and promote the high-quality development of common economy.

1. Introduction

Urban green transformation is to develop within the carrying capacity of economy, society and environment, realize green production mode, green lifestyle, and inclusive social environment, and promote the city to take the road of intensive, intelligent, and beautiful ecology. It can be seen that the concept of "green transformation" has a strong consistency with the goal of "production-living-ecological" space optimization in connotation, that is, to promote intensive and efficient production space, livable, and moderate living space, and beautiful ecological space. As an advanced form of economic and social development, digital economy strengthens the integration of urban development and industrial development from the perspective of big data, plays an important role in industrial transformation and upgrading, social governance, and other fields. And it gradually becomes a new driving force leading the green transformation and development of cities. It is of great significance to further exert the development of digital economy to lead the green transformation of cities and boost the high-quality development of cities. Urban agglomeration is the highest form of spatial organization in the mature stage of urban development. It refers to a specific region with at least one megalopolis as its core and at least three large cities as its units. Relying on the developed infrastructure network such as transportation and communication, it forms a city group with compact spatial organization and close economic connection, and finally realizes the high degree of integration. Urban agglomeration is a large, multicore and multilevel city group formed by a number of geographically concentrated megacities and big cities, which is the union of metropolitan areas. At present, there are six world-class urban agglomerations universally recognized around the world: the Atlantic coastal urban agglomerations in the northeast of the United States, the Great Lakes urban agglomerations in North America, the Pacific coastal urban agglomerations in Japan, the British urban agglomerations in the northwest of Europe, and the Yangtze River Delta urban agglomerations. Urban agglomeration will be the most dynamic and potential strategic support and growth pole in China's future economic development pattern and dominate the lifeblood of national

economic development. As a link of regional economic and social connection, transportation is a necessary guarantee for the formation and development of urban agglomerations. Meanwhile, the layout of transportation facilities will also affect the spatial structure and evolution mode of urban agglomerations. Since the reform and opening up, China's urban agglomeration and regional transport system has been constantly mature, the quality of transport facilities and transport mileage has been constantly improved. At present, all urban agglomerations in China have formed relatively perfect high-speed transportation systems, which play an important driving role in the spatial conduction and effective allocation of inter-city production factor flow and the optimization and reorganization of urban agglomerations spatial structure, as shown in Figure 1.

Transportation integration is an important support and guarantee for the implementation of regional coordinated development strategy and national development strategy of Yangtze River Delta regional integration. In particular, high-speed transportation system can produce many linkage development effects and is an important driving force for shaping urban gateway effect and efficient utilization of resources. On September 19, 2019, the Outline of Building China into a Transport Country issued by the CPC Central Committee and The State Council clarified the development goal of "basically building China into a transport country by 2035 and comprehensively building China into a transport country that is satisfactory to the people and at the forefront of the world by the middle of the 21st century". At the end of 2019, the Outline of the Plan for regional Integrated Development of the Yangtze River Delta defined the transportation tasks of "jointly building the Yangtze River Delta on the track". Although the construction of high-speed transportation system in the Yangtze River Delta region has a good foundation for development, it still faces some bottleneck problems, such as unbalanced development of high-speed transportation system, uncoordinated high-speed transportation subsystem and the overall competitiveness of transportation to be improved. Therefore, it is necessary to put the construction of high-speed transportation into the overall regional integration development of the Yangtze River Delta, and fully realize the role of high-speed transportation in the implementation of the integration strategy of the Yangtze River Delta, as shown in Figure 2.

In recent years, China's international and domestic tourism income has achieved fruitful results. The tourism performance and tourism market are well-developed. However, with the advent of the era of mass tourism, some quality shortcomings in the development of China's tourism industry are gradually exposed. For example, the insufficient tourism products effective supply cannot adapt to the people's growing travel demand. The imbalance of urban and rural tourism development cannot adapt to the global tourism development. The insufficient novelty of tourism product forms cannot adapt to individuation and diversification of tourism consumption demand. The tourism theory research cannot adapt to the rapid development of tourism industry practice. The huge tourism economies are not coordinated

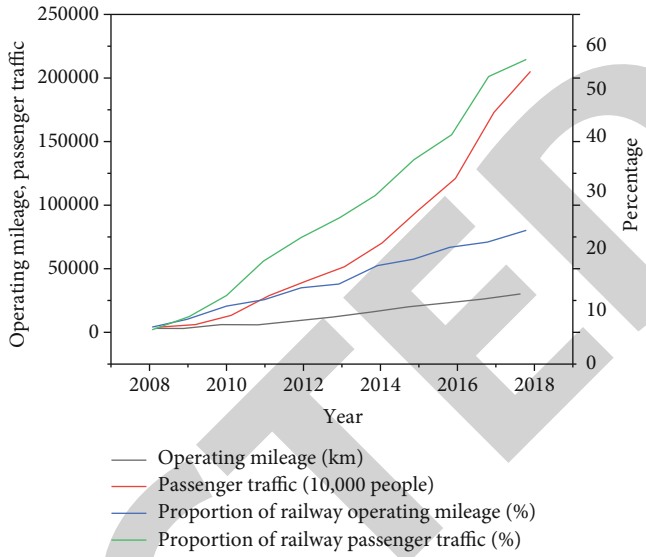


Figure 1: Basic situation of China's high-speed railway development.

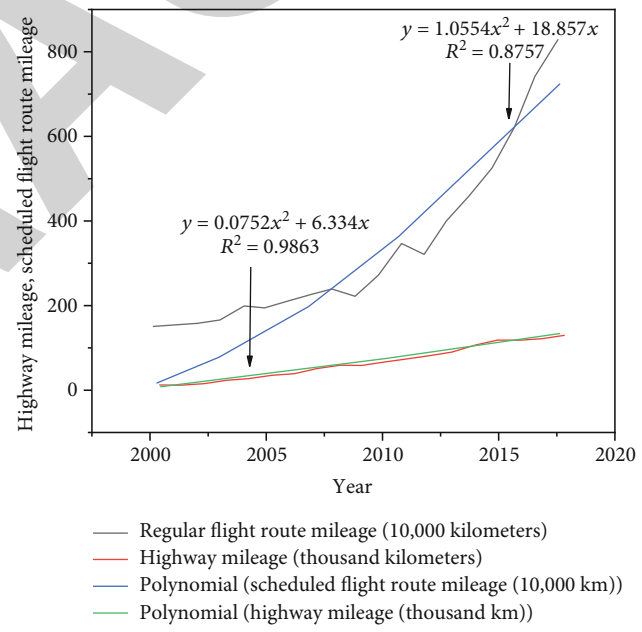


Figure 2: Basic situation of China's expressway mileage and civil aviation route mileage.

with the low operational efficiency of tourism industry. With the fragmentation of the tourism market of consumer demand and multiple overlays is forming, if China's tourism industry cannot improve, transform, and innovate in terms of supply side, demand side, and industrial operation efficiency in a timely manner, it may be difficult to jump out of the "primary stage of mass tourism trap". If it follows the trend of great changes unseen in the world and high-quality economic development, the tourism industry will enter a new blue ocean, as shown in Figure 3.

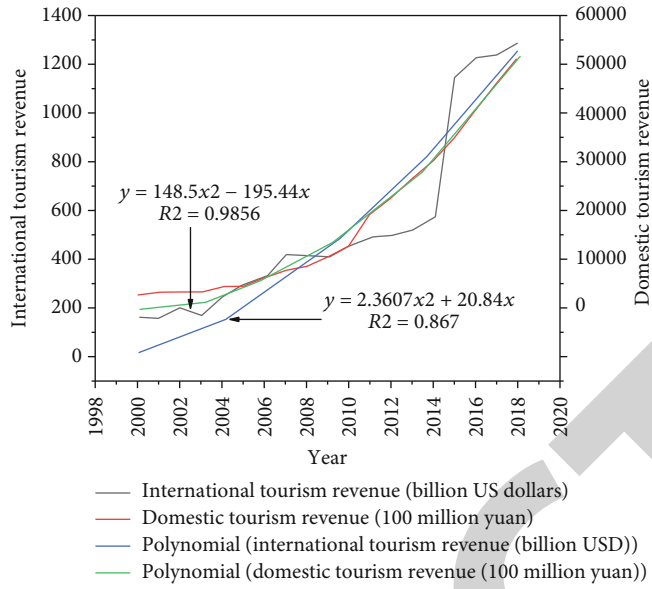


Figure 3: The tourism development in China.

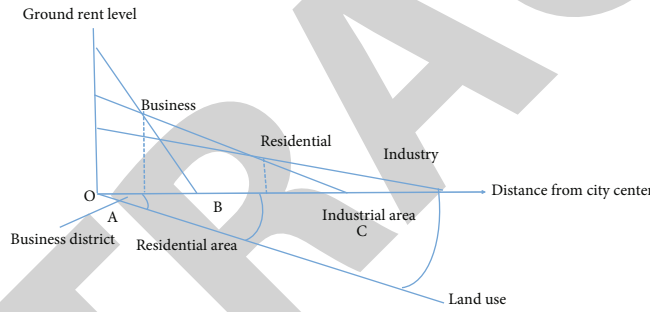


Figure 4: Evolution mode of spatial structure.

2. Literature Review

On the basis of systematic review and summary of relevant domestic and foreign research literature, a theoretical research framework is built based on tourism destination system theory, traffic economic belt theory, coupled and coordinated development theory, and unbalanced development theory of regional economy in the research. Following the research line of theoretical model construction of high-speed traffic dominance degree, tourism intensity, and their coupling coordination → comprehensive score calculation of high-speed traffic dominance degree and tourism intensity → verification of the spatiotemporal dynamic relationship between high-speed traffic dominance degree and tourism intensity → grasping the evolution law and simulating the trend prediction of spatio-temporal coupling coordination degree of high-speed traffic dominance degree and tourism intensity → revealing the influence mechanism of the spatiotemporal evolution of the coupling coordination degree of the high-speed traffic dominance degree and the tourism intensity → proposing the optimal path and policy suggestions for the coupling coordination between the high-speed transportation dominance degree and the tourism intensity, integrating multiple comprehensive evaluation model, coupling coordination model, Arc GIS spatial analysis technology, mathematical statistics analysis technology, spatial econometric model and multiple method model, the spatio-temporal evolution, and multidimensional driving mechanism of transport and travel coupling coordination degree in the Yangtze River Delta are systematically investigated. The specific research ideas are as follows:first, it is based on theoretical model construction and comprehensive development level calculation of geographical elements [1]. On the basis of constructing the theoretical evaluation model framework of high-speed traffic superiority degree and tourism intensity, the mathematical statistics methods, such as entropy weight TOPSIS method, Bootstrap-DEA model, box graph and kernel density curve, and Arc GIS spatial analysis technology are used to measure the high-speed traffic superiority degree and tourism intensity of cities in the Yangtze River Delta region. The respective time series evolution characteristics of the Yangtze River Delta regional scale, provincial scale and prefecture-level city-scale high-speed traffic dominance degree and tourism intensity theory are

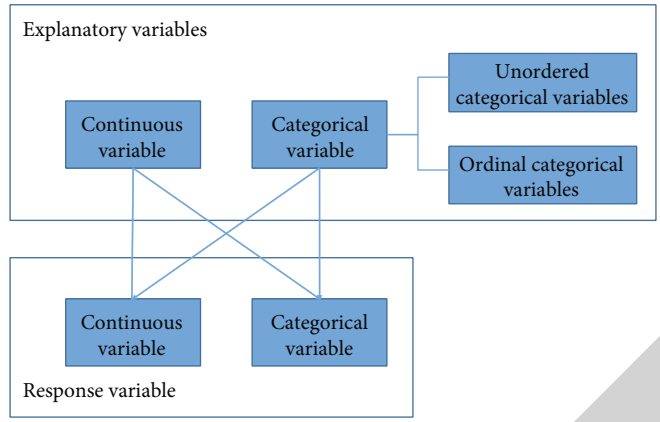


Figure 5: Schematic diagram of regression model in high-speed traffic system.

Table 1: Comparison of impacts of different modes of tourism transportation on tourism environment.

The image content	Private cars	Buses	Civil aviation	Trains
HC (threat to health)	0.01	0.05	0.03	0
CO (threat to health)	0.19	0.05	0.13	0
NOx (acid rain formation)	0.06	0.30	0.38	0
CO_2 (greenhouse effect)	67.3	17.53	105.11	0.9
Energy consumption (KWH)	250	66	409	42
Environmental costs (SEK)	28.11	19.32	42.02	0.38

explored, and the evolution types of prefecture-level city-scale high-speed transportation dominance degree and tourism intensity are refined. ArcGIS spatial analysis technology is used to measure the spatial and temporal differentiation characteristics of high-speed traffic dominance and tourism intensity, which is the basic work for the follow-up in-depth research of the thesis.

The range standardization method is used for data processing, and the normalized index matrix is multiplied by the weight matrix determined by the entropy weight method to obtain the weighted normalized evaluation matrix Y, as shown in

$$Y = \begin{bmatrix} Y_{11} & Y_{12} & \cdots & Y_{1m} \\ Y_{21} & Y_{22} & \cdots & Y_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ Y_{n1} & Y_{n1} & \cdots & Y_{nm} \end{bmatrix} = \begin{bmatrix} r_{11} \cdot \omega_1 & r_{12} \cdot \omega_2 & \cdots & r_{1n} \cdot \omega_n \\ r_{21} \cdot \omega_1 & r_{22} \cdot \omega_2 & \cdots & r_{2n} \cdot \omega_n \\ \cdots & \cdots & \cdots & \cdots \\ r_{m1} \cdot \omega_1 & r_{m2} \cdot \omega_1 & \cdots & r_{mn} \cdot \omega_n \end{bmatrix}. \quad (1)$$

In Formula (1), rmn represents the nth index in the mth year after standardization, and ω refers to weight. Positive and negative ideal solutions are determined as.

$$Y^+ = \max\left\{\left(y_{ij} | i = 1, 2, \cdots, m\right)\right\}(j = 1, 2, \cdots, n) = \{y_1^+, y_2^+, \cdots, y_n^+\},$$
$$Y^- = \min\left\{\left(y_{ij} | i = 1, 2, \cdots, m\right)\right\}(j = 1, 2, \cdots, n) = \{y_1^-, y_2^-, \cdots, y_n^-\}. \quad (2)$$

In Formula (2), Y^+ represents the maximum value of the jth index in the year i, and Y^+ is the positive ideal solution, which can be selected as the most ideal scheme. Y^- represents the minimum value of the jth index in the year i, and Y^- is the negative ideal solution, namely the worst scheme [2], as shown in Figure 4.

The second is based on the verification of the spatial-temporal dynamic relationship between high-speed traffic dominance and tourism intensity. Determining the spatio-temporal dynamic relationship between the superiority degree of high-speed transportation and tourism intensity and the degree of interaction is a prerequisite for calculating the coupling coordination degree of transportation and tourism [3]. Bivariate LISA model, decoupling effect model, and panel vector autoregressive model are used to verify the spatio-temporal dynamic relationship between high-speed transportation superiority and tourism intensity from different perspectives of spatio-temporal correlation effect, decoupling effect, and dynamic interaction effect.

The third is to grasp the spatial and temporal evolution characteristics of the coupling coordination degree of high-speed transportation superiority and tourism intensity at multiple scales and from multiple perspectives and predict its future development trend. Based on the coupling coordination degree model, Arc GIS trend surface analysis module, Exploratory spatial Data analysis (ESDA), standard Deviation ellipse model (SDE), LISA time path and temporal, and spatial transition analysis (ESTDA) are used to calculate the coupling coordination index of high-speed transportation superiority and tourism intensity. The spatio-temporal evolution of the coupling coordination degree of high-speed traffic superiority and tourism intensity in the Yangtze

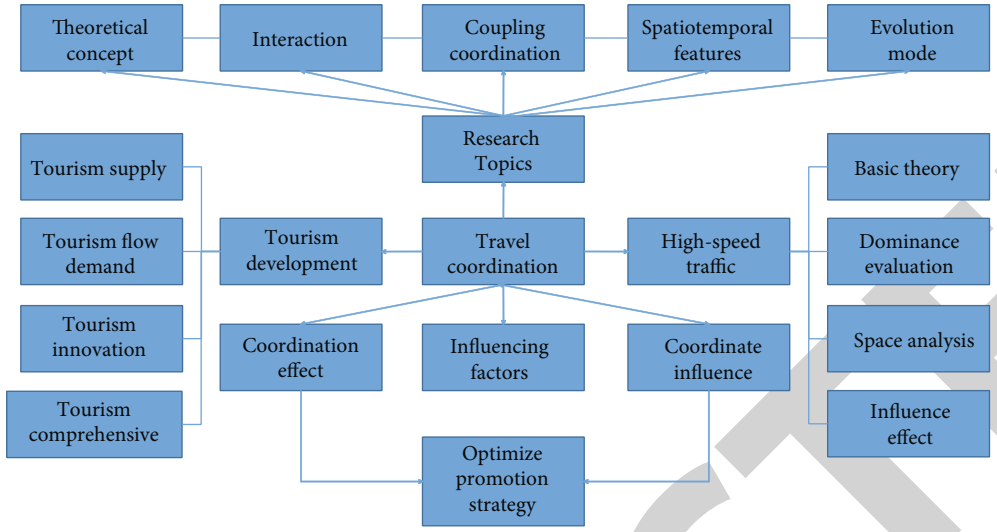


Figure 6: Research framework system of traffic clearance relationship.

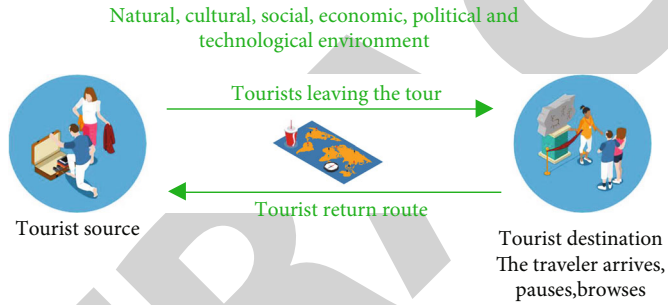


Figure 7: Tourism system.

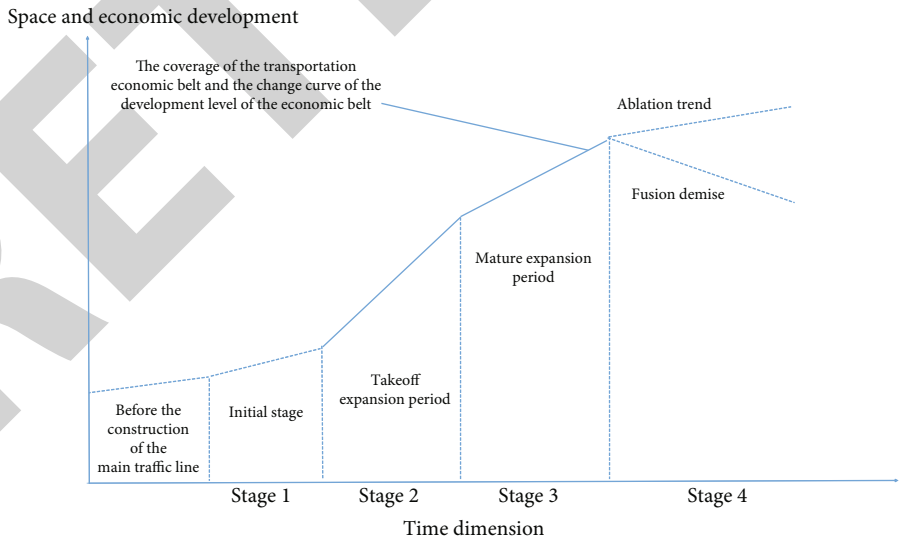
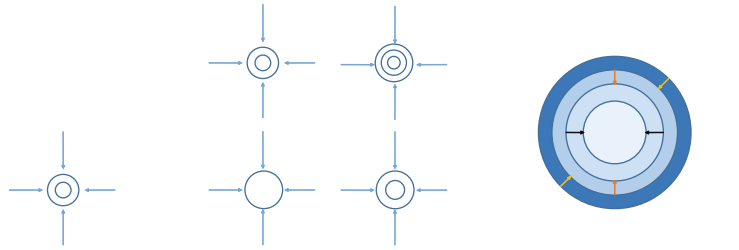


Figure 8: Development stages of traffic economic belt.

River Delta region is studied from the perspectives of overall trend, spatial differentiation, spatial correlation, pattern evolution, and spatio-temporal dynamic evolution path [4]. The modified grey forecasting GM (1, 1) model is used to predict and simulate the future development level of coupling coordination degree between highway traffic superiority degree and tourism intensity in 41 cities in the Yangtze River Delta region. From the global perspective, the temporal and spatial



(a) Centripetal polarization (b) Hierarchical polarization (c) Wavy ring layer polarization

Figure 9: Schematic diagram of polarization mode.

trends of the future coordinated development of high-speed transportation construction and tourism development in the Yangtze River Delta region are analyzed.

The fourth is to scientifically reveal and systematically refine the driving mechanism of the spatio-temporal evolution of the coupling coordination degree between the superiority degree of high-speed transportation and tourism intensity, and put forward the optimization strategy of the integration of transportation and tourism [5]. Firstly, influence variables with internal and external layers are constructed based on multisource heterogeneous data, and ridge regression analysis method, panel quantile regression model (Figure 5), system dynamic panel regression model (SGMM), and spatial panel econometric model are comprehensively adopted. From the perspectives of internal endogenous force, interaction influence and external driving force, the internal action mechanism, interaction influence mechanism, and external driving mechanism of the spatio-temporal evolution of the travel-travel coupling coordination degree in the Yangtze River Delta region are extracted, respectively. The effect process, intensity and nature of each variable on the change of travel-travel coupling coordination degree in the Yangtze River Delta are systematically analyzed, and the main driving forces affecting the spatial differentiation of travel-travel coupling coordination degree are clarified [6]. Secondly, according to a series of empirical research conclusions, as well as the actual situation of high-speed transportation construction and tourism development in the Yangtze River Delta region, the optimization path and policy suggestions are proposed to promote the coupling and synergistic development of high-speed transportation superiority degree and tourism intensity in the Yangtze River Delta region. It provides an important basis for the construction of high-speed transportation system and the decision of regional tourism spatial integration and optimization in Yangtze River Delta.

3. Research on the Interactive Relationship between High-Speed Transportation System and Tourism Development

Some scholars' studies have shown that aircraft have the largest nitrogen oxide and carbon dioxide emissions, the highest energy demand and environmental cost, and buses have the highest nitrogen and hydrogen compounds emissions [7]. In (Table 1), railway transportation has a good effect in all classification investigations. Some scholars found that the waste emissions in Hainan increased under the operation of high-speed rail, as shown in Figure 6.

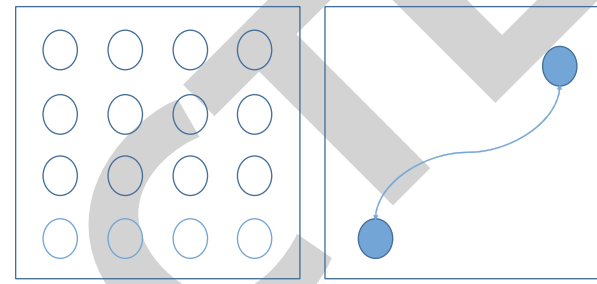


Figure 10: Evolution of the "point-axis" spatial structure system.

3.1. Theory of Regional Unbalanced Development

3.1.1. Regional Pole Theory. French economists formally put forward the concept of "growth pole" in the article On the Concept of "Growth Pole". In 1966, French geographer defined "growth pole" as the industrial complex with expanding urban area configuration and guiding the further development of economic activities under its influence. Growth pole is the "engine" of regional social activities and economic growth, which can form a polar core spatial structure. Later, on this basis, economic geographer Miller and Kiernan proposed the theory of "dual-core" spatial structure according to the development reality of China's coastal and riverside areas [8], as shown in Figure 7.

According to the growth pole theory, the backward regions are generally broad in area and rich in natural resources, but these regions tend to have poor natural conditions, low degree of development, weak economic foundation, low transportation accessibility, and poor investment environment, etc., which seriously lack central cities to drive the overall development of the region. In this case, in order to accelerate the economic development of the above regions, the key is to cultivate the rise of central cities that can drive the overall development of the region and implement the unbalanced development strategy [9]. There are two ways to form the growth pole. One is to realize the agglomeration of factors of production in large central cities by using the mechanism of market spontaneous regulation, and give play to its agglomeration and scale effect to form the regional growth pole. The second is to give full play to

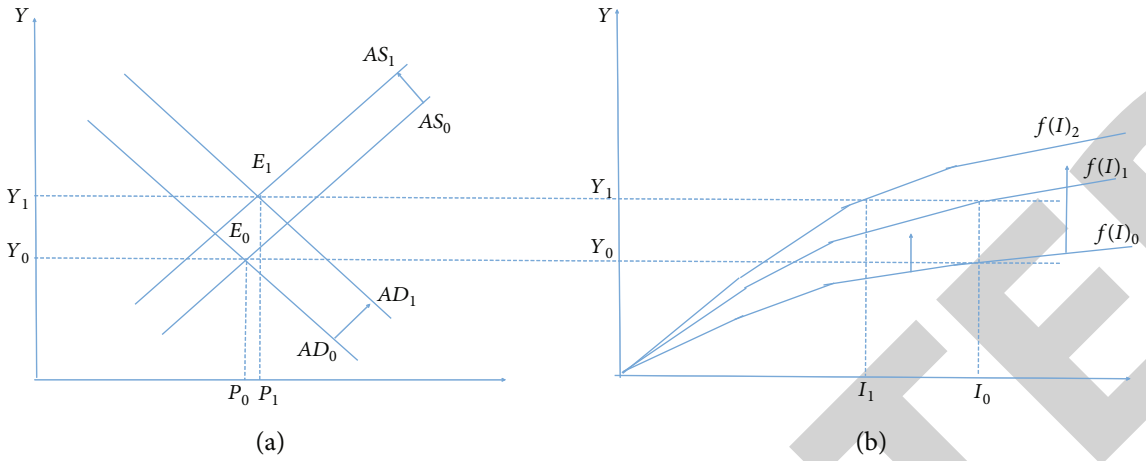


Figure 11: Theoretical logic of the internal relationship between high-speed traffic and tourism intensity and its subsystems.

the government's macrocontrol role and use the government's intervention role. Adhering to the concept of "concentrated investment, key construction, agglomerated development, focusing on diffusion", regions, and industries with better conditions are selected to give key support and large-scale economic growth poles are cultivated, so as to give full play to the linkage role of the growth pole of "point to surface", as shown in Figure 8.

The tourism growth pole accelerates or restrains the tourism in the surrounding areas mainly through its polarization and diffusion. On the one hand, the polarization of tourism growth pole will lead to the gap of tourism development strength between it and its neighboring regions. On the other hand, by exerting its scale and agglomeration effect, tourism growth pole can transfer its tourism information flow, talent flow, capital flow, and tourism flow to the adjacent areas, and then play a driving role in the development of tourism in the adjacent areas. To a certain extent, it enlarges the tourism connection intensity among the tourism nodes and makes the node tourism economic connection model tend to compound network. At the same time, the tourism growth pole theory also provides useful theoretical guidance for less developed tourism areas to develop core tourism nodes by centralizing superior resources through government macrocontrol policies and exerting the regional linkage effect of tourism core nodes on surrounding cities, as shown in Figure 9.

The quality and radiation range of tourism nodes have also expanded significantly. Tourism exchanges and connections between tourism nodes must be supported by the transportation network system, which puts forward higher requirements for the quality and scale of transportation construction (axis). That is, the tourism axis between the nodes will gradually penetrate vertically and horizontally, thereby forming a set of tourism connection networks between multiple nodes. In a word, in the "point-axis" system theory of regional tourism destination, its basic elements include tourism nodes, tourism transportation axis, and tourism element flow [10]. The difference in development strength and industrial structure among tourism nodes is the internal dynamic mechanism for the formation of their agglomeration and diffusion effects. The tourism development axis is the bridge and carrier of the spatial transmission and configuration of the development factor flow between tourism nodes. Tourism element flow is the material and nonmaterial medium of spatial interaction between tourism nodes, as shown in Figure 10.

3.2. Construction of the Coupling Collaborative Evaluation Model of High-Speed Traffic Superiority Degree and Tourism Intensity. The construction of "transport-travel" collaborative evaluation model is the basic work to calculate the coupling coordination degree of high-speed transportation superiority degree and tourism intensity. In the past, few studies have constructed the collaborative evaluation model of the two, which is not conducive to the understanding of the connotation of the coordination degree of transport and travel coupling and the systematic disclosure of its evolution law. High-speed transportation system and urban tourism development have a coupling and synergistic development trend and dynamic interaction process in geographical space, and this trend and process often promote the synergistic effect of transportation and tourism in physical space and virtual space, showing the continuous improvement of the coupling coordination level of transportation and tourism [11]. It is difficult to find an accurate model to evaluate these coupling synergistic relationships. In order to solve this problem, a more flexible evaluation system is needed to analyze the coordination process of "transport-travel", as shown in Figure 11.

The relationship between high-speed traffic advantage degree and intensity of tourism space coupling coordination degree (D), tourism intensity (TI), and high-speed traffic dominance (HST) is not a simple linear, but reflects the process of mutual optimization and integration and reorganization between systems [12]. It is the continuous process of driving reconstruction, mutual integration, and configuration optimization of the intersystem element system that can promote the coupling synergistic effect of high-speed transportation superiority and tourism intensity from low level (extreme imbalance) to high level (excellent coordination), as shown in Figures 12–14.

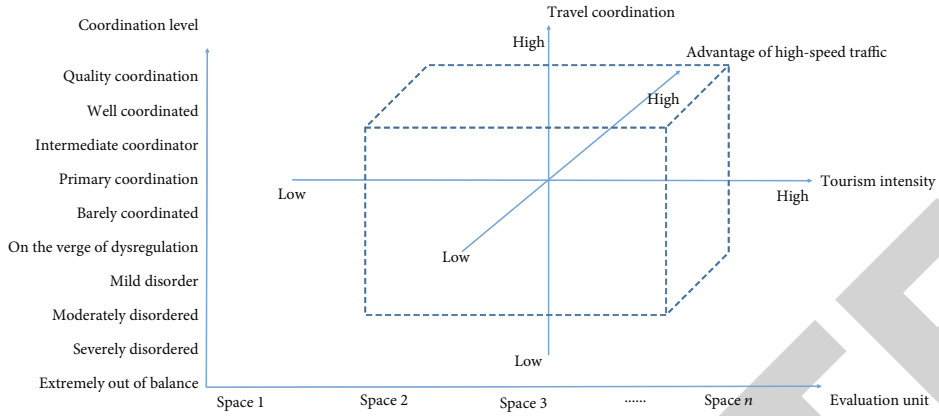


Figure 12: Construction of coupling coordination degree evaluation model.

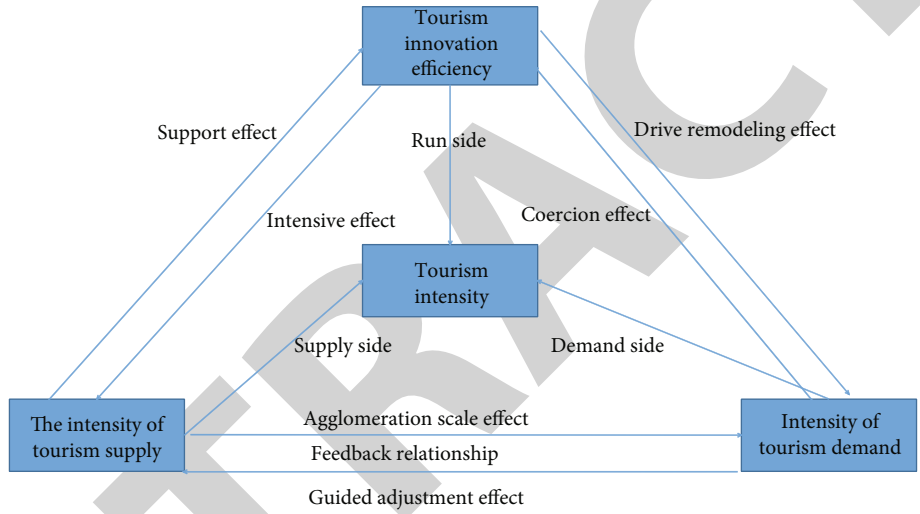


Figure 13: Conceptual model of strength.

4. Thoughts and Suggestions on the Development of Regional Tourism Towns

4.1. Urban Products. With the continuous advancement of China's urbanization process, the level of urbanization has been significantly improved. The urbanization rate is increasing year by year, the construction of urban public infrastructure is improving day by day, and the supply level and capacity of urban public services have been improved to some extent. People enjoy a certain sense of gain and happiness [13]. However, there is no denying that there are also some problems in big cities, such as traffic congestion, shortage of education and medical resources, environmental pollution, group anxiety caused by stylized life pace, great psychological pressure of residents in big cities, and the proportion of people in subhealth state is increasing. On the whole, China's production capacity of modern industrial products has increased, while the supply capacity of ecological products has weakened, as shown in Figure 15.

With the improvement of people's income level and living standard, the demand for fresh air, clean water, pleasant climate, and other ecological products, as well as the demand for leisure and health care seeking spiritual "habitat" and relieving pressure of tourism consumption is increasing day by day. An important reason for the sustainable development of small tourism towns in ethnic minority areas in the upper reaches of Minjiang River lies in the fact that this region can produce and provide characteristic products and play special functions. Relying on the huge population volume of Chengdu-Chongqing urban agglomeration, it forms normal complementarity and communication with the products and functions provided by the large urban agglomeration. In other words, the region offers specific products and features that people in big cities need. Correspondingly, products such as strong and diverse ideas, advanced technological equipment, advanced concepts, convenient official service products, and huge consumer groups infused with postmodern consumer culture in big cities are urgently needed for the development of the region. The two products and functions can complement each other, so as to achieve the continuous dynamic optimization in mutual promotion [14], as shown in Table 2.

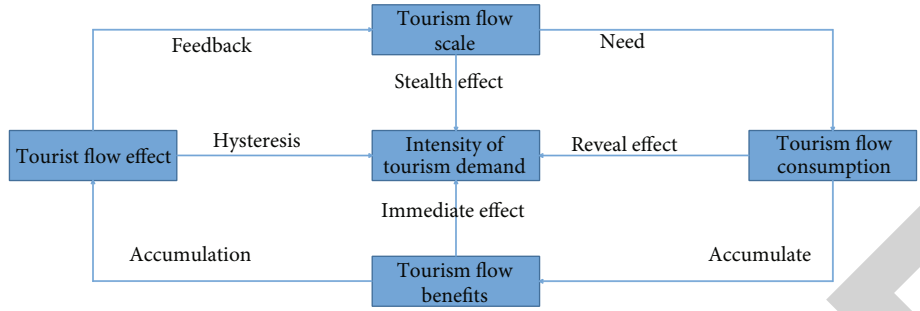


Figure 14: Demand intensity evaluation model.

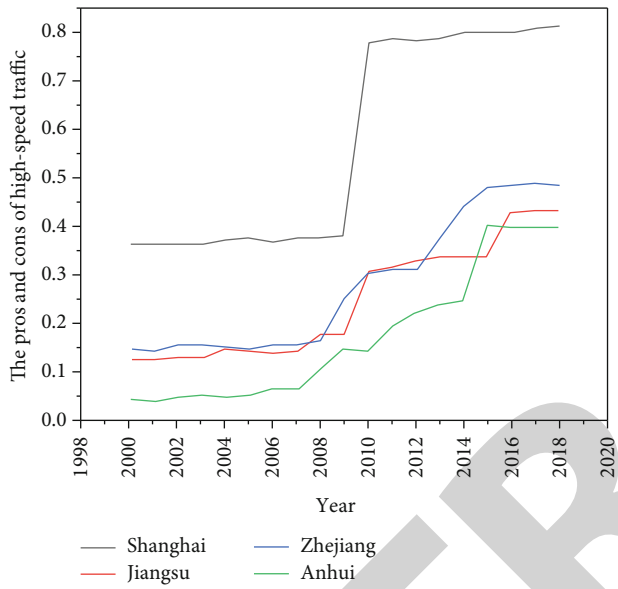


Figure 15: Time change of the comprehensive evaluation index of high-speed traffic dominance degree.

4.2. Product Relationship between Regional Tourism Towns and Large Urban Agglomerations. Tourism small towns in ethnic minority areas in the upper reaches of Minjiang River connect the vast rural hinterland of the region with large urban agglomerations. Based on high-quality characteristic natural tourism resources, they produce and provide high-quality tourism products covering happiness industries. Relying on Chengdu-Chongqing urban agglomerations, they radiate to major urban agglomerations in southwest China and even the whole country. It can meet the needs of people in large urban agglomerations for food safety, green ecological agricultural products, parent-child education, ethnic culture with different characteristics, handicrafts of minority ethnic groups, and other aspects [15]. It is complementary to the products produced and provided by the large urban agglomeration, and the two have formed perfect and regular complementarity in terms of products and functions. The tourism towns in this region and the Chengdu-Chongqing urban agglomeration present their own continuous optimization and upgrading situation through two-way complementarity of products, which promotes the innovation and upgrading of tourism products and the development of tourism industry structure in this region, as well as the economic and social development and the sustainable development of tourism towns in this region. The complementary relationship between the two is shown in Figure 16.

The supply-side structural reform of tourism in ethnic minority areas in the upper reaches of Minjiang River should be actively promoted to improve the supply system structure and quality of tourism products in the region, so as to consolidate the industrial foundation for the sustainable development of small tourism towns in the region. Continuous tourist flow is the fundamental guarantee for the sustainable development of small tourist towns, and the continuous innovation and development of tourism products and their characteristics is the key to attract tourists. The upgrading of tourism product structure and the continuous improvement of tourism product quality are the foundation of the upgrading of tourism industry structure. Due to the inertia of tourism industry, minority areas in the upper reaches of Minjiang River fail to timely adapt to the consumer demand of independent personalized tourism era, and the concept and quality of the main body of the product supply system lag behind the changing trend of consumer demand of tourists for a long time, which affects and restricts the sustainable development of tourism economy in this region [16]. Therefore, it is necessary to innovate and upgrade the supply system of tourism products in this region, so as to promote the innovation and upgrade of tourism industry in this region and consolidate the industrial foundation of tourism towns in this region. Tourism products have obvious characteristics of simultaneous production and consumption and non-transferability, which makes the location conditions and accessibility of tourist destinations become important factors affecting the development of tourism in ethnic areas. The natural and cultural tourism resources and ethnic cultural resources of tourist destinations affect the location conditions to a great extent. The small tourist towns in ethnic minority areas in the upper reaches of the Minjiang River should, based on their own resources and functional positioning, conduct in-depth analysis and research on the characteristics and evolution trends of the individual, differentiated, and autonomous travel consumption demands of consumer groups under the influence of postmodern consumer culture, and implement differentiated tourism development. The strategy focuses on the regional complementarity of the tourism product supply system and the differentiated supply of tourism products, promotes the complementarity, and sharing of tourism resources among

Table 2: Descriptive statistical results of variables.

The variable name	Numbers of samples	Average	Standard deviation	Minimum value	Maximum value
Urban green transformation	880	0.115	0.017	0.074	0.207
Ecological space transformation	880	0.090	0.040	0.021	0.0642
Level of economic development	880	0.242	0.106	0.038	0.759
Technological innovation level	880	1.407	1.427	0.020	15.977
Level of urbanization	880	53.072	12.858	22.600	89.600

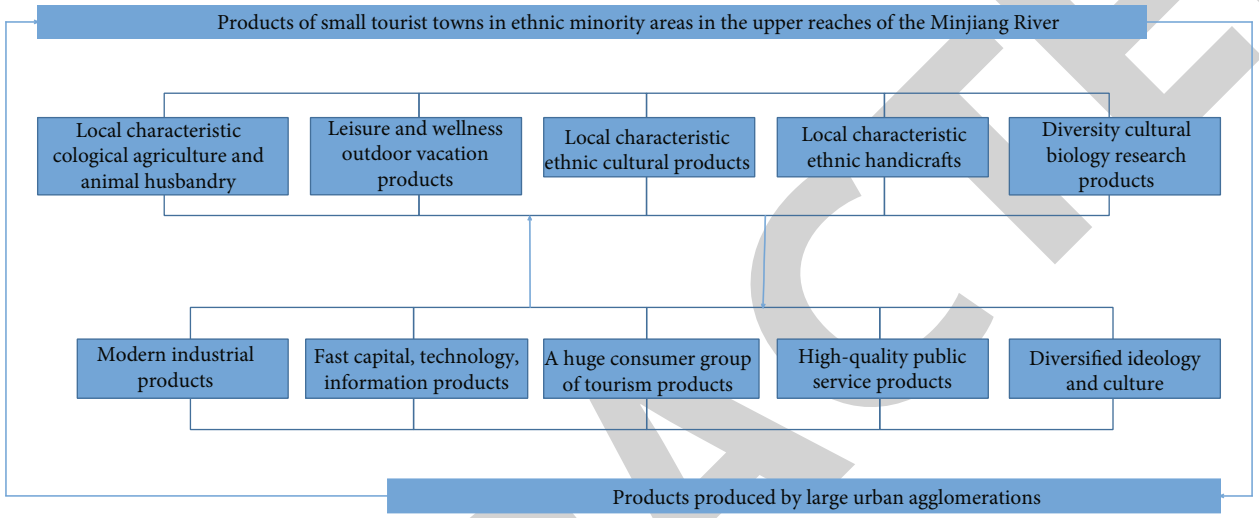


Figure 16: Complementary products of tourism small towns and large urban agglomerations in the upstream ethnic regions.

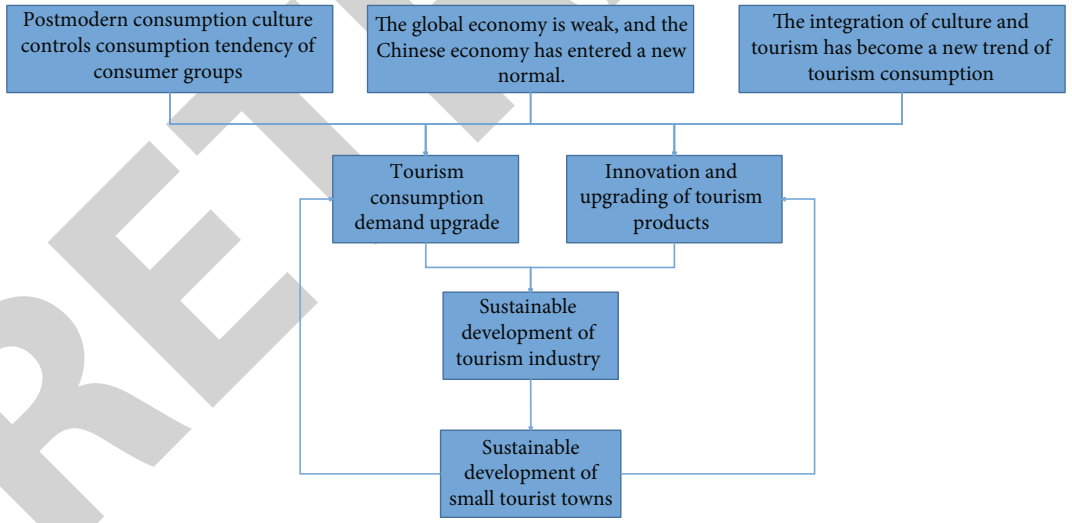


Figure 17: Regional tourism industry development and tourism town development.

small tourist towns, realizes the coordinated development of small tourist towns, and forms a regional tourism development community, as shown in Figure 17.

Culture and tourism are like poetry and distance. People's consumption level is constantly improving with the increase of income level; the same is true of tourism consumption. At first, it is the popular tourism consumption level, and with the cultural level of mass tourists, the tourism consumption level is increasing to the cultural consumption level. Visitors enter the new normal economic development; tourism consumption groups gradually show a trend of younger, self-independence, and individuation. The function elements in tourism are also greatly expanded and improved [17]. People pay more attention to the individuation of the travel experience and identity, group identification function. Therefore, the supply of personalized experiential tourism products can not only meet people's basic consumption needs for tourism to achieve the function of tourists' leisure

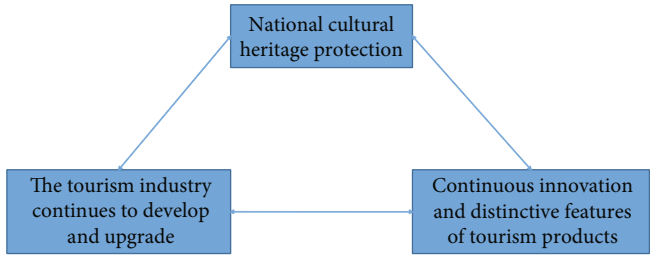


Figure 18: Cultural inheritance and protection and tourism development.

and entertainment but also drive tourists to personalize tourism experience to achieve the purpose of "experience it with the body and experience it with the heart" [18]. It can also promote tourists to consume personalized experience tourism products, realize the function of tourist group identification and identity identification, and maximize the expansion functions and benefits of tourism. In addition, when planning and designing small tourist towns in the region, the differentiated national culture of the region should be integrated with modern architectural technology and art, and the special identification of national culture should be integrated into the urban construction. Combined with the regional natural environment, thematic image, and the characteristics of national culture, the planning and construction of urban characteristic cultural blocks, architectural styles, etc., implementing the concept of global tourism, the characteristic architecture, culture, and art of the local ethnic group are fully demonstrate to make the ethnic characteristic architecture and urban landscape become an important part of the attractiveness and brand image of small tourist towns [19, 20], as shown in Figure 18.

5. Conclusions

Excellent natural ecological environment is an important environmental support for the development of tourism. Excellent natural ecological environment itself is tourism resources, which can be developed into tourism products and extend the industry chain of tourism industry. At the same time, it can serve as environmental support for other tourism products, provide benign development space for the development of tourism in the region and the construction of tourism towns, and participate in the production and supply of tourism products in the region, becoming an important part of the tourism product system in the region. Therefore, it is necessary to strengthen ecological environment protection and environmental restoration in minority areas of the upper reaches of Minjiang River to provide environmental support for the development of tourism towns in this area. Building unique and outstanding traditional culture based on regional economy is abundant resources in national regions of the upper reaches of Minjiang river, the continuous culture source power of the region's tourism product innovation and development, the source of the core of the regional tourism products attractive tourism in the construction of small towns in the region, and the cultural source of highlighting its local characteristics. For the innovation and upgrading of tourism products, the sustainable development of tourism industry and the continuous promotion of tourism small towns in this region, the advantage resources of ethnic characteristic culture must be grasped, which has the most vitality. The stability and harmony of soft environment in minority areas in the upper reaches of Minjiang River depends on the effect of social governance. A stable and harmonious social environment is the social guarantee for the steady development of tourism in this region and the continuous promotion of tourism towns. The development of tourism depends on a safe and stable social environment. With the development of tourism in ethnic areas, a large number of tourists flood in, resulting in a variety of contradictions and disputes due to cultural differences, conflicts of interests, and other reasons. The uneven distribution of benefits brought by the development of tourism economy also leads to the increase of contradictions among the people in small tourist towns. If this situation is not managed well, it will inevitably affect the sustainable development of tourism in this region and the healthy development of tourism towns.

Rural revitalization and new-type urbanization, the two national strategies will have a significant impact on the economic and social development of China's rural areas, especially the ethnic minority areas in the upper reaches of the Minjiang River for a long period of time. Therefore, small tourist towns in this region, as well as economic and social development, national culture protection and inheritance, and rural grass-roots governance are research hotspots and directions for further research in this region. The research is expected to make due contributions to the economic and social development of the region. In view of the insufficient application of measurement methods in the research, it will continue to be improved according to my own actual situation, so as to conduct an in-depth research on the region.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

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Retraction

Retracted: Labor Culture and Ecological Environment: The Renewing Path of the Nurturing Concept of "Nurturing Talents for the Country" in Labor Education

Journal of Environmental and Public Health

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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 the 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 given the opportunity to register their agreement or disagreement with this retraction. We have kept a record of any response received.

References

[1] W. Hu and K. Ma, "Labor Culture and Ecological Environment: The Renewing Path of the Nurturing Concept of "Nurturing Talents for the Country" in Labor Education," *Journal of Environmental and Public Health*, vol. 2022, Article ID 6563526, 12 pages, 2022.

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Research Article

Labor Culture and Ecological Environment: The Renewing Path of the Nurturing Concept of "Nurturing Talents for the Country" in Labor Education

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It is the responsibility of colleges and universities to nurture talents for the country. In the final analysis, the purpose of teaching, scientific research, and social services in colleges and universities is to educate people. The study of labor education, in the face of the important historical opportunity of transformation, is a theoretical representation of labor education and its value choice. The answer to this question can help us clarify the meaning of labor education and improve the scientific and systematic practice of labor education. Labor education in colleges and universities has an important and extensive value significance for cultivating contemporary college students, which can not only inspire students to study hard in science and culture, master their skills, and grow their talents but also guide them to firm ideals and beliefs, exercise good character, and cultivate the emotional experience of labor so that contemporary college students can integrate the pursuit of life values with the great cause of national prosperity and national rejuvenation and integrate the beautiful vision of personal ambition and family happiness with the good cause of collective, social, and national interests. This paper is based on the background of the times. Therefore, this paper studies the labor culture and ecological environment from the background of the times: the path of renewing the concept of "cultivating talents for the nation" in labor education. It also gives a profound discussion on labor education in high schools and finally puts forward relevant suggestions for the problems.

1. Introduction

The study of labor education is a theoretical representation of labor education and its own value choice in the face of the important historical opportunity of the transformation of the times. They can combine their personal ambition and family happiness with the community of development and destiny, which integrates collective, social, and national interests [1]. It is of theoretical and practical significance to strengthen the research on the innovation of labor education methods in colleges and universities in the new era. The effect of labor education is influenced by the purpose, content, subject and object, environment, carrier, and other aspects. Although labor education is characterized as "education," its implementation path is not only based on the school curriculum but also emphasizes the practice of labor education. China has a long history of providing labor education courses [2]. At present, although the relevant opinions issued by the Party Central Committee and the implementation of the relevant planning outline have made important arrangements and top-level design for labor education in colleges and universities, there is still a need for in-depth discussion on the innovation of labor education in colleges and universities. In terms of labor education theory research, the basic connotation, important significance, and institutional mechanism of innovation of labor education methods in colleges and universities in the new era need to be explored in depth [3].

2. Research Background

General Secretary Xi Jinping has made a profound discussion on labor education. The discourse explains the important status

of labor education, which is not only a way for the comprehensive development of youth but also takes up the historical responsibility of working together with moral, intellectual, physical, and aesthetic education to cultivate qualified newcomers of the times [4]. Colleges and universities should assume the main responsibility of organizing and guiding the development of students' ideological education in order to promote the reform and innovative development of labor education, cultivate the labor sentiment of contemporary college students, and make the cause of national rejuvenation obtain the dedicated participation of a batch of qualified talents [5].

It is the responsibility of colleges and universities to nurture talents for the country. In the final analysis, the purpose of teaching and conducting scientific research and social services in colleges and universities is to nurture people. Since the 18th National Congress, Xi Jinping has repeatedly requested to make efforts in labor education, so as to strengthen the cultivation of labor values and make college students realize the truth that "labor is the most honorable, noble, and beautiful." To strengthen the moral cultivation, we must cultivate the excellent labor quality of college students and teach them to struggle hard, work honestly, innovate, and dedicate; to increase knowledge and insight, we must strengthen the cultivation of scientific labor skills and labor practice training, so as to move forward in the right direction of seeking the truth, understanding the truth and understanding things; to cultivate the spirit of struggle, we must strengthen social labor practice, further. To make efforts in cultivating the spirit of struggle, we should strengthen social labor practice, further promote the integration of industry and education, and solidly promote college students to truly grasp hard work and take up struggle in the social melting pot; to make efforts in enhancing comprehensive quality, we should give full play to the comprehensive educational value that labor naturally possesses and organically incorporate labor education into the teaching system of comprehensive development [6].

It is conducive to promote the practical development of labor education way innovation in colleges and universities in the new era. The practice of labor education in colleges and universities in the new era is still at the initial stage, and there are many difficult problems that need to be solved. Innovation of labor education methods to the effectiveness of labor education. "What contents should be taught in school education and what ways should be adopted to impart these contents to students, so as to stimulate students' interest in knowledge to reach educational goals." The innovation of labor education methods can solve the problem of how to teach labor education and how to attract students, as a way to enhance the modernity and scientificity of labor education methods [7].

3. Materials and Methods

3.1. Basic Theories

3.1.1. Labor Education. The General Secretary's important discourse on labor education is of great significance in improving the concept of five education and three comprehensive education, while this discourse is an important part of the development and improvement of the Marxist labor education ideology under the new stage and new conditions, which is of great significance in helping students to establish good moral character and has important theoretical significance for the long-term development of China's education [8], as shown in Figure 1.

Labor education is a very important part of it, and it is important for promoting moral, intellectual, physical, and aesthetic education, and Xi Jinping's important discussion on labor education is important for promoting the implementation of the "five education" concept of comprehensive development [9].

To cultivate morality through labor, the formation of a person's moral character is mainly influenced by his acquired education and experience. In the ancient times, "Heaven is healthy, and a gentleman is self-improving." In the ancient times, "Heaven is healthy, and a gentleman is strong by self-improvement," emphasizing the formation of moral character through diligence and hard work. "Therefore, if Heaven will give a great task to a man, he must first suffer his heart and mind and labor his muscles and bones." It can be seen that labor has always been closely related to character building, and General Secretary Xi Jinping called for the promotion of labor education to promote people to establish the good virtues of perseverance, hardship, and hard work in serious and practical labor and in ordinary daily work, to enhance the sense of social responsibility and morality of workers, and to promote moral construction [10].

Increasing wisdom with labor, the composition of people's knowledge mainly includes direct experience and indirect experience, both of which have the same status and importance. Indirect experience is the experience of the previous people; the experience that has been summarized and organized by others to form literal theories and conclusions. Direct experience is the experience that individuals gain through their own actual feelings and experiences in practical activities and behaviors. Indirect experience gives people theoretical guidance and basic direction and is the absorption of valuable human knowledge, while direct experience is the experience people accumulate directly in real life, which has the characteristics of more intuitive, more visual, and more vivid. In order to grow into a fully developed and socially progressive person, it is far from enough to learn knowledge from books and to learn only from the words in books, but it is necessary to accumulate enough direct experience to obtain real growth. Labor activity is an important practical activity for human beings to gain direct experience, in which people increase their technical skills to cope with different situations and problems and constantly sum up the methods to solve various problems.

Strengthening the body with labor. Mao Zedong pointed out the importance of strong national body and strong will for national development and national rejuvenation. A strong body is the basis and prerequisite for people to do all work well, and the body is the capital of revolution. The physical quality of young students is not only about their personal future and development but also about the overall quality of the nation, which is an important symbol of the development and prosperity of a country and the happiness of its people. Through labor education, organization of labor activities, and labor courses, we can help students get exercise in labor

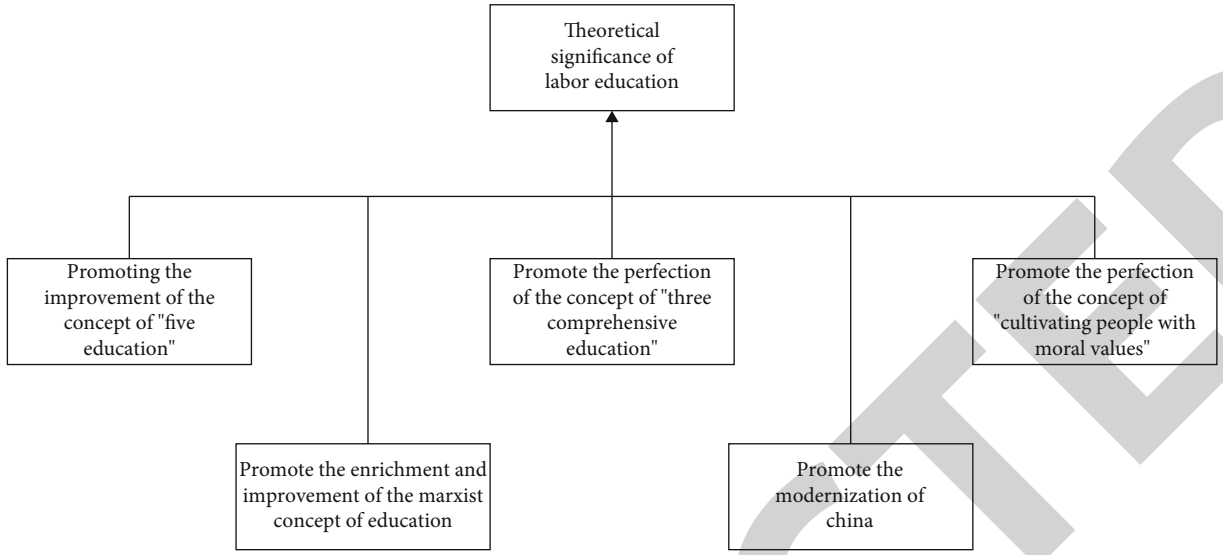

Figure 1: Theoretical significance of labor education.

activities, strengthen their physical strength, and create conditions for their work development.

Educating beauty through labor, the beauty of a person includes both inner and outer beauty. On the one hand, carrying out labor education and guiding students to participate in labor activities can strengthen students' physique, increase students' vitality, help students maintain a balanced and slim physique, and promote students to face life with a high and upward appearance, thus increasing students' external beauty. On the other hand, by organizing students' labor and participating in practical activities, it can help students forge a good character of hard work, diligence, and courage, cultivate the labor spirit of dedication and excellence, lay a good foundation for students to shine in their future positions, help students realize their self-worth through labor, enhance their sense of gain, satisfaction, and achievement in life, enhance their self-confidence, and show their youthful power. It also helps students to enrich their inner beauty.

Xi Jinping's important statement on labor education promotes the scientific education concept of "three-wide education." The requirement of "three-whole education" is to educate the whole person, the whole process, and the whole range of people. The implementation of labor education is essentially the implementation of the concept of "three-wide education." First of all, the purpose of integrating labor education into the whole process of human resource training, from elementary school to university, is to integrate labor into all processes of education and teaching, which reflects the idea of nurturing people in the whole process. In the process of labor education, we follow the objective laws of education and progress step by step, helping students to establish correct labor concepts by promoting correct labor values, enriching labor knowledge and improving labor quality by establishing labor courses, improving labor skills by organizing labor activities, gradually advancing from labor concepts to labor knowledge to labor skills, and integrating labor education in all aspects and processes of education and teaching. Secondly, we advocate that labor education is not only the responsibility of schools but also requires the cooperation of families and the support of society. Labor education is not only the responsibility of schools but also the responsibility of families and society, and the effective promotion of labor education cannot be achieved without the joint efforts and cooperation of all three parties. By organizing students' household activities and helping their parents to solve some trivial household tasks, families foster the correct awareness of paying attention to personal health and hygiene, develop good habits of hard work, improve students' skills of independent living, and get rid of students' extreme dependence on their parents and families [11]. Schools improve students' ability to master labor knowledge and theory through labor courses and labor knowledge education, while society helps students improve their labor ability by providing them with a platform for practical and labor activities, helping them to further complete the socialization process and become high-quality talents who can adapt to the development and needs of society. It can be seen that the promotion of labor education cannot be separated from the efforts of any party in school, family, and society and requires the coordination and systematic optimization of all parties in school, family, and society, and insisting on the coordination of all parties in family, school, and society is an important embodiment and perfect development of the scientific education concept of "three comprehensive education" [12]. The five-education, three-whole concept is shown in Figure 2.

3.1.2. "Nurturing Talents for the Country" Concept. "Nurturing talents for the country" is the fundamental task of talent cultivation in China. In ancient times, China advocates "cultivating oneself, preparing one's family, ruling the country, and pacifying the world," emphasizing that the governance of political clarity and harmony should start from the internal moral cultivation of individuals. Eventually, the world will be governed [13]. Xi Jinping's emphasis on "understanding great virtue, abiding by public virtue, and being strict with private virtue" specifies the requirements and contents of moral cultivation of character in "cultivating

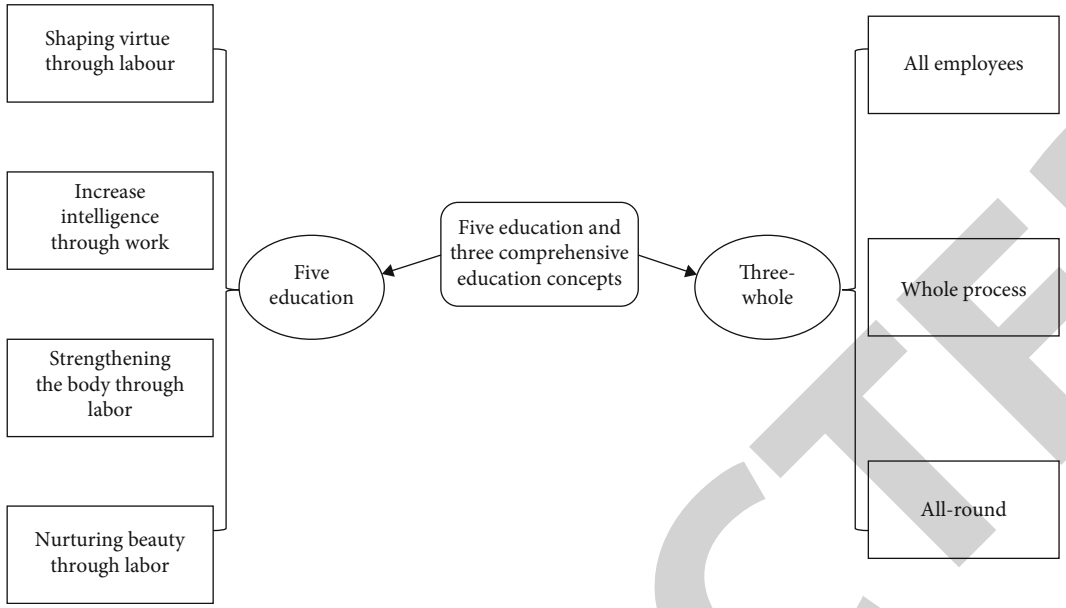

Figure 2: The five-education and three-whole philosophy.

talents for the country." Labor is an important practical activity that sustains human survival and development, and labor morality is an important part of personal morality. Through labor education, students are helped to develop good moral character by making their own efforts to gain from simple labor activities, so as not to make any mistake about their names. The goal of "education for the nation" is implemented. Unlike the education and teaching of theoretical knowledge, labor education is a kind of practical education, which helps students learn by doing and practice by learning. Through organizing students to carry out labor practice activities, grassroots posting activities, and social volunteer activities, students can improve their level of facing challenges and overcoming difficulties, sharpen their willpower of perseverance, enhance their ability to help others and repay society, and cultivate their character of putting others before themselves and actively contributing to society. We also aim to enrich the content of the education concept of education for the country. It is not enough to cultivate students' character only from theoretical knowledge, students can have a basic idea of character, but theoretical knowledge is too abstract and lack real feeling and experience of character establishment. The students will be able to understand the spirit of hard work, courage, courageousness, and perseverance. Students are helped to integrate these good virtues into their own practice, to get rid of the stereotypical impressions and senses of establishing good virtues, and to form their own true feelings about serving others and society [14].

On the one hand, Marx and Engels followed the laws of materialistic dialectics to emphasize the need to achieve a combination of productive labor and education and to cultivate people who achieve comprehensive development in all aspects, highlighting the importance of labor for social progress as well as personal advancement [15]. On the other hand, Xi Jinping has made many visits and explorations to improve and practice Marx and Engels' thought of labor education on the basis of the current situation of China's educational development and the process of social development and has made a new judgment and positioning of the value of labor education in the era, by guiding the people to form a correct concept of labor, improving the labor literacy of the working masses, realizing the cultivation of character and forging will through labor, and improving people's intelligence through labor activities. Through labor activities, people's intellect is enlightened, their discernment is improved, their physical condition is improved, and their personality is enhanced through labor, and the Marxist concept of labor education is made practical, concrete, and enriched by incorporating labor education into the whole process of human resources training, throughout the school years from elementary school to university, and in all aspects. These important statements specify the essence of labor education and, in the process of practice, insist on following the pursuit of truth and basing on facts, build a good platform for students to grow in labor and practice, provide ways to practice labor, improve students' social life skills, and raise their labor level. Encourage students to dare to go out of their comfort zone and carry out some meaningful and valuable work in places where the development of the motherland is urgently needed, help students resist temptation in the complicated society, establish a correct outlook on life, worldview and values, and make labor education take on a new look in the new era.

3.1.3. Ecological Environment Improvement Theory. Habitat is the environment suitable for human habitation. With rapid population growth, people's living conditions are deteriorating, and the problem of human settlements is of increasing concern [16]. Both developed and developing countries face the same human settlement problems: overpopulation, underfunding of basic services, inadequate housing, and deteriorating infrastructure; 40 to 50 percent of the world's population lives in slums [17].

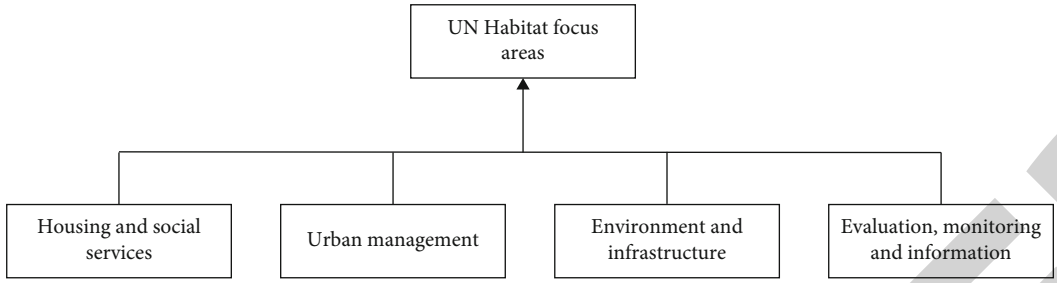

Figure 3: Habitat focus areas of work.

UN-HABITAT was established in 1978 as the leading agency within the UN system for coordinating human settlement development, supporting and collaborating with governments, local authorities, nongovernmental organizations and the private sector to promote global human settlement development [18], as shown in Figure 3.

First, the majority of low-income people in all regions of the world do not have access to adequate housing and social services. In developing countries, at least 600 million urban dwellers live in poor conditions with inadequate access to drinking water, sanitation, hygiene, and waste disposal, which pose a constant threat to their lives and health. One million urban dwellers are forcibly evicted from their homes each year, bringing the number of homeless people to an estimated 100 million. Habitat assists in the development of policies, strategies, and supply systems for housing and social services. The center promotes the full and progressive realization of the right to housing through the development of appropriate housing policies with community participation and calls on governments to remove institutional and regulatory constraints that impede access to land and housing.

Second, by the year 2000, half of the world's population will be living in cities. By 2030, the urban population will be twice as large as the rural population. Rapid urbanization, concentration of urban populations in large cities, massive urbanization, and rapid expansion of megacities are among the most important changes of our time. As a result, the development of almost every country today will depend to a large extent on its ability to manage its cities. Recognizing that local authorities may be the most effective partners in building more productive, equitable, and sustainable urban areas, the center is committed to working closely with local authorities and other city administrations to implement the Habitat Agenda at the city level.

Once again, urban development related to the environment and infrastructure can provide important opportunities for sustainable development, as cities can effectively accommodate large numbers of people in a limited space. However, without proper planning and management of the environment and infrastructure, cities will become major sources of air pollution, water pollution, poor sanitation, and serious health, environmental, and economic problems caused by human activities and natural disasters. Determined to improve people's living conditions, it supports governments, local authorities, and communities in planning, implementing, and maintaining infrastructure and services in urban and rural human settlements and promotes the development of local environmental policies, especially in the areas of water supply and waste management, wastewater treatment, transportation, and energy.

Finally, through its Global Urban Observatory, the center monitors and oversees implementation at the global level through two main monitoring tools, the Best Practices Project and the Urban Indicators Project. The results of these observations are published in the State of the World's Cities Biennial Report. The center's worldwide press offices, targeted information materials, the Internet, and its two main periodicals, the Global Report on Human Settlements and the Habitat Debate, have contributed to raising awareness of the sustainable development and urban agenda for political change in favor of society as a whole, as well as economic and environmental issues in an urbanizing world [19]. The development of eco-environmental theory has evolved in three stages as shown in Figure 4.

3.2. Main Evaluation Methods. In this paper, an ant colony algorithm is used to perform relevant calculations and evaluations of the study. The specific calculations of the cluster optimization algorithm are shown below.

The density peak-based clustering algorithm is to select cluster centroids based on ρ_i the measure of δ_i great local density and large distance and to divide the data by quickly searching for cluster centers and assigning noncluster center samples to the clusters where the nearest neighboring data points with greater local density than them are located [20]. The algorithm has two important metrics.

Local density, let ρ_i the dataset $D = (X_1, \cdots, X_n)$ be for each data in $X_i = (1, 2, 3, \cdots, n)D$ calculate its local density value, defined as

$$\rho_i = \sum_j e^{-dij/dc}. \tag{1}$$

The distance between and high density δ_i points is the minimum value i of the Euclidean ρ_i distance between those points selected among all data points whose local i densities are larger than the data points, and the formula is shown in

$$\delta_i = \min_{j:\rho_j > \rho_i} \left(d_{ij}\right), \tag{2}$$

where d_{ij} is i the j Euclidean distance between the data and d_c is the truncation distance, in general, the distance between all data in ascending order after taking the first 1% to 2% of the distance as the truncation distance.

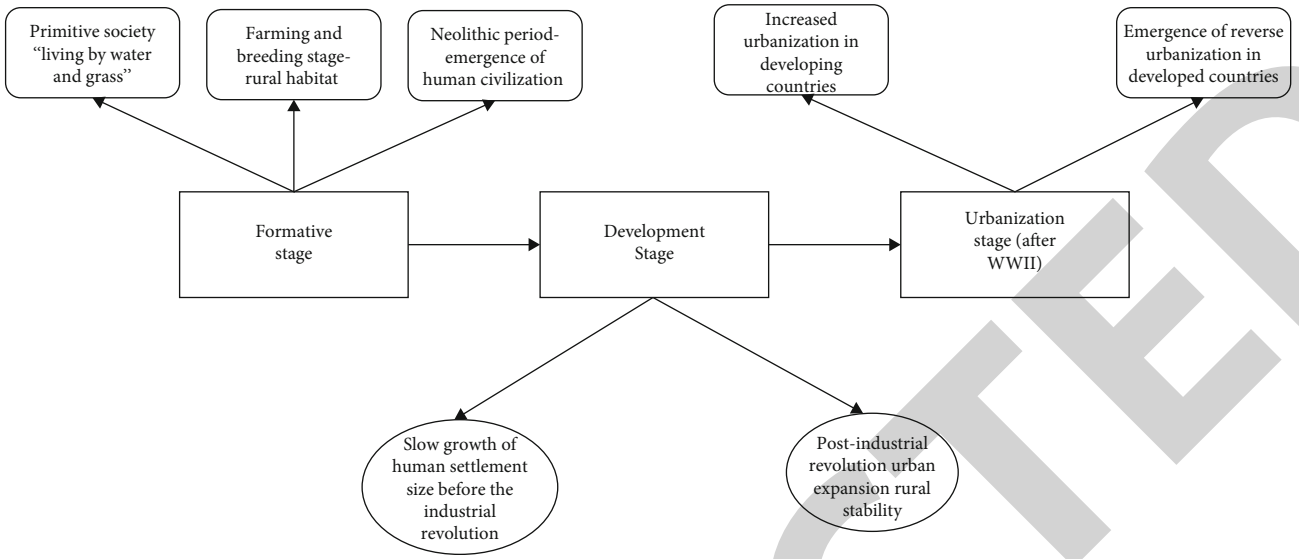

Figure 4: History of the development of ecological and environmental theory.

According to the above definition to calculate the corresponding value, ρ as the horizontal coordinates, as the vertical coordinates to generate a decision diagram, the determination of the cluster center requires a larger local ρ_i density and a larger and high-density δ_i point between the distance, that is, the cluster center is generally located in the upper right position of the decision diagram.

4. Results and Discussion

4.1. The Real Situation of Cultivating Labor Values among College Students in the New Era. "It is not easy to learn on paper, but it is necessary to do it by oneself." In order to explore the problems of labor values of college students in the new era, this research conducted a questionnaire survey and carefully sorted them out in order to understand the current situation of the cultivation of labor values of contemporary college students through the actual survey and, on this basis, explore the reasons that hinder the progress of the cultivation of labor values and then provide some targeted strategies for the cultivation of labor values of college students. The answers to the above questions depend on the actual survey, so the conclusions of the article are based on the empirical research, mainly in the form of a questionnaire.

Having a correct knowledge of the connotation of labor lays a good foundation for the establishment of labor values. After the survey, it is found that college students at this stage can know the connotation of labor more correctly, but there is also a situation that they cannot understand labor in the new era accurately. In the survey on the connotation of labor, 46.92% of students think that labor is the activity of doing physical or mental work and creating material and spiritual wealth, 30.38% of students think that labor is the basis of social survival and development and a special form of human activity, and only 10.19% of students think that labor is the process of producing material materials, as shown in Figure 5.

In the understanding of the act of labor, according to the survey results, hard work, daily life labor, and internship, and practical training are all considered to be representatives of labor. This is shown in Figure 6.

In addition, 83.86% of the students think that there is no difference between high and low level of occupation, and no matter what kind of occupation they are going to engage in, as long as they work hard, they deserve respect. 68.65% of the students think that "labor is the most beautiful, glorious, great, and noble," 33.85% of the students think that mental labor is better than physical labor, 21.92% of the students think that there is no need to promote the spirit of hard work in the new era, and 5.19% of the students think that housework is a matter for parents, so there is no need for children to interfere, as shown in Figure 7.

From this, it can be seen that most college students have a more correct perception of labor, but there are still a small number of students who do not have a clear and accurate perception of labor. The majority of college students can understand the connotation of labor more correctly and have a more accurate cognition of labor.

The majority of college students have a more accurate understanding of the value and choice of labor, and they can judge the role of labor in social development more correctly. In the new era, labor plays a very important role in social development, and the cognition of the role of labor can promote college students to make more correct value judgment. Regarding the value choice, on the one hand, take employment as an example. In response to the question of "what kind of job do you prefer after graduation?" In this question, most of the students prefer stable, interesting, and mental labor, and only 9.62% of them choose physical labor, which shows that most of the college students are still not willing to engage in physical labor. With the development of science and technology and the characteristics of the new era of college students, the type of labor represented by mental labor and stable labor has become the direction that the "00" college students pursue nowadays. Most of the students prefer second- and third-tier cities, their

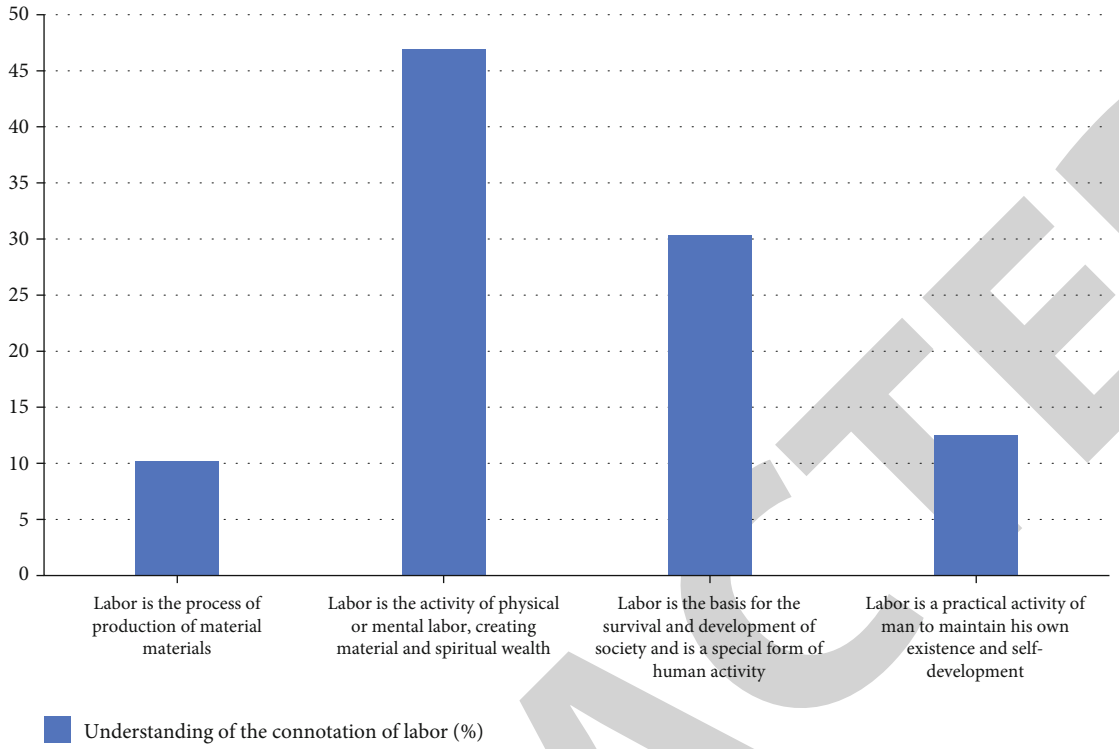

Figure 5: Understanding of the connotation of labor.

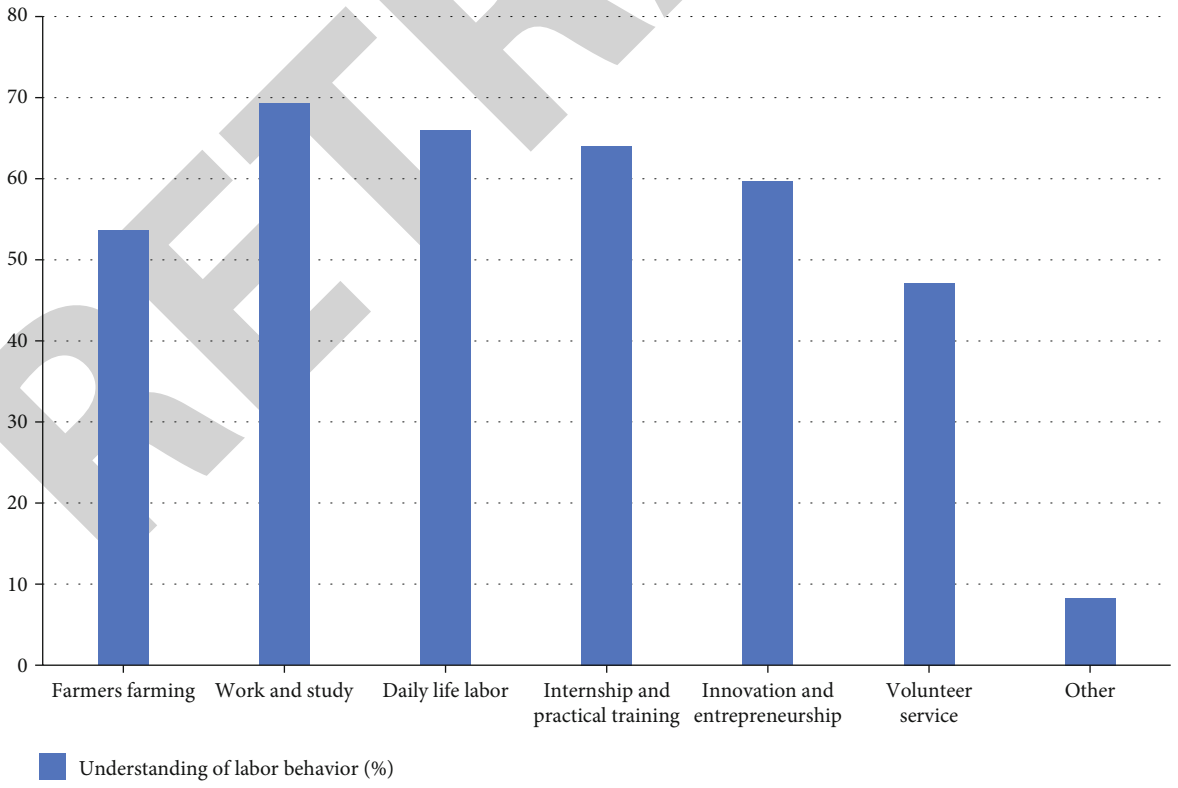

Figure 6: Understanding of labor behavior.

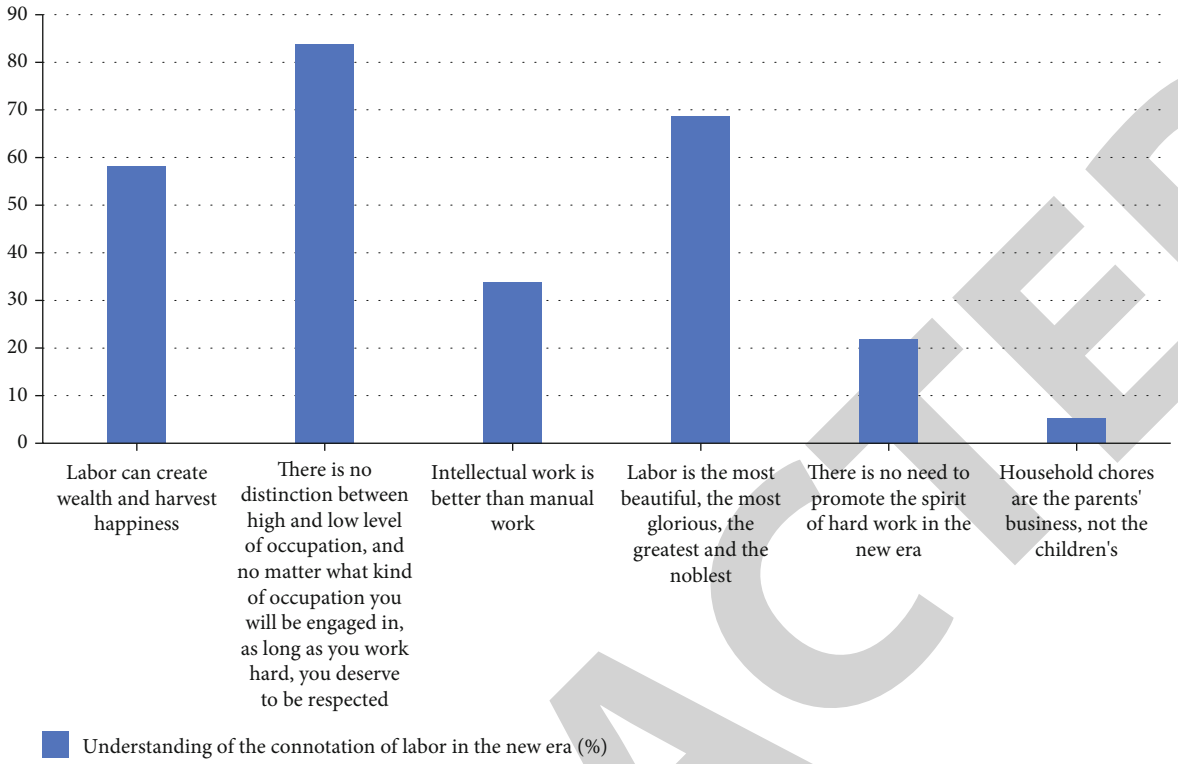

Figure 7: Understanding of the connotation of labor in the new era.

hometowns, and first-tier cities such as North, Shanghai, and Guangzhou, and only a small proportion of them choose remote areas such as Northwest China. The first choice, in addition, the main factors that affect the career choice of college students are welfare treatment, personal development space, whether the major is in line with personal interests, and the overall strength of the company, while social status has little influence on the new generation of college students, accounting for less than 20%. This shows that the new-age college students care more about the economic value brought by labor, which is a true reflection of the wealth value that labor can create, and they pay more attention to the future development, which shows that the new-age college students have their own clear plans for labor and pay less attention to the social status brought by labor to themselves. This is of great practical significance to their future development.

In addition, this paper also researches the development of the concept of "cultivating talents for the country" through the development of labor culture dissemination and ecological environment improvement. The study found that with the dissemination of labor culture and the improvement of ecological environment, the concept of "nurturing talent for the nation" has developed greatly, but the overall impact of the improvement of ecological environment on the concept is not as good as that of the dissemination of labor culture. This is shown in Figure 8.

4.2. Suggestions for Strengthening the Innovation of Labor Education in the New Era. How to make efforts in the innovation of labor education in colleges and universities and turn the tasks given by the times into practical actions, it is necessary to pay attention not only to the concept of strengthening the innovation of labor education but also to the majestic power brought by practical activities. Colleges and universities should face new problems and challenges, cooperate with multiple subjects to form a scientific value whole with internal and external linkage, so as to explore an effective path for innovation of labor education methods in colleges and universities in the new era.

(1) Implement the spirit of innovation and enhance the innovative concept of colleges and universities. The innovation practice is led by the innovation concept, and whether the innovation concept is strong or not fundamentally determines the innovation effectiveness and even success or failure. To promote the innovation of talent development system and policy, colleges and universities should raise the banner of innovation of labor education method, focus on the central link of "educating talents for the country," study and implement the spirit of innovation of labor education method as a whole, realize the idea first, let all teachers and students deeply experience the deep meaning of innovation of labor education method, and promote. The innovation of labor education method is internalized into spiritual pursuit and externalized into practical action

In-depth study of General Secretary Xi Jinping's important discourse on innovation, through teacher training, thematic report meetings, and thematic class meetings, we will study the spirit and rich connotation of the innovation of

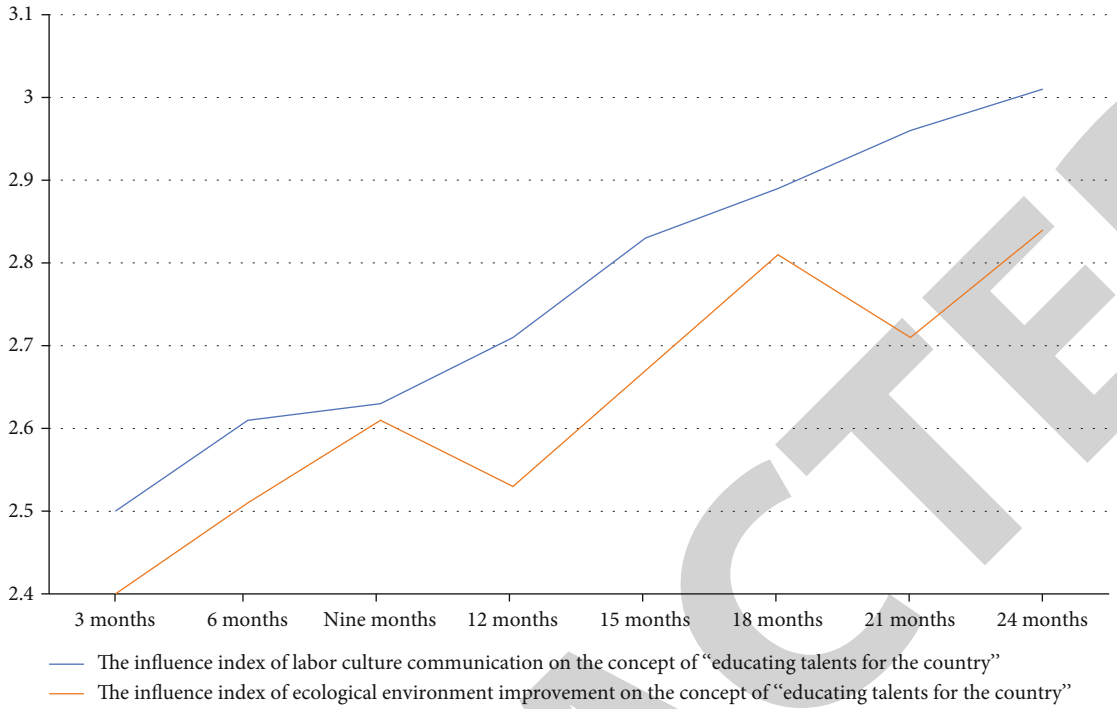

Figure 8: The influence of labor culture dissemination and ecological environment improvement on the concept of "cultivating talents for the nation."

labor education methods in the new era in depth and implant the innovation of labor education methods deeply into our minds so that teachers know how to innovate and have the ability to innovate. To enhance students' innovative ideas, we can carry out labor education-themed entrance education activities during the new students' entrance stage, convey the spirit and stories of model workers to students, and invite outstanding labor representatives of our school to tell the deeds of model workers at the training site so that students feel more intimate and the education effect is more obvious. Be a good advocate of the concept of innovation in labor education methods, pay attention to establishing the concept of innovation in labor education methods among teachers and students, and guarantee the efficient promotion of innovation in labor education methods.

(2) To carry out thematic training, teachers are the practitioners of the innovation of labor education methods, and a correct understanding of the innovation of labor education methods is an important prerequisite. If teachers do not have a deep enough understanding of the labor education approach, they are bound to operate deformation in the practice of labor education approach innovation. To achieve innovation in labor education methods in this context, it is necessary to change teachers' cognition of innovation in labor education methods. Colleges and universities should strengthen teachers' professional training to enhance their cognition of labor education approach innovation. Motivate teachers to be active in the innovation of labor education methods and take the initiative to contribute their own strength to the innovation of labor education methods

(3) Promote the awareness of innovation and strengthen students' innovative ideas. In the new era, China is in the stage of high-quality development, and the country needs talents with innovative ideas to achieve innovative development and should pay attention to the innovation of labor education methods. Students in the new era should focus on solving problems that cannot be solved by existing methods and approaches, always with a sense of worry and innovation, and also focus on solving and preventing new problems and challenges to be faced in the future, combining the spirit of innovation with the attitude of seeking knowledge and enhancing the confidence, courage, and ability to cultivate innovation

4.2.1. Keeping in Mind the Original Intention of Nurturing Talents for the Country, Strengthen the Sense of Innovation in Labor Education Methods. In recent years, the development of colleges and universities also puts innovation in the core position, deeply explores the advantages of using resources, makes efforts to strengthen the construction of innovative colleges and universities, and promotes the national innovation-driven development to achieve new breakthroughs. It is deeply aware of the changes in the innovation environment of labor education methods, further optimizing the innovation environment of labor education methods, enhancing the innovation consciousness of labor education methods, and accelerating the pace of construction of innovative universities.

Implement the spirit of innovation and enhance the innovative concept of colleges and universities. The concept is the precursor of action, and the innovation practice is led by the innovation concept, and whether the innovation concept is strong or not fundamentally determines the innovation effectiveness and even success or failure. To promote the innovation of talent development system and policy, colleges and universities should raise the banner of innovation of labor education method, focus on the central link of "educating talents for the country," study and implement the spirit of innovation of labor education method as a whole, realize the idea first, let all teachers and students deeply experience the deep meaning of innovation of labor education method, and promote. The training will help teachers and students deeply appreciate the deeper meaning of the innovation of labor education methods and promote the innovation of labor education methods to be internalized into spiritual pursuit and externalized into practical action.

To carry out thematic training, teachers are the practitioners of labor education innovation, and a correct understanding of labor education innovation is an important prerequisite. If teachers do not have a deep enough understanding of labor education methods, they will definitely operate deformation in the practice of labor education method innovation. In this context, in order to realize the innovation of labor education method, it is necessary to change teachers' cognition about the innovation of labor education method. Higher education institutions should strengthen teachers' professional training to enhance their cognition of labor education approach innovation.

Propagate the awareness of innovation and strengthen students' innovative ideas. Strengthen the concept of innovation, expand scientific knowledge, and promote the unity of knowledge and action. College students' minds are not yet mature enough to use scientific theories to discriminate when facing the intrusion of undesirable external trends in order to avoid themselves from falling into the whirlpool of finalization and secularization. Continuously optimize the way and method of learning, improve the consciousness of learning, and enhance cultural self-confidence. Adhere to the practice of linking theory with practice, actively learn to master scientific and cultural knowledge, use the deeds of model workers to inspire themselves, use the power of role models to spur themselves on, use excellent traditional culture to inculcate themselves, learn from the advanced to love their jobs and strive for first-class dedication, and lay down the fundamental guarantee of establishing themselves and building the foundation of serving the country.

4.2.2. Establish and Improve Institutional Mechanisms to Stimulate the Innovation of Labor Education Methods

(1) Form a guarantee mechanism to ensure innovation conditions. The innovation of labor education methods in colleges and universities depends on the leadership of innovative ideas and scientific and reasonable evaluation system. At the same time, it also needs the support and guarantee of conditions in all aspects. Organizational attention, reasonable staffing mechanism, financial investment, and sufficient practice sites are all necessary to ensure the innovation of labor education methods

Scientific organization and implementation mechanism of labor education, according to the requirements of the documents about strengthening labor education, colleges and universities seriously implement the spirit of the documents and include the innovation of labor education methods in the labor education plan, taking into account the actual local conditions. The leaders of colleges and universities should establish a sound labor education organization and implementation work mechanism, clarify the hierarchical supervisors, and specify the responsibilities of each department to guarantee the orderly development of labor education. For example, Zhengzhou Shengda College of Economics, Trade, and Management makes clear the leaders in charge in the labor education implementation system, establishes a labor education management organization—Labor and Health Section, and also has two full-time personnel to supervise and oversee the implementation of labor education so that the implementation is carried out at all levels and responsibilities are assigned to people, which effectively improves the problem of vapid labor education way innovation.

(2) Writing the effect of labor education into the evaluation index of colleges and universities to improve the motivation of innovation of labor education methods in colleges and universities, quality assessment of higher education is a concern of college reform. Although higher education teaching assessment has effectively promoted high-quality development of higher education institutions, it also presents many problems. For example, the subjects of assessment are not diversified and scientific enough, and colleges and universities perform passively. In order to stimulate the independent creativity and initiative of colleges and universities, they should be encouraged to combine the advantages of our university and build unique and attractive colleges and universities. Let colleges and universities get comprehensive, active, and sustainable development and stimulate the independent innovation ability of colleges and universities. The government should also take the initiative to give policy support and pay attention to the educational function of assessment. The phenomenon of vain and weak innovation of labor education methods in colleges and universities is largely due to the fact that the leaders of colleges and universities do not pay enough attention to the innovation of labor education methods. Therefore, the effect of labor education can be included in the important indexes of higher education evaluation, so as to stimulate the enthusiasm of labor education method innovation

(3) The objectives of evaluation should be in line with reality. Colleges and universities should fully grasp the law of college student development and the law of education development, clarify the development stage and environment in which the university is located, and

combine their own development plans and goals. The form of assessment should be diversified, reflecting quantitative and taking into account qualitative, adding self-assessment and other assessment. In a fixed period of time, an evaluation team composed of teachers, students, and expert teachers is set up to give a comprehensive evaluation of the implementation of labor education for students. This kind of evaluation can provide visual feedback on the effect of labor education and facilitate the labor education guidance department to update the indicators of evaluation in time

4.2.3. Deepen Offline-Online Integration and Broaden the Innovative Platform of Labor Education Methods. The diversification of labor education contents determines the diversification of labor education methods. With the development of the times and the progress of information technology, the content of labor education has become more colorful, and "online learning" has become the learning method of many students. This also determines that the innovation of labor education methods should be made in the direction of integrating online and offline and broadening the platform for innovation of labor education methods.

Integrating labor education courses into on-campus labor practices, there are many real labor practice opportunities on campus. The content of labor education courses can be combined with dormitory hygiene cleaning, logistics work, cafeteria work, campus greening, and also with assistant supervisors, assistant teachers, on-campus tour guides, and exhibition lectures to provide students with labor practice opportunities and enrich the content and methods of labor education courses. Adhere to the orientation of nurturing people and always take cultivating the new man of the times as the goal of education. Grasp the value orientation of labor education, fully respect the characteristics of students' subjects, guide students' love for labor, advocate the democratization of the choice of labor education methods, and fully mobilize students' enthusiasm. In order to improve the attractiveness of labor education courses and enrich labor education methods, Zhejiang Agriculture and Forestry University has opened four labor education on-campus practice courses, including learning to cook fish with a famous chef, planting trees and flowers with a green master, and learning storage with a host teacher. Henan University of Technology explored a new model of labor+education, playing the role of school logistics, online "basic maintenance of life," "dormitory life experience," and other labor education "new classroom."

The labor education courses are conducted online and offline with the full use of integrated media resources. With the development of science and technology, education and teaching are also being reformed. Modern network technology has played a good role in education, and the teaching content has been integrated with intelligent elements so that students can enjoy colorful teaching content. Course theory teaching has been as an important form of teaching. Therefore, colleges and universities should actively use network resources, use intelligent technology, and innovate labor education methods. By combining with network resources, the classroom does not have the boundary of inside and outside the school. The innovative curriculum approach will improve the labor education approach system and fully realize the important function of curriculum education.

5. Conclusion

The innovation of labor education methods in colleges and universities is crucial. In the new era, colleges and universities cultivate knowledge-based, technical, and innovative talents with comprehensive development, which can effectively enhance the core competitiveness of college students in employment. Labor education plays an important role in the goal of comprehensive development education, and it is reasonable to conduct systematic research on the innovation of labor education methods in colleges and universities to enhance the effectiveness of labor education in colleges and universities and accelerate the realization of the Chinese dream of great innovation of the Chinese nation. Through the research on the innovation of labor education methods in colleges and universities in the new era, the core connotation and value implication of the innovation of labor education methods in colleges and universities in the new era are deeply understood. Based on the broad perspective of integrating theory and reality, General Secretary Xi Jinping pointed out the historical responsibility and mission of the times that colleges and universities shouldered and gave the target orientation and basic direction for the innovation of labor education methods in colleges and universities in the new era. The effect of innovation of labor education methods in colleges and universities maps the development direction of future society. Although the overall innovation of labor education methods in colleges and universities is good, there are still phenomena of deficiency, weakness, simplicity, and fragmentation. The reasons for the problems of labor education innovation in colleges and universities include five aspects: the innovation of labor education in colleges and universities emphasizes general propaganda, light on specific practice and continuity of inheritance, innovation of revolution and imitation, originality of characteristics and rich content, development of carrier, local breakthrough, and overall promotion. On this basis, colleges and universities should bear in mind the original intention of educating talents for the country and enhance the awareness of innovation of labor education methods among teachers and students. The innovation of labor education methods should be emphasized in the preservice and postservice training of teachers, and the innovation of labor education methods should be promoted in the entrance training and daily class meetings of students. In order to stimulate the vitality of labor education method innovation in colleges and universities, colleges and universities should form guarantee mechanism, formulate incentive mechanism, standardize evaluation system, promote curriculum integration, broaden practice channels, and tap network resources as a way to broaden the platform of labor education method innovation. In cooperation with families, schools, and society, we should strengthen the communication between them and join hands with each other to optimize the environment of labor education innovation. In the new era, the innovation of labor education in colleges and universities faces great opportunities, and the strategic

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Research Article

Study on the Effect of Straw Mulching on Farmland Soil Water

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Straw mulching farming is currently an effective dry farming technique for improving arid soil environments. Straw mulching technology can increase the infiltration capacity of soil water and improve crop yield and water use efficiency. In this study, the aim is to improve the soil water holding capacity, water retaining capacity, and comprehensive water use efficiency of crops in dry farmland. First, the response surface model is used to study and analyse the optimal parameters of straw returning and its mulching technology, and then, the crop yield, water consumption, and comprehensive water use efficiency of spring corn under different mulching conditions during 2017-2019 are studied. The test results show that the optimized parameters obtained by the response surface model are as follows: film thickness is 0.03 mm, straw returning amount is 4500 kg/hm^2, straw particle size is 5 mm, and straw returning depth is 25 mm. At this time, the maximum soil water storage can reach 404.50 mm. The results of the straw mulching test show that under 4500 kg/hm^2 mulching, the soil has more water storage, higher soil water content, and a simultaneous increase in water consumption, which is conducive to the efficient use of limited precipitation by crops. The field experiment for three years shows that 4500 kg/hm^2 straw (wheat) mulching in the dry farming area of southern Ningxia can better store water and protect soil moisture, promote the virtuous cycle of farmland soil water, and show outstanding performance in improving corn yield and water use efficiency, which can be popularized and implemented in spring corn production in this area.

1. Introduction

Straw return to the field is an effective field fertilization technology to improve soil moisture, physical and chemical properties, and fertility to improve crop yield and quality. Straw return to field technology can not only solve the environmental pollution and resource waste caused by straw burning and stacking but also greatly promote the sustainable, circular, and healthy development of the rural planting industry [1–4]. Straw mulching farming is currently an effective dry farming technique for improving arid soil environments. Straw mulching technology can strengthen the accumulation of soil organic matter, increase soil water infiltration capacity and effective reservoir capacity, adjust soil temperature, improve crop yield and water use efficiency, etc. [5, 6]. However, the effects of straw mulching techniques on crop yields are quite different under different amounts of straw mulch, different soil types, and different tillage practices, and yield reductions under crop protection tillage practices have distinct regional characteristics [7]. In addition, some studies show that an unreasonable mulching amount and method can easily produce negative effects on crop growth and development, which leads to yield reduction. Therefore, the main problems existing in straw returning and mulching technology need to be further studied [8–10].

Based on this, this study selects the dry farming area in southern Ningxia as the research area, aimed at improving the soil water holding capacity and retaining capacity and comprehensive water use efficiency of crops. First, the response surface model is used to study and analyse the optimal parameters of straw returning and its mulching technology. Based on the optimal parameters, spring corn crops are selected as the research object, and the crop yield, water consumption, and comprehensive water use efficiency of spring corn under different mulching conditions during 2017-2019 are studied to provide a theoretical basis for the promotion and application of straw mulching technology in this type of region.

2. Materials and Methods

2.1. Overview of the Test Area. In this study, the dry farming area in southern Ningxia is selected as the research area. The annual precipitation in the selected test area is approximately 400-500 mm, and the rainy season is concentrated in the four months of June, July, August, and September. The selected area is rich in light and heat resources, with an average annual temperature of 6-15°C. The selected soil is loess. The average bulk density of the soil at a depth of 0-50 cm is 1.25 g/cm^3, the pH value of the soil varies from 7.6 to 8.1, the field water holding capacity is approximately 25.33%, the fertility is relatively low, and the contents of organic matter and total nitrogen in the soil are approximately 8.03 g/kg and 0.36 g/kg, respectively. The selected research time was three consecutive years from 2017 to 2019, and the effective rainfall of crops in the sowing and seedling periods was 270.9 mm, 294.2 mm, and 366.5 mm, respectively.

2.2. Test Scheme Design. In this study, spring corn was selected as the test variety, and the field planting test was carried out by film mulching+straw mulching. Before the formal test, the interaction rule between the parameters, such as film thickness, straw returning amount, straw particle size, and straw returning depth, used in straw returning to the field was analysed by the response surface model to obtain the optimal parameters of straw returning to field (the design of test parameters is shown in Table 1).

Then, using the optimized parameters, a test on soil water consumption and crop water comprehensive use efficiency with different straw mulching amounts was carried out. The test took planting without straw mulching as a control (CK), and then, with other parameters unchanged, the straw mulching amounts of 3000 kg/hm^2 (E1), 4500 kg/hm^2 (E2), and 6000 kg/hm^2 (E3) were taken as test groups, and each group was repeated three times at random.

2.3. Test Items and Data Statistics. The main indexes tested in this study mainly include soil water storage, crop water consumption, and the comprehensive water use efficiency of crops [11–13], and the calculation formulas of each index are as follows:

(1) Soil water storage is an important index reflecting the water storage capacity of soil, and its calculation formula is

$$W = \frac{(H \times A \times B \times 10)}{100}. \quad (1)$$

W is the soil water storage, mm; H is the soil depth, cm; A is the soil bulk density, g/cm^3; and B is the soil water content, %.

(2) Crop water consumption (ETa) reflects the water consumption of crops in the growth process, and its calculation formula is

Table 1: Factor level design scheme of the response surface method.

Experiment factor	Coded value	Factor level and coding design		
		-1	0	1
Film thickness (mm)	A	0.01	0.02	0.03
Straw returning amount (kg/hm^2)	B	3000	4500	6000
Straw particle size (cm)	C	3	5	7
Straw returning depth (cm)	D	15	25	35

$$\mathrm{ETa} = \mathrm{SG} + P + W_1 - W_2 - R - D. \quad (2)$$

ETa is crop water consumption, mm; SG is groundwater consumption, mm; W_1 is soil water storage before sowing, mm; W_2 is soil water storage after harvest, mm; and R and D are runoff and leakage, respectively, mm.

(3) WUE is a vital index reflecting the relationship between crop material production and water consumption. The calculation formula is

$$\mathrm{WUE} = \frac{Y}{ETa}. \quad (3)$$

WUE is the comprehensive use efficiency of crops, kg/(mm·hm^2); Y is crop yield, kg/hm^2; and ETa is soil water consumption.

3. Results and Analysis

3.1. Optimization of the Straw Mulching Scheme in Farmland Soil

3.1.1. Mathematical Modelling. Taking film thickness A, straw returning amount B, straw particle size C, and straw returning depth D as four influencing factors of the response surface model and taking the soil water storage amount before sowing R as the response value, Design-Expert 10 software was used to design a four-factor three-level test to discuss the interaction rules of each process parameter on soil water storage under straw mulching. The test design results are shown in Table 2. It can be seen from the table that within the selected parameter range, the change range of soil water storage is 303.5 mm~395.6 mm.

3.1.2. Variance Result Analysis. According to the Box-Behnken Design (BBD) in the response surface method, variance analysis of the test model was carried out, and the results are shown in Table 3. It can be seen from the data in the table that the binary multiple regression model of soil water storage has $F = 28.77, P < 0.01$, which indicates that the model has significant differences and can be used to optimize the test parameters of soil water storage under straw mulching. In this study, the best response surface model was obtained by regression analysis of the above data, using soil water storage R as the objective function. Then, the

Table 2: Response surface test design and results.

Test number	Influencing factors				Soil water storage (R)
	Film thickness (A)	Straw returning amount (B)	Straw particle size (C)	Straw returning depth (D)	
1	0.01	4500	5	35	320.8
2	0.03	4500	7	25	395.6
3	0.03	4500	3	25	392.5
4	0.02	4500	5	25	357.6
5	0.02	4500	7	35	375.6
6	0.03	3000	5	25	383.5
7	0.02	4500	5	25	360.2
8	0.02	6000	5	15	370.3
9	0.03	4500	5	15	386.7
10	0.01	4500	5	15	325.4
11	0.02	3000	5	15	340.5
12	0.01	3000	5	25	303.5
13	0.02	3000	7	25	342.4
14	0.02	6000	5	35	374.2
15	0.02	4500	5	25	358.4
16	0.02	4500	5	25	356.7
17	0.02	3000	5	35	346.2
18	0.03	6000	5	25	390.5
19	0.02	4500	5	25	357.5
20	0.02	4500	3	35	370.8
21	0.01	6000	5	25	329.7
22	0.02	6000	7	25	373.2
23	0.03	4500	5	35	390.4
24	0.02	3000	3	25	345.6
25	0.01	4500	7	25	326.9
26	0.02	4500	7	15	334.5
27	0.01	4500	3	25	330.1
28	0.02	6000	3	25	378.8
29	0.02	4500	3	15	366.4

insignificant items in the model were eliminated to obtain the final model, and its quadratic multiple regression equation was $R = 358.08 + 33.57A + 12.92B - 3C + 4.52D - 4.8AB + 9.17CD$.

3.1.3. Result Analysis of the Response Surface Model

(1) Interaction of Film Thickness and Straw Returning Amount on Soil Water Storage. Figure 1 is the response surface model of film thickness and straw returning amount to the soil water storage under straw mulching. It can be seen from the figure that under the condition of keeping straw particle size and straw returning depth unchanged, the soil water storage gradually increases with the increase in film thickness while showing a trend of first rising sharply and then increasing gently with the increase in straw returning amount. The use of mulching can reduce the evaporation rate of water to a certain extent, and the mulching rate gradually decreases with increasing film thickness so that the soil water retaining capacity increases, and the water storage also increases [14]. On the other hand, with the same film thickness, the increase in straw returning amount can significantly improve the soil water holding capacity, which makes the soil water storage increase with the increase in straw returning amount, but when it increases to a certain extent, the soil water storage will not further increase [15]. In addition, from the contour map, it can be clearly observed that the effect of the amount of returned straw on soil water storage is significantly higher than that of film thickness, and the interaction between them is obvious.

(2) Interaction of Film Thickness and Straw Particle Size on Soil Water Storage. Figure 2 shows the response surface model of film thickness and straw particle size to soil water storage. It can be seen from the figure that with the same straw returning amount and straw returning depth, the soil water storage increases slowly with increasing film thickness, while it shows a trend of first increasing and then slowly decreasing with increasing straw particle size. To some extent, the increase in straw in the soil will affect the contact area between the soil particles and change the bulk density of the soil. In this test, with the increase in straw particle size,

Table 3: Variance analysis results of soil water storage under straw mulching.

Source	Sum of squares	df	Mean square	F value	P value
Model	16593.83	14	1185.27	28.77	<0.0001**
A—film thickness	13520.65	1	13520.65	328.17	<0.0001**
B—straw returning amount	2002.08	1	2002.08	48.59	<0.0001**
C—straw particle size	108	1	108	2.62	0.1277
D—straw returning depth	244.8	1	244.8	5.94	0.0287*
AB	92.16	1	92.16	2.24	0.157
AC	9.92	1	9.92	0.24	0.6312
AD	17.22	1	17.22	0.42	0.5284
BC	1.44	1	1.44	0.035	0.8544
BD	0.81	1	0.81	0.02	0.8905
CD	336.72	1	336.72	8.17	0.0126
A^2	46.5	1	46.5	1.13	0.306
B^2	35.14	1	35.14	0.85	0.3714
C^2	126.87	1	126.87	3.08	0.1011
D^2	2.32	1	2.32	0.056	0.816
Residual	576.8	14	41.2		
Lack of fit	569.74	10	56.97	32.24	0.0022
Pure error	7.07	4	1.77		
Cor total	17170.63	28			

Note: ∗ indicates a significant difference, $P < 0.05$; ∗∗ indicates extremely significant.

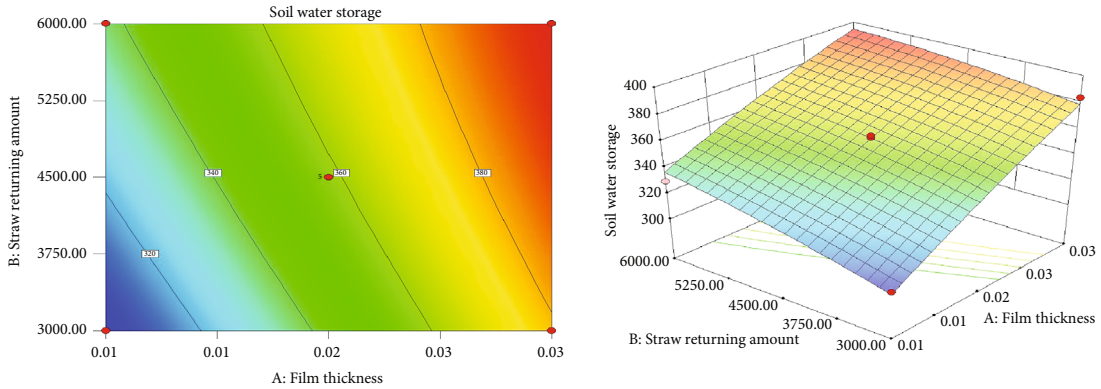

Figure 1: Contour map and 3D model of the effect of film thickness and straw returning amount on soil water storage.

the compactness of the soil will decrease, and the pore structure will increase, so the bulk density will also decrease, resulting in an increase in the soil water holding capacity. Then, the straw particle size continues to increase, but the soil water holding capacity decreases to a small extent because although the bulk density of the soil is reduced with larger particle size, the dissipation space of water molecules in the soil also increases, and the soil water retaining capacity decreases, so the soil water holding capacity decreases [16, 17]. In addition, from the contour map, it can be found that the effect of film thickness and straw particle size on soil water storage is basically the same, and the interaction between them is not obvious.

(3) Interaction of Straw Returning Amount and Straw Particle Size on Soil Water Storage. Figure 3 shows the response surface model of the straw returning amount and straw particle size to soil water storage. It can be seen from the graph that, keeping film thickness and straw return depth constant, soil water storage increases sharply and then slows down as the amount of straw returned to the field increases, while an increase in straw particle size causes soil water storage to increase and then decrease. Combined with the contour map and 3D model, it can be seen that the difference in the effect of the amount of returned straw on the soil water storage is more obvious than that of the straw particle size. In addition, there is an obvious interaction between the

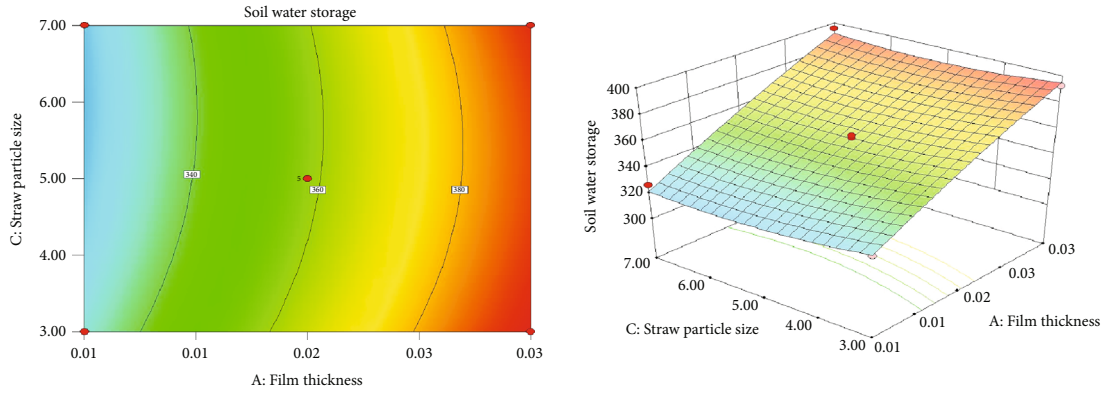

Figure 2: Contour map and 3D model of the effect of film thickness and straw particle size on soil water storage.

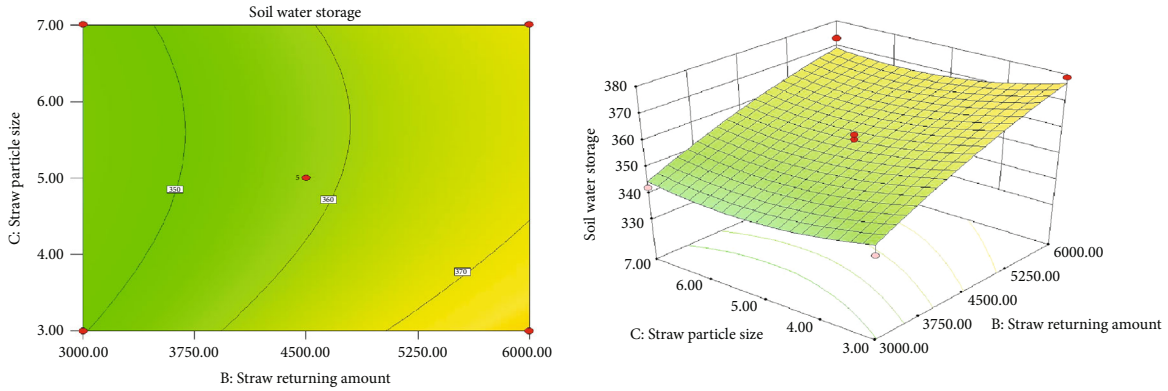

Figure 3: Contour map and 3D model of the effect of straw returning amount and straw particle size on soil water storage.

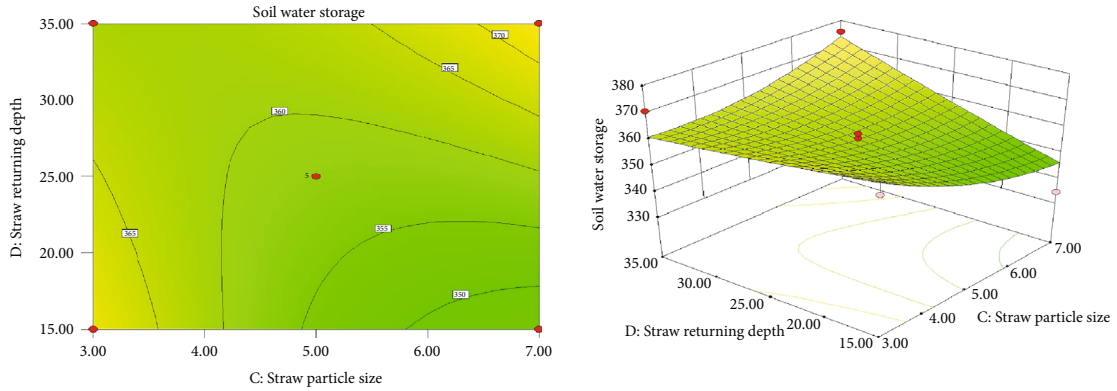

Figure 4: Contour map and 3D model of the effect of straw particle size and straw returning depth on soil water storage.

straw returning amount and straw particle size, which forms a "climbing" shape between them.

(4) Interaction of Straw Particle Size and Straw Return Depth on Soil Water Storage. Figure 4 shows the response surface model of straw particle size and straw returning depth to soil water storage. It can be seen from the figure that under the condition of constant film thickness and straw returning amount, the soil water storage increases first and then decreases with the increase in straw particle size and decreases gently with the increase in straw returning depth. Due to the difference in water content at different soil depths, the straw returning depth will also affect the soil water storage to a certain extent. In this test, the soil water content slightly decreases with increasing soil depth, but the decrease difference is not obvious, which also makes the difference in soil water storage between the parameters of returning depth not obvious [18, 19]. In addition, it can be seen from the contour map that there is a certain degree of interaction between straw particle size and straw returning depth, but the interaction is not significant.

Table 4: Crop yield, water consumption, and comprehensive water use efficiency under different test conditions in the last three years.

Year	Treatment	Yield (kg/hm^2)	Water consumption (mm)	WUE (kg/(mm·hm^2))
2017	CK	4768.65	276.3	17.26
	E1	4908.7	270.9	18.12
	E2	5426.43	292.8	18.53
	E3	5564.34	295.5	18.83
2018	CK	4307.65	243.8	17.67
	E1	4896.24	255.9	19.13
	E2	5309.85	273.4	19.42
	E3	5558.27	274.1	20.28
2019	CK	5699.78	308.2	18.49
	E1	6087.72	317.9	19.15
	E2	6409.88	325.7	19.88
	E3	6736.12	322.5	20.68

In summary, to improve the soil water storage, by response surface model analysis, the optimized process parameters obtained by this study are as follows: film thickness 0.03 mm, straw returning amount 4500 kg/hm^2, straw particle size 5 mm, and straw returning depth 25 mm. At this time, the maximum soil water storage can reach 404.50 mm.

3.2. Effects of Different Straw Mulching Amounts on Water Consumption and Water Use Efficiency of Farmland Crops

3.2.1. Trends in Crop Yield. The crop yield during the three years is shown in Table 4. It can be seen from the table that the effects of different straw mulching treatments on crop yield are obviously different in the three-year period. In 2017, the crop yields of the E1, E2, and E3 treatment groups increased by 2.94%, 13.79%, and 16.69%, respectively, compared with the CK group. In 2018, the crop yields of the E1, E2, and E3 treatment groups increased by 13.66%, 23.27%, and 29.03%, respectively, compared with the CK group. In 2019, the crop yields of the E1, E2, and E3 treatment groups increased by 6.81%, 12.46%, and 18.18%, respectively, compared with the CK group. After three years, the E2 and E3 treatment groups showed significant differences compared with the control group ($P < 0.05$), while E1 showed no significant difference compared with the control group ($P > 0.05$). It is worth noting that under the same test treatment, the precipitation in the growth period of crops in 2018 was higher than that in 2017, but the crop yield was lower, which may be due to the severe drought in the first quarter of 2018, affecting the growth of crops in the seedling period. Although there was more rain in the second quarter, it was not enough to completely compensate for the negative impact of the previous drought on crop growth [20].

3.2.2. Trends in Soil Water Consumption. Under the influence of precipitation distribution and ambient temperature, the water consumption of crops in different years is also different (as shown in Table 4). The rainfall period in 2017 was mainly distributed in the early stage of crop growth, so the water consumption of crops under each test condition was E3 > E2 > CK > E1, among which the difference between the E1 and CK treatment groups was not obvious ($P > 0.05$), while compared with CK, the difference between E2 and E3 was obvious ($P < 0.05$). The rainfall period in 2018 was mainly distributed in the middle and late stages of crop growth, so the water consumption of crops under each test condition treatment was E3 > E2 > E1 > CK, and the water consumption of each test treatment increased by 30.3 mm, 29.6 mm, and 12.1 mm, respectively, among which the difference between the E2 and E3 treatment groups was obvious compared with the CK group ($P < 0.05$). In 2019, the rainfall period was evenly distributed, and the water consumption of crops under each test condition was E2 > E3 > E1 > CK. Compared with the CK group, the water consumption of each test treatment increased by 17.5 mm, 14.3 mm, and 9.7 mm, respectively, but there was no significant difference between the E2 and E3 treatment groups ($P > 0.05$).

3.2.3. Trends in Comprehensive Water Use Efficiency of Crops. Comprehensive water use efficiency is an index used to evaluate the growth and decline relationship among crop yield, transpiration water consumption, and surface water evaporation. Table 4 shows that in 2017, the comprehensive water use efficiency of the E3, E2, and E1 test groups increased by 9.10%, 7.36%, and 4.98%, respectively, compared with that of the CK group. In 2018, the comprehensive water use efficiency of the E3, E2, and E1 test groups increased by 14.77%, 9.90%, and 8.26%, respectively, compared with that of the CK group. In the past two years, the differences between the E3 and E2 treatment groups were significant ($P < 0.05$), E1 was not significant ($P > 0.05$), and E3 and E2 and E1 had no significant differences between the CK group ($P > 0.05$). In 2019, the comprehensive water use efficiency of each treatment group increased by 11.84%, 7.52%, and 3.57% compared with CK, among which E3 and E2 had significant differences compared with CK ($P < 0.05$), while E1 had no significant differences ($P > 0.05$), and E3 and E2 and E1 had no significant differences between the CK groups ($P > 0.05$).

In summary, under 4500 kg/hm^2 mulching, the soil has more water storage, higher water content, and higher water consumption, which is conducive to the efficient use of limited precipitation by crops, thus increasing the spring corn yield. Field experiments over three years show that 4500 kg/hm^2 straw (wheat) mulching in the dry farming area of southern Ningxia can better store water and protect soil moisture, promote the virtuous cycle of farmland soil water, and show outstanding performance in improving corn yield and water use efficiency, which can be popularized and implemented in spring corn production in this area [21, 22].

4. Conclusion

(a) The test results show that the optimized parameters obtained by the response surface model are as follows: film thickness is 0.03 mm, straw returning amount is 4500 kg/hm^2, straw particle size is 5 mm, and straw returning depth is 25 mm. At this time, the maximum soil water storage can reach 404.50 mm

(b) The field experiment for three years shows that 4500 kg/hm^2 straw (wheat) mulching in the dry farming area of southern Ningxia can better store water and protect soil moisture, promote the virtuous cycle of farmland soil water, and show outstanding performance in improving corn yield and water use efficiency, which can be popularized and implemented in spring corn production in this area

Data Availability

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

Conflicts of Interest

The author declares no competing interests.

Acknowledgments

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Retraction

Retracted: Analysis of the Influence of Library Information on the Utilization of Regional Environmental and Ecological Resources: From the Perspective of Intelligent Adaptive Learning

Journal of Environmental and Public Health

Received 20 June 2023; Accepted 20 June 2023; Published 21 June 2023

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] S. Jiang and X. Yang, "Analysis of the Influence of Library Information on the Utilization of Regional Environmental and Ecological Resources: From the Perspective of Intelligent Adaptive Learning," *Journal of Environmental and Public Health*, vol. 2022, Article ID 1110105, 12 pages, 2022.

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Volume 2022, Article ID 1110105, 12 pages
https://doi.org/10.1155/2022/1110105

Research Article

Analysis of the Influence of Library Information on the Utilization of Regional Environmental and Ecological Resources: From the Perspective of Intelligent Adaptive Learning

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In order to further develop and improve the management theory of public libraries, this paper studies the impact of library information on the utilization of regional environmental resources from the perspective of intelligent adaptive learning. Firstly, based on the data envelopment analysis method, this paper measures the efficiency of Public Libraries in various regions of China. Then, using Tobit model, this paper analyzes the environmental factors affecting the efficiency of public libraries from three aspects: financial allocation, per capita GDP, and per capita years of education. The results show that there is a significant correlation between per capita GDP, per capita years of education, and the efficiency of public libraries. There is a significant negative correlation between per capita GDP and public library efficiency (the coefficient is $-5.73\text{x}10^{-6}$, and the probability of two-sided t-test is 0.0229); There is a significant positive correlation between the number of years of education per capita and the efficiency of Public Libraries (the coefficient is 0.0684, and the probability of two-sided t-test is 0.0169). Conclusion: This study provides a reference for the performance evaluation of provincial public libraries.

1. Introduction

Public library is an important part of the public cultural system. It is an important institution to transmit scientific and cultural knowledge, carry out social education, and preserve human cultural heritage. It plays an important role in promoting the development of social advanced culture, popularizing social civic education, and promoting social information construction and services. In recent years, with the construction of public cultural service system covering the whole country being put on the national agenda, grassroots libraries below the county level have been paid more and more attention by governments at all levels [1]. Compared with public libraries above the provincial level, grassroots libraries mainly refer to district, county, street, and community libraries in cities, while in rural areas they mainly refer to county, township, and village libraries. Among them, district and county level public libraries are the public libraries with the largest number, the widest coverage and the largest number of service people, and play an irreplaceable role in the development of social economy and culture. On the other hand, with the continuous development of technology, high resource integration, and rapid resource acquisition have become the development requirements of contemporary public libraries. Therefore, the operating efficiency of libraries has attracted more and more attention [2]. Efficient libraries will certainly be able to provide more high-quality, stable, and satisfactory services, so as to give full play to their own advantages in similar libraries, while inefficient libraries will have a bad impression on readers and affect their own development. This requires us to evaluate the operation efficiency of public libraries, so as to analyze the current situation of library operation, and put forward some suggestions on its development direction. As far as the public library is concerned, it is a regional knowledge portal, providing a "lifelong learning, independent judgment, and cultural development environment" for all local people. It can be said that the public library plays

a great role in the national cultural and educational system and the development process of a harmonious society. As a main form of grass-roots libraries, district and county-level libraries are the library groups closest to public life and concerned by the society and the public [3]. Compared with other libraries, the indicators and utilization of district and county-level public libraries can better reflect the social, economic, and cultural level of a region. Through the evaluation and analysis of the efficiency and influencing factors of district and county-level public libraries, it will provide theoretical and practical basis for the healthy development of library undertakings, so as to provide better services for the public. Therefore, the efficiency evaluation of district and county-level public libraries will be conducive to optimizing the resource allocation of libraries, ensuring the effective use of resources, making them better provide intellectual support for economic construction and social development, so as to create greater economic value.

2. Literature Review

Zhu, J. Q. and others believe that the concept of library service includes two basic aspects: quality and value. The evaluation standard of service quality is whether the library can meet the needs of users, and the service value is the service effect recognized by the fund provider. This concept has a wide influence in the early western scholars' research on library evaluation, and also laid a theoretical foundation for future research on Libraries [4]. Liu, Z. and others pointed out that any type of service evaluation can be divided into three perspectives: effect evaluation, cost effect evaluation, and cost-benefit evaluation [5]. Among them, the effect evaluation is based on the satisfaction of the service object to its use needs. Cost effectiveness evaluation is based on the relationship between the service performance level and the relevant inputs consumed to achieve this goal. Cost benefit evaluation is whether the value of service output is reasonable for the cost paid. Mansky, S. and other believe that the criteria for evaluating the quality of libraries can be fabricated, but their credibility is damaged by artificially splicing indicators. In addition, he further affirmed the two concepts of quality and value, and believed that resource input is the basis for the development of library services. Without relevant resource input, libraries will lose the basis for their existence and development. Therefore, library evaluation based on resource utilization is an important basis for reflecting the quality and value of libraries [6]. Talaat, M. and others put forward "it is useful for us to make money produce value, especially if we can prove that a small increase in money will produce a large increase in value" by introducing cost-benefit and cost-benefit theories, which shows that both from the perspective of government supervision to provide financial support for libraries and libraries themselves, we need to pay attention to the relationship between library input costs and output benefits [7]. Saif, Y. and others took the British public libraries before and after the reorganization as the object, put forward the relevant assumption that the service efficiency of public libraries will change over time, compared the efficiency of British public libraries before and after the reorganization, and evaluated the reorganization effect of libraries [8]. Olney, A. M. and others used DEA model to analyze the efficiency of 118 University Libraries in 6 countries, and ranked the efficiency of university libraries by comparing the efficiency values among university libraries [9]. Balachandran, P. V. used DEA model to evaluate the resource utilization efficiency of University Libraries. Through analysis, they concluded that the use degree of electronic resources has a significant impact on library efficiency, so it is necessary to strengthen the digital construction of University Libraries [10]. Karthikeyan, L. and others used a two-stage DEA model to evaluate the efficiency of American public libraries, evaluated the impact of intermediate output on efficiency in terms of services and project results, and estimated the optimal level of nonperforming loan ratio to promote the improvement of the second stage efficiency [11].

This paper takes 31 provincial regions in China as the research object, based on the reasonable selection of input-output indicators, measures the operation efficiency of Public Libraries in different regions based on DEA method, uses Tobit regression method, and makes efficiency analysis through SE-SBM model, and discusses the environmental factors affecting the efficiency of regional public libraries.

3. Research Methods

3.1. Learning Support System. The research on the adaptive learning support system includes: intelligent network teaching system, adaptive hypermedia system, adaptive intelligent agent system, adaptive distance learning support system, semantic web adaptive learning system, two-way adaptation mechanism, etc. Module components in the system mainly include domain model, user model, adaptive model, interface module, etc. The learning support system proposed in this paper takes the learning behavior evaluation model as the center, including modules such as learner portrait and resource recommendation [12]. The structure is shown in Figure 1:

3.1.1. Data Acquisition. Adaptive learning is based on data acquisition and data mining of historical data generated in the whole process of learners' learning. Therefore, libraries are required to fully perceive the learning environment, application equipment, learners' information, and other situational information. The data to be collected can be divided into basic education data, online learning data, library use data, and library behavior data. Among them, basic education data include learners' names, gender, age, student number, departments, grades, research projects, research results, etc. Online learning data includes online time, login habits, number of resource visits, link dwell time, hit rate of heat map, correct rate of exercises, assessment results, etc. Library usage data includes borrowing and returning data, portal access data, digital resource search, and download data. Library behavior data includes access control data, track tracking data, learning efficiency data, learning emotion data, etc. In terms of data acquisition methods, basic education data, online learning data, and library use data can be obtained from the corresponding databases or logs. Learners' behavior data in the library needs to be

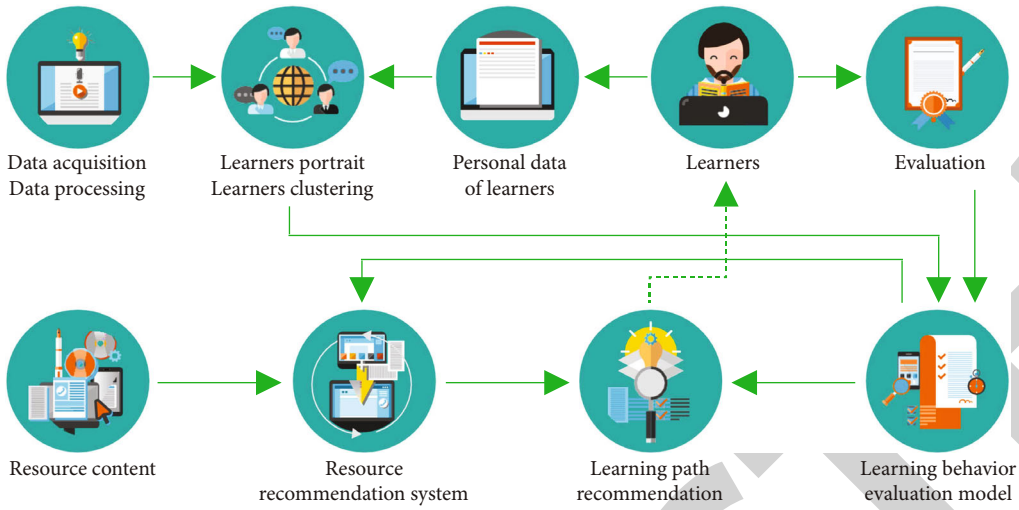

Figure 1: Structure diagram of adaptive learning system.

collected through devices [13, 14]. Learners' time in the library and habits of entering the library can be collected through the access control system. The trajectory of activities in the museum space can be tracked by face capture surveillance cameras and other equipment. The web browsing data of the public computer in the library can be collected by eye tracker. The writing data in the library can be collected by dot matrix digital pen. The learning emotion data in the self-study area in the library can be collected by the face capture surveillance camera. Libraries should pay attention to the legality, legitimacy, and necessity of collecting and using learners' personal data in accordance with relevant national laws and regulations [15]. All personal data shall not be provided externally, collected beyond the scope, and sensitive information shall not be publicly disclosed. Libraries should sign confidentiality agreements with cooperative units that have access to personal information and data, limit the number of contacts, establish accountability systems, and ensure data security.

3.2. Research Methods and Data Description

3.2.1. DEA-Obit Two-Step Method. DEA method was proposed by James, Cooper, and Rhode in 1978 to evaluate the relative effectiveness of decision-making units under the "multi-input and multi-output" mode. This paper uses the CCR model of DEA method to measure the efficiency of public libraries with the national inter provincial region as the basic decision-making unit. For any decision-making unit, the CCR model in dual form can be expressed as the following formula (1):

$$M_{\theta,\lambda} \text{in}\left[\theta - \varepsilon\left(e^t s^- + e^t s^+\right)\right]$$

$$\text{S.T.}\begin{cases} \sum_{i=1}^{n} \lambda_i y_{ir} - s_s^+ = y_{0_r} \\ \sum_{i=1}^{n} \lambda_i x_{ij} + s^- = \theta_{x_j} \\ \lambda_i \geqslant 0 ; s \geqslant 0 ; s \geqslant 0 \\ i = 1, 2, \cdots, n ; j = 1, 2, \cdots, m ; r = 1, 2, \cdots, s \end{cases}, \quad (1)$$

where n is the number of decision-making units, m and s are the number of input and output variables, respectively, $x_{ij}(j = 1, 2, \cdots, m)$ is the input element, $y_{ij}(j = 1, 2, \cdots, m)$ is the output element, and θ is the effective value of decision-making unit DMU_0. If $\theta = 1$ and $s^+ = s^- \neq 0$, DEA of decision-making unit is valid. If $\theta = 1$ and $s^+ \neq 0$ or $s^- \neq 0$, the decision-making unit is weak DEA effectiv. If $\theta < 1$, the decision-making unit is not DEA effective.

In order to further analyze which environmental factors affect the evaluation efficiency value and their influence degree, a method called "two-stage method" is derived from DEA analysis. The first step is to evaluate the efficiency value of the decision-making unit through DEA model. The second step is to do the regression of efficiency value (dependent variable) to various environmental factors, and judge the influence direction and intensity of environmental factors on efficiency value from the coefficient of independent variable [16]. However, the efficiency value (independent variable) determined by the DEA model is limited to 0 and 1. If the model is directly regressed by the ordinary least square method, the parameter estimation will be biased towards 0. Censored regression model (also known as "Tobit model") can solve this kind of problem, as shown in formula (2):

$$\begin{cases} y^* = \beta_{x_i} + \varepsilon \\ y_i = y_i^*, \text{if } y_i^* > 0, \\ y_i = 0, \text{if } y_i \leqslant 0 \end{cases} \quad (2)$$

where $\varepsilon_i \sim \mathbf{N}(0, \sigma^2)$, β is the regression parameter vector, x_i is the independent variable vector, y_i^* is the dependent variable vector, and y_i is the efficiency value vector.

Using DEA-Tobit two-step method to analyze efficiency and its influencing factors has been relatively mature in various fields. DEA-Tobit two-step method has been relatively mature in terms of method, which is worthy of reference.

3.2.2. Data Source and Variable Description. Based on the existing literature on library performance evaluation and the availability of data, this paper selects 31 provinces and

cities in Chinese Mainland as the spatial decision-making unit (DMU) for the measurement and evaluation of input-output efficiency of public libraries. The input variables include five aspects: the number of Public Libraries (number), the number of employees (number), the total collection of books (thousands of books, pieces, and sets), the construction area of public houses (thousands of square meters), and the number of seats in reading rooms (thousands). The output variables include the cumulative number of valid library cards issued (1000), the total circulation of people (1000), and the number of books and documents borrowed (1000). All data are from the China Library Yearbook.

When using DEA method to evaluate efficiency, we need to meet the principle of "isotropy", that is, there must be a strong positive correlation between input and output variables, so as to ensure that increasing an input will not reduce an output instead. The commonly used method is to detect it by Pearson correlation test. The calculation results of SPSS17.0 are shown in Table 1:

It can be seen from Table 1 that the correlation coefficients between input variables and output variables in all provinces and cities are positive, and can pass the two-tailed test at the significance level of 10% or 1%, which shows that the input-output index meets the principle of "homogeneity" required by the model and is reasonable.

The focus of this paper is to determine the environmental factors affecting the efficiency of regional public libraries, which has not been considered in the existing literature. Given the constraints of resource conditions, different external environments may have an important impact on the efficiency of public libraries. Generally speaking, the government's attention to public libraries, the level of local economic development, and the education level of local residents may be the factors affecting the efficiency of public libraries. This paper also discusses the impact of the external environment on the efficiency of public libraries from three aspects. Among them, the government's emphasis on public libraries is described by the financial allocation (1000 yuan) variable, and the economic development level of various regions is measured by per capita GDP. As for the education level of residents, considering the availability of data, it is measured by the number of years of education per capita in each region [17, 18]. Because the "China Statistical Yearbook" gives the sampling data of the population aged 6 and above in various regions who have not attended school, primary school, junior high school, senior high school, and junior college or above. According to the weighted average of the five types of population, the time of education is 0, 5, 8, 11, and 14.5 years, respectively, from which the average years of education of the local population can be calculated. The financial allocation data are from the China Library Yearbook, and the per capita GDP and per capita years of education in various regions are from the China Statistical Yearbook.

3.3. Efficiency Analysis Based on SE-SBM Model

3.3.1. Index Construction

(1) Selection Principle. In order to better select the evaluation indicators of service efficiency, we must grasp the selection principles of evaluation indicators in order to make the evaluation results scientific and reasonable. This paper takes SMART, a principle commonly used in performance research, as the basic principle of index selection: (1) The principle of specificity. (2) Measurable principle. (3) Realizable principle. (4) The principle of relevance. (5) Time bound principle. To sum up, this paper selects appropriate variable data from five perspectives: clarity, measurability, realizability, relevance, and timeliness.

(2) Selection Basis. From the existing research, it can be seen that domestic and foreign scholars choose input indicators from three aspects: human, material, and financial resources, and output indicators from the flow of people, the number of books borrowed, or the volume of business, but there are still some differences in details. For example, some scholars tend to use the total value, and some scholars tend to choose the average value. Therefore, we need to combine the actual situation of the current research object to determine the evaluation index.

(3) Determination of Indicators. The primary function of the public library is to provide literature borrowing, information consulting, and information retrieval services for the public in the service area. Therefore, the selected indicators need to directly reflect the service function of the public library. In terms of the selection of investment indicators, the number of books collected, the number of employees, the opening hours of the library, the number of reading rooms, the purchase funds of new books, the total investment of funds, the area of the library, and other indicators reflect the resource investment of the public library. The circulation person times, the number of books borrowed, the number of valid library cards issued, and the business volume reflect the service volume of the public library services to the public [19].

In terms of investment indicators, the construction of public libraries is inseparable from the investment of human, material, and financial resources. From the perspective of manpower, the number of employees represents the infrastructure of human services. The site management, activity development, borrowing, and consulting of the library must be completed with the participation of service personnel. Public libraries without manpower will lose their due service functions. From the perspective of material resources, the buildings of the public library provide the necessary space for services, and are the space carrier for the realization of public library services, and the housing area is an important indicator to measure the space carrying capacity. In addition, the most important and core product of the public library is its collection of books and documents. Only through the collection can its functions of information dissemination, browsing, and borrowing be realized. Therefore, the number of books collected is also an important basis for public library service investment. From the perspective of financial resources, the expenditure reflects the necessary expenditure to support the operation of the whole venue. The purchase of new books, the holding of activities, the

Table 1: Pearson correlation coefficient of input variables and output variables.

Input item	Output item				
	Number of public libraries	Number of employees	Total book collection	Building area of public buildings	Number of reading rooms
Number of valid library cards	0.349*(0.054)	0.766***(0.000)	0.677***(0.000)	0.914***(0.000)	0.878***(0.000)
Total circulation person times	0.333*(0.067)	0.738***(0.000)	0.666***(0.000)	0.922***(0.000)	0.867***(0.000)
Lending times of books and documents	0.348*(0.055)	0.793***(0.000)	0.723***(0.000)	0.955***(0.000)	0.900***(0.000)

Table 2: Input indicators for service efficiency evaluation of a public library in a city.

Secondary indicators	Data sources
Expenditure (yuan)	Statistical yearbook of a city 1999-2018
Public housing area (m2)	
Number of books collected (volume)	

Table 3: Output indicators of service efficiency evaluation of a public library in a city.

Secondary indicators	Data sources
Number of employees (number)	Statistical yearbook of a city 1999-2018

maintenance of venues, the renewal of equipment, and so on are inseparable from the support of relevant funds.

In terms of output indicators, unlike the private sector, public libraries do not take business income and operating profit as the basis for measuring service results. In essence, they want to provide public services for the public. Therefore, the most intuitive statistical method is to use the total circulation and book lending times that can best reflect the output results. Among them, the total circulation person times reflect the degree to which the public go to the public library to participate in the service, and the number of books and periodicals borrowed reflects the degree to which the public use the cultural products of the public library [20].

To sum up, this paper selects the expenditure, the number of books collected, the public area of houses, and the number of employees in terms of input indicators, and selects the total circulation person times and book lending times in terms of output indicators, as shown in Tables 2–5 below.

4. Result Analysis

4.1. DEA Efficiency Analysis. DEA method has two modes: input-oriented and output-oriented. Input-oriented mode refers to the appropriate adjustment and control of input under the premise of fixed output, while output-oriented mode refers to the adjustment and control of output under the premise of fixed input [21]. In the operation of public libraries, the input-output ratio is easy to control. Therefore, this paper selects the input-oriented DEA model for analysis. Using DEAP2.1 software package to calculate the efficiency value of Public Libraries in various provinces and regions in China. The calculation results are shown in Table 6, Figures 2–4.

Table 4: Evaluation index of service efficiency of Public Library in a city.

Secondary indicators	Data sources
Total circulation person time (person time)	Statistical yearbook of a city 1999-2018

It can be seen from Table 4 and Figures 2–4 that the regions at the forefront of efficiency include 14 provinces and cities, including Beijing, Inner Mongolia, Shanghai, Fujian, Jiangxi, Guangdong, Guangxi, Hainan, Chongqing, Guizhou, Yunnan, Gansu, Qinghai, and Ningxia, accounting for 45.2% of all regions. These 14 provinces and cities are both technically efficient and scale efficient. Based on the current input scale, the output has reached the optimal level. Unless the input is partially or completely increased, or a certain amount of output is reduced, its output cannot be increased under the existing technical level. The pure technical efficiency and scale efficiency of DEA noneffective units are investigated, respectively. The calculation results show that Hebei, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Hunan, Sichuan, Tibet, Shaanxi, and Xinjiang are pure technical efficiency rather than scale efficiency, accounting for 38.7% of all regions. According to the current output, the input of these regions can not be reduced. The remaining five provinces and cities of Tianjin, Jilin, Heilongjiang, Zhejiang, and Shandong are neither technically effective nor scale effective, indicating that even if some of their inputs are reduced, it is possible to maintain the current output level.

4.1.1. Analysis of Environmental Impact Factors. DEA analysis results show that the efficiency of Public Libraries in various regions of China is inconsistent. As mentioned above, the factors affecting the efficiency of public libraries include the importance the government attaches to public libraries, the level of economic development in various regions, and the education level of residents in various regions. Next, Tobit regression is carried out with the technical efficiency of Public Libraries in various regions as the dependent variable and the financial allocation, per capita GDP and per capita years of education in various regions as the independent variables. The model is constructed as follows:

$$\mathrm{TEF} = \alpha_0 + \alpha_1 \mathrm{FIN} + \alpha_2 \mathrm{PGDP} + \alpha_3 \mathrm{EDU} + \varepsilon_i. \quad (3)$$

Among them, TEF represents the technical efficiency of the public library, FIN represents the financial allocation, PGDP represents the per capita GDP, EDU represents the

Table 5: Input and output data of Public Libraries under the jurisdiction of a city.

Particular year	Input index				Output indicators	
	Number of books collected (book)	Public area of the house (m2)	Expenditure (yuan)	Number of employees (number)	Total circulation person time (person time)	Book lending times (book times)
1999	3270000	58602	5146000	324	744000	799000
2000	3320000	40631	6818000	316	877000	723000
2001	3461000	55922	7940000	304	673000	770000
2002	3415000	55942	10820000	306	879000	906000
2003	3439000	66482	11760000	295	1253000	1242000
2004	3499000	56303	13250000	294	960000	931000
2005	3650400	55556	14905000	290	964000	1057000
2006	3770600	55195	18926000	286	1034200	1085500
2007	3904700	54592	25256000	279	1117100	819400
2008	4059000	55051	24826000	279	1453500	1171600
2009	4244000	57891	30806000	288	1078200	936700
2010	4396200	57891	34412000	287	1097200	950300
2011	4170600	55662	38361000	289	1506300	950500
2012	4656900	58025	44593000	305	2836600	1204300
2013	4937400	58558	54059000	298	1754400	1132300
2014	5069400	59558	67764000	290	1850700	1215700
2015	5228400	59558	97343000	289	1869400	1358300
2016	1689700	34096	31927000	142	773920	731380
2017	2134500	43274	36152000	132	1244900	3493800
2018	2240600	43412	33889300	137	1333600	1280500

Table 6: DEA efficiency values of Public Libraries in various regions.

Region	Technical efficiency	Pure technical efficiency	Scale efficiency
Average	0.936	0.982	0.953

per capita years of education, α_0, α_1, α_2, α_3 are the coefficients to be estimated in the model, and ε_i is the random disturbance term. The estimated results of software eviews6.0 are shown in Tables 7 and 8.

The estimated results in Tables 7 and 8 shows that there is a significant correlation between per capita GDP, per capita years of education, and the efficiency of public libraries. There is a significant negative correlation between per capita GDP and public library efficiency (the coefficient is $-5.73\text{x}10^{-6}$, and the probability of two-sided t-test is 0.0229). There is a significant positive correlation between the number of years of education per capita and the efficiency of Public Libraries (the coefficient is 0.0684, and the probability of two-sided t-test is 0.0169). The number of years of education per capita is significantly positively correlated with the efficiency of public libraries, that is, the more developed education is, the higher the efficiency of public libraries is. This fully shows that there is a close relationship between the operation of public libraries and the education level of readers. Readers with higher education tend to go to the library to seek literature resources, so as to promote the more effective use of public library resources, and then improve the efficiency of public libraries.

The negative correlation between per capita GDP and public library efficiency seems to be contrary to common sense. Generally speaking, the material and cultural needs of the public in economically developed areas should be higher, so as to play a positive guiding role in the operation of public libraries, and then improve the efficiency of public libraries. However, this empirical study does not support this conclusion. In-depth analysis is not difficult to explain, in economically developed areas, readers often have higher demand. However, the decision-making of Public Libraries in China is dominated by administration, and the decision-makers directly affect the resource supply of public libraries. When the interests of decision-makers are inconsistent with or even contrary to the needs of readers, it is easy to see the phenomenon of supply exceeding demand, which makes the library resource supply appear structural imbalance. In this way, the resource allocation of Public Libraries in economically developed areas is difficult to match the higher needs of readers, resulting in lower efficiency.

Financial allocation is positively related to the efficiency of public libraries, but the impact is not significant, which shows that financial allocation does play a positive role in promoting the efficiency of public libraries, but from the national level, this effect is not obvious [22]. This conclusion further confirms the low efficiency of the use of funds in public libraries in China, and the financial allocation has not effectively improved the efficiency of public libraries. The reasons may be as follows: first,

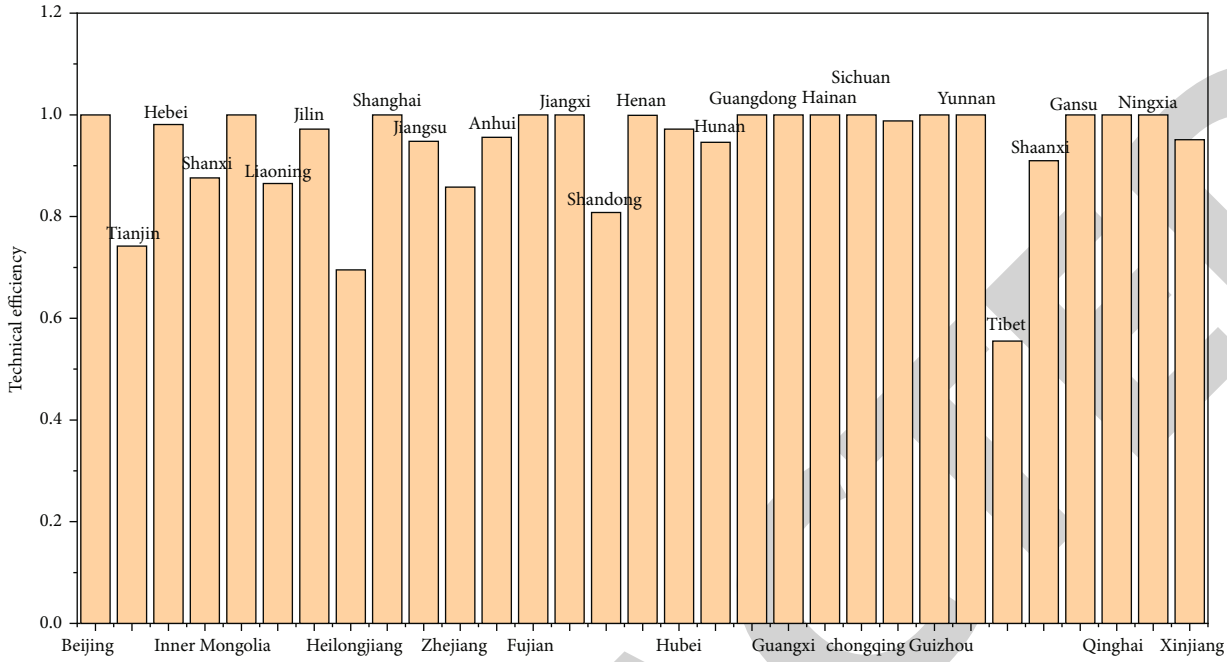

Figure 2: DEA technical efficiency values of Public Libraries in various regions.

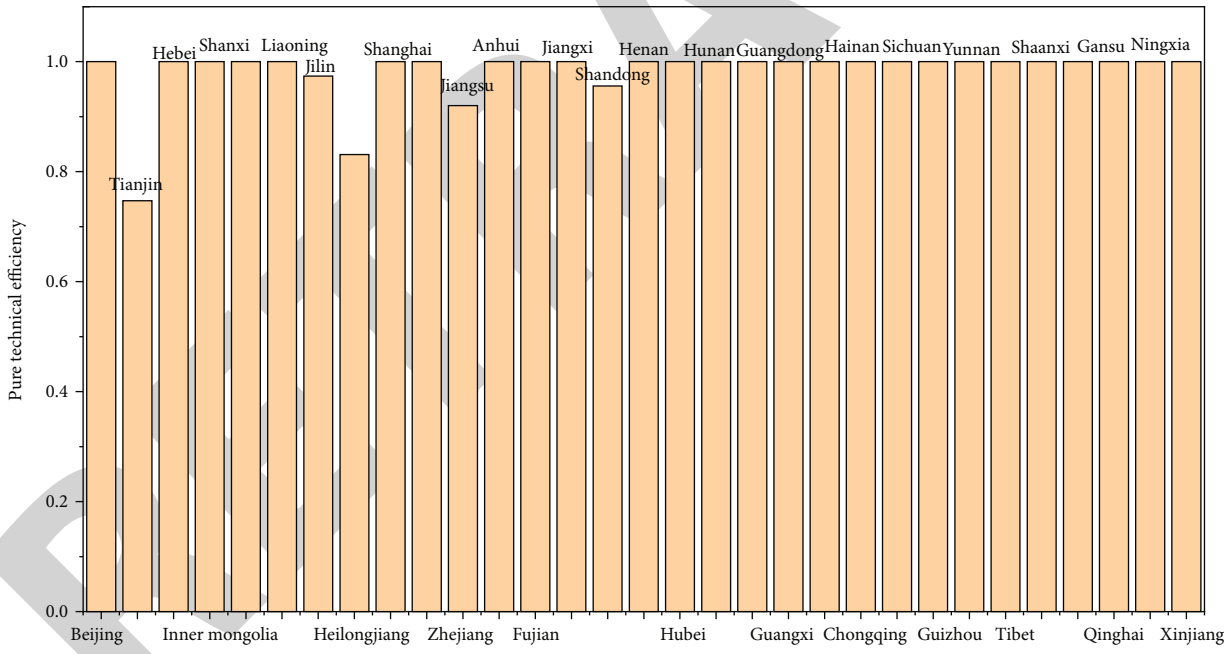

Figure 3: DEA pure technical efficiency value of Public Libraries in various regions.

the service object of the public library are the readers, but it is difficult to grasp the needs of readers, which makes it difficult for funds to allocate resources effectively, resulting in the failure of financial allocation to improve the efficiency of the public library. The second may be that the limited funds are seriously disconnected from the needs of readers when allocating resources, such as building large-scale venues in areas with small reader needs, colluding with booksellers to purchase a large number of overstocked books, etc.

Remove the variable financial allocation in model 1 that has no significant relationship with the efficiency of public libraries, and observe the change of regression results. See model 2 for the results. The impact of variables in model 2 on the efficiency of public libraries is still significant, and the coefficient symbols are consistent with the original model. Therefore, it can be considered that the impact of these variables on the efficiency of public libraries are stable and reliable.

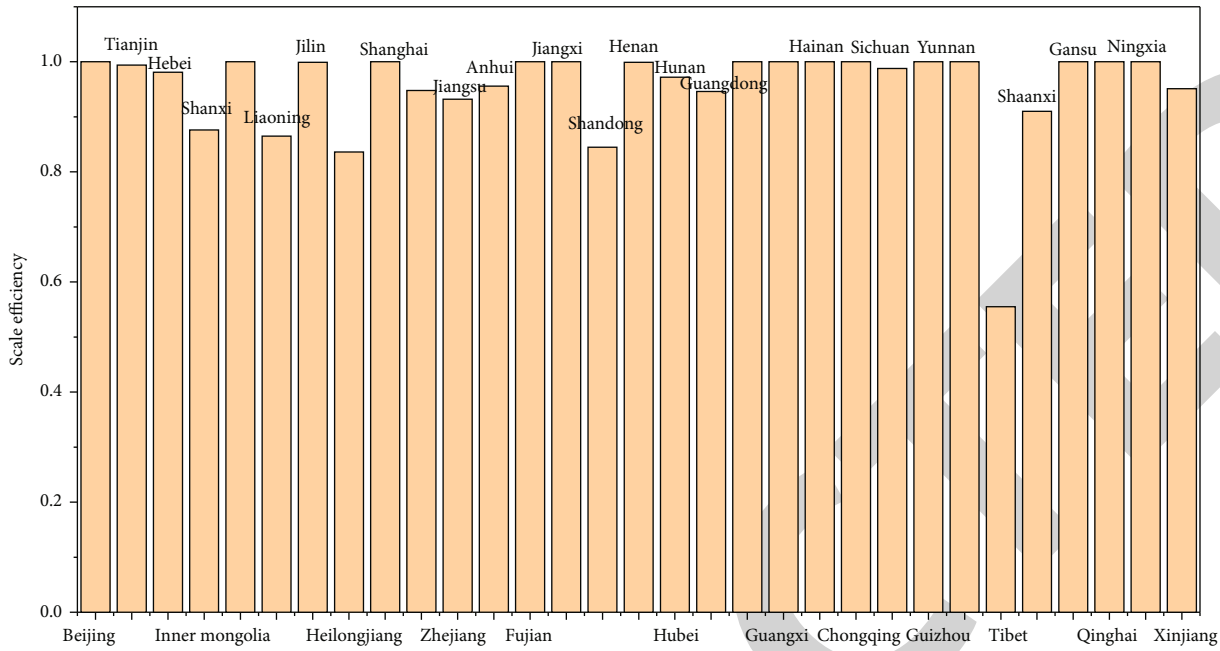

Figure 4: DEA scale efficiency value of Public Libraries in various regions.

Table 7: Analysis of influencing factors of public library efficiency (Model 1).

Variable	Model 1
α_0	$0.5456(0.0025)^{***}$
α_1	4.07×10^{-7} (0.2033)
α_2	$-5.73 \times 10^{-6}(0.0229)^{**}$
α_3	$0.0684(0.0169)^{**}$
F value	$2.5165(0.0793)^{*}$
AdjR-quared	0.2185

Table 8: Analysis of influencing factors of public library efficiency (Model 2).

Variable	Model 2
α_0	$0.5691(0.0018)^{***}$
α_2	—3.76 × 10—6$(0.0522)^{*}$
α_3	$0.0634(0.0256)^{**}$
F value	$2.8536(0.0745)^{*}$
AdjR-quared	0.1693

4.2. Data Analysis of SE-SBM Model in a City. This paper selects the SE-SBM-I-V model in the SE-SBM model, and the statistical tool is MaxDEA. The assumption of the model is that when the output is fixed, the input is nonradial and the return to scale is variable, that is, the input and output of the decision-making unit can be changed in different proportions. Taking the relaxation variable into the consideration of the model helps to distinguish the efficiency value under the same proportion of input and output changes, and it is convenient to sort the research results.

4.2.1. Pure Technical Efficiency. Pure technical efficiency score (VRS) reflects the production efficiency of each input factor of the decision-making unit at the optimal production scale. Its efficiency value is affected by the technology and management of the decision-making unit, and it is the efficiency of resource utilization level after excluding the impact of changes in return to scale.

As shown in Table 9 below, from 1999 to 2018, the pure technical efficiency of a city's public library showed a trend of decreasing first and then increasing. Among them, the efficiency values in 1999, 2000, 2001, 2003, 2012, 2016, 2017, and 2018 were higher than 1, indicating that the pure technical efficiency in the above years was relatively effective excluding the impact of scale changes. Therefore, the technical and management resources of a city's Public Library in these years were better utilized. While the technical efficiency value in other years is less than 1, indicating that the technical efficiency is insufficient and the resources invested in technology and management have not been fully used.

To form effective output. As shown in Figure 5 below, from the change of pure technical efficiency, it can be divided into two stages: from 1999 to 2010, except for 2003 and 2008, the pure technical efficiency showed a significant downward trend, and decreased year by year. 2010 was the minimum efficiency, and the efficiency value was 0.297, indicating that during this period, the resource utilization and service output level of a municipal public library were declining. From 2011 to 2018, the pure technical efficiency began to reverse the downward trend and rebounded. In particular, 2012 was the maximum efficiency value, and the efficiency value was 1.265. The efficiency value of the previous three years was less than 1 from 2013 to 2015, which was relatively invalid, while the efficiency value from 2016 to 2018 was higher than 1, which was relatively effective. The

Table 9: Efficiency value results calculated by SE-SBM model.

Particular year	Comprehensive technical efficiency (CRS)	Pure technical efficiency (VRS)	Scale efficiency (SE)	Return to scale (RTS)
1999	1 .116	1.122	0.995	Increment (+)
2000	1.082	1.126	0.961	Increment (+)
2001	0.632	1.001	0.632	Increment (+)
2002	0.692	0. 785	0.881	Increment (+)
2003	1.116	1 .124	0.992	Decrement (-)
2004	0.655	0.73	0.896	Increment (+)
2005	0.644	0.718	0.897	Increment (+)
2006	0.568	0. 617	0.922	Increment (+)
2007	0. 375	0. 395	0.95	Increment (+)
2008	0. 668	0. 673	0.992	Increment (+)
2009	0. 299	0.335	0. 892	Increment (+)
2010	0. 285	0.297	0. 960	Increment (+)
2011	0. 339	0. 346	0. 977	Decrement (-)
2012	1 .228	1 .265	0.971	Decrement (-)
2013	0. 314	0. 402	0.781	Decrement (-)
2014	0. 328	0. 427	0.768	Decrement (-)
2015	0.334	0.433	0.771	Decrement (-)
2016	0.36	1.162	0.31	Increment (+)
2017	1.482	1.497	0.99	Increment (+)
2018	1.01	1.035	0.976	Increment (+)

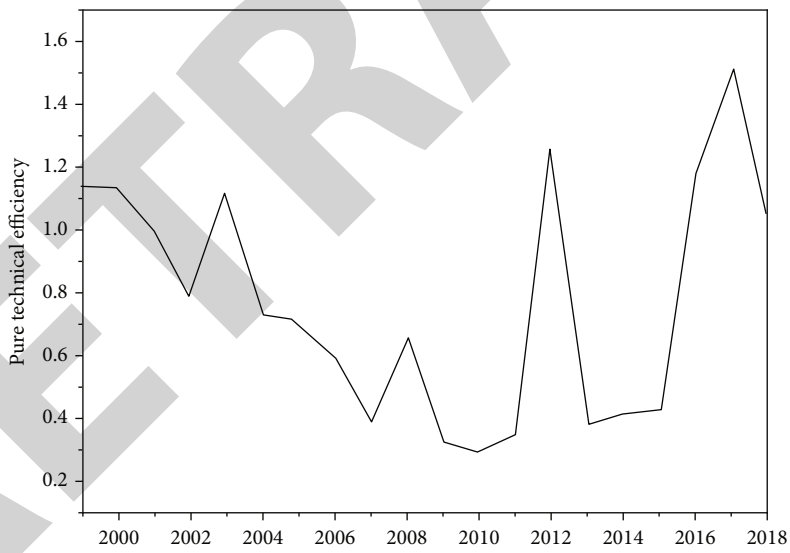

Figure 5: Pure technical efficiency change curve.

efficiency value in 2017 was the maximum efficiency value, and the efficiency value was 1.497. It shows that from the perspective of technology and management, a municipal public library has performed well in the level of resource utilization and service output in these three years, and the efficiency value has been greatly improved compared with that before 2010.

4.2.2. Comprehensive Technical Efficiency. Technical efficiency score (CRS) is the product of pure technical efficiency and scale efficiency. Different from pure technical efficiency, the comprehensive technical efficiency considers the impact of changes in production scale on the resource utilization of decision-making units. The calculation result is the efficiency under the condition of constant scale, which is a comprehensive evaluation of the resource allocation capacity of decision-making units. As shown in Figure 6 below, overall, the comprehensive technical efficiency value from 1999 to 2018 also showed a trend of first decreasing and then increasing. Among them, the efficiency value in 1999, 2000, 2003, 2012, 2017, and 2018 is greater than 1, which is relatively effective, indicating that under the condition of

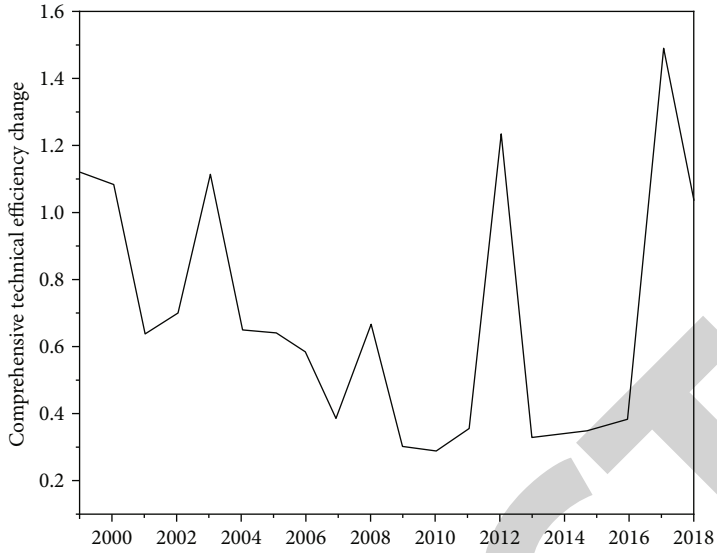

Figure 6: Change curve of comprehensive technical efficiency.

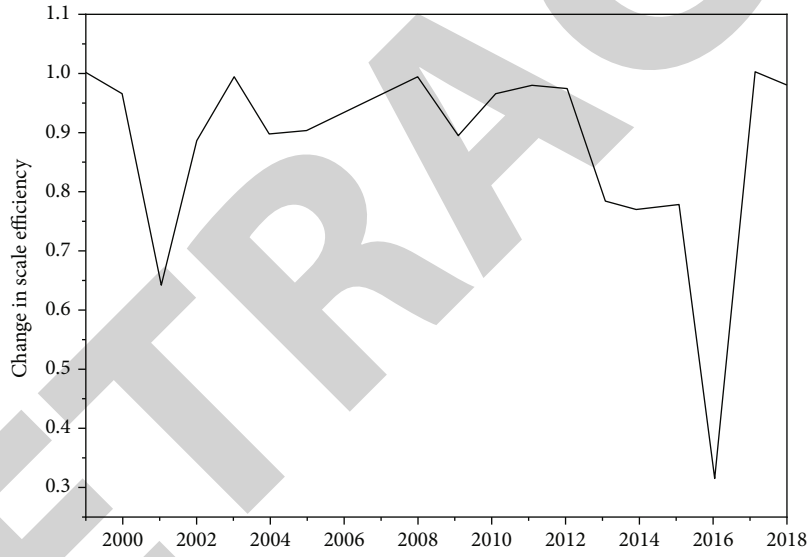

Figure 7: Change curve of scale efficiency.

comprehensively considering the changes in the size of the library, the resource utilization and service output of the public library are better, while the efficiency in other years is less than 1, which indicates that the resources invested in these years have not formed effective output.

From the perspective of the change of comprehensive technical efficiency, it can also be divided into two stages: from 1999 to 2010, except for 2003 and 2008, the comprehensive technical efficiency showed a downward trend, and in 2010, it reached the minimum efficiency value, with the efficiency value of 0.285. Since 2011, the downward trend of efficiency value has changed, and there has been an upward trend. Among them, 2012 is the maximum efficiency value, and the efficiency value is 1.228, while the comprehensive technical efficiency from 2013 to 2016 fell back to a lower level. The efficiency value less than 1 is relatively ineffective, only slightly higher than the efficiency in 2009 and 2010, and the growth change range is small. It shows that the comprehensive capacity of resource allocation of a municipal public library during these four years is insufficient, and no good output has been formed. The efficiency value in 2017 and 2018 is higher than 1, and 2017 is the maximum efficiency value, and the efficiency value of 1.482 is relatively effective, reflecting that the level of resource utilization and service output in this year is the best year since the research year.

4.2.3. Scale Efficiency. Scale effect score (SE) is the ratio of comprehensive technical efficiency to pure technical efficiency. It represents the ratio of the actual production scale to the optimal production scale. The value range is 0 to 1. The larger the value, the closer the actual production scale is to the optimal production scale.

As shown in Figure 7 below, the change of scale efficiency from 1999 to 2018 is different from that of pure technical efficiency and comprehensive technical efficiency. The scale efficiency from 1999 to 2012 is between 0.88 and 1 except for 2003, which indicates that the overall production scale of a city's Public Library in these years is close to the optimal. From 2013 to 2016, the scale efficiency decreased significantly. In particular, the scale efficiency in 2016 was 0.310, which was the minimum value of scale efficiency. Combined with the pure technical efficiency value of 1.162 and the comprehensive end efficiency value of 0.360 in that year, it can be found that although a municipal public library achieved relative efficiency in technology and management in 2016, there was a gap between the actual production scale and the optimal production scale. Therefore, the service output of public libraries is limited from the scale, resulting in the relatively ineffective comprehensive technical efficiency in that year. The scale efficiency in 2017 and 2018 is close to 1, indicating that a municipal public library has expanded its scale in these two years, making the actual production scale tend to the best scale, so the comprehensive technical efficiency is relatively effective.

4.2.4. Return to Scale. Returns to scale (RTS) refers to the output change caused by the change of various production factors in the decision-making unit in the same proportion under other conditions unchanged. It reflects the proportional relationship between the change of production scale and the resulting output change.

In the past 20 years, returns to scale have increased in all years except 2003, 2011, and 2015. This reflects that the year of increasing returns to scale increases with the level of scale, and the growth rate of output income is higher than that of resource input, which has obvious characteristics of economies of scale. With the expansion of production scale in 2003, 2011, and 2015, the growth rate of output and income of a city's public library did not keep up with the growth level of resource input, indicating that the relevant inputs used for library construction were not translated into service output in time, and the utilization level of unit production factors failed to adapt to the changes in scale.

5. Conclusion

This paper uses DEA obit model to measure the efficiency of China's provincial public libraries, and analyzes its environmental factors. The results of DEA analysis show that at present, only 45.2% of provinces and cities in China are at the forefront of efficiency. The following Tobit model analysis explains the impact of the external environment on the efficiency of public libraries from three aspects: financial allocation, per capita GDP, and per capita years of education in various regions, and draws some relevant conclusions. There are still some areas that need to be improved in this paper. First of all, this paper only explains the three factors that affect the efficiency of public libraries. Whether there are other factors and how to affect them are not considered due to the unavailability of data. Secondly, the empirical analysis of this paper shows that the per capita GDP and the per capita years of education in various regions have a significant impact on the efficiency of public libraries, and these two factors are not excluded in the efficiency evaluation. Then, after excluding environmental factors, will the efficiency of Public Libraries in various regions change? This is also the research content that the author will consider soon. Finally, this paper mainly studies the horizontal comparison of the efficiency of Public Libraries in various regions, but does not involve vertical changes. Subsequent research will consider this issue.

Data Availability

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

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Acknowledgments

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Research Article

Influence of Pretreatment System on Inorganic Suspended Solids for Influent in Wastewater Treatment Plant

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In order to investigate the cause of accumulation of the inorganic suspended solid (ISS) in biochemical tank for wastewater treatment plant (WWTP) in recent years, the influent quality of one WWTP in Chongqing was monitored in one year, and the removal efficiency of ISS during the pretreatment process was studied. Results showed that the low removal efficiency of ISS (<7%) was ascribed to the weak removal efficiency of sand in the grit chamber. The primary sedimentation tank showed a good removal efficiency of ISS up to 69% and also had a good removal efficiency of COD up to 70%. The annual variation rule of MLVSS/MLSS for mixed liquor varied in contrast to the influent quality, ranging from 0.24 to 0.57, much lower than the normal value of 0.7. In order to maintain the normal function of activated sludge, it is necessary to retain the primary sedimentation tank to remove ISS.

1. Introduction

The pretreatment system of municipal wastewater treatment plant includes grille sand, grit chamber, and primary sedimentation tank, among which the main grit chamber and primary sedimentation tank could remove pollutants, and the treated wastewater directly entered into the biochemical tank. Some research was focused on the influences of influent and flow on the removal efficiency of phosphorus and nitrogen in the biochemical treatment system, obtaining much precious operation regulation experience [1–3]. However, less attention had been paid to inorganic suspended solids in influent. In recent years, a large number of inorganic solids were deposited at the bottom of structures in oxidation ditch and other sewage treatment systems, resulting in reducing the hydraulic retention time of wastewater and the effective volume of reactor, which seriously affected the performance of wastewater treatment [4, 5]. Meanwhile, a large number of studies had shown that MLVSS/MLSS of activated sludge was significantly affected by inorganic solids of influent, and the MLVSS/MLSS of activated sludge in many wastewater treatment plants was as low as 0.3-0.5, which was below the normal level of 0.7 [6–10]. The results indicated that there were still a large number of inorganic suspended solids flowing into the biochemical treatment system after the pretreatment system, reducing the activity of activated sludge. Therefore, the influent quality of one WWTP in Chongqing was monitored in one year, and the removal efficiency of ISS during the pretreatment process was studied. Meanwhile, the influences of the pretreatment system of grit chamber and primary sedimentation tank on the treatment of inorganic suspended solids in sewage were

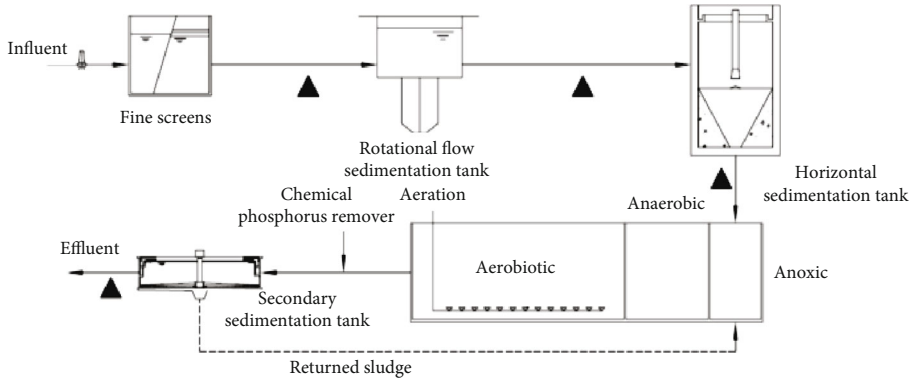

Figure 1: Sampling points of the wastewater treatment plant.

Table 1: Average concentration of pollutants at each sampling point.

Index	Influent of grit chamber	Influent of primary sedimentation tank	Effluent of primary sedimentation tank
Particle size (μm)	60.93 ± 7.17	57.58 ± 8.15	49.56 ± 7.73
COD (mg/L)	635 ± 203	620 ± 177	277 ± 91
SS (mg/L)	1123.2 ± 272.7	1048.7 ± 335.7	317.6 ± 125.0
ISS (mg/L)	809.2 ± 234.5	769.5 ± 261.3	231.9 ± 86.9
TN (mg/L)	67.72 ± 8.23	64.24 ± 9.13	45.08 ± 8.22
TP (mg/L)	9.3 ± 1.4	8.7 ± 1.4	4.8 ± 1.1
ISS/COD	1.34 ± 0.40	1.30 ± 0.51	0.93 ± 0.89
COD/TN	9.30 ± 2.29	9.61 ± 2.24	6.11 ± 1.59

analyzed, providing technical support for solving the problem of the decrease of the organic component ratio of activated sludge.

2. Materials and Methods

2.1. Sampling Points of the Wastewater Treatment Plant. The wastewater treatment plant was located in the main urban area of Chongqing, and the combined sewerage system was used for sewage collection. The service area of the WWTP was 125 km^2 with a processing capacity of 60,000 t/d in dry season and 100,000 t/d in rainy season. The pretreatment system for sewage treatment was composed of rotational flow sedimentation tank, horizontal sedimentation tank, and the inverted A^2O process of biochemical treatment system. And the process flow is shown in Figure 1. Besides, 27 samples were conducted from May 2020 to June 2021, and the sampling points are shown in Figure 1. During the sampling process, a professional bottom inlet water quality sampler was used to take water samples, so as to ensure the representativeness of samples.

2.2. Index Analysis. The concentrations of SS, TP, MLSS, TN, and TP were measured by Water and Wastewater Monitoring Methods (4th edition). SS was calcined in muffle furnace at 600°C temperature for 1 h and calcined to constant weight, so the remaining residue was ISS. The particle size distribution in the test sample was analyzed by BT-9300HT laser particle size measurement system (Dandong Better Technology Co., LTD., China), with the measurement range of 0.1~1000 μm.

Table 2: Removal efficiency of pretreatment system.

Structures	Removal efficiency of pollutant (%)				
	COD	SS	ISS	TN	TP
Grit chamber	2.36	6.68	4.91	5.14	6.45
Primary sedimentation tank	55.32	69.71	69.86	29.82	44.83

3. Results and Discussion

3.1. Removal Performance of Pretreatment System. The mean values of water quality parameters of 27 samples are shown in Table 1, and the removal efficiencies of each pollutant using the pretreatment system are shown in Table 2.

According to the classification of typical domestic sewage by Metcalfe and Eddy company. The concentration of SS and ISS for this sewage factory was higher than the domestic sewage with high intensity. The concentration of SS was reduced to the moderate strength, and the concentration of ISS was still higher than high strength after primary sedimentation treatment. The concentration of COD for influent did not meet the higher strength, while the concentration of COD was lower than the low strength after wastewater treatment.

As shown in Table 1, after the treatment of grit chamber, the average concentration of COD of wastewater was

Table 3: The removal efficiency of grit with different particle size by two kinds of grit chambers.

Particle size (μm)	350	250	200	150	100
Removal efficiency of grit using rotational flow grit chamber (%)	95	92	90	85	75
Removal efficiency of grit using aerated grit chamber (%)	92	80	95	42	0

decreased from 635 to 620 mg/L, the average concentration of SS was decreased from 1123 to 1048 m/L, the average concentration of ISS was decreased from 809 to 769 mg/L, and the concentrations of TN and TP were changed little. According to the treatment efficiency in Table 2, it was found that the removal efficiency of each pollutant was less than 7%, indicating that the removal efficiency of pollutants in the grit chamber was weak. In general, the grit chamber had a good removal efficiency of suspended solids with particle size larger than 200 μm. As the particle size of SS for influent in the grit chamber was about 60.93 μm and far less than 200 μm, the removal efficiencies of SS and ISS were very lower.

The average removal efficiencies of COD, SS, ISS, TN, and TP were 55.32%, 69.71%, 69.86%, 29.82%, and 44.83%, respectively. The removal efficiencies of SS and COD in ordinary advection sedimentation tank were about 50% and 30%, and the removal efficiency of pollution was increased proportionally with the increase of influent concentration. In primary sedimentation tank, organic and inorganic components in suspended solids were coprecipitate when SS was removed, and excessive removal of organic matter occurred during the removal of suspended inorganic matter. In the case of high concentration of SS, the synergistic efficiency for the removal of COD and ISS was more obvious. Therefore, the wastewater treatment plant showed higher removal efficiencies of COD, SS, and ISS.

The value of SS/COD for the influent in the grit chamber of the wastewater treatment plant was about 1.78, which was converted to BOD_5/COD was 0.45 according to the typical domestic sewage to [11], and the value of SS/BOD_5 for the influent was 3.96. Compared with the value of SS/COD (1.1) in developed countries, the value of SS/COD for the influent in the wastewater treatment plant was high. After the primary sedimentation treatment, the value of SS/COD was reduced to 1.14, which was converted to SS/BOD_5 was 2.53 and still higher than 1.1. After primary sedimentation treatment, the value of ISS/COD for influent was reduced from 1.3 to 0.93, which was still much higher than the value of 0.2 in developed countries. The results indicated that a large amount of inorganic solids entered the biological treatment structure, which might be the reason for the decrease of MLVSS/MLSS in the wastewater treatment plant. After treatment of primary sedimentation tank, the value of COD/TN was decreased from 9.3 to 6.11, becoming a typical low-carbon source wastewater [12–14]. At present, in order to solve the problems of carbon source required for phosphorus and nitrogen removal in most wastewater treatment plants, the primary sedimentation tank had been generally eliminated in small and medium-sized urban sewage plants using SBR and oxidation ditch. According to the research results, it was suggested that the primary sedimentation tank should be retained in wastewater treatment plants with high concentration of inorganic suspended solids in influent, and the carbon source was retained by hydrolysis and fermentation of wastewater in the primary sedimentation tank.

3.2. Analysis of Low Removal Efficiency of Inorganic Solids in Wastewater Treatment Plant. According to the above results, the primary sedimentation tank showed high removal efficiencies for ISS and SS and up to 69.71% and 69.86%, respectively, but the removal efficiencies for SS and ISS were only 6.68% and 4.91%, respectively. Therefore, the main reason for the low removal efficiency of inorganic solids in the pretreatment system was the lower removal capacity of sand in the sedimentation tank. Generally, the sediment was designed to remove silt with a relative density of 2.65 and particle size larger than 0.2 mm, but the removal performance of silt with particle size less than 0.2 mm was not good [15]. The removal efficiency of a typical grit chamber on sand with different particle sizes under optimal operating parameters is shown in Table 3.

The above results about removal efficiency of grit were achieved basing on the optimal operating parameters and skilled operation by the American Water & Wastewater Institute. There was a great difference about the operation effect of rotational flow grit chamber between foreign report and research in our country, and it was difficult to achieve the higher removal efficiency of sand in domestic grit chamber [16, 17].

The combined drainage system was adopted in the area that the wastewater treatment plant belonging to; meanwhile, the service area was large, and the sewage pipe network was long. Therefore, inorganic particles with large particle size were easy to deposit in the sewage pipe, resulting in small particle size of inorganic particles entering the wastewater treatment plant [18, 19]. The average particle size was only about 60 μm, which was much lower than 100 μm, so the removal efficiency of sand under the optimal operating parameters was less than 75%. However, the removal efficiency of the sand in grit chambers was lower than 7% and far below than the design level coupled with the gap between the actual control level of the wastewater treatment plant and the operation process, resulting in the lower removal efficiency of the sand in grit chambers for the wastewater treatment plant.

Rotational flow grit chamber was used in this wastewater treatment plant and the blade speed needed to adjust in order to achieve the high removal efficiency of grit [20]. In addition, the head loss in the tank was a function of the size of sediment to be removed. So the head loss should be increased accordingly in order to remove smaller particles, but there was no clear and feasible operation method for the adjustment of speed and water level. The HRT of

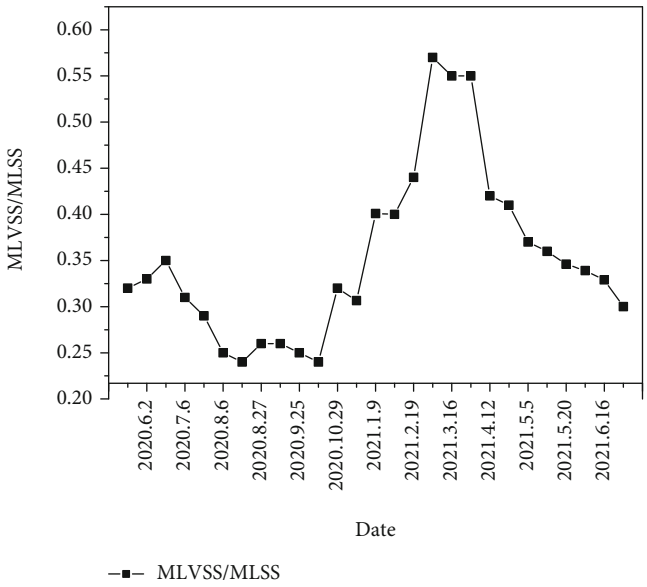

Figure 2: Annual variation of MLVSS/MLSS.

rotational flow grit was short, and the flow rate had strict requirements, so it was greatly affected by water fluctuation. Therefore, it was the key to improve the capacity of wastewater treatment plant to deal with the inorganic solids through diversion of rainwater and sewage and strengthen the operation control of grit chamber.

3.3. Annual Variation of MLVSS/MLSS. The annual variation of MLVSS/MLSS is shown in Figure 2. MLVSS/MLSS ranged from 0.4 to 0.6 from January to March, reached the maximum value of 0.57 in February, and then gradually decreased to the lowest value of 0.24 at the end of September.

According to outdoor drainage design specifications (GB50014-2006), the sludge concentration of A^2/O process should be controlled between 2500 and 4500 mg/L when the MLVSS/MLSS of the mixture could be stabilized at the normal level (about 0.7), that was, the MLVSS concentration should be controlled between 1750 and 3150 mg/L [13]. The sewage plant must obtain a higher concentration of sludge to maintain the MLVSS at the normal level when MLVSS/MLSS was much lower than 0.7. During the rainy season, the sludge in this sewage plant showed a high concentration of inorganic substances and it must be maintained at a high sludge concentration. The value of MLVSS/MLSS was increased from January to March, so the sludge concentration was appropriately reduced. Meanwhile, the average concentration of sludge was about 4811 mg/L, and MLVSS/MLSS was about 0.49, so the concentration of MLVSS was about 2357 mg/L. Similarly, the concentration of MLVSS in rainy season was 1900 mg/L. After increasing the concentration of sludge, the concentration of organic matter for sludge in the sewage plant meets the requirements of "Code for design of outdoor drainage." Although the sewage plant can maintain the normal operation of the sewage treatment system by increasing the concentration of sludge, the inorganic solids in the influent might be accumulated in the sewage treatment system. The inorganic solid suspended in the mixture increased the density of sludge, which led to the difficulty of mechanical mixing or aeration, blockage of sludge pipes, aggravation of mechanical wear of pipes, and dehydration equipment. Therefore, it would increase energy consumption and operating costs [14, 21, 22].

4. Conclusions

High concentration of inorganic suspended solid and low treatment efficiency of inorganic suspended solid for the pretreatment system were the common problems in wastewater treatment plant. The low removal efficiency of ISS was ascribed to the weak removal efficiency of sand in the sedimentation tank after long tome analysis, while the primary sedimentation tank showed a higher removal efficiency of sand. Therefore, it was suggested that the wastewater treatment plant with high concentration of inorganic suspended solids in influent should retain the primary sedimentation tank and strengthen the operation regulation of the grit chamber.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

There are no conflicts to declare.

Acknowledgments

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Research Article

Analysis of the Combination of the Regional Natural Environment and Local Characteristics of the Tourism Industry under the Perspective of Synergistic Development

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Ecological environmental protection and tourism development are complex systems that are inextricably linked, mutually influencing, and interdependent, forming an organic whole. The natural environment and its various natural factors constitute an ecosystem, which both is a prerequisite for regional tourism development and has a certain impact on the regional ecosystem. The development of tourism must take the protection of the natural environment as the premise, the protection of ecological environment must be throughout the whole process of tourism development, and the principles and methods of system science must be used to solve this problem. Tourism is an important strategic support for the development of China's national economy. However, with the rapid increase in the number of tourists, tourist attractions are also facing unprecedented pressure. Tourism and its related industries are a complex and open system that consists of economic, social, and ecological environment; policy; technology; and other factors. By analyzing the interrelationship of each element in the tourism sustainable development system, we can provide a scientific basis for sustainable tourism development.

1. Introduction

1.1. Tourism and Tourism Industry. Tourism refers to the tourist resources of the destination, the infrastructure, and accommodation of the destination [1]. From the tourist's point of view, "tourism is the travel and stay of those who leave their permanent place of residence to go abroad for reasons other than migration or work, as well as the phenomena and connections arising from these activities" and is a kind of nonresident travel or hiking. It is a kind of nonresidential travel and excursion that people undertake to satisfy their curiosity and seek mental pleasure [2]. From the point of view of tourism resources, different tourism resources are formed and can attract more tourists due to regional and territorial differences, satisfying the intrinsic need for something new and diverse. Tourism is the tourism industry and the industries and sectors closely related to it, providing material or immaterial services and support, such as cultural, information, human, material, financial, and intellectual resources. Industry is a kind of industrial cluster with multiple industrial chains, which refers to the gathering and aggregation of core resources and their related elements in a specific geographical space. The tourism process is formed by the combined influence of several industries.

1.2. Connotation of the Concept of Tourism Industry Ecosystem. The most fundamental unit of ecological science is the organism, while the study of industrial ecology is based on the enterprise or factory [3]. Ecological individual organisms are very similar to industrially organized enterprises in that they all have their own activities, they all need to use material and energy to maintain and develop, they can reproduce (establish branches), they can make strains according to changes in the outside world, and according to the principle of life cycle, after different periods of growth, they also have a fixed life span, and regardless of the length of time, they will eventually come to extinction [4]. A tourism enterprise is an independent operating unit that uses tangible space facilities and resources to realize intangible services based on tourism attractiveness, including hotels, travel agencies, tourism,

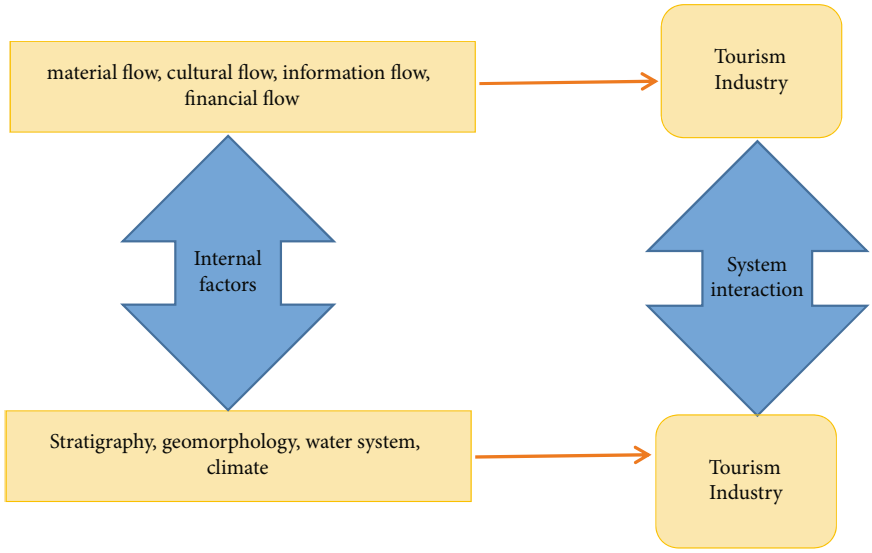

Figure 1: Mechanism of interaction between tourism industry system and ecological environment system.

travel industry, and tourist attraction enterprises. It is the basic attribute of a single industry in the industrial economy, and thus its essential characteristics are similar to those of individual organisms in an ecosystem, whose growth and development are closely related to the environment on which they depend. For example, Qingdao Ocean Hotel is a tourism individual whose operation cannot be separated from the local social, economic, and natural environment of Qingdao.

1.3. Tourism Ecosystem. In short, ecosystem is based on "community + abiotic," but "ecosystem" is not just a combination of "two elements" but the interactions and dependencies between the elements of the system, creating a flow of material, energy, and information within and outside the system. Wang Shoubing defines the industrial ecosystem from the perspective of industrial economy and focuses on its role [5]. In this paper, the tourism industry ecosystem is a unified whole of energy flow, material flow, passenger flow, and information flow formed by the interaction and interdependence of tourism industry population, tourism industry population, and environment in a certain spatial and temporal scope. Tourism ecosystem is not simply a combination of tourism population; it is based on the principle of market orientation and the principle of material circulation, which is similar to biological ecosystem in order to achieve the circulation of material, energy, passenger flow, and information, as shown in Figure 1.

The tourism industry is an important part of rural characteristic tourism; its tourism landscape should be organically combined with the local natural and humanistic landscape, in the overall design of the building, strive to maintain the original simple and primitive ecological environment of the village, and reflect the local characteristics in the layout, on the basis of natural landscape resources, combined with production, ecology, life, and other aspects, to create a representative feature and landscape nodes to attract tourists and make them feel the different natural environment and regional culture.

2. Description of the Problem

2.1. Status of Domestic Research. Although the current level of tourism development in China is still far behind other countries in the world, there is a considerable amount of research on sustainable tourism development [6]. On the China Knowledge website, we searched for the topic of "sustainable tourism" and collected 4381 related documents, which were categorized and organized. Starting from the 11th Five-Year Plan, research on sustainable tourism development in China has been developing rapidly, with peaks in 2019 and 2020, as shown in Figure 2.

There have been more research results on sustainable tourism development by domestic and foreign scholars, and there are big breakthroughs in research content, theory, and methods. However, tourism as an emerging discipline is developing and changing rapidly. According to the current research status, the author believes the following:

(1) The operation mechanism of sustainable tourism development [7]. At present, the research on sustainable tourism is mostly focused on the in-depth exploration of tourism environmental supply system, environmental carrying capacity composition, influencing factors, and metric model, while the systematic research on the operation mechanism of sustainable tourism is rare. The realistic issues that need to be concerned in sustainable tourism development are the regulatory mechanism and driving force of sustainable tourism development and the interactive characteristics and features among various factors in the tourism system, so as to provide a long-term guarantee for sustainable tourism development

(2) Assessing the sustainability of tourism. At present, the evaluation obtained from the static tourism sustainability model constructed by domestic and foreign scholars is static and ideal, while the analysis

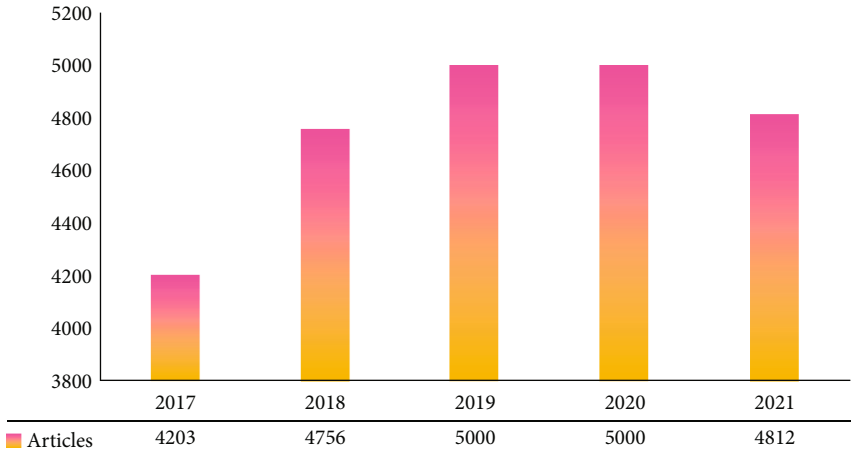

Figure 2: Annual distribution of publications.

of reality is dynamic. At the same time, there is a lack of quantitative studies due to a single research method [8]. The current domestic and international literature on sustainable development mostly focuses on both qualitative and empirical aspects, mainly on the depiction of sustainable development status and worries about the future, with heavy subjective overtones, less theoretical and standard research, and less quantitative research. The monitoring of tourism sustainable development assessment and development process is still blank

(3) From the perspective of sustainable development, the theoretical system of sustainable tourism development. At present, there have been quite a lot of studies and researches on the issue of sustainable tourism in academic circles at home and abroad, but there is no unified definition of sustainable tourism, and academic research on sustainable tourism has been conducted from different perspectives, and there are different understandings and descriptions of the composition and structure of sustainable tourism. At present, there is a lack of a comprehensive, systematic, and authoritative theoretical interpretation of the conceptual system of sustainable tourism

2.2. Status of Foreign Research. Foreign research on sustainable tourism development is mostly focused on tourism management, tourism problem analysis, and development of tourism field. Although there are differences in their research methods, their focus is the same, namely, the connotation, model, management methods, paths, concepts, and ecotourism of sustainable development. Although the literature on this area is scarce, research on this area is becoming increasingly hot. Ecotourism is centered on natural landscapes and is the subject of sustainable development [9]. Therefore, this paper compares the results of this research with those of foreign scholars and considers it as an important element of sustainable development. Strongza argues that most current research on the origins and impacts of tourism focuses on tourists and destinations and advocates an integrated analysis of ecotourism and sustainable development. Li proposes an evaluation index. In recent years, scholars at home and abroad have paid more attention to ecotourism, but their studies mostly stay on the interaction between tourists and travelers. In fact, from the 21st century, Weaver and Lawton began to research and explore ecotourism, ecotourism industry, and the external environment of ecotourism [10]. However, the academic response to ecotourism is still inadequate; therefore, this paper provides a preliminary discussion on it.

2.3. Analysis of the Current State of Tourism Development. Since the beginning of the new century, tourism has become one of the largest and fastest-growing industries in the last decades due to the expansion of tourism investments and the rapid growth of people's demand for tourism, as well as the easing of population movements between countries, which has contributed to the accelerated development of China's tourism industry [11]. According to the National Tourism Administration, China's revenue reached $3.38 trillion in 2014, equivalent to 5.5% of GDP (gross domestic product), of which the number of tourists in China has surpassed 100 million; in 2012, there were more than 24,000 travel agencies in China, with traditional travel agencies accounting for 61.6% of the market share, 310,000 hotels, including 27,000 hotel chains, 75,000 independent hotels, and 210,000 other accommodation units. The proportion of tourism to GDP is about 5%, and the GDP per capita is US$6,000, entering a period of diversified tourism development, as shown in Figure 3.

Although tourism is currently developing rapidly, it still encounters some problems in achieving sustainable development [12]. Tourism development is biased towards speed, scale, and quantity, resulting in inefficient utilization of tourism resources, low level of industrial energy, serious homogeneous competition among tourism enterprises, and weak international competitiveness; social culture has been reduced to a tool for chasing economic interests, distortion and commodification are highlighted, and culture loses its deep connotation and soil for growth, while ignoring the rights and interests of community residents and being

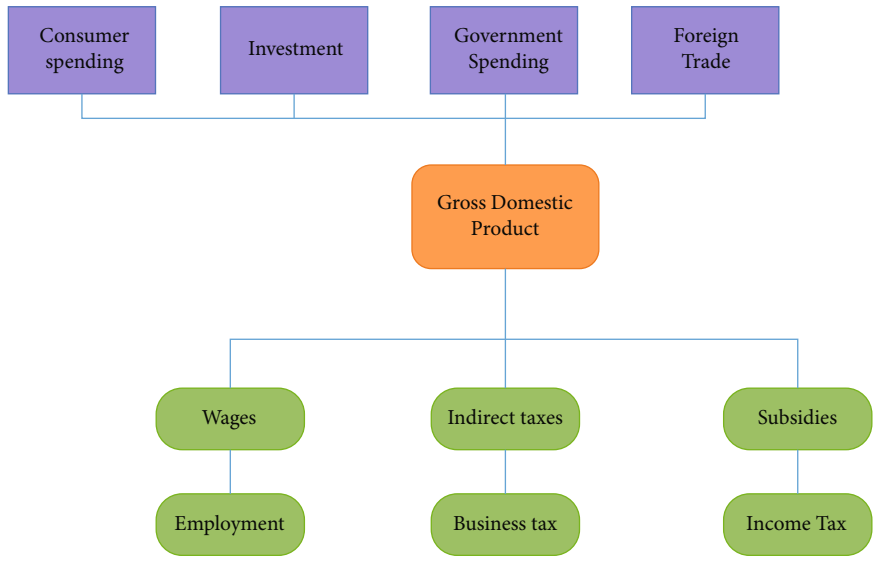

Figure 3: Contribution of tourism to the economy.

reduced to a purely negative external influence. The ecological environment is seriously threatened, and the ecological environment is seriously damaged. The traditional way of tourism development makes the tourism industry face a "bottleneck" in the new development conditions, that is, the sustainable development of tourism resources. In this context, how to give full play to tourism resources and promote the sustainable development of tourism without sacrificing the interests of future generations, based on four factors environmental, social, economic, and ecological, has become a hot topic of research in the world today. In this paper, from the perspective of system theory, the operation mechanism of each block group in the industry is discussed in depth, in order to obviously improve the sustainable development benefits of the tourism industry.

For a long time, there are still some problems in the infrastructure construction of China's rural tourism industry. First, many rural roads are not hardened and have uneven surfaces, causing inconvenience and affecting tourists' interest in visiting. Secondly, the sanitary condition of some villages is poor, and the feces of domestic animals are mixed with those of other animals, which affects the overall image of the city [13]. Third, the public service facilities in rural areas are not perfect; for example, there are too few toilets, which makes it difficult for tourists to solve their private problems. Fourth, the disposal of rural household waste is also the biggest problem, and the lack of a sound waste collection facility is very detrimental to the environment of building a beautiful countryside. Therefore, to promote the development of rural tourism, it is necessary to strengthen the infrastructure construction in rural areas so that rural tourism can be further developed.

3. State of the Art

3.1. Synergistic Evolution of the Tourism Ecosystem. The external system of the tourism industry consists of two aspects: one is the tourist consumption and the other is the endogenous system. The endogenous system analyzes the evolution from the perspective of supply, while the external system is analyzed from both supply and demand. The coevolution of the exogenous system is a dynamic mechanism and process of interaction and influence between the factors of production and consumers within the enterprise. The tourism population is developing new tourism products based on the potential needs of consumers, while the consumers are rationalizing the goods offered by the enterprises by making adjustments [14].

Table 1: Tourism industry system demand factor push-and-pull factor system table.

Status layer	Intrinsic factor system layer
Thrust factor	Family belonging
	Learning factor
	Living environment factor
	Health factor
	Escape factor
	Adventure factor

The coordinated evolution of the external system of the tourism industry ecosystem is a co-developmental evolutionary process in which tourism enterprises meet the needs of consumers and consumers are led by the consumption of tourism companies. Tourism companies cannot do without the consumer market, and consumers cannot enjoy the services that companies cannot provide, the two interact, and one cannot leave the other.

Based on the results of analysis of the push-and-pull factor system for tourism motivation, this paper establishes a tourism demand factor system for the tourism ecosystem, including both push and pull factors, to visually and quantitatively analyze the evolutionary process of the exogenous system of the tourism ecosystem, as shown in Table 1.

Push factors stimulate tourists, stimulate internal needs, and stimulate their desires; pull factors influence tourists'

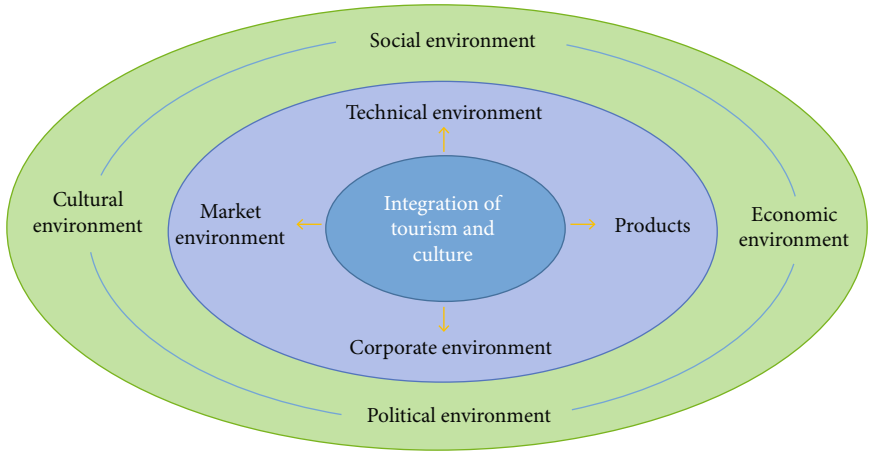

Figure 4: Environmental framework for the integration of tourism and cultural industries.

awareness and judgments, which in turn influence the choice of tourist destinations, i.e., endogenous systems, tourism products, and services offered by advertising and promotional activities.

3.2. Research on the Environmental Architecture of Tourism and Cultural Industry Integration. This paper analyzes the current background, integration mode, integration environment, and government function positioning and draws the following conclusions: from the perspective of industry development, in the process of deep integration of tourism and cultural industry, factors such as technology, products, enterprises, and market environment play an important role in promoting the internal integration of the two industries, and the four elements influence and promote each other; that is, they influence each other and mutually promote each other, which is the necessary condition to realize the deep integration of the two industries and reach the best integration point, while the external environment consisting of social environment, political environment, economic environment, and cultural environment is the basis and guarantee for the two industries to realize integration [15]. In this paper, we analyze and summarize the internal and external elements of the integration of the two industries and discuss the relationship between them, as shown in Figure 4.

In the internal environment of integration, the solid arrows indicate that the four factors technology, product, enterprise, and market support the development of the integration of the two industries, and the joint action and continuous coordination of these four factors are the optimal integration point to be reached in the integration process of the two industries. The arc shows the relationship between the four factors: the technological environment provides fertile ground for the two industries to eliminate their respective technological barriers and gradually blur at the boundaries to eventually achieve technological integration.

The integration of products creates opportunities for enterprises to innovate and design, create core cultural tourism products, and promote the synergistic development of tourism and cultural enterprises; at the same time, the integration environment of technology, products, and enterprises will also have a direct impact on the market environment [16]. At the same time, the integration environment of technology, products, and enterprises will also have a direct impact on the formation of the market, while the level of development of the market environment will also have an impact on the elements, thus prompting the elements to make corresponding adjustments, thus forming a new integration environment as a way to achieve the purpose of development. The external conditions of integration include four major factors: political, economic, social, and cultural. These four factors interact and promote each other, providing a fertile ground for the internal integration of each, enabling a relaxed, positive policy environment based on quality culture and quality culture to promote the integration of tourism and culture for better development.

3.3. Establishing Endogenous System Index System. The endogenous system of the tourism industry is an important part of the tourism ecosystem. Therefore, in order to study the ecosystem of the tourism industry, the evolution of its internal system must be explored in depth [17]. This paper constructs a set of evaluation index system reflecting the endogenous system of the tourism industry ecosystem based on the "multi-dimensional super-capacity ecological niche." The internal mechanism of the tourism industry ecosystem was created by the rise of tourism, and each industry revolves around the six factors of food, accommodation, transportation, tourism, shopping, and entertainment for consumers, so the six factors must be the core of the evaluation indexes. Based on the principles of scientificity, data accessibility, wholeness, comparability, and representativeness, and according to the characteristics of eco-location width, the endogenous metrics of eco-location width were selected. See Table 2. The selection includes the number of tourism resources, the travel agency industry, the accommodation industry, the catering enterprises, and the length of transport routes in the tourism transportation industry.

3.4. Sustainable Tourism Development Models. At present, there are three main sustainable tourism development

Table 2: Measurement index system of endogenous system ecological niche model of tourism industry ecosystem.

Status layer	Variable element layer
Tourism resources	Number of tourist attractions
Travel agency industry	Total number of travel agencies
Accommodation industry	Number of legal entities
Catering	Number of legal entities
Tourism and transportation industry	Number of transport lines

Table 3: Table of countermeasures for sustainable development mechanism of tourism industry.

Mechanism	Countermeasures	Properties
Incentives	Strengthen the propaganda guidance	Ecology
	Business support	Economic environment
Balancing mechanism	Protecting ethnic cultural resources	Ecology
	Industry structure	Economic environment
Drive mechanism	Science and technology	Policy and technology environment
	Tourism brand communication	Social environment

models: government-led, market-oriented, and industry-based.

(1) Government-led model. The government-led model is a model that guides tourism development with macroregulation and microguidance and is applicable to the primary stage of market economy development with its own excellent tourism resources. In the government-led development model, the main role of the government is to macroregulate, make laws, improve the environment, guide the development of resources, build a sound infrastructure, guide leading promotional activities, and regulate and serve to ensure the implementation of sustainable development strategies. The leading direction of tourism development should be reasonably determined according to the different stages of tourism development and different levels of resource development in order to promote the sustainable development of tourism in the province [18]. From a life-cycle perspective, the role played by the government varies at each stage of tourism development. In the early startup period, the government-led focus is to improve the overall image and marketing of the province's tourism brand. In the period of economic transition or recession, the core government-led performance is how to develop tourism in a scientific and rational manner

(2) Market-driven. The market-driven tourism sustainable development model refers to the use of market mechanisms for effective development of resources and their effective protection under market regulation. The market-driven sustainable development model, represented by the central city, is characterized by convenient general transportation, developed regional economy, and high dependence on the source market. In the process of sustainable development, it should actively participate in interprovincial cooperation to achieve a win-win situation and integrate interprovincial resources to achieve optimal allocation

4. Results Analysis

4.1. Sustainable Tourism Development Guarantee Measures. Each region should develop its own characteristic development model based on its own specific situation and its own development path. To ensure the smooth implementation of these development paths and related development approaches, it is necessary to establish a comprehensive and sustainable development system. To this end, this paper has designed a mechanism for sustainable development of tourism in each region by attribute and developed countermeasures (see Table 3) and a pathway guarantee system (e.g., Figure 5).

To strengthen ecological protection, a full play to the role of tourism resources should be given. Tourism development is the game process of local economic interests and ecological environment, the development speed is too fast, then the region's ecological environment will show a rich carrying capacity, while the economic development is relatively backward; conversely, excessive development will bring irreparable damage to the ecological environment of the scenic spot and bring a series of negative consequences. Therefore, the reasonable development of ecological tourism resources will become an important element in the sustainable development of tourism in China.

First, we should make use of the professional power of the industry to systematically coordinate and scientifically promote the sorting out of cultural industries, brand building, production and marketing construction, and production and financing services. Secondly, we should explore the value and development path of the local special cultural industry, explore the mature business model, attract

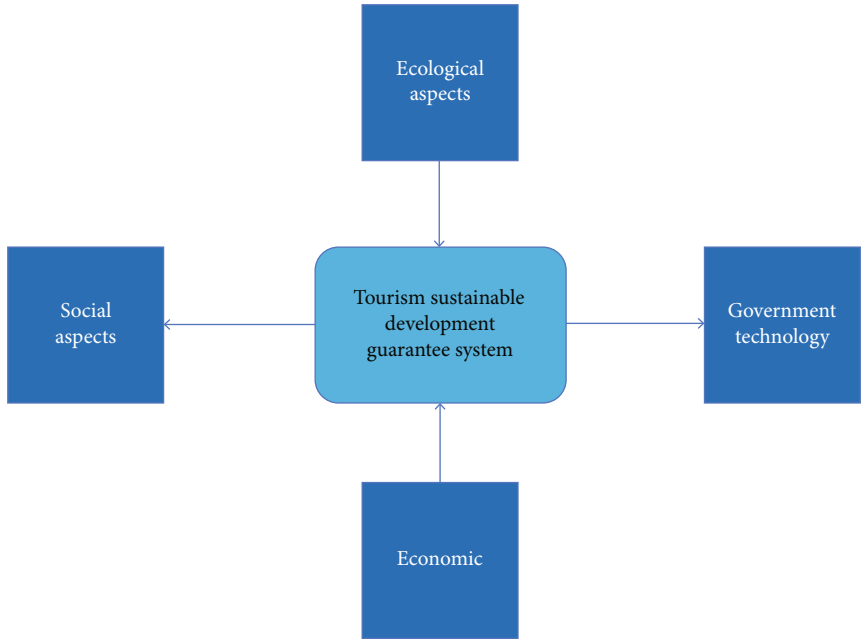

Figure 5: Tourism industry sustainable development path guarantee system.

investment from financial institutions, and promote the activation of the cultural tourism industry; through services such as exhibition and sales show, financing training, and matchmaking meeting, we should promote the effective docking of subdivided cultural tourism industry resources with market and tourism destination [19]. Through the combination of culture, science and technology, and capital, the construction of benchmark projects of the special tourism industry will be made bigger, and a local special tourism industry development model with demonstration, good effect, and self-operation will be formed.

4.2. Tourism Sustainable Development Path Selection. In order to realize the sustainable development of the tourism industry in the province, the industrial structure should be adjusted from both internal and external aspects of the tourism industry.

(1) External restructuring of the tourism industry. The development of the tourism industry involves many industries and economic fields; therefore, it is necessary to take ecological and low-pollution industries as the main investment direction, adjust the proportion of investment, and carry out industrial restructuring, so as to provide abundant tourism resources for the sustainable development of tourism industry [20], as shown in Figure 6

(2) Adjusting the internal structure of the tourism industry. According to its internal structure, the tourism industry can be divided into several types such as trade, ecology, health, and entertainment. In order to achieve the sustainable development of tourism in the province, the resources and environmental capacity of the province should be used as the upper limit, so as to enrich the content of tourism activities and reduce the degree of damage to the resources and environment of scenic spots as much as possible within certain limits

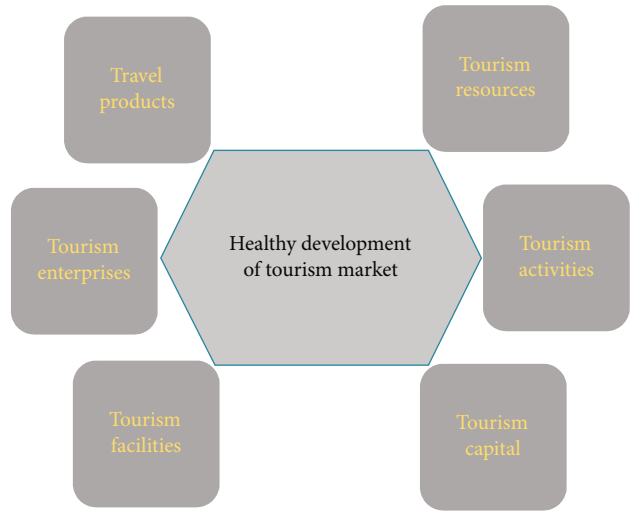

Figure 6: Tourism market benign development "barrel principle" diagram.

Strengthen the support for tourism talents and promote the exchange and training of tourism talents. To build a harmonious social environment, we should start from solving employment, reemployment, reforming the income distribution system, and improving the public service system. The tourism industry is a labor-intensive industry that requires not only a large number of professionals but also highly qualified personnel. To continue to promote the in-depth development of tourism, we must continue to strengthen the existing hardware and software strength and constantly

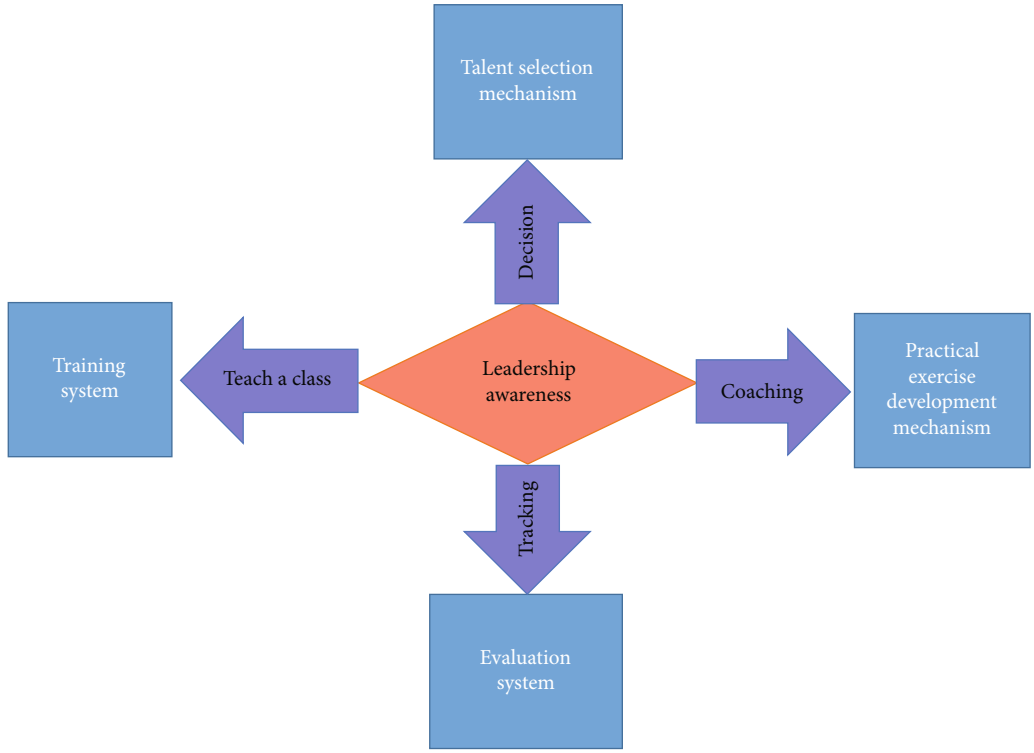

Figure 7: Tourism sustainable development talent training strategy map.

improve the structure of human, financial, and material resource input and output and improve tourism infrastructure and support, of which the training of talents is the top priority. To increase the support of talent, it is necessary to base on the vision of the world, accelerate the training, and introduce talent. According to the needs of the development of tourism market, senior management as well as operation and service managers should be cultivated and a team of tourism professionals and teachers in colleges and universities should be built. At the same time, tourism management departments should strengthen staff training, establish an effective assessment mechanism, and improve staff's service awareness; tourism talent development, tourism talent exchange, and tourism talent resource sharing should be promoted; talent service platforms should be built; and tourism talent comprehensive quality and comprehensive quality should be improved [21]. The tourism company should work together with the provincial tourist attractions, the provincial tourism bureau, the provincial education system, and other four departments to provide practical and relevant timing for the management of tourism areas to improve the level of training of tourism professionals and technicians. At the same time, tourism management should strengthen training and establish an effective assessment mechanism to enhance service awareness. In terms of training and education, the training units should develop suitable training programs and report to the relevant competent authorities and educational authorities. The functional departments should organize regular annual meetings between the program development parties and the provincial stakeholders to further improve and deepen the tourism training system. Finally, tourism authorities are required to conduct continuous training and evaluation of the staff of the tourism industry concerned in accordance with the evaluation model of the health system and, at the same time, to cancel unqualified tourists (see Figure 7).

4.3. Comparison of Tourism Development Models. Due to the different spatial and temporal contexts of industry development, there are no absolute advantages or disadvantages between the traditional tourism development model and the sustainable tourism development model. Through a comparative analysis of the traditional and sustainable industries, this study concludes that there are gaps between the two mainly in terms of goal pursuit, beneficiaries, management styles, and impacts. First, in terms of goal pursuit, traditional tourism only seeks to maximize profits, while a sustainable industry seeks to maximize economic and social harmony.

4.4. Effective Methods of Developing a Rural Tourism Industry. The development of a rural tourism industry with local characteristics is an important element in the development of rural tourism. First of all, it is necessary to correctly position it, repackage it, and dig it deeply when developing planning. Secondly, the development content of many local characteristics is empty and unoriginal to attract tourists; therefore, experts must be introduced continuously to develop local tourism with local characteristics by using local resources. The development of rural tourism cannot be separated from the construction of the brand, because the current rural tourism industry has a large number of homogeneous

phenomena; without its own products and brand promotion, it is unable to attract tourists. Therefore, when developing rural tourism, we must establish our own brand according to local characteristics, and at the same time, we must strengthen the promotion of the brand and the excavation of brand characteristics, so as to add new highlights to the tourism industry and improve the rural tourism.

At present, the lack of sufficient local labor force in rural areas has seriously affected the development of rural tourism. Therefore, while developing rural tourism in rural areas, it is necessary to strengthen the development of rural tourism and also strengthen the promotion of rural tourism, so as to attract more local youth to join rural tourism and thus provide talent assurance for the development of rural tourism. On this basis, local rural practitioners should be trained in professional tourism knowledge and skills and provided with relevant courses on tourism characteristics so that they can better understand the local culture and tourism products. In addition, the government should hire experts to explain the planning and operation of tourism development to local residents and also regularly provide local staff with knowledge on product characteristics and tourist attractions, so that the development of rural tourism can be more vernacular.

With the rapid development of information technology, the Internet platform has become an important means to promote rural tourism products and marketing. Therefore, it is necessary to build a set of systematic internet marketing concept for rural tourism and use online platforms such as Weibo, WeChat, and Shake to promote rural tourism products, as well as to publish popular topics such as farming events and festivals in rural tourism, thus forming the characteristics of rural tourism and thus attracting more tourists. Meanwhile, travel portals such as Ctrip and Tuniu can also provide travelers with information on accommodation, attractions, food, and other aspects online. Rural tourism should make full use of Internet technology for innovation in marketing methods.

5. Conclusions

At present, China's tourism and cultural industry has entered a new stage of development; China's cultural industry is facing the historical mission of institutional change and industrial development, and tourism development is in an important stage of transformation and enhancement. By enriching and expanding the cultural connotation of scenic spots, we can continuously meet the spiritual needs of tourists and improve the quality of tourism; driven by the marketization of tourism, we can promote the dissemination of Chinese culture in the form of unique tourism, which has become a proven method to achieve win-win cooperation between tourism and culture and achieve development goals in the new period and situation.

The tourism industry ecosystem is a more comprehensive and systematic research. In studying the structural function and coordinated evolution of the tourism industry ecosystem, it should be carefully analyzed and explored by combining the characteristics of each spatial space, and on this basis, a tourism industry ecosystem with a larger scale should be established and its future development trend should be predicted.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

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Research Article

Promoting Environmental Protection through Art: The Feasibility of the Concept of Environmental Protection in Contemporary Painting Art

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With the development of society and the progress of science and technology, the impact of human beings on the environment is becoming more and more serious but also facing the crisis of resource exhaustion. The frequent occurrence of natural disasters has sounded the alarm to human beings, and people are paying more and more attention to the concept of green ecology. There is a close relationship between people and the environment, the development of industry, and the abuse of resources, so that today's ecological environment has been greatly damaged, people's requirements for the environment are constantly improving, and people's environmental awareness is also increasing. While vigorously strengthening environmental management, the government also put forward the "people-oriented" sustainable development strategy. Along with the development of The Times, the art of graphic design is an important service in the field of the society, serves people, is the service life of important activities, its art function must keep pace with The Times, should not only meet the needs of The Times, and to be able to meet the needs of The Times, and to be able to meet the needs of the market. More should make full use of the function of the design to influence and change the society through design ideas, to advocate environmental protection, to improve people's thinking patterns and values, and to change those production and life styles that deviate from sustainable development. Therefore, this article will discuss and analyze the modern painting from the artistic concept, art education, green environment concept, green design, and so on.

1. Introduction

1.1. Creation Background of Ecological Painting. Ecological painting is purely hand-painted with materials such as natural plants, plants, and even butterflies according to their shapes, colors, and sizes. It is a kind of art, a kind of culture, and a combination of art. The original work is based on scientific specimens and the beautiful art of embossing. It can satisfy people's thirst for flowers for thousands of years and make it prosperous. It is the best choice for people at home, restaurants, hotels, offices, and shops. It is a sign of social status and upbringing. With the improvement of mechanization, China's economic development speed is getting faster and faster, but due to environmental pollution, some local environmental problems are more and more serious; the government is also paying more and more attention to environmental protection [1], but there is no way to timely solve the environmental problems in cities and villages. There are more and more people on earth, and people are competing with other life for survival. Some people have begun to realize the importance of environmental protection, but their environmental awareness is still in the bud. Although they have been aware of the deterioration of the environment, their quality of life is not good, their environmental awareness is still very low, their confidence in nature is constantly collapsing, and the problem of environmental protection has a long way to go.

1.2. The Necessity of Ecological Painting. From the perspective of the whole ecosystem, ecological painting shows people's concern about the ecological balance of nature and themselves, thus arousing people's concern about nature

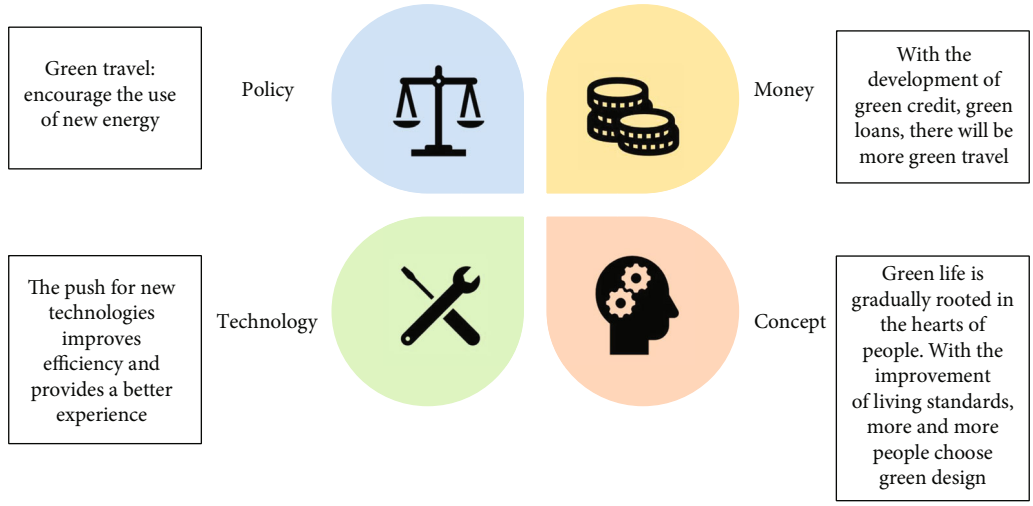

Figure 1: Green concept in all aspects of the showe.

and the surrounding living environment. Reconstruction of underground pipelines in the old city is difficult, and residents have to endure the stench. The sewage and waste from the mink farms are not treated, and the water in the fish ponds has become undrinkable [2].

Villagers are still raising ferrets in the most primitive way [3]. People tend to ignore results, do things without thinking through them, have a hard time thinking about the bigger picture, and have an inert conformity mentality. In the development of contemporary ecological art, oil painting, as an ancient and composed form of expression, can also express the needs of the environment and the public from the perspective of the public. At the same time, ecological painting can also carry out necessary communication with the public [4]. From the perspective of public education, it is easier for both adults and children to understand and participate.

1.3. Basic Concepts of Green Design. Green design is an international design trend emerging in the late 1980s. Green design is not only a reflection on the environmental and ecological damage caused by modern science and technology but also a return to the designer's ethics and social responsibility. In the long history of human beings, industrial design has not only provided modern living and living environment for people but also accelerated the consumption of resources and energy and seriously damaged the earth's ecosystem. In particular, the excessive commercialization of industrial design has made design an important medium, which encourages people to carry out unrestricted consumption. No wonder people call "advertising design" and "industrial design" the "primary culprit" of publicizing mass consumption, which has attracted a lot of accusations. In this context, designers must reflect on the responsibilities and roles of industrial designers, so green design comes into being, as shown in Figure 1. "3R" is the basic principle of green design [5]. The reduction principle is to reduce the consumption of matter and energy and the discharge of harmful substances. The reuse principle is to design the product and its parts so that they can continue to be used after treatment. The recycling principle is that the recyclability of materials should be considered in product design.

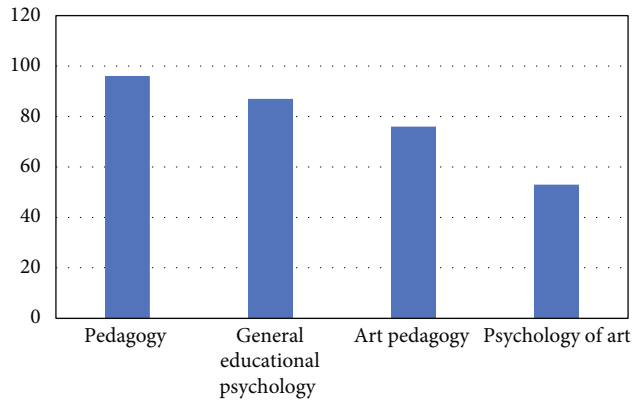

Figure 2: Knowledge of art psychology and other disciplines.

1.4. Psychology of Art

1.4.1. Differences between Art Psychology and General Education Psychology. As psychology exists in pedagogy, it can better enrich itself and thus guide educational activities, as shown in Figure 2. Our goal, then, was to find unique ways to enrich ourselves in art teaching and that came naturally to us [6]. Through comparison, we can see that art psychology is a unique way in art teaching.

The psychology of art is a science that studies artistic creation and human psychology [7]. This is the kind of knowledge that leads to a better understanding of art [8]. Therefore, art education and art education are closely linked. Art psychology is a kind of psychological reconnection, which has strong practicability and can show its application well. In Europe, the development of psychology and physics is particularly prominent in the 19th century, while the development of applied psychology has gone through the

baptism of wisdom and history and gradually matured with the development of psychology. In this era, in the world of art, a new and unique discipline emerged, that is, experimental aesthetics.

1.4.2. Characteristics of Educational Psychology. Educational psychology is a scientific field belonging to applied psychology as well as artistic psychology [9]. Educational psychology takes various psychological phenomena in education and teaching as the research object and the change of this phenomenon, as well as the psychological law of the educated people in the environment of "teaching" and "learning" to learn technology and cultivate intelligence and personality. Of course, neither does educational psychology [10]. Therefore, educational psychology is mainly concerned with the cultivation and development of students' psychological characteristics.

The main content of educational psychology is summarized as the following four aspects:

(1) Individual psychological differences

(2) Formation and rules of technology

(3) Psychological characteristics of the educated in mastering technology and techniques

(4) Moral cultivation and cultivation of educates

1.5. Research Purpose and Significance of Spatial Metaphor. As a new concept, spatial metaphor was proposed by Rakoff and Johnson in 1980. As an academic term, its research is currently limited to language and cognition. Therefore, after reviewing a large number of studies on metaphor and spatial metaphor, the author looked back at Tuymans and the works of several contemporary artists using space as the medium and found many similarities with modern oil painting art. Metaphor can break through our past thinking inertia and construct a new logical relationship for us. Through analogy, projection, and other new perspectives and methods, we can effectively expand our thoughts, so that our thoughts can be better expanded into an unknown abstract world, thus making new connections between our thoughts and feelings. In contemporary art, as an important participation factor, spatial metaphor is increasingly valued by people, but there is no systematic theory to analyze it at present [11]. Secondly, this paper mainly draws lessons from metaphors from other disciplines so that metaphors in contemporary art can be applied to other studies, thus extending metaphors to art.

2. Description of the Problem

2.1. Status Quo of Ecological Art. Ecological art, ecological photography, ecological film, and so on are gradually rising in China. In the 1990s, Chinese local artists are also trying to go global in the way of contemporary ecological art. In the 21st century, the world has taken the industry by storm [12]. For example, the combination of art and photography and a large number of environmental photography sites like China emerged to take practical action to protect the environment. Ecological photography is a kind of ecological art, which can actively make the audience feel protected and close to nature.

Compared with China, foreign ecological art is more diverse and creative, and artists themselves are also the backbone of environmental NGOs. They persevere and go into the public space through the form of art to promote the importance of environmental protection but also recognize the contribution of art to society and call on the public to actively participate. The painter has a direct involvement in the treatment of environmental problems.

2.2. Green Urgency. With the development of science and technology, contemporary design has more space for development and more forms of expression [13], at the same time deep into the level of design thinking, resulting in the change of design concept, namely, depletion and destruction of ozone layer, greenhouse effect, earth overload, destruction of biological chain, reduction of forest vegetation, resource depletion, urban solid waste pollution, sulfur dioxide smog event in Maas Valley of Belgium, London smog event, and Beijing haze event. Human beings originally hope to inspire designers' moral and social responsibility through the perspective of professional self-discipline [14]. Chinese scholars appeal: Design should not be limited to the infinite expansion of commerce and consumption, and the code of conduct of design is the ethics of design. From the perspective of ethics, the design has been comprehensively considered, including the factors of people, environment, and resources, so as to shoulder the historical task of serving the environment with limited resources and healthy development of human beings. Chinese scholars believed that he had to talk to the public and instill a new concept of "fit is good" in the society with the most basic ideas. However, in the past 50 years, in the struggle between ethics and commercial interests, and in today's deteriorating ecological environment, the "humble" working attitude of designers has declared the failure of design ethics. In order to find a way out of survival, people began to take the road of mandatory law, which opened a new era of "green design," as shown in Table 1.

2.3. The Aesthetic Interest of Painting Art. Plagiarism, piecing together the blind imitation of doctrine, results in a variety of not mean neither fish nor fish weird atmosphere. From multifarious vanity to simplicity, from waste of beauty to insistence on the environment, the industry has a responsibility to reverse this vice. As a country with a long history, China's thousand-year civilization has bred a unique outlook on life and ethics. How to integrate the essence of Chinese traditional culture into our design is an important task entrusted to us by The Times. Here, it must be pointed out that the spirit and form of tradition are different; how to grasp its essence, rather than just stay on the surface of simple imitation, this problem is worthy of in-depth discussion and research by the design circles at home and around the world.

Table 1: The types and quantities of renewable resources that can be recycled every year in China.

Renewable resources that can be recycled	Iron and steel scrap	Waste paper	Waste tires	Scrap nonferrous	Waste plastics	Other waste materials	A combined
Unit: ten thousand tons	4000	3000	5000	500	600	1000	100 million

Table 2: Key issues of ecological painting creation.

The key problem	
Focus on 1	Choose appropriate materials and expressions
Focus on 2	Explain the relationship between man and nature
Focus on 3	Hands-on experience is cleverly combined with ecological creation

2.4. Key Issues of Ecological Painting Creation. One of the key points of ecological painting creation is to choose appropriate materials and expressions [15]. Creation requires the selection of a theme closely related to people's life, and the seemingly ordinary theme is properly expressed and highlighted by various means of painting.

The second key is how to explain the relationship between man and nature. From what point of view? But he looked at himself. How to correctly and vividly describe environmental pollution can not only make the audience better understand the relevant knowledge of the environment but also correctly understand the relationship between human and nature and guide the audience to constantly think about what they should do to change this phenomenon. While destroying the environment is protecting the environment, art is art, influencing others from a subconscious point of view, combined with ecological civilization. The third point is to skillfully combine personal experience with ecological creation to make the work more full and full of spirit and meaning, as shown in Table 2.

3. State of the Art

3.1. Requirements of Ecological Painting Creation. Ecological painting should conform to the basic principles of ecology and environmental science and be combined with facts, be reasonable and well-grounded, and have a good role in environmental education. Also, ecological painting triggers reflections on social, environmental, and human relationships [16]. At the same time, the creation of ecological oil painting should also follow the aesthetic rules of art creation and choose the theme and language close to nature as much as possible, so that the public can better experience its beauty, as shown in Figure 3. Positive emphasis on the beauty of the environment and harmony between man and nature can also be used to describe the real situation of environmental deterioration from a reverse perspective to warn people of the importance of environmental problems. In the creation of ecological oil painting, we should draw lessons from the expression of ways and methods of modern ecological art and, on this basis, innovate it.

3.2. Relationship between Sustainable Development Strategy and Green Design Policy. To achieve sustainable development, we must build a recycling society and improve the efficiency of resource and energy reuse.

"Go." The development of circular economy inevitably needs "reduction, reuse, and recycling" to prevent pollution from the source and build a sustainable production and consumption system, and the key to achieving this goal is to promote green design. Before the 1950s, there were only six international conventions on environmental protection and management, which increased to 16 in the 1970s and more than 100 in the 1980s. Now there are more than 180 international conventions and agreements covering the atmosphere, land, and sea [17]. With the continuous enrichment and expansion of the concept of sustainable development, the formulation and implementation of green design policy also provide a strong impetus for the formation of green design policy in the early 21st century.

However, the strategy of sustainable development is the general direction of mankind and an overall strategic decision. In a particular industry, in the design aspect, there is a great practical value. "Landing" is an important path of sustainable development strategy. Design majors are booming these days, but the price of professional design is high. The lack of values and ethics makes design become a way for developers to grab profits and cheat consumers. Brazzard is in urgent need of new values to reshape its advanced and scientific nature. These two levels are urgent needs for the development of human society and an important driving force for green design policy, as shown in Figure 4. It can be said that the sustainable development strategy points out the direction for the formulation and implementation of green design and provides a strong policy support for it. At the same time, the policy of green design is constantly improving and perfecting the concept of sustainable development.

3.3. Painting Art Is the Foundation of Modern Design. Regardless of history, form, language, and other aspects, painting art is the cornerstone of contemporary design. In the practice of brand, painting art also plays a very important role. An Australian industrial design advisory committee in 1998, according to a report, published that a design student should have 10 best skills, namely, "be good at drawing and painting freehand"; this is the basic quality which designers must have; therefore, no manual drawing and design ability are not correct. Painting can promote design thinking and technology, and a simplified icon design is a simple summary and summary of the concrete sketch. In fact, no computer-aided design can replace a sketch on paper.

3.4. Painting Art Status Quo. Chinese painting art is good at summary, direct, and casual, through the effect of

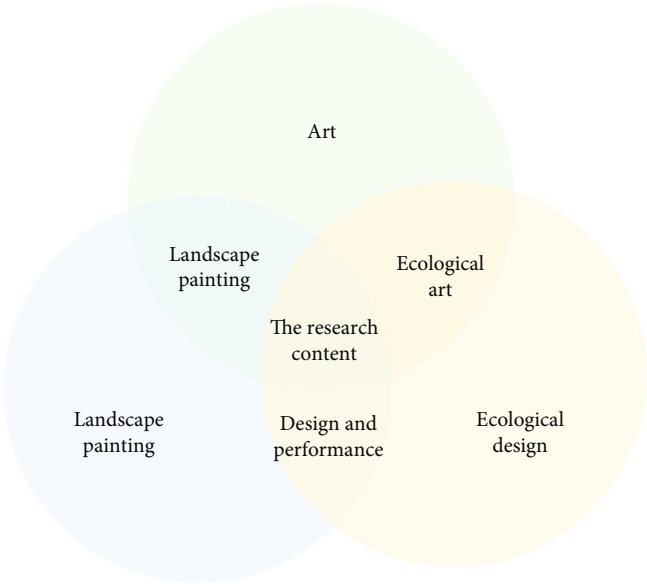

Figure 3: Interdisciplinary and research content.

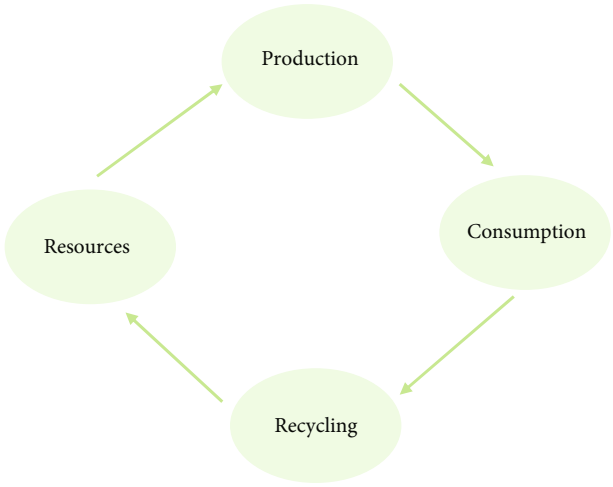

Figure 4: For sustainable development of benign cycle schematic diagram.

images to express the artist's aesthetic ideas, the pursuit of levels, and aesthetic interest. Throughout the long history, Chinese painting has been a kind of "noble art" since ancient times. The folk art of the public still exists, but it has not received special treatment [18]. Until today, the traditional Chinese poetry and calligraphy and painting have been well known to people. Among today's Chinese artists, many artists are still inheriting and developing traditional traditions and following the traditions of their predecessors. On the basis of tradition, their artistic styles and characteristics are also constantly developing. The former was the representative of Gu Lin and Jincheng, while the latter was Huang Binhong, Pan Tianshou, and Qi Baishi. Form, shape characteristic, the understanding of Chinese painting and thinking, realistic performance, and shape characteristics constitute the Chinese classical aesthetics and philosophy, in the general observing things, with the size to large and small in see big way, in the observation and understanding in general, and what also not on the surface, are not in a place of rest. Just like the objective images of natural landscapes, flowers, birds, and so on, the observation, understanding, and expression are all consciously connected with human's social consciousness and aesthetic taste, while "freehand brushwork" and "lyric expression" are the expression of the Chinese thought of "unity of nature and man." In the specific works, attention is paid to the organic combination of poetry and calligraphy, painting, and seal, as well as through the poetic language in the picture; the artist's cognition and expression of society, life, and art are all part of the organic deepening of the theme and picture.

Painting art is rich and colorful; beauty is its essence. Beauty is the basis of human existence and is the basis of continuous progress and development. Western painting focuses on induction and analysis and tends to reason. To analyze the objective world in the way of painting, until modern times, its important works were still widely used in people's daily life, and many painters' works were priced sky-high, but its artistic essence was created for the working people. However, the beauty of artistic discovery is different from the beauty of nature. It is a kind of hazy beauty, which needs more artists to constantly explore and explore! The traditional art of western painting, which can be traced from lines to primitive times, as an independent artistic activity, tries its best to show accurate and flexible purposes. Although it could not get rid of the shackles of Western philosophy, it was at that time due to its precise pursuit of form, as shown in Table 3. Therefore, the scientific relationship with the objective world is relatively close, for example, with the continuous development of painting art, more and more accurate, and more and more realistic, three-dimensional space concept is gradually excavated, and in the art field of painting, there are relatively few art concepts and intelligence.

3.5. The Value of Spatial Metaphor in Contemporary Painting Art

3.5.1. Value of Spatial Metaphor in Contemporary Painting Art. Nothingness was used to be an art, but now its size is seen as an art. This is according to an exhibition "The Art of Empty Questions" by American artist Jeanifer Richter. The word "space question" was widely used in The European Renaissance. "Space" is defined as the distance between objects and objects, while the traditional IFL space is represented or served as a background by points, lines, planes, and colors. In the 20th century, the concept of space has been expanded and has a close relationship with psychology, literature, and many other fields. The French phenomenological philosopher Merleau Ponty regarded "empty inquiry" as a universal relation, and he linked "time inquiry" with the active state of "empty inquiry." The generation of "empty questioner" originates from the "Lord of space," which transforms "empty" from a tool of "description"" to "emotion," which is reflected in contemporary paintings.

Table 3: Understanding of contemporary art and its artistic view in basic art education.

The problem		Students	Teachers'
Contemporary art	Do not understand	96%	72%
Focus on contemporary art	Do not focus on	87%	92%
The relationship between contemporary art and schooling	It does not matter	85%	93%
The desire to understand contemporary art	Want to	93%	87%

3.5.2. Expansion of Traditional Space Art by Contemporary Space Metaphor. As far back as Greek and Roman times, there was attention to space. Under the influence of "imitation theory," many excellent painters can well show their pursuit of objects in the use of light and focus. Classical, neoclassical, romantic, realism, and other traditional schools of painting are very high attainments in the simulation of objective things. It is precisely because in the traditional concept, the most important thing is to show real objects, so since the birth of perspective, space has been strictly limited in a series of laws such as big, far and small, near reality, and far and virtual. Through the continuous study of the structure of human vision, painters have been thinking about how to make their works more realistic and more appealing to the audience.

4. Results Analysis

4.1. Strategic Policy and Structural Environmental Programmes. The strategic policy is based on economic strength, environmental pollution, and technological level [19]. Strategies are guidelines for the development and implementation of environmental protection regulations or codes, as well as social objectives for environmental protection design and cleaner production. It has three main contents sustainable development, environmental protection, and integrated product planning. Environmental action plan and integrated product plan are an important means of sustainable development strategy rather than a dependency [20]. Sustainable development strategy: The action plan will promote the sustainable and efficient use of natural resources, energy, and raw materials, as well as the elimination of hazardous substances and hazardous raw materials from the manufacture and design of products from a source control perspective. Since about 80% of the environmental impacts have been identified at the product design stage, important products should be enhanced with environmental design, such as taxation. The production process is more detailed and cleaner, which is the focus of planning management.

4.2. Methods of Green Design

4.2.1. Life Cycle Design Method. Life cycle is a broad concept, which is widely used in politics, economy, environment, technology, society, and other fields. The production of products includes raw material collection, processing, storage, transportation, use, scrap, disposal, and other whole process. The life cycle method is an important approach to green design. This is the test from the beginning of the concept design, from the design, research and development, production, use, disposal, and other whole process to ensure the environmental performance of products. In the process from design to production, the life cycle method is most relevant to "green" products, as shown in Figure 5.

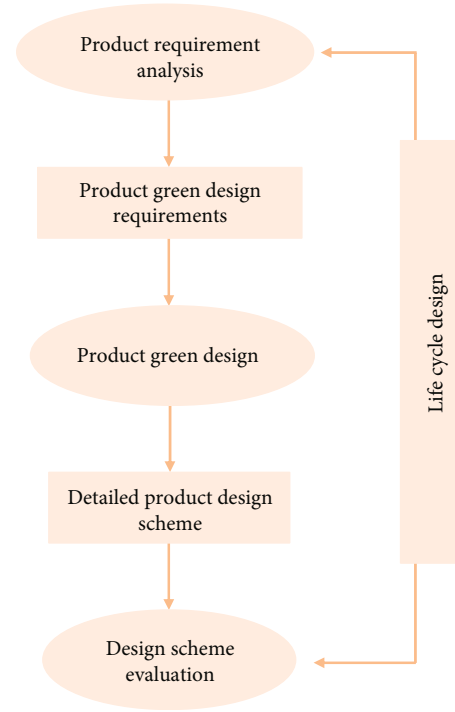

Figure 5: Green design content and process.

4.2.2. Modular Design Method. One of the most important aspects of green design is modularity [21]. Modular design classifies the function, performance, specifications of the product design, and different selection and combination of functional modules, in order to achieve different functional requirements. Modularization can shorten the design and manufacturing cycle of products, reduce production costs, standardize product varieties, improve quality, and accelerate product updates, as shown in Figure 6. In addition, the product adopts a modular design, is easy to repair, and because of its consistent size, is easy to disassemble, and in the event of local failure, can be quickly replaced and can extend the service life of the product; also, it can be said to kill two birds with one stone.

4.3. The Artistic Expression of Painting Improves the Aesthetic Value of Design. Beauty is an emotion in the human heart, a strong thing that awakens the beauty in the deep [22]. This is a man's best wish. Beauty is hidden deep in people's

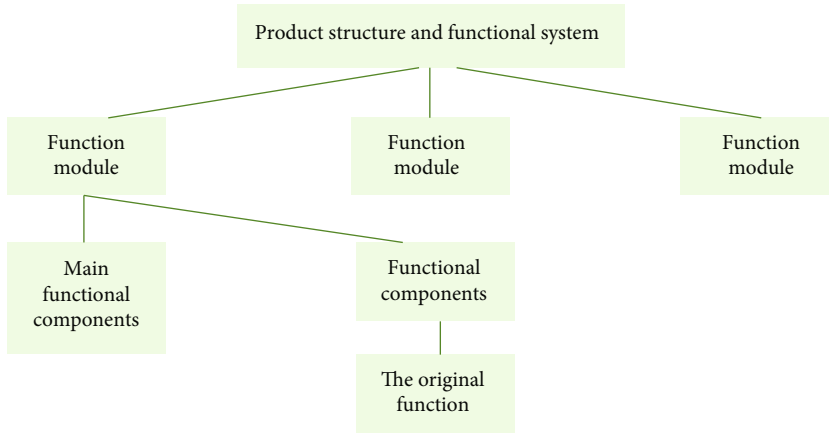

Figure 6: Modular design diagram.

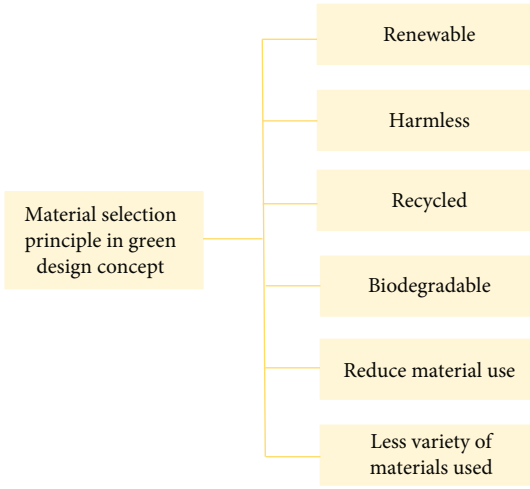

Figure 7: Material selection principle in green design concept.

subconscious, unspeakable beauty; artists should draw it well, let people see. This is what a painter should do. The sky in the painting art design should have beauty, beauty not only to the eye, but also the eye. It is a spiritual connection.

4.4. Construct the Basic Path of Green Design Policy Implementation. As a kind of public policy, the policy goal of "green design" is long term and complicated, and it must be transformed into specific standards through specific implementation channels: goals or paths to realization. Factors such as science and technology, economy, and culture vary greatly among countries, so the conditions for policy making are also different. Its implementation path has many characteristics. The implementation approach of green design policy in China should be in line with technical feasibility, economic affordability, social acceptance, political acceptance, and implementation of the policy plan. Choose the best strategy by evaluating and choosing the potential risks associated with the path, as shown in Figure 7. The implementation of "green design" mainly includes supporting the research and development of key technologies such as green manufacturing and green production and leading market innovation, establishes incentive mechanism and punishment mechanism, and strengthens the support to small and medium-sized enterprises. The combination of moral guidance and policy incentive constructs the basic mode of green design.

4.5. Research and Thinking on the Way of Ecological Art Movement. The connection between traditional artists and the public is broken, and art may be beyond the understanding of ordinary people. We believe that art comes from life, but it is more important than life. The social basis of ecological art can be divided into two kinds: one is natural education institution, the other is natural education institution, and the other is art museum. However, the nature of the two men's societies was quite different. NGO is a public service organization, and the art is often a meeting place for culture-centered social groups. In the exhibition hall, ecological artists focus on the images of animals and humans, using installations, paintings, sculptures, and other art to remind people of the connection between humans and nature, but it is difficult to change their mind. The nature museum, which is open to the public, has the dual attributes of art and science. Physical specimens can also be displayed as a work of art in the museum, attracting more attention and understanding. While appreciating ecological art works, people will spontaneously enter nature to seek peace of mind and the connection between man and nature.

Whether ecological artists care about, improve, and serve the society depends on individual ability and choice. In the contemporary era, ecological artists tend to return to the masses. Ecological art is often the artistic temperament expressed by artists in the social ecological movement. Take Huang Yifeng from Taiwan for example. He uses his environmental art education to encourage more people to participate in the creation of nature and make people realize the importance of the environment. Huang Yifeng's "Cultivation of Natural Observation Talents" and "DIY of Natural Wild Interest" are his experience and practice in ecological art. In the simplest and most direct way, they help more people get spiritual satisfaction in life and also satisfy people's pursuit of nature. Maybe the public's painting and creation techniques are not professional enough, but each person's creativity is unique, the public's concept will gradually

change, and people will gradually pay attention to the natural environment.

In contrast, the local natural ecological art movement has a larger space for development. Sun Jun's advocate of "green cross" is the construction of "green," Beijing's "green cross" to "country" into a "rural," "ecological," "ecological," "environmental protection," "environmental protection," "garbage collection," "classification," and other "green." Sun Jun of green cross, in a series of works about rural ecology, has created a real and beautiful picture.

5. Conclusions

At present, the global energy is about to be exhausted, and the ecological crisis is imminent. In a sense, this is the issue of environmental protection. Associate designers attempt to awaken "profit seeking" by means of design ethics, so that they wake up and dare to be responsible for their own survival. To solve the current dilemma, the responsibility of protecting the earth's resources and the environment is unrealistic. Categories do not have much time for designers to wake up. What measures should enterprises take under the guidance of sustainable development strategy? Develop flexible green design guidelines and strict environmental regulations to limit the actions of designers. Establishing and perfecting environmental protection system is an urgent problem to be solved at present.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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Retraction

Retracted: The Scheme of Ecological Environment Governance under International Discourse Power from the Perspective of Ecological Civilization

Journal of Environmental and Public Health

Received 20 June 2023; Accepted 20 June 2023; Published 21 June 2023

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.

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[1] Z. Yu, "The Scheme of Ecological Environment Governance under International Discourse Power from the Perspective of Ecological Civilization," *Journal of Environmental and Public Health*, vol. 2022, Article ID 3367200, 13 pages, 2022.

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Journal of Environmental and Public Health
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Research Article

The Scheme of Ecological Environment Governance under International Discourse Power from the Perspective of Ecological Civilization

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Ecological civilization construction is an important field of global ecological environment governance, and biodiversity is an important foundation of ecological civilization construction. In the process of building international discourse power of ecological civilization, governments, enterprises, and individuals should attach great importance to ecological environmental protection. Especially in the context of the new era, the promotion of international discourse power of ecological civilization and the governance of ecological and environmental problems must be in the process of further consolidating the foundation of ecological economy, paying particular attention to the management of enterprise ecological and environmental costs. Therefore, from the perspective of practical research, fuzzy analytic hierarchy process is used to comprehensively evaluate enterprise environmental cost management. Through research, the importance of enterprise environmental cost management and the help to ecological environment management are proved, and on this basis, ecological environment management countermeasures are put forward.

1. Introduction

In recent years, with the deepening of China's reform and opening-up policy, China's economy has developed rapidly, and at the same time, China's position in the world economic pattern is becoming more and more obvious. However, with the development of global economy and the rise of China's economic strength, the ecological environment governance issues became the primary problem we must pay attention to, such as air pollution, water pollution, land desertification, and other environmental issues more and more obvious, all these problems hinder our country to build more good ecological civilization is the international voice of important factor. Of course the emergence of these problems and industrial production, economic development has a direct relationship. In particular, the production and sales of industrial enterprises are one of the important causes of these pollutions. Therefore, from the perspective of ecological environmental governance and the construction of international discourse power of ecological civilization, this essay focuses on high-pollution enterprises and takes the construction of ecological civilization as the guide to deeply analyze the importance of ecological environmental cost management in the process of enterprise operation. See Figure 1.

2. Literature Review

In western society, human development, and natural environment is so brazenly and its common belief of Christianity has a lot to do—in congregational Christian, god created everything and finally, creates the human, god created everything is for the service of humanity, all things if not for human use, it has no value. It is obvious that this religious axiom will directly lead to the spread of anthropocentrism [1]. Therefore, in order to deal with this problem, American scholars proposed in the middle and late 1960s that ecological problems could not be solved if westerners could not reject the Christian axiom that "nature has no value of existence except for serving human beings". Some scholars sounded the horn against anthropocentrism for the first time, and it was also during this period

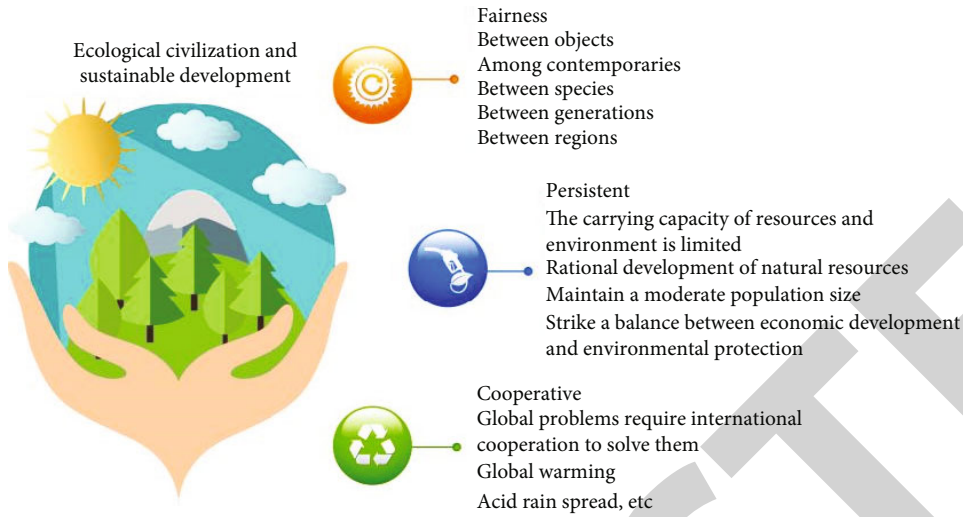

Figure 1: The ecological environment under the international discourse power from the perspective of ecological civilization.

that western ecological theories began to form a certain philosophical system, with various schools of thought arguing, including ecocentrism, ecological Marxism, modern anthropocentrism, ecological politics, and ecological ethics [2].

Some scholars especially emphasized the important role of cultural identity in the world order. He divided the world into eight civilizations and believed that after the disintegration of the bipolar structure, the clash of civilizations would become more significant. From the perspective of discourse power, culture is an important way to enhance discourse power. We should not only respect the differences between different cultures but also actively seek commonalities, enhance exchanges, and build a new type of international relations. Similarly, some scholars put forward the concept of "soft power"; that is, in addition to hard power such as military and economic power, cultural and political values, and the ability to make rules and decide political issues in the international community, which indicates that the power of discourse is not only reflected in some material levels but also in many abstract levels [3]. The above views have important implications for the research on the promotion of discourse power.

The research on the theoretical basis of discourse power of ecological civilization in China is the starting point for the study of discourse power of ecological civilization [4]. Some scholars believe that today's China has enough confidence in discourse. It is pointed out that the discourse confidence of China's ecological civilization construction comes from the common value appeal of mankind, the profound traditional Chinese ecological wisdom, the rich practice of ecological civilization construction, and the moral power of China's ecological civilization construction. Therefore, in the process of building the discourse system of China's ecological civilization construction, it is necessary to get rid of discourse dependence and discourse worship on the West, break through the "discourse deficit", strengthen discourse confidence in China's ecological civilization construction, and strive for international discourse power [5]. Some scholars from the perspective of system confidence argue that China improve the influence condition of ecological civilization, if it is thought that the Chinese voice to promote ecological civilization have superior socialist system as the backing, has high efficiency of system effectiveness for the reality basis, and has a profound experience and abundant practical results for history basis, a system of deep popularity for value basis. Therefore, the conditions for the promotion of discourse power are relatively mature [6]. Some scholars view it from the perspective of the challenges faced by the discourse power construction of China's ecological civilization. For example, under the traditional international discourse system of "the west is strong and the east is weak", some media and scholars in the western society wear colored glasses, ignoring our achievements in the construction of ecological civilization; we amplify and spread some existing environmental problems [7].

3. Current Situation and Problems of Ecoenvironmental Cost Management of Enterprises in China

3.1. General Situation of China's Industrial "Three Wastes" Discharge

(1) Total emission of industrial pollution and its increase and decrease in China

First, analyze waste water discharge. As can be seen from Table 1 and Figure 2, since 2004, with the improvement of industrialization and urbanization, the national wastewater discharge has been increasing. In 2014, wastewater discharge exceeded 70 billion, reaching 71.62 billion tons. Compared with 2004, the increase was 23.38 billion tons, an increase of 48.47%, with a large increase. Among them, industrial waste water emissions were generally flat, reaching a peak of 24.66 billion tons in 2007, and then, gradually decreased. From 2006 to 2010, the national wastewater discharge increased steadily with a small increase, in which the industrial wastewater discharge was basically flat, and the increase or decrease ratio was controlled within 3%. From 2011 to 2014, the country's wastewater emissions increased by 5.7 billion tons, up 8.65 percent year on year,

Table 1: Overview of pollution emission and its increase and decrease in China.

	National waste water		Industrial waste water		Industrial sulfur dioxide		Industrial nitrogen oxide		Industrial smoke and dust		Industrial solid waste	
	Total emissions (tons)	Sequential growth (%)	Total emissions (tons)	Sequential growth (%)	Total emissions (tons)	Sequential growth (%)	Total emissions (tons)	Sequential growth (%)	Total emissions (tons)	Sequential growth (%)	Total emissions (tons)	Sequential growth (%)
2004	482.4	4.9	221.8	4.5	1891.4	5.6			1791.3	-4.1	12	20.2
2005	524.5	8.7	241.2	10.0	2168.2	14.6			1860.1	3.8	13.4	11.7
2006	536.8	3.2	321.2	1.2	2337.6	3.2			1236.8	-10.1	15.2	13.5
2007	556.8	3.5	246.3	2.7	2140	-4.4	1361.3	11.0	1698.2	-12.1	16.7	15.4
2008	576.5	2.7	241.7	-2.0	1991.0	-6.9	1250.5	-0.9	1526.2	-14.6	10.9	8.0
2009	590.2	2.8	234.8	-3.2	1865.9	-6.3	1284.8	2.7	1280	-10.2	20.4	7.4
2010	617.3	4.7	237.5	-1.2	1685.4	-0.1	1463.1	14.2	1051.9	-6.7	24.1	18.1
2011	659.3	6.8	232.5	-3.1	2017.2	8.2	1789.2	18.0	1100.8	4.7	32.3	34.0
2012	687.1	3.6	221.6	-4.0	1911.7	-5.2	1685.1	-4.1	1029.3	-6.5	32.8	-0.3
2013	698.5	1.5	206.6	-4.0	1835.2	-4.0	1516.5	-6.8	1094.6	6.3	32.6	-0.6
2014	716.8	3.0	201.3	-2.0	1750.4	-5.2	1401.8	-9.1	1546.1	33.0	20.1	0.7

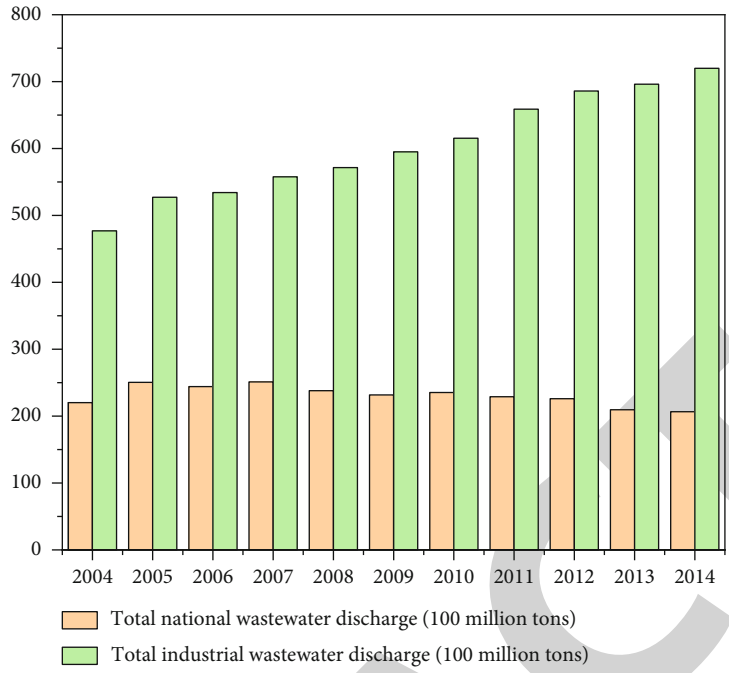

Figure 2: Interannual comparison of national wastewater and industrial wastewater discharge.

while industrial wastewater emissions decreased by 2.56 billion tons, down 11.09 percent year on year. From Figure 2, it is obvious that the "scissors difference" between national wastewater discharge and industrial wastewater discharge increases gradually.

Figure 3 shows that in 2004–2005, the growth rate of sulfur dioxide industry was 14.6% and the growth rate of smoke and dust was 3.8%. During November five year, industrial sulfur dioxide emissions, industrial fumes and dust emissions showed a downward trend, with a decrease rate of 16.68% and 37.12%, respectively, exceeding the emission reduction target. Only industrial nitrogen oxide emissions and growth rates were on the rise, and the increase was significant in the last year, reaching 14.1% month-on-month, an increase of 11.4 percentage points compared with 2009. After 2011, except for industrial smoke and dust, which rose sharply in 2014, all three kinds of pollutants have declined at different ranges [8].

As can be seen from Figure 4, the industrial solid waste increased year by year from 2004, with a fast growth rate. In 2010, the growth peaked in 2011. The sequential growth rate in 2011 was as high as 34%, and the total annual production was basically flat after that. It can be seen that Chinese enterprises need to further improve their emission control and emission standards for solid waste [9].

(2) Overview of investment in environmental pollution control

As can be seen from Figure 5, China's investment in environmental pollution control has been increasing steadily since 2004, and exceeded 700 billion yuan in 2010 and reached 951.65 billion yuan in 2013, showing an overall upward trend. It can be seen that China is highly concerned about environmental problems and has taken actions to invest in and improve environmental pollution control on a large scale. From the analysis of the total amount of waste water and other pollutants discharged and the general situation of increase and decrease, it can be seen that China's control of pollution discharge is slightly effective. However, China's investment in industrial pollution control has not increased, accounting for less than 10%, and the relative investment proportion has even decreased [10].

3.2. Construction of Enterprise Ecoenvironmental Cost Management Evaluation Model. In this study, the fuzzy analytic hierarchy process (FAHP) combined with the two methods is used to comprehensively evaluate the environmental cost management system. According to "resource saving and protection" and "environmental protection and management" in the path of ecological civilization construction, the resource benefit index and environmental benefit index are put forward, and the economic benefit index and social benefit index are put forward according to the economic development and external social image of enterprises. These four indicators are used to evaluate environmental cost management [11]. The environmental cost management evaluation system adopted in this paper is shown in Figure 6:

3.2.1. Determine Index Weight. This study used the unambiguous analytical hierarchical (FAHP) technique to determine the weight of each measure. The fuzzy analysis hierarchy (FAHP) receives the fuzzy filtering matrix by comparing the tests, and finally, obtains the weight of each instrument through the fuzzy filtering matrix.

Due to the influence of each indicator at the subindicator level on the indicator level and the influence of each indicator at the target level are not the same, the importance of

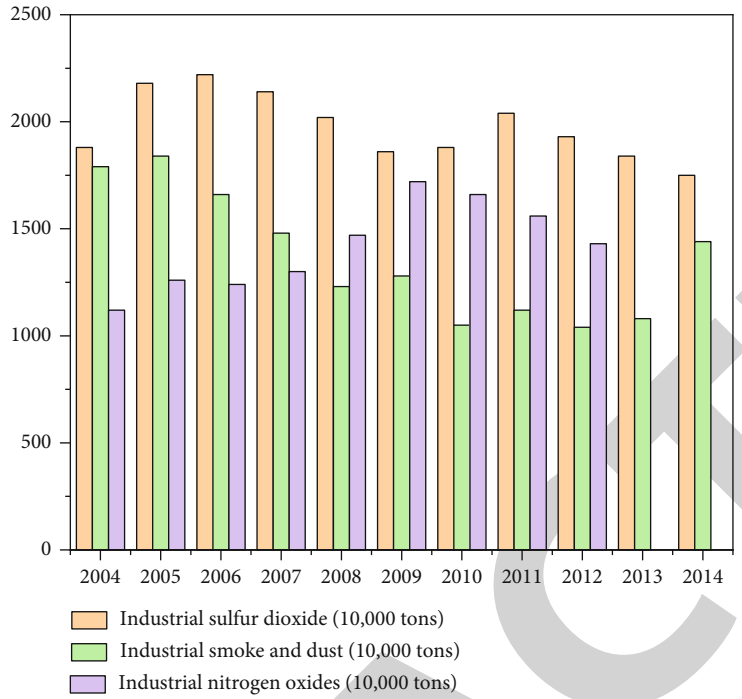

Figure 3: Interannual variation of main pollutants in exhaust gas.

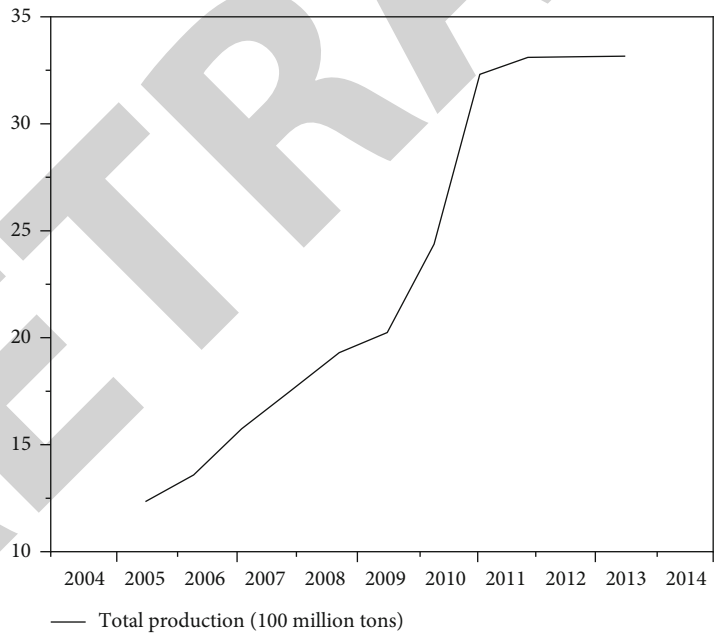

Figure 4: Interannual variation of industrial solid waste output.

each indicator at the upper level is also different. In the analytic hierarchy process, pairwise comparison is carried out on each indicator in the subindicator layer and indicator layer to judge the importance, and the relevant fuzzy judgment matrix is finally obtained by using the 1-9 scaling method as shown below [12], as shown in Table 2.

A hierarchical scale is the weight of the sequence of values of the index process obtained by counting the unknown filtering matrix to the next target layer. The special steps are as follows.

Firstly, the product of each row of elements of the fuzzy judgment matrix needs to be calculated, as

$$M_i = \prod_{j=1}^{n} a_{ij}, i = 1, 2, \cdots, n. \quad (1)$$

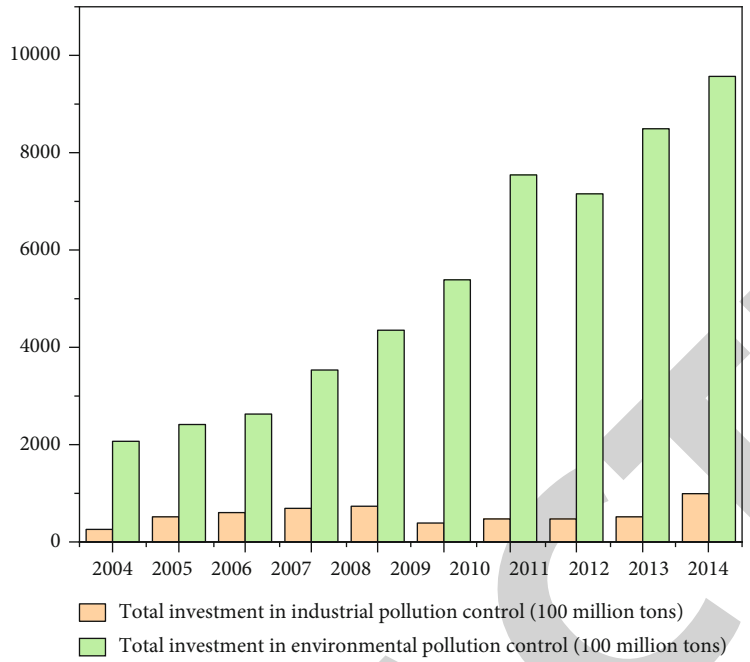

Figure 5: Annual changes in environmental investment pollution control and pollution reduction.

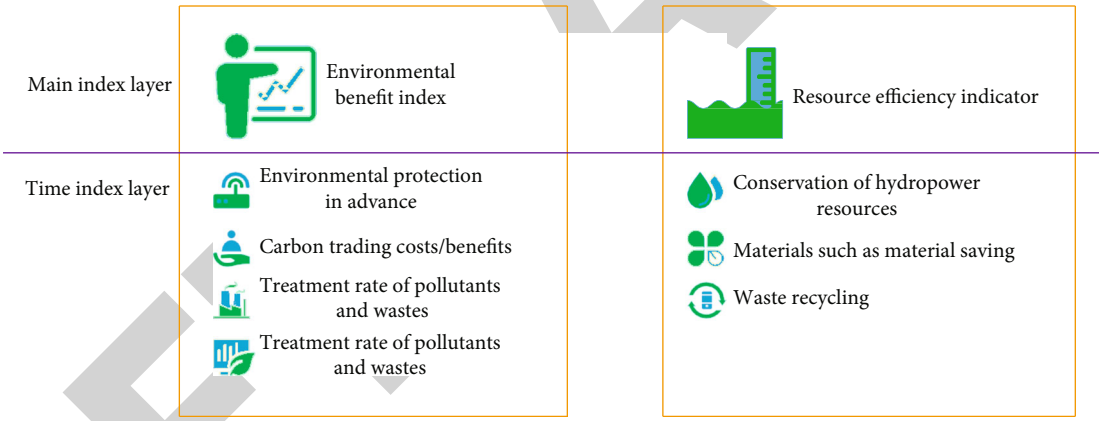

Figure 6: Evaluation model of enterprise environmental cost management from the perspective of ecological civilization.

Table 2: Significance scale of fuzzy judgment matrix and its meaning.

The serial number	Importance level	U_{ij} assignment
1	i element, j element with equal importance	1
2	The i element is slightly more important than the j element.	3
3	*The* i element is obviously more important than the j element.	5
4	The i element is stronger than the j element.	7
5	The i element is extremely more important than the j element.	8
6	The i element is slightly less important than the j element.	1/3
7	The i element is obviously less important than the j element.	1/5
8	i element is strongly not important than j element.	1/7
9	Element i is extremely less important than element j.	1/9
10	Comparison of the importance of elements i and j between intermediate and adjacent judgment values (qualitative analysis to judge)	2, 4, 6, 8, 1/2, 1/4, 1/6, 1/8

Calculate the NTH root of M_i, as

$$\bar{W}_i = \sqrt[n]{M_i}. \tag{2}$$

Secondly, the vector (Equation (3)) is normalized to obtain Equation (4):

$$\bar{W} = \left(\bar{W}_1\ \bar{W}_2\ \cdots\ \bar{W}_n\right)^T, \tag{3}$$

$$W_i = \frac{\bar{W}_i}{\sum_{j=1}^{n} \bar{W}_j}. \tag{4}$$

Formula (5) is the eigenvector of index weight obtained.

$$W = (\ W_1 \quad W_2 \quad \cdots \quad W_n\ )^T. \tag{5}$$

Then, calculate the maximum characteristic root of the fuzzy judgment matrix, as

$$\lambda_{\max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}, \tag{6}$$

where $(AW)_i$ represents the i element of vectorAW .

3.2.2. Consistency test. The consistency index is calculated, as

$$CI = \frac{\lambda_{\max} - n}{n-1}. \tag{7}$$

The magnitude of the measured value indicates the difference in resolution of the filter matrix. The lower the measurement value, the better the consistency of the filter matrix. It indicates the value of the mean of the relative mean of the unknown visible matrix, as shown in Table 3.

Because the first and second order judgment matrices are definitely identical, there is no need to test, and RI is always 0. When the order of the judgment matrix is ≥3, the random consistency ratio (CR) can be calculated to determine whether the judgment matrix has satisfactory consistency, as

Table 3: Average random consistency index.

1	2	3	4	5	6	7	8	9
0.00	0.00	0.45	0.90	1.20	1.24	1.32	1.42	1.44

$$CR = \frac{CI}{RI}, \tag{8}$$

when $CR < 0.10$, the judgment matrix has satisfactory consistency. If not, it is necessary to correct the judgment matrix to make it have satisfactory consistency. Therefore, the importance measurement of each expert on each evaluation factor, namely weight, can be finally determined, and the follow-up judgment can be made according to the weight (W).

3.3. Steps of Environmental Cost Management Evaluation

(1) To establish the target enterprise environmental cost management evaluation system

(2) To determine the fuzzy comprehensive evaluation set

The fuzzy comprehensive evaluation index factor set as

$$U_i = (\ U_1 \quad U_2 \quad U_3 \quad \cdots \quad U_m\ ). \tag{9}$$

The evaluation index factor set is subdivided into N evaluation subindex factor sets according to index attributes,

$$U_i = \left(\ U_{i1} \quad U_{i2} \quad U_{i3} \quad \cdots \quad U_{i,j}\ \right), i = 1, 2, 3, \cdots, m\,; j = 1, 2, 3, \cdots, n. \tag{10}$$

$M = 4$ in the comprehensive evaluation model in this paper, where

$$U = \{\ U_1 \quad U_2 \quad U_3 \quad U_4\ \} = \{\text{Environmental benefits, Environmental benefit, Economic benefits}\},$$
$$U_1 = \{\ U_{11} \quad U_{12} \quad U_{13} \quad U_{14}\ \}, \tag{11}$$
$$U_2 = \{U_{21}, U_{22}, U_{23}\} = \{\text{Conservation of hydropower resources}\}.$$

To set up comments and values, this evaluation model defines the comment set as

$$V = \{V_1, V_2, V_3, V_4, V_5\} = \{\text{Good, Medium}\}. \tag{12}$$

The evaluation value set is shown in

$$\{100, 80, 60, 40, 20\}. \tag{13}$$

According to the comprehensive research and analysis of invited experts, each index is evaluated and scored to achieve qualitative and quantitative transformation. Meanwhile, according to the membership degree of each index, the fuzzy evaluation matrix R of each evaluation factor of the secondary index and the main index is finally obtained [13]. The determination of membership degree is a key step in the application of fuzzy mathematics. The determination of membership degree is a key step in the application of fuzzy mathematics. However, because the whole process depends on human subjectivity, this paper introduces trigonometric fuzzy function to

determine feasible relative index membership degree, as

$$R_{ij} = \begin{pmatrix} R_{i1} \\ R_{i2} \\ \cdots \\ R_{ij} \end{pmatrix}. \quad (14)$$

The weight matrix W_i of the secondary index obtained above and the fuzzy evaluation matrix R of the first-level fuzzy comprehensive evaluation determined by the membership function of the previous step are combined to obtain the first-level fuzzy comprehensive evaluation, as

$$B_i = W_i * R_i, i = 1, 2, 3, 4. \quad (15)$$

From the four benefit indicators to the target company's "environmental cost management" final comprehensive evaluation. In other words, the second-level comprehensive evaluation results can be obtained by multiplying the fuzzy evaluation matrix R composed of the weight W of each index at the index layer and the evaluation results of each index at the index layer, as

$$B = W * R = W * \begin{pmatrix} B_1 \\ B_2 \\ B_3 \\ B_4 \end{pmatrix}. \quad (16)$$

The final result score of E is the comprehensive evaluation of the environmental cost management of the target company. The score of E is obtained by multiplying the comprehensive evaluation value of the target layer and the evaluation value set, as

$$E = B * V^T. \quad (17)$$

The higher the value of E is, the better the target company performs in environmental cost management and the higher its environmental performance is; otherwise, the worse.

3.4. Evaluation of XY Company's Environmental Cost Management from the Perspective of Ecological Civilization

3.4.1. To determine Index Weight. In order to ensure the effectiveness and completeness of expert management evaluation, XY Steel Company invited 10 experts in related professional fields and set up a management evaluation group. The specific results are shown in Tables 4–9.

From Table 9, we can intuitively see the degree of influence of the subindicator layer on the main indicator layer and the main indicator layer on the target layer [14]. For example, in the evaluation of environmental cost management of XY Iron and Steel Company, environmental benefit index, and economic benefit index are equally important, and resource benefit is in the second place. Therefore, the current environmental problems are serious; all walks of life should give high attention. As for environmental benefit indicators, the expert group believes that environmental protection is very important in advance, while carbon transaction costs/benefits and pollutant and waste treatment rates are relatively less important. As for the resource benefit index, the comprehensive utilization of materials is very important, and the conservation of hydropower resources and waste reuse are at a slightly important level. As for economic benefit index, the importance of environmental investment return on capital is 0.4258, which is in an important position. For social benefit indicators, a good and positive image of environmental protection is very important [14].

Table 4: Judgment matrix and weight comparison—environmental cost management.

	U_1	U_2	U_3	U_4	The weight(W_i)
U_1	1	1	1	1	0.2463
U_2	1	1	1	2	0.2849
U_3	1	1	1	1	0.2463
U_4	1/2	1	1/2	1	0.1750

Note: Consistency test : λ max = 4.0606, CI = 0.0202, RI = 0.9, CR = 0.0224 < 0.1, meet the requirements.

On this basis, combined with the above series of formulas, the following results can be obtained through calculation, as shown in Table 10:

It can be seen that the comprehensive evaluation result of environmental cost management of XY Iron and Steel Company is 76.9127, which is above the middle level. Environmental benefit and resource benefit are also close to good level. This shows that XY Steel Company has paid great attention to environmental pollution and resource shortage, and relevant environmental protection measures and actions have achieved initial results [15]. As for economic benefits, in recent years, the world economy continues to operate at a low level, while China's economy develops slowly and its growth rate continues to shrink, leading to oversupply in the steel market, increasingly intensified homogeneous competition, and relative decline in economic benefits. Therefore, the economic benefits of XY Steel Company are at an above medium level. As for social benefits, XY Steel Company, as the industry leader, needs to invest more in corporate environmental protection and product environmental protection. The increase of costs will affect corporate profits, and the contradiction between the two also makes the social benefits of the company at an above medium level.

4. Governance Countermeasures under International Discourse Power of Ecological Environment

4.1. To Improve Government Ecological and Environmental Governance

(1) To establish the government's responsibility for ecological and environmental governance

First of all, the government has the responsibility to protect the natural ecological environment. Natural environment

Table 5: Judgment matrix and weight comparison—environmental benefit index.

	U_{11}	U_{12}	U_{13}	U_{14}	The weight(W_{1j})
U_{11}	1	3	3	3	0.4950
U_{12}	1/3	1	1/2	2	0.1328
U_{13}	1/3	2	1	1	0.1996
U_{14}	1/3	1	1	3	0.1835

Note: Consistency test : λ max = 4.0606, CI = 0.0202, RI = 0.9, CR = 0.0224 < 0.1, meet the requirements.

Table 6: Judgment matrix and weight comparison—resource benefit index.

	U_{21}	U_{22}	U_{23}	The weight(W_{2j})
U_{21}	1	1/2	3	0.4950
U_{22}	1/2	1	1	0.4126
U_{23}	1	1	1	0.3276

Note: Consistency test : λ max = 4.0606, CI = 0.0202, RI = 0.9, CR = 0.0224 < 0.1, meet the requirements.

Table 7: Judgment matrix and weight comparison—economic benefit index.

	U_{31}	U_{32}	U_{33}	U_{34}	The weight(W_{3j})
U_{31}	1	2	2	3	0.4950
U_{32}	1/2	1	2	1	0.2314
U_{33}	1/3	1/2	1	1	0.1484
U_{34}	1/2	1	2	2	0.2354

Note: Consistency test : λ max = 4.0606, CI = 0.0202, RI = 0.9, CR = 0.0224 < 0.1, meet the requirements.

Table 8: Judgment matrix and weight comparison—social benefit index.

	U_{41}	U_{42}	The weight(W_{4j})
U_{41}	1	2	0.6667
U_{42}	1/2	2	03232

Note: Consistency test:λmax =4.0606, CI =0.0202, RI =0.9, CR =0.0224<0.1, meet the requirements.

is the fundamental environment for human survival, the premise for human production and life, and the fundamental place for human survival [16]. However, in the process of human development, there are many phenomena that destroy the natural ecological environment, which seriously affect human survival and development. Some human behaviors seriously damage the natural ecosystem and break the balance of the ecosystem. These behaviors will eventually lead to the destruction of human living environment. The government, as an institution to safeguard the survival and development of human beings, has the obligation to take on the responsibility of protecting the living environment of human beings, and at the same time has the responsibility to punish and supervise the destruction of the natural environment.

Second, the government has an obligation to avoid ecological damage caused by market imbalances. The market has a direct impact on the ecological environment. Market failure is a potential threat to the ecological environment, so it is the duty of the government to maintain the orderly market and ensure the standardization of the market. We will strengthen oversight and management of the market to ensure that it operates in an orderly manner and does not threaten or damage the ecological environment. Collectives and individuals who violate market rules and cause environmental damage shall be punished to make violators pay the price, increase the cost of violation, and make the behavior of destroying the ecological environment pay the due price.

(2) Government ecological environment administrative responsibility type

Subjective administrative responsibility refers to the subjective administrative feeling of government administrative staff, the conscience and loyalty of administrative staff, and the subjective initiative and autonomy of administrative staff. The realization of administrative responsibility depends on the subjective consciousness of administrators. Therefore, the government's environmental subjective administrative responsibility depends on the government staff's subjective consciousness of environmental responsibility, and the government's environmental subjective administrative responsibility is a subjective feeling, conscious recognition, and active practice of the government administrator. The subjective environmental administrative responsibility of the government is gradually produced in the process of human socialization, and is an indispensable part of the process of human environmental protection [17]. In the process of carrying out the environmental administrative responsibility, the government cannot lack the subjective administrative responsibility of the government. The subjective administrative responsibility of the government is of great significance for the government administrators to deal with various environmental responsibility problems.

Objective administrative responsibility refers to the responsibility delivered by laws, regulations or administrative personnel. Therefore, the objective administrative responsibility of the government ecological environment refers to the ecological environment management and protection responsibilities that the government administrators should do according to laws and regulations or entrusted by the superior.

4.2. To Improve the Rule of Law for Government Ecological and Environmental Management

(1) To promote reform of the government's judicial system for ecological and environmental protection

First, try to handle cases in different places of the judicial system to avoid excessive interest involvement of the judicial organ in the region and improve the independence of handling cases [18]. Second, in terms of funds, the central government can be used to allocate funds to solve the problem that judicial institutions are subject to local governments in terms of financial power. Third, we should strengthen supervision

Table 9: Weight comparison of primary and secondary indicators on environmental cost management evaluation.

	The main indicators	Time indicators	The weight(W)
Environmental cost assessment management	Environmental benefit index	Ex ante environmental cost	0.4950
		Carbon trading costs/benefits	0.1450
		Treatment rate of pollutants and wastes	0.9968
		Postcontamination treatment	0.1560
	Resource efficiency indicator	Conservation of hydropower resources	0.2599
		Comprehensive utilization of materials	0.4128
		Waste reuse	0.3276
		Return on capital for environmental investment	0.4258
	Economic benefit index	Environmental cost input ratio	0.2312
		Environmental loss cost rate	0.1484
		Environmental restoration cost rate	0.1945
	Social benefit index	Corporate environmental image	0.6667
		Product environmental image	0.2323

Table 10: Comprehensive evaluation results of environmental cost management and main indicators.

Project	Environmental cost management	Environmental benefits	Resource efficiency	Economic benefits	Social benefits
Comprehensive evaluation value	76.9125	75.7588	78.7588	75.9982	78.6333

over the effectiveness of judicial organs in enforcing the law and strengthen their functions in ecological and environmental governance. Fourth, "third party forces" such as the public and social groups should be given the right to file ecoenvironmental lawsuits to ensure that the public and social groups have the right to supervise the behavior of destroying the ecological environment or the absence of functions of government agencies [19]. Fifth, it is necessary to establish and improve the internal supervision mechanism of judicial organs, crack down on judicial corruption, and build a clean and efficient judicial team [20].

(2) To improve government law enforcement of ecological and environmental issues

On the premise of "there are laws to abide by and to be observed", we should also ensure that "there are laws to be observed, law enforcement is strictly enforced and lawbreakers are prosecuted". For ecological environmental governance, while ensuring the integrity of laws and regulations related to the ecological environment, we should also improve the level and efficiency of law enforcement of ecological environmental governance. Specifically, the following points should be done: first, education and training activities should be carried out to educate and study law enforcement teams on national laws, regulations, guidelines, and policies, so as to improve the level of law enforcement and ensure that law enforcement conforms to national laws and regulations. Second, we should promote the anticorruption work of the ecological environment law enforcement team, resolutely crack down on the rent-seeking behavior of the ecological environment law enforcement officers, and strictly punish the corrupt behavior to ensure the integrity of the ecological environment law enforcement team [21].

5. The Practical Path to Enhance the Discourse Power of Ecological Civilization in China in the New Era

5.1. Actively Build China's Discourse System of Ecological Civilization

(1) To make full use of the rich local ecological and cultural resources

The construction of discourse system of ecological civilization in China must be based on the rich local ecological and cultural resources, based on China's historical practice, and combined with the current development needs, so as to make this system have a solid foundation [22]. In order to meet the needs of the current construction of ecological civilization, we can completely absorb nutrients from traditional culture to innovate the theory of ecological civilization in our country and strengthen the discourse right of ecological civilization in our country. For example, the ancients advocated thrift, opposed extravagance and waste, and moderately took from and enjoyed from nature, rather than burning forests and farmland or draining water and fishing, so as to achieve the coordination between man and nature [23]. This idea can be used to counter the increasingly serious consumerism in the

market economy and alleviate the current situation of valuing consumption and economic development rather than human beings themselves. Actively innovating China's ecological civilization thought through China's local cultural resources is the embodiment of "cultural confidence", which is not only of realistic significance to the present but also of great significance to the Sinicization of Marxist theory [24].

(2) To fully excavate Marxist classical ecological discourse

The situation of ecological civilization in today's world is complicated and more complicated. It is beneficial to solve the problem and establish the discourse system of ecological civilization to make Marx's classical theory adapt to the development status of human society through innovative elaboration and explanation. In fact, many thoughts and concepts of ecological civilization in China are influenced by the classical ecological discourse of Marxism, such as "people-oriented" and "harmonious society" advocated by the "Scientific Development Concept", "clear water and green mountains are gold and silver mountains" proposed by General Secretary Xi Jinping, and "ecological prosperity leads to civilization prosperity". Besides, the viewpoints of "ecological decline means civilization decline" and "life community" excavate the classical ecological discourse of Marxism to varying degrees. Of course, Marxist thought still has a strong time; many theories still need to be combined with the needs of the reality to explore, so as to further use.

5.2. To Condense and Sublimate Chinese Ecological Civilization Theory Achievement and Experience Summary. The theoretical achievements and experience summary of China's ecological civilization is based on the practical experience of the Chinese people's ecological civilization construction led by the party and state leaders since the founding of the People's Republic of China 70 years ago, especially since the reform and opening up, which has made the theory and practice of ecological civilization from scratch, from weak to strong, and finally, achieved today's brilliant achievements. In order to construct the discourse system of ecological civilization in China, it is necessary to further condense and sublimate the theoretical achievements and experience summary of ecological civilization in China. Practice is the basis of cognition and the only standard to test the truth. The theoretical achievements and practical experience of China's ecological civilization construction are the most solid foundation for the construction of discourse system.

The historical experience of China's splendid achievements in ecological civilization can be summarized as follows: first, the construction of ecological civilization adheres to the leadership of the Communist Party of China (CPC), which is the only political force in China with overall planning. The overall planning of ecological civilization, the formulation of laws, and the tackling of difficulties are inseparable from the role of the Party. The leadership of the Party is the political guarantee of ecological civilization construction. Second, we need to put the people first. The people are the creators of history. We need to mobilize the enthusiasm of the people in our efforts to promote ecological progress. Third, we need to rely on system construction to ensure the effective progress of ecological civilization construction. We need to analyze specific problems on a case-by-case basis, formulate laws and regulations according to local conditions, and ensure that law enforcement is strictly enforced and violations of laws are prosecuted. Finally, we should pay attention to the combination of ecological civilization construction and economic development, avoid "campaign-style" governance, give overall consideration to environmental protection and economy, and formulate different laws and regulations in different historical periods to meet the needs of the times.

5.3. To Expand External Exchanges of Ecological Progress

(1) To use the communication power of we media to construct a kind of green values

As a socialist country, it should learn to use the basic principles of Marxism as a weapon, in line with the concept of "a community with a shared future for mankind", and use the communication power of we media to promote the construction of a novel international ecological governance values. This kind of values should make people realize that the fate of the earth is closely related to everyone, and infinite expansion of individualism will lead to disaster. Therefore, it is necessary to make a thorough change to the original life and actively establish a green and sustainable new way of life.

(2) To attach importance to the construction of overseas online media platforms

Some traditional Chinese media should pay more attention to the construction of overseas online media platforms, and some well-known employees of propaganda agencies should also actively participate in overseas new media platforms to interact with foreign netizens by answering questions to narrow the distance, and show a good image of China to the world. In addition, in the era of the media, information spreads rapidly, so it is more important to actively seize the right to speak. Environmental pollution is an inevitable phenomenon in the development process of any country. In the face of negative events, including ecological problems, if the government hides it, it will be easy to ferment once spread abroad, resulting in widespread rumors, and even become the material for western media to smear China. Therefore, we should try not to hide or cover up the facts, but take the initiative to report the facts, actively seize the right to speak, and demonstrate the confidence of a major country.

6. Conclusion

The significance of discourse power of ecological civilization is not limited to the field of ecological environment itself but to meet the needs of China's future development, become a modern socialist power and realize the rise of the Chinese nation. As a traditional weakness in China's development process, on the one hand, it does face a lot of development resistance, and we still need to accumulate experience. At the same time, however, we should be optimistic that after decades of "hiding its strength and biding its time", the "hard power" that China

has accumulated has brought it closer than ever to becoming a power of discourse in ecological civilization, and we should make full use of this opportunity. In view of the analyzed opportunities and challenges, we should enhance the discourse power of ecological civilization from three aspects: the construction of ecological civilization itself, the construction of discourse system of ecological civilization, and the strategy of external communication. Of course, it must also be recognized that the issue of discourse power is a relatively new research topic in China, and the research in the field of discourse power of ecological civilization is relatively rare. Therefore, it is relatively difficult to collect literature in the writing process, and the collected information is not rich enough. In the end, the author only made a slight expansion of the research field on this basis, but in the research process, we can obviously perceive that this is still a field worthy of further research, and hope that the majority of scholars can continue to study.

Data Availability

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

Conflicts of Interest

There are no conflicts of interest.

Acknowledgments

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Research Article

Investigation on the Status Quo of Ecological Environment Construction in Northeast China from the Perspective of Dual Carbon Goals

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Since the 20th century, the resources and environment in Northeast China have changed, and it is one of the typical regions that have short-term or high-intensity environmental impacts in the world. However, due to the excessive consumption of regional resources and strong environmental pollution to the atmospheric environment, development is being greatly affected. Maintaining the natural ecological environment has become a very urgent task. This paper studies the important ecological environment problems in Northeast China from the perspective of double carbon goals. The study points out that there are ecological problems in Northeast China, such as the lack of forest resources, the aggravation of desertification, the decline of black soil quality, and the shrinkage of wetlands, which are severe urban environmental protection problems. At the same time, affected by the trend of world environmental change, policy drivers in Northeast China, and some relatively new environmental pollution problems, the natural environmental quality of Northeast China will still have a significant decline in the future. The future development of Northeast China will be based on the perspective of double carbon goals, constantly improve the ecological environment monitoring system, strengthen the research of scientific and technological system, strengthen innovation, and vigorously develop circular economy and further improve the construction of basic systems. Through a series of ecological environment governance and the coordinated development of economy and ecological environment, the dual growth of economy and ecological environment in Northeast China will be realized, and the overall revitalization of the old industrial zone in Northeast China will be realized.

1. Introduction

The northeast part is Liaoning, Jilin, and Heilongjiang, including three cities and one league in the east of Inner Mongolia (Chifeng City, Tongliao City, and Yilun City and Xing'an League). The overall framework of ecosystem is reasonable, especially suitable for the development of large-scale agriculture. It has been an important agricultural production base since ancient times and also an important industrial base in China [1]. According to the data at the end of 2014, the territorial area of the whole region is about 1.25 million square kilometers, which is 13% of the territorial area of the whole city; the population is about 118 million, accounting for 8.4% of the population of the province; the regional GDP is about 1.6 trillion, accounting for 11.8% [2]. Through the construction of nearly half a century, Northeast China has formed a large industrial system dominated by heavy industries such as steel, machinery, petroleum, chemical industry, and coal mining. It is China's main heavy industry production base and commodity grain production base and has a decisive strategic position for the development of Quantong. However, in the past two decades, the growth of enterprises in Northeast China has been slow, and their relative importance in China has decreased significantly. In addition to the problems of economic system, a series of ecological and environmental problems arising from the extensive development mode have restricted the development of Northeast China at the cost of natural resource consumption and environmental pollution damage for a long time.

The ecological environment is dominated by human settlements, including human survival and living environment, working environment, tourism environment, and resource cultivation environment [3]. Therefore, the ecological environment directly affects the life and quality of life of the creator of social productivity.

The natural environment is the basic condition for people's survival and development and is an important cornerstone of human economic and social development. Strengthening the construction of ecological environment, disaster prevention, and mitigation is an inevitable requirement for sustainable development.

Since the central government clearly puts forward a major strategic decision to revitalize the northeast and other old industrial training bases in 2003, environmental engineering has become one of the main focuses of scholars' research on revitalizing the Northeast [4]. Over the past two decades, investment in the construction of Northeast China has increased, and the development of the national economy has accelerated significantly. However, with the long-term historical accumulation, there are still many severe ecological and environmental problems, and the carrying capacity of resources and environment is also undergoing severe changes [5]. In order to further improve the existing natural ecological environment in Northeast China and realize the revitalization of the old industrial base, this paper systematically summarizes the main problems faced by the current ecological environment protection in Northeast China from the perspective of double carbon goals and predicts the recent development and changes of the ecological environment through possible influencing factors. Finally, the report points out the key measures to speed up the construction of ecological environment in Northeast China from the perspective of sustainable development.

2. Status Quo of Ecological Environment Development in Northeast China

2.1. Major Ecological and Environmental Problems in Northeast China. Over the past hundred years, large-scale mining has seriously polluted the natural environment in Northeast China and highlighted contradictions. Since the 20th century, with the short-term, high-intensity, and large-scale development of human society, the natural environment in Northeast China has also undergone great changes. In the first half of the 20th century, the Russian and Japanese colonists arrogantly seized iron ore, coal, and other resources, especially forest resources, which brought great damage to the economic resources and natural environment of Northeast China. Figure 1 shows the administrative location of the Northeast region. Geographically, China has the greater Hinggan Mountains and Erguna River in the southwest; the lesser Hinggan Mountains and Heilongjiang and Wusuli rivers in the northeast; Jilin Changbai Mountain area, Tumen River, and Yalu River in the southeast; and Yilehu in the north. Lishan is connected to the northern part of the Greater and Lesser Xing'an Mountains, forming a unique natural geographical environment surrounded by five waters and surrounded by mountains on all sides.

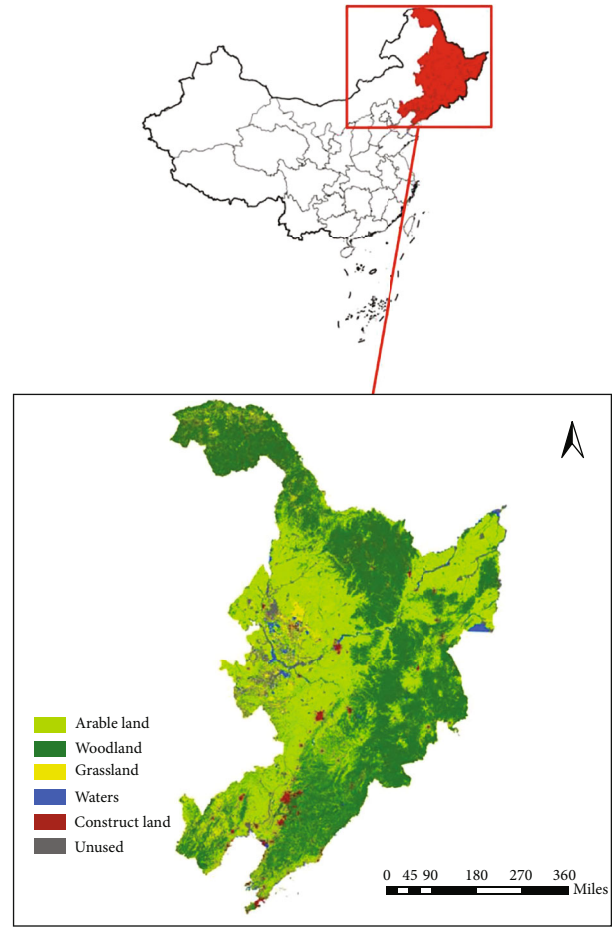

Figure 1: Schematic diagram of the geographical location of Northeast China.

Since the founding of new China, it has become the most strategic old industrial base in China. Large-scale industrial development and environmental pollution remediation are relatively backward, resulting in great energy consumption in Northeast China, and unreasonable development has seriously deteriorated the ecological environment (Figure 2). Some researchers even believe that the ecological environment in Northeast China is close to an irreversible critical state. Generally speaking, the ecological environment in Northeast China mainly faces the following problems [6].

Northeast China used to be the largest forest production base in China, but due to the long-term "heavy cutting and light cultivation" and "taking more than giving," the forest region suffered a serious shortage of recoverable forest resources in the mid-1980s. According to statistics, as in the early stage of enclosure construction, the number of natural forests in Hilly and semimountainous areas in Northeast and Eastern China has declined rapidly. The area of natural forests in the South has decreased from 65 million hectares to 57.87 million hectares, and the water volume per hectare has also decreased from 172 cubic meters to 84 cubic meters [7]. Today, these natural primary forests have become secondary forests, with significantly reduced quality and serious deterioration of ecological functions. Taking Liaoning as an example, because of the uneven cutting and

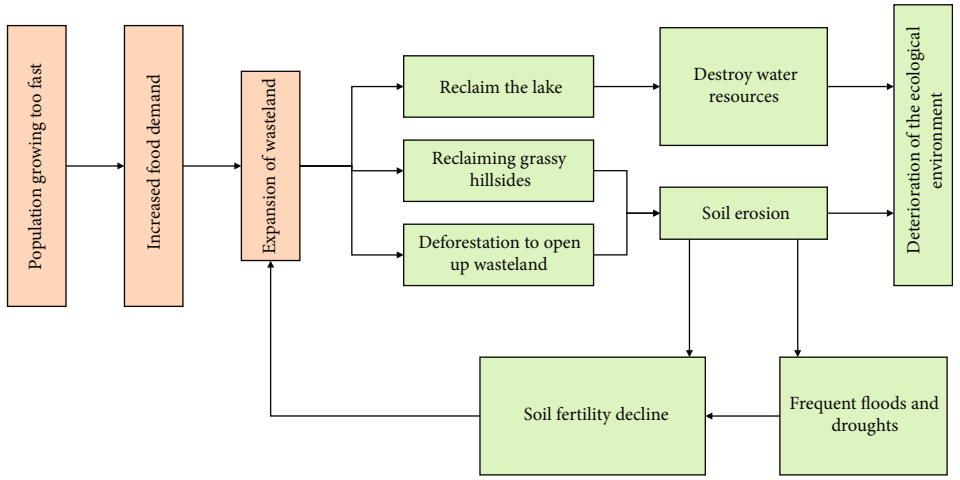

Figure 2: Ecological and environmental problems in Northeast China.

replenishment of resources in recent years, coupled with human deforestation, the area of natural forests in this region began to decline, and the primitive forests also basically disappeared; the proportion of natural protection forests is relatively small, accounting for only 22.9% of the national natural forest area; what is unreasonable is that the area of middle-aged and young forests accounts for 81.8% of the national natural forest area, and nearly mature forests, mature forests, and over mature forests only account for 18.2% of the total national natural forest area. The function of natural ecological construction has been seriously weakened. The importance of forest ecosystems is self-evident, such as forest vegetation that can intercept rainfall during the rainy season, maintaining most of the water on the leaf surface and in the leaf litter, soil, and living tissues, thus reducing surface runoff. In particular, forest litter can form a protective film on the surface of the soil layer, maintain the balance of the internal structure of the soil layer, and reduce the erosion of rainfall; it can increase soil roughness, filter, and intercept and reduce surface runoff; litter can increase the concentration of organic matter in land plants, thereby improving soil composition and fertility and increasing water holding capacity.

The greatest impact of human activities on the western part of the Northeast Plain of China was the agricultural development in the 1930s, especially the large-area cultivated land reclamation in the early 1980s, which further affected the grassland landscape and led to huge destruction of animals and plants. Soil desertification in the west of the Northeast Plain is mainly reflected in soil desertification and farmland salinization [8]. As shown in Figure 3, the desertification area of this area has reached 72280.6 square kilometers, accounting for 22.2% of the total land area of the country. From the 1950s to the late 1980s, the scale of desertification in the region increased sharply, with an average annual increase of about 1.5%-3.7%; since the 1990s, the scale of regional desertification has reversed, but in general, the scale growth of regional desertification has been greater than the reversal. At present, the salinized land in this region is 33850.8 square kilometers, accounting for 10.44% of the total land area, and is growing at an average annual rate of

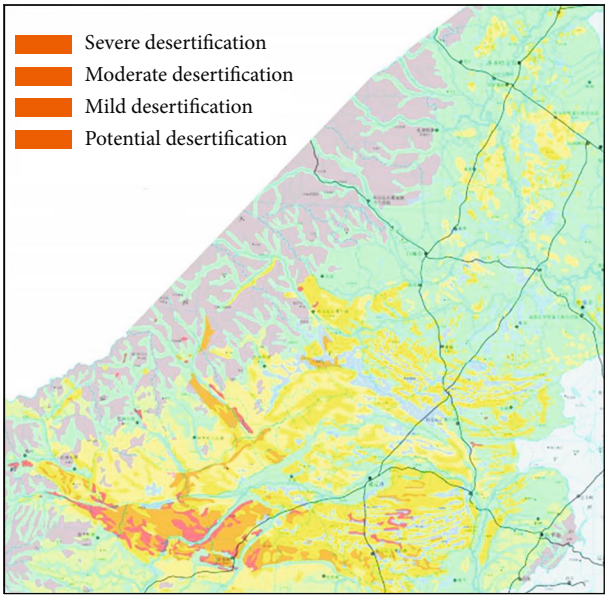

Figure 3: Map of desertification in the western part of the Northeast Plain of China.

1.4% to 2.5%, especially in Jilin Province. According to statistics, the area of water and soil erosion has reached 3.15 million hectares, accounting for about 16.5% of the land area of Jilin Province; the grassland area in the west is 1.36 million hectares, of which 472000 hectares are salinized, accounting for 36.7% of the total area of the country, and 158000 hectares are gravelized, accounting for 11.6% of the country.

Northeast black soil is mainly distributed in the middle of Songnen Plain, with a total area of about 11 million hectares, accounting for 8.9% of the total land area of Northeast China. However, in the past, nearly 0.5 century, due to excessive cultivated land, about two-thirds of the farmland in the whole black soil area has suffered serious soil erosion and low fertility [9].

Northeast China is the most important wetland area of the Yellow River in China, which is mainly distributed in

Table 1: Land transfer matrix of Heilongjiang Province from 2010 to 2018.

Area (km^2) 2010	2018						
	Cultivated land	Woodland	Grassland	Waters	Land used for building	Unused land	Total
Cultivated land	159413.21	1084.84	584.80	161.28	980.91	636.74	162871.79
Woodland	2369.42	188756.58	431.27	57.32	78.58	2879.57	194572.74
Grassland	4696.25	1432.60	20191.65	280.92	136.80	8881.62	35619.85
Waters	2417.84	95.49	67.04	9226.58	65.53	1680.63	13553.11
Land used for building	313.80	16.89	14.65	25.33	9275.15	24.77	9670.60
Unused land	5627.41	467.61	718.06	410.38	116.28	28819.86	36159.60
Total	174837.93	191854.01	22017.47	10161.82	10653.26	42923.18	452447.68

Sanjiang plain, Songnen low plain, Xialiaohe plain and coastal areas, Hulunbuir grassland, great and small Xing'an Mountains, and Changbai Mountain Tourism Group Co., Ltd. Wetlands used to be the main natural barrier in Northeast China, but since the founding of the People's Republic of China, with the large-scale reclamation of cultivated land, the scale of wetlands has decreased significantly, coupled with the interference of engineering construction and human factors, and the natural landscape of wetlands has gradually disappeared and has been more and more seriously damaged [10]. Table 1 shows the land transfer matrix of Heilongjiang Province from 2010 to 2018. The ecological role of wetland parks in resisting floods; controlling rainfall runoff, flood storage, and drought resistance; controlling climate; preventing soil erosion; purifying the environment; and protecting biodiversity has been significantly weakened.

Most of the urban air pollution in Northeast China has the typical characteristics of urban coal-fired air pollution. In the heating period, the urban ambient air quality is obviously inferior to that in the nonheating period, and fine particles are also the primary pollutants that directly affect the urban indoor air quality. The content of particulate matter in winter heating period in Liaoning Province is 1.3~1.5 times that in the nonheating period; at the same time, the sand dust pollutants in spring are obvious, and the total suspended particulate matter content is 1.6 times that in winter and 1.9 times that in summer. However, the coal-fired pollutants in the urban atmospheric environment of Jilin Province have not been completely treated, and the air pollution load formed by coal-fired during the heating period accounts for more than 40% of the air pollution load [11].

2.2. Status Quo of Ecological Environment Governance in Northeast China. In recent years, leaders at all levels and government departments have begun to recognize the important role of the ecological environment and are paying more and more attention to the ecological environment and actively take measures to strengthen the construction of the ecological environment [12]. For example, Jilin Province proposed to establish an "ecological, environmental protection, and benefit-based economic framework" during the "Tenth Five-Year Plan" period, taking into account the construction of the ecological environment while considering leapfrog development. However, there are still many deficiencies in the governance of the deity environment, which are mainly manifested in the following aspects:

First, basic theoretical research is insufficient. The current environmental construction work has not yet been guided by a systematic theory, and most of them are in a state of blind construction or in a state of headache and foot pain. There is no theoretical basis for ecological environment construction in a certain area. For example, the proportion and layout of factories, institutions, schools, dwellings, and green spaces, as well as the environmental capacity of various landforms and organisms, have not yet been coordinated by a systematic theory.

Second, the ecological environment value assessment system has not yet been formed. It is impossible to make a correct quantitative evaluation of a built ecological environment, so it is impossible to evaluate the pros and cons of a pre-constructed environmental facility [13]. Often, the public is right, the mother is right, and the leadership is difficult to make decisions. For example, it is impossible to quantitatively compare the ecological environment value of "Dalian City's Big Lawn Green Space Construction Ideas," "Jilin City's Jilin Street Reconstruction Project," and so on.

Thirdly, in the means of ecological environment construction, the technological content is low, the technical level is not high, the construction efforts are small, and some development activities are still at the cost of environmental damage.

The government has insufficient respect for the laws of nature in decision-making, lacks sufficient demonstration, always follows others, and fails to get out of its own characteristics; human factors dominate the construction process, and the planning and design of some new communities are unreasonable. The green space rate is low, the awareness of advanced protection is lacking, and the strategic view of long-term sustainable development is not reflected.

2.3. The Trend of Ecological Environment Change in Northeast China. In the context of environmental changes at home and abroad, according to the analysis of the driving factors of economic development in Northeast China, it shows that the ecological environment situation in Northeast China has not been optimistic since the recent medium term [14], mainly in the following aspects.

First, the temperature increased significantly and the rainfall decreased slightly. The harm to the ecological environment is obvious. Northeast China is one of the sensitive regions of climate change [15]. In the past 100 years, the average temperature in Northeast China has shown a

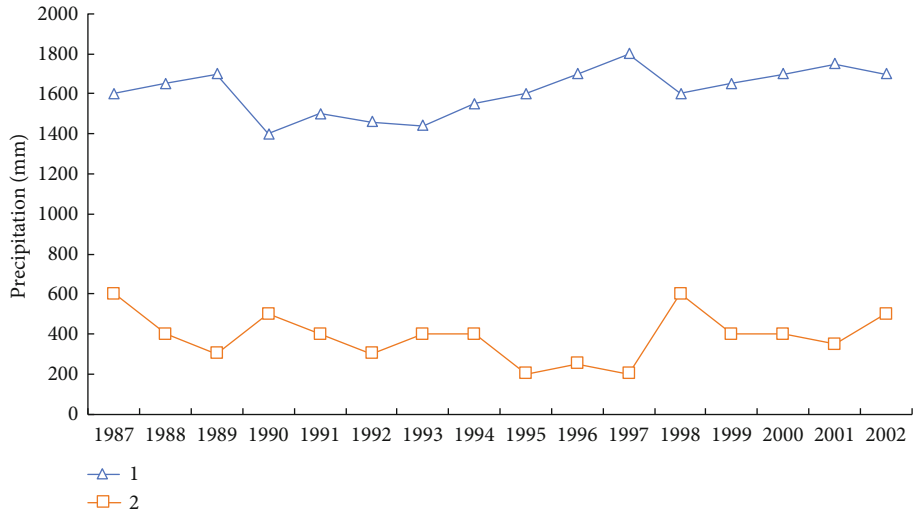

Figure 4: Variation curves of annual average evaporation1 and precipitation2 in Northeast China.

significant growth trend, especially in the past 20 years, showing an unprecedented significant warming momentum. As shown in Figure 4, although the annual average evaporation in Northeast China shows a significant upward trend, the annual average rainfall shows a slight decrease trend, which has decreased by nearly 20-30 mm since the beginning of the 20th century [16]. Before the mid-1960s, there was abundant rainfall in Northeast China. From the late 1960s to the early 1980s, Northeast China has always been in a dry period. From the mid-1980s to the mid-1990s, this was a wet era. Since the mid-1990s, Northeast China has always been in a dry period. The region will enter the next drought period. The rise of temperature and the decrease of precipitation have caused adverse effects on the ecological environment in Northeast China. In particular, it has caused an important impact on the drought situation in the northeast and central and western regions. Scientific research has confirmed that the reduction of rainfall is the main manifestation of drought in the central and western regions of Northeast China, resulting in the decline of the natural environment [17].

Second, there are also many debts caused by environmental pollution, which are difficult to control. The deterioration trend is obvious. For a long time, the development of industrial economy in Northeast China has always been at the expense of environmental protection, heavy industrial production, and light environmental protection. In order to achieve the national mandatory production goals, it has led to serious historical debt of ecological environment protection [18]. At the same time, as an old industrial base in Chinese history, heavy chemical industry has always accounted for a large proportion. Coupled with the development of coal and the energy pattern dominated by electricity, the ecological damage and pollution in Northeast China are coupled, making it more difficult to control [19].

Third, economic growth has accelerated, but structural transformation is difficult. The environmental pressure is further increased. Through the efforts of the whole 20th century, China's industrial system, which has the advantages of natural resource development and basic raw material resources, still has considerable advantages and will still play a key role in China's future economic development. According to their comparative advantages and economic foundation, the governments of the three northeastern provinces have focused on establishing a heavy industrial structure dominated by advanced equipment industry and raw material industry in their respective development plans. But it will still have a great burden on the earth's ecological environment [20]. Through several years of development, Northeast China will strengthen the modern industrial system dominated by heavy industries such as machinery and equipment industry, petrochemical industry, and metallurgy. Although the government has vigorously promoted the promotion of industrialization with informatization, actively promoted the development of high-tech manufacturing industry, and strengthened technological innovation, the system composed of heavy industry still determines that Northeast China will still be under greater environmental pressure in the future [21].

3. Analysis of the Causes of Ecological and Environmental Problems in Northeast China

3.1. The Traditional Development Model Induces the Occurrence of Ecological and Environmental Problems. The traditional mode of national economic development is a simple straight-line development of "natural resources, production, and environmental pollution utilization," which is characterized by "high energy consumption, high emissions, low environmental volume, and low efficiency." The sustainable basis of this approach lies in the inexhaustible, low-cost, and easy access of funds, and the preconditions on which this economic development model depends do not exist. Therefore, this development model is not sustainable for human society. The three northeastern provinces are China's old industrial bases and should adhere to the correct direction of sustainable development.

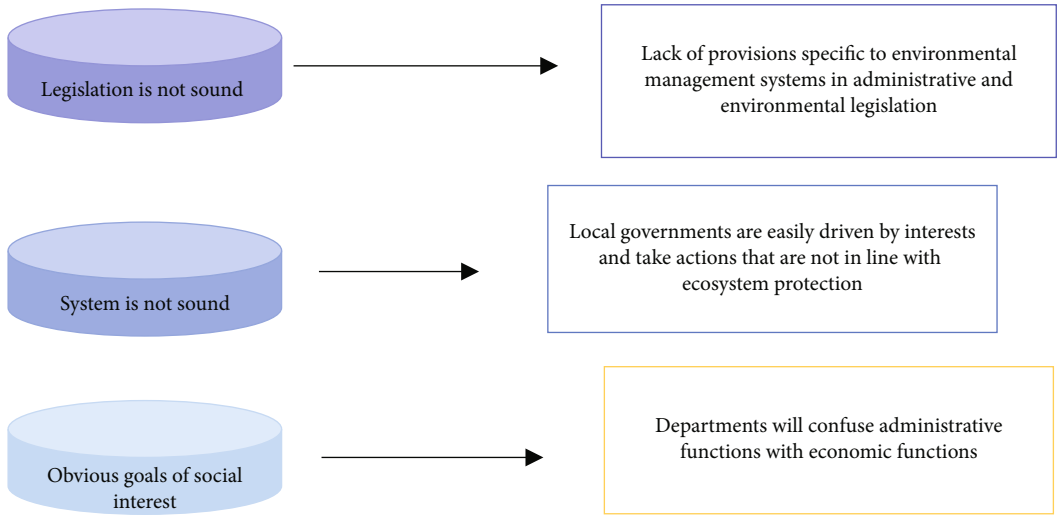

Figure 5: Lack of local government public resource management system.

It is these traditional economic growth models that have been adopted for a long time at the expense of excessive consumption of natural resources and environmental protection. Although the three provinces have begun to actively explore and practice the new development path of circular economy, the traditional development model has induced and left over the utilization of resources. The contradiction between economic development and economic development, especially the grabbing and destruction of nonrenewable productive resources, still has a negative impact on the ecological environment protection and development of this region.

3.2. The Level of Economic Development Restricts the Improvement of Ecological Environment. The emergence and worsening trend of ecological environment problems are inseparable from the long-term and frequent economic activities of human beings. From a practical point of view, the environmental problems of developed countries are gradually being solved and controlled, but the environmental problems of developing countries are generally not optimistic, which is closely related to the economic development level of developing countries.

The first is the influence of the traditional industrial development model. Industrialization is an insurmountable stage of development for any country. An important feature of the industrial structure of industrialization is that the heavy chemical industry occupies an important position in the development of the national economy. In terms of standard meaning, China's economy entered the primary stage of industrialization after the 1980s to meet the needs of the international market. At present, China's energy, transportation, metallurgy, chemical industry, building materials, and other heavily polluting industries are in a period of great development. Our economic development level is far from a stage where we can rely on scientific and technological progress to gradually improve the environment without affecting economic development. The mode of production of rural residents is relatively backward. Living standards are still generally low, and there is still a stage of overgrabbing of productive natural resources such as land and water, all of which put China's environment under heavy pressure and restrict the solution of environmental problems.

Secondly, the lack of environmental demand preference restricts the governance and improvement of the ecological environment. Increased government investment in environmental pollution control will inevitably affect investment in other economic activities. Therefore, in all developed countries, government departments cannot strengthen the ability of environmental pollution management without restrictions. This requires the government to make appropriate judgments and choices on environmental goals and the corresponding environmental pollution control efforts. Generally speaking, the choice of pollution control intensity is in line with people's environmental demand preference, and the strengthening of this demand preference is continuously improved with the improvement of economic level and education level. It cannot be arbitrarily strengthened by human will. From the perspective of the overall development level of China's economy, people's preference for environmental needs is not very strong, and this deficiency restricts the improvement of environmental problems to a certain extent. As a typical example of a planned economy, the three northeastern provinces have a large number of laid-off populations, and regional income levels are generally low. Coupled with factors such as culture, education, and technology, the characteristics of insufficient environmental demand preference are more obvious in the northeast. These are to a certain extent. It restricts the management and improvement of the ecological environment.

Third, the absence of the scientific concept of development artificially increases the emergence of ecological and environmental problems. If the first two factors are objective factors that are difficult to overcome in the short term, then the serious lack of the scientific development concept in the actual decision-making work is the main human factor that causes the current ecological and environmental problems

and increases the environmental impact to a certain extent. Problem arises. For a long time, people lacked sufficient understanding of the importance of ecological construction and environmental protection in the process of sustainable economic and social development. The blind pursuit of GDP in economic life has led many departments to simply pursue the speed of economic development and is keen to do big projects and projects. In addition, due to the lack of scientific decision-making, some wrong decisions have been artificially expanded, further increasing the scope of environmental damage.

Finally, the defects of the public resource management system increase the difficulty of solving the ecological environment problem. One of the primary goals of transforming government functions is the realization of public management as the primary function of the government, which requires a series of institutional conditions to ensure its ability to regulate, as well as a series of institutional conditions to ensure that its behavioral goals conform to the interests of the people. However, at present, the government cannot guarantee the realization of these two conditions in the process of changing its functions, resulting in that many institutions that manage social public resources do not have sufficient institutional capacity. To some extent, it also improves the ability and difficulty of the government in dealing with ecological and environmental issues, as shown in Figure 5.

4. Significance and Countermeasures of Ecological Environment Construction in Northeast China

Although China's industrialization development stage is insurmountable, the traditional industrial development model can be changed, and the increasingly severe pressure on the ecological environment is destined to be urgent and necessary. The clear requirements of the new industrialization road on resource utilization and environmental protection provide a historic opportunity for the protection and improvement of the ecological environment in the three northeastern provinces.

4.1. Significance of Strengthening Ecological Environment Construction. One is the need for economic development. According to the data of some provinces, the direct loss caused by environmental damage in Northeast China is 100 billion yuan, indirect loss caused by ecological damage in Northeast China is about 10 million yuan, and the indirect economic loss, the restoration cost after ecological damage, and the potential economic loss that is difficult to measure in monetary terms are even greater. Only by strengthening the ecological environment protection and ensuring the environmental resource base for sustainable development can we realize the revitalization of the old industrial base in Northeast China and ensure the sustainable development of the economy in the Northeast region.

The second is the need for social development. Environmental pollution not only restricts the development of industrial and agricultural production but also destroys the living conditions on which people depend and endangers human health. Due to the deterioration of the ecological environment, the incidence of many diseases and fetal malformations in the industrial and mining areas are high. For example, the carcinogenic and teratogenic rates in Shenyang and Fushun areas were 1.2 times higher than those in the control areas. The increasing use of pesticides, chemical fertilizers, and agricultural film has led to the expansion of the polluted area of farmland and the decline of the quality of agricultural products. Northeast China is also China's commodity grain production base and the main heavy industry base. Improving and preserving the natural ecological environment in Northeast China are the basic requirements for the health of northeast people and the sustainable development of society, as well as the need for the national ecological environment protection.

4.2. Basic Ideas and Countermeasures for Improving the Ecological Environment in Northeast China. Compared with other regions of the country, the natural resources of Northeast China have their own unique advantages, but there are also some problems. In view of the problems existing in the utilization of environmental resources, governments at all levels and decision makers should provide a good sustainable development guarantee for the revitalization of the Northeast from the aspects of improving the system construction and promote the transformation and economic revitalization of the old industrial areas in the Northeast.

The first is to do a good job in the mechanism construction of ecological environmental protection. People's governments at all levels should give priority to environmental protection and incorporate the basic state policy of environmental protection into the macrostrategy of social and economic development. As shown in Figure 6, according to the ecosystem approach, rationalize the management system and build a multiagent comprehensive governance model. Promote the improvement of laws and regulations, improve the scientific decision-making and supervision mechanism, improve the supervision system, and create a good legal and regulatory environment for the implementation of effective macro-control. Establish and improve the responsibility system of people's governments at all levels for the quality management of the ecological environment under their jurisdiction and of all units for the management of industrial and social environment. Improve the ecological environmental protection and management audit system, and implement a strict performance reward and punishment system. Establish and improve the subsidy system for natural resources and environmental protection, and increase the investment in natural resource protection and development. Establish and implement tax relief measures, tax relief measures, credit preferential policies, and other relevant measures to ensure that the ecological environment work in Northeast China is carried out well.

The second is to adjust the industrial structure and change the mode of economic growth. Industry in Northeast China, especially heavy industry, has an absolute advantage in the economy, and the industrial structure is unreasonable. At the same time, most cities belong to resource-based heavy

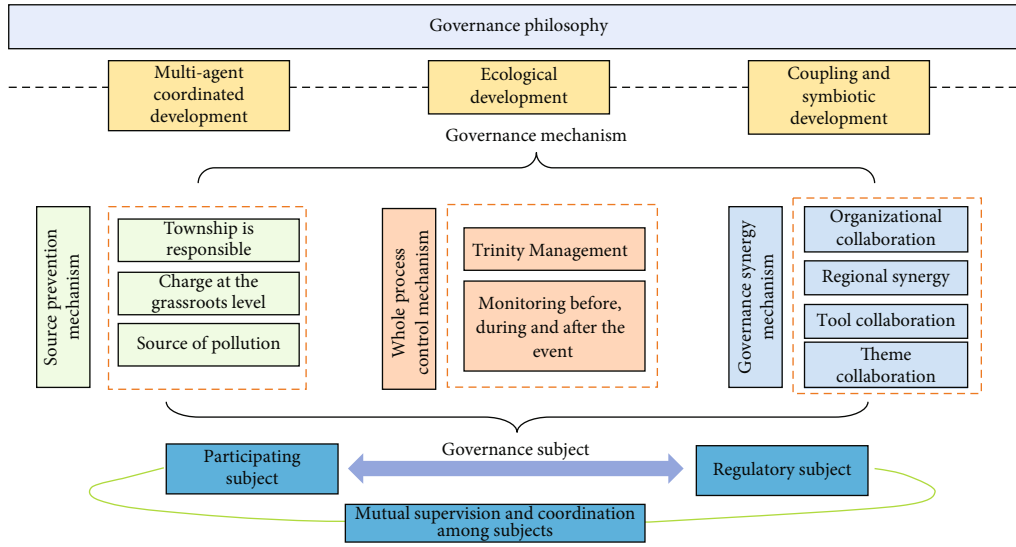

Figure 6: Ecoenvironmental governance in a multiagent model.

industry cities, and the environmental pollution is relatively serious. Although environmental protection and pollution control have been intensified and environmental quality has improved, the overall environmental situation has not been fundamentally improved. Transform the mode of economic development, promote the development of industrial technological transformation, vigorously implement the policy of industrial energy conservation and consumption reduction, and form an economic mode of energy conservation, and promote the coordinated development of the urbanization process and the ecological environment. While the regional urban space reconstruction has an impact on the ecological environment, it is also responded by the ecological environment. The feedback itself can hinder or accelerate the process of urban space reconstruction and affect the effect of urban space reconstruction as shown in Figure 7.

Thirdly, actively participate in environmental protection cooperation in Northeast Asia. Northeast Asia is the region with the largest number of neighbors and the most extensive contacts in Northeast Asia, and it is also an ideal region for international cooperation in Northeast Asia. The development of environmental cooperation among countries in Northeast Asia is an external condition necessary for the development of Northeast old industrial bases. Regional environmental cooperation in Northeast Asia can promote the environmental governance and environmental quality improvement of key river basins, regions, and cities in Northeast China. For example, Heilongjiang Province used yen loans to support the prevention and control of water pollution in the Songhua River Basin. Through the regional environmental cooperation in Northeast Asia, international advanced environmental concepts and environmental management experience are introduced to improve the level of environmental protection technology, governance technology, and other environmental technology cooperation. These have a good reference and enlightenment for revitalizing the northeast old industrial base.

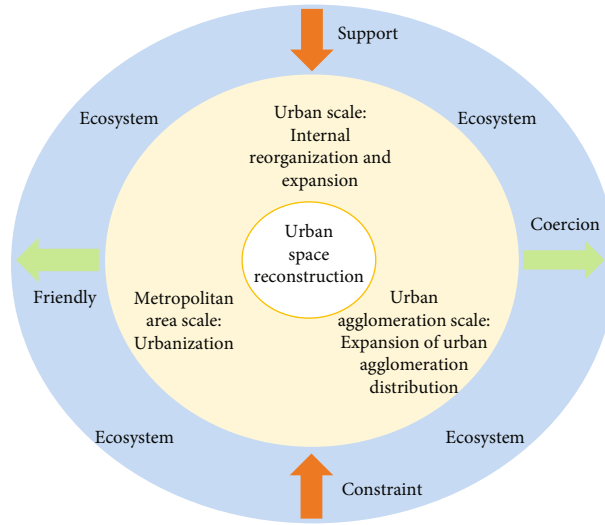

Figure 7: The synergistic mechanism of urbanization and ecological environment governance.

5. Conclusion

Ecological environment is an eternal topic that the majority of residents, especially the government management and decision-making departments, urgently need to pay attention to. It is related to people's health and living standards. Ensuring and improving the basic conditions for people's survival and promoting sustainable development are the fundamental strategies for China's economic growth. Under the guidance of the new concept of development, the formation of a new mode of growth plays a major role in the overall development of the regional ecological environment and economic and social development. China is rapidly industrializing. "WTO entry" has accelerated her pace of integration into economic globalization. The launch of the "Northeast Revitalization Project" has opened an important scene of northeast industrial structure adjustment. In the new era,

the economic development of the three northeastern provinces is facing new major opportunities. Ecological construction and environmental protection are also facing new challenges. The phenomenon of ecological environment in Northeast China is particularly obvious, which has caused harm to the sustainable development of local social economy and the revitalization of the old industrial base in Northeast China. The northeast ecological construction and environmental protection strategy in the new era are of far-reaching significance for promoting the revitalization of old industrial bases and sustainable economic and social development. On the basis of objective research and scientific understanding of the major natural resource ecological and environmental problems that need to be solved urgently in this region, we should actively take positive measures to improve the legal system, increase scientific and technological investment, and promote the adjustment of industrial structure, so as to do a good job in ecological construction, use ecological energy scientifically, promote the ecological environment, and promote regional development and sustainable economic and social development.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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Research Article

Research Report on the Application of MEMS Sensors Based on Copper Oxide Nanofibers in the Braking of Autonomous Vehicles

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Herein, we report a novel nanofiber as a humidity sensor applied to autonomous vehicles. We prepared copper oxide nanofibers by electrospinning, characterized the obtained materials by XRD, SEM, and TEM, and fabricated MEMS sensors based on copper oxide nanofibers. The humidity sensitivity performance of the sensor was tested in different humidity environments. We found that the MEMS humidity sensor based on copper oxide nanofibers can detect the change of humidity in the environment over a large humidity range. Its fast response/mixing speed (1 s), good stability, and sensitivity make it to fully adapt to the high speed of the car.

1. Introduction

As one of the basic substances that constitute life, water plays an inaccessible but important role in human production and life. In the environment of our daily life, water can be said to be innumerable, and it affects every bit of our lives all the time [1]. The term "humidity" usually refers to the amount of water vapor in the atmosphere. It is worth noting that humidity not only affects the comfort level of the human body but also interferes with the results of many experiments, which require us to detect and control the environmental humidity [2].

A humidity sensor is an important device used to detect environmental humidity, which is widely used in medical, biological, construction, and other fields [3]. The performance of the humidity sensor determines that only those materials with high sensitivity to humidity, rapid response, nontoxic, and nonpolluting materials are suitable for advanced humidity-sensitive materials [4]. At present, effective progress has been made in humidity sensors based on semiconductor metal oxides [5] and conductive polymers [6], and many different types of humidity sensors with good performance have been developed and put into practical applications. In addition, carbon-based materials have gradually become a hot spot for humidity sensors [7].

Among them, the humidity sensor based on semiconductor metal oxide has excellent sensitivity, can maintain good humidity sensitivity at room temperature, and can effectively detect humidity values in a wide humidity range, gradually becoming a research hotspot in the field of humidity sensing [8, 9]. For humidity sensors based on semiconductor metal oxides, the sensing mechanism is usually related to the change in the resistance of the humidity-sensitive material.

Copper oxide (CuO) is a typical p-type semiconductor metal oxide with a band gap of only 1.2 eV [10], which not only has high electrical conductivity but also has low production cost, easy preparation, nontoxic and harmless, and has gradually developed into a popular material in the field of humidity sensing [11]. According to research, the application of copper oxide can effectively reduce the cost of humidity sensing materials [12].

Copper oxide is a typical chemical resistance sensing material, and its sensing mechanism is inseparable from the change in the conductivity of the material itself caused by the adsorption of water molecules on the surface [13]. As shown in Figure 1, the adsorption of water molecules on the surface of copper oxide can be divided into physical adsorption and chemical adsorption [14]. Charge transfer is achieved by

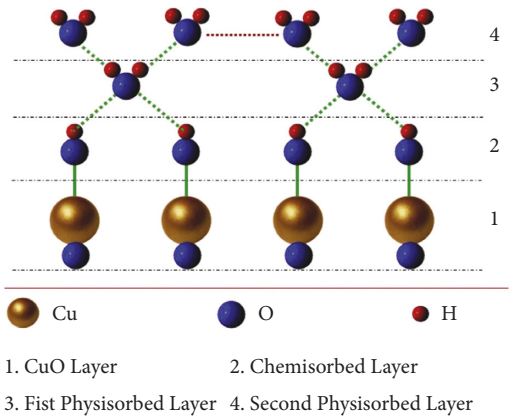


Figure 1: Schematic diagram of the humidity sensing mechanism of CuO.

Figure 2: The humidity sensor behind a car tire.

proton hopping between hydroxyl groups of the chemisorption layer [4]. The chemical adsorption layer of water molecules that has been formed will continue to accept water molecules and form a physical adsorption layer in the outer layer. According to the Grotthuss transport mechanism, a large number of water molecules are ionized to form hydronium ions, and the charge transfer is achieved by the hopping of hydrogen ions between adjacent water molecules [15]. This process will increase the electrical conductivity of the material, which will change the resistance of the copper oxide [16, 17]. It is because of the change of this resistance with humidity that the detection of the humidity value is realized.

It is worth mentioning that the operating temperature is always an important factor affecting the performance of the sensor [18, 19]. The operating temperature of the sensor will affect the electron mobility inside the material, thereby controlling the electrical conductivity of the material [20]. In the field of gas sensing, how to reduce the working temperature of the sensor is always a difficult problem because the working temperature is too high, which means the loss and waste of energy, which is in serious conflict with the current theme of energy conservation and emission reduction in the world [21, 22]. In addition, the high operating temperature will also affect the stability and sensitivity of the material, thereby reducing the service life of the sensor [12]. In contrast, the humidity sensor based on copper oxide shows relatively excellent humidity sensitivity even at room temperature, so no additional heating device is required, which not only reduces power consumption but also makes the sensor more portable [23–27]. There is no doubt that the humidity sensor based on copper oxide is more suitable for our living needs, whether from the perspective of cost and energy, or for convenience.

In addition to playing a huge role in medical, biological, and other fields, humidity sensors can also be applied to a new generation of automotive autonomous driving technology, as shown in Figure 2.

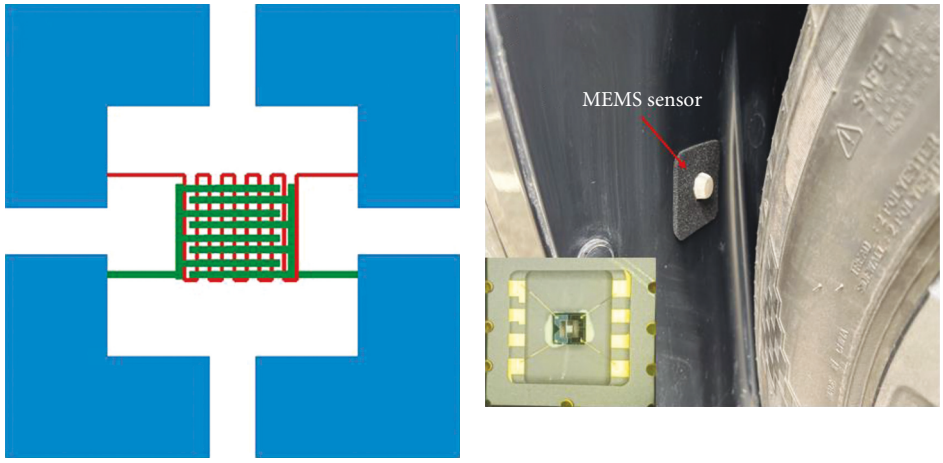
In this work, we fabricated a novel MEMS humidity sensor using copper oxide nanofibers for environmental humidity detection in autonomous vehicles. The material was synthesized by electrospinning technology. Our work aims to provide a guideline for mass production at an industrial level. The obtained sample was characterized by XRD/SEM and fabricated into a MEMS sensor. The MEMS sensor integrates a Pt wire for temperature measurement. We installed the sensor on the body behind the car tire. When the vehicle is running, the updraft rolled up by the tire will bring the water molecules on the ground to the sensor position, so as to feedback the humidity of the ground, and the sensor can be used for automatic driving braking.

2. Experiments

2.1. Materials and Methods. Ethanol (>99%) and copper chloride ($CuCl_2{\cdot}6H_2O$) were purchased from Merck Company. Vinyl alcohol (PVA, Mw = 31,000–50,000) and vinylpyrrolidone (PVP, Mw = 1,300,000) were obtained from Sigma Aldrich. All chemicals were of analytical grade and were used as received without further purification.

We used electrospinning to prepare copper oxide nanofibers by electrospinning a mixture of copper chloride ($CuCl_2{\cdot}6H_2O$) and polyvinyl alcohol (PVA). The specific method is to first dissolve the polyvinyl alcohol powder in deionized water, stir at 60°C for 5 h to obtain a 10 wt% PVA solution, and then add 20 wt% copper chloride solution and polyvinylpyrrolidone powder to the solution; after fully stirring for 12 h, inject the resulting solution into a 20 ml syringe equipped with a metal needle tip in a controlled electrospinning device. The applied voltage for electrospinning was 20 kV, the feeding rate of the mixed solution was 0.2 mL/h, and the distance between the glass substrate and the needle tip was 10 cm. Finally, the fibers obtained by electrospinning were peeled off with tweezers and placed in a crucible. The material was calcined at a temperature of 400 °C for two hours. Simultaneously remove organic components (PVP/PVA) in nanofibers.

2.2. Synthesis of CuO Nanofibers. The structure of the calcined CuO nanofibers was verified using the X-ray diffraction (XRD) technique (a Philips XRD diffractometer using Cu $K\alpha$ ($K\alpha = 1.540$ Å and $2\theta = 10$–80 radiation as the X-ray source)). Scanning electron microscopy (SEM) images of calcined nanofibers were obtained using a LEO 1450 VP (Germany) instrument.



(a) (b)

Figure 3: (a) The block diagram of the sensor. (b) MEMS sensor on a car, and the inset is a picture of the sensor growing material.

2.3. Humidity Sensitivity Test. The MEMS humidity sensor is fabricated by the following method. First, the sensing material and absolute ethanol are ground into a uniform paste, and the paste is applied on the surface of the central interdigitated electrode of the MEMS chip with a brush. The thickness of the sensing film is 100 μm. After ethanol was volatilized, the device was aged at 250°C in ambient air to improve its stability and obtain a resistive MEMS humidity sensor.

In order to investigate the influence of gas concentration on the response, a gas distribution system (CGS-Beijing Ailite) is used to control the different humidity and then evaporated into the well-defined concentration of the target gas in the reaction chamber. We used dry air through pure water to control the humidity level inside the test chamber by adjusting the flow rates of dry air and humid air at room temperature. During these measurements, the humidity level in the room is also monitored by a standard hygrometer.

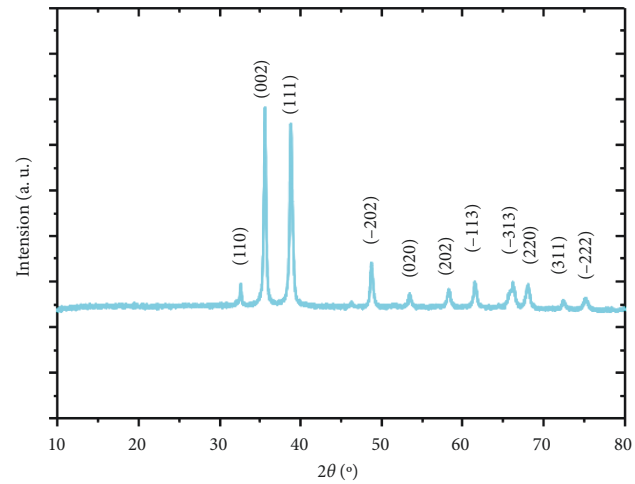


Figure 4: XRD of copper oxide nanofibers prepared by electrospinning.

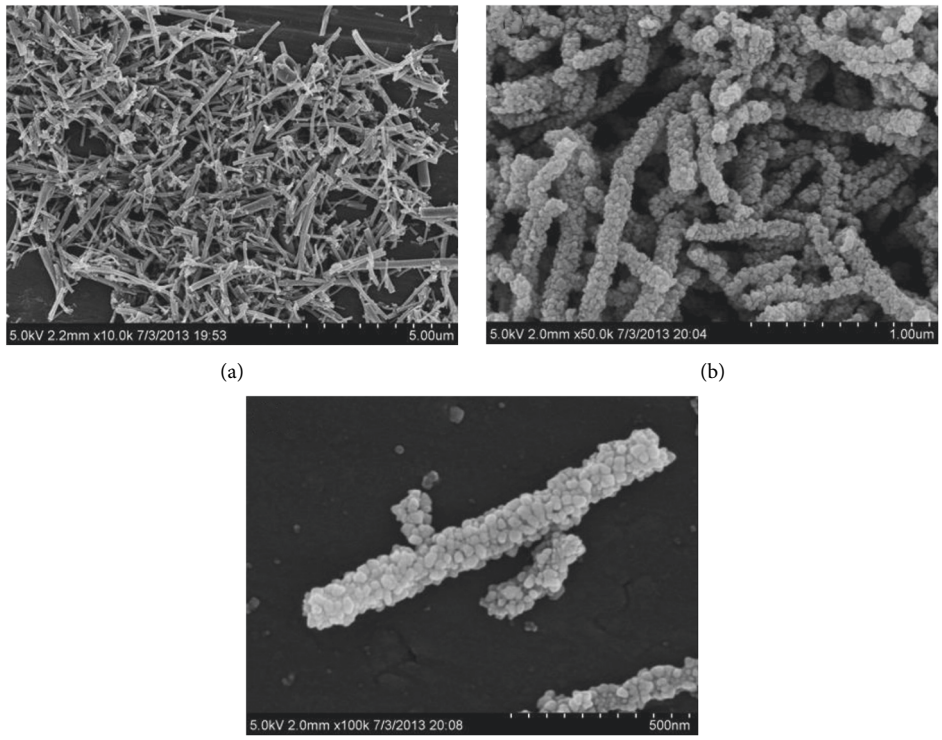
3. Results and Discussion

The schematic structure of the sensor is shown in Figure 3(a), in which the signal electrode is interdigitated, and the temperature electrode is Pt wire, which is formed by bending back and forth to form a temperature measuring electrode. Figure 3(b) shows the MEMS humidity sensor behind the actual car tire. The sensor after the material is grown is shown in the illustration. When the car is running, the rotating tire rolls up the rising airflow, which will bring the moisture from the ground to the surface of the MEMS sensor. In this way, the humidity of the ground is detected in real time.

The X-ray diffraction pattern (calcined CuO nanofibers) of CuO nanofibers placed at 400°C for 2 h is shown in Figure 4. The CuO peaks appear at diffraction angles of 32/53°, 35/55°, 38/75°, 48/75°, 51/40°, 58/35°, 61/57°, 66/28°, 68/14°, 73/01°, and 75/28°, corresponding to reflection from (1 1 0), (0 0 2), (1 1 1), (−2 0 2), (0 2 0), (2 0 2), (−1 1 3), (−3 1 1), (2 2 0), (3 1 1), and (−2 2 2) planes, respectively. The strongest diffraction pattern viewed at $2\theta = 35/55°$ suggests that CuO grows with a preferential orientation of (0 0 2) on the glass plate and illustrates the formation of the single-phase of monoclinic CuO. The resulting XRD spectrum is in good agreement with the 2θ values reported in JCPDS Card Nos. 48–1548.43.

Figures 5 and 6 are the SEM and TEM images of the obtained material after calcination at different magnifications. From the figures, we can observe that the calcined copper oxide nanostructures are slender and fibrous. This shows that we have successfully prepared copper oxide nanofibers that meet the experimental requirements by electrospinning.

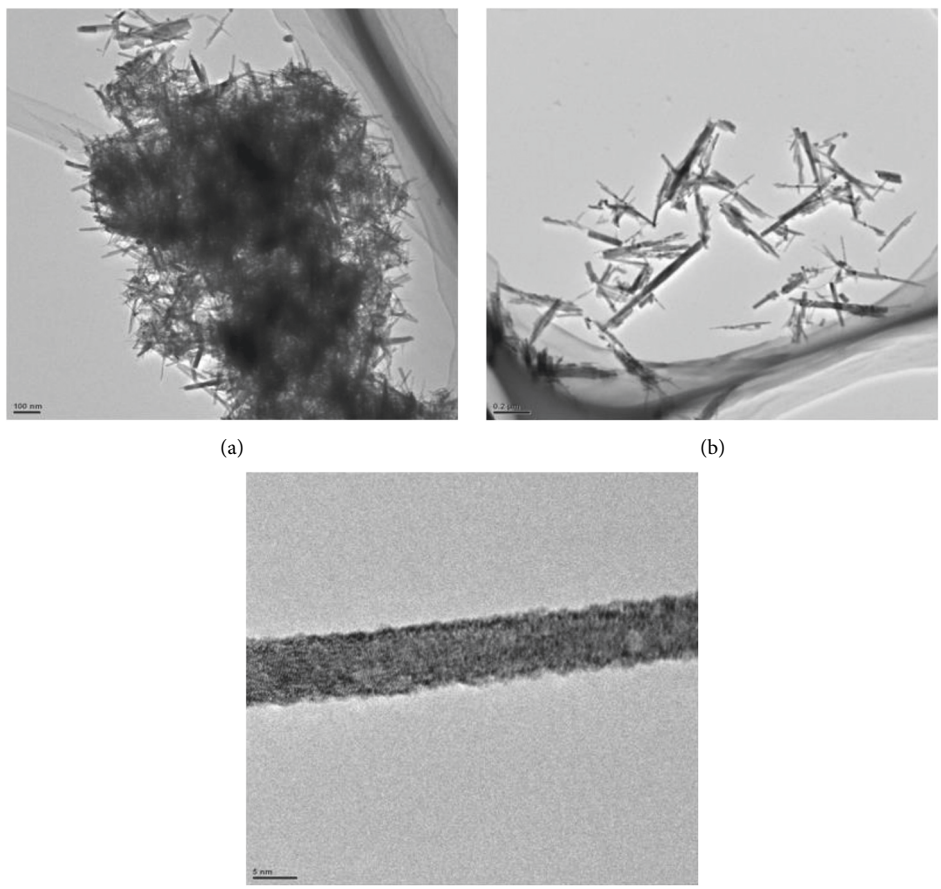
Figure 7 shows the variation trend of the impedance of the MEMS humidity sensor with humidity in the range of 0–100% humidity. The experimental results show that under the low humidity level of 0–20%, the impedance of the sensor does not change significantly; it almost maintains the state of a horizontal line. In the humidity range of 20–100%, it can be observed that the impedance of the sensor decreases



(a) (b)

(c)

Figure 5: SEM of copper oxide nanofibers at different magnifications.



(a) (b)

(c)

Figure 6: TEM of copper oxide nanofibers at different magnifications.

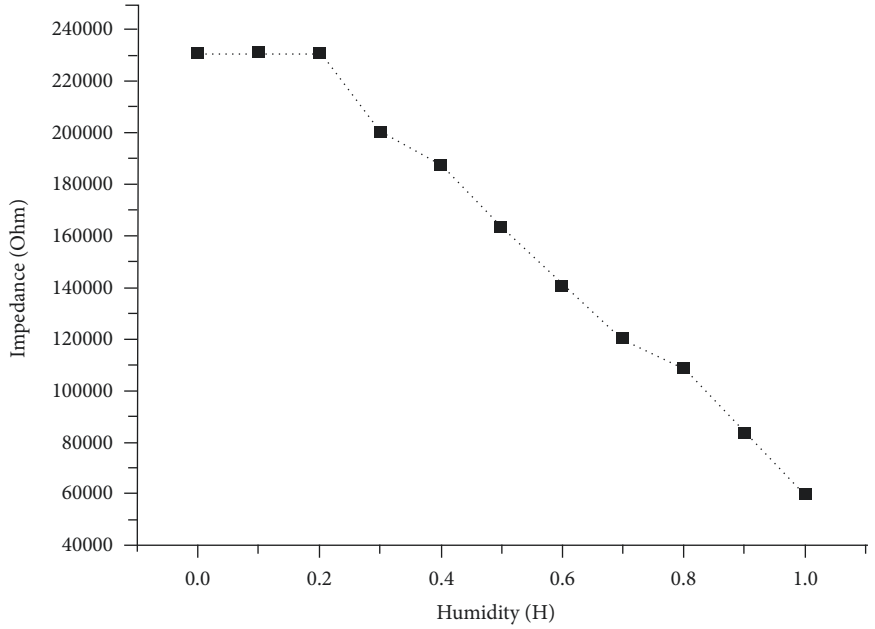


Figure 7: The humidity sensing curve of a humidity sensor.

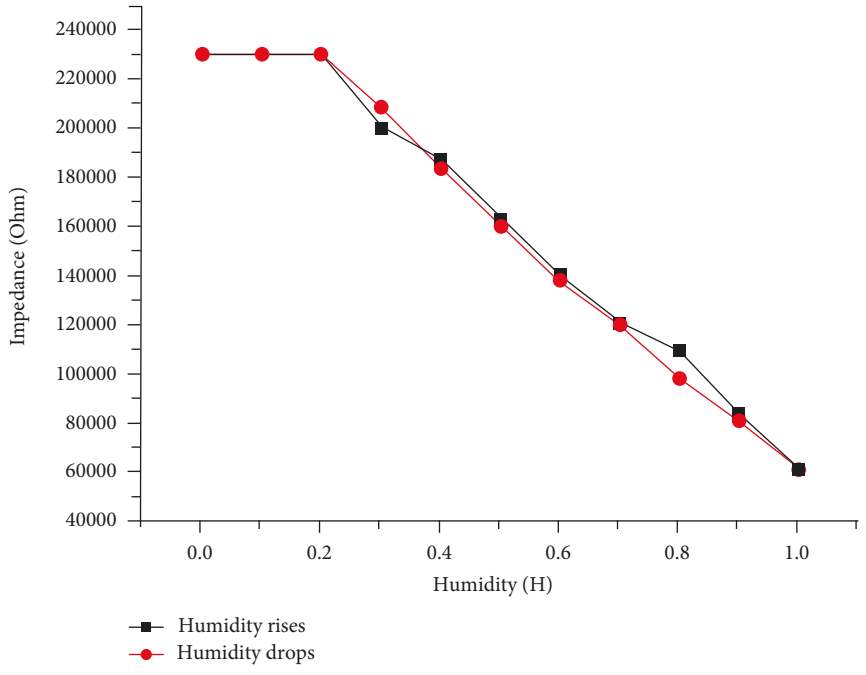


Figure 8: The hysteresis curve of the humidity sensor.

linearly with the increase of humidity, and the impedance drops from 230000 Ohm to 60000 Ohm. This shows that in the range of 20–100% humidity, the MEMS humidity sensor shows a good response state to the ambient humidity and has excellent potential for humidity measurement applications.

Then, in the humidity range of 0–100%, we detected the change in the impedance of the MEMS humidity sensor during the two changes of humidity rising and falling. The results are shown in Figure 8, where the red line represents the change of the sensor impedance under the humidity reduction condition and the black line represents the process of increasing humidity. From the figure, we can find that the impedance change of the sensor is very small, whether it is from low humidity to high humidity or the opposite process from high humidity to low humidity. This shows that the heat change generated when water molecules adsorb or desorb on the surface of the copper oxide nanofiber material has little effect on the output impedance of the sensor, further proving the excellent response and stability of the MEMS humidity sensor.

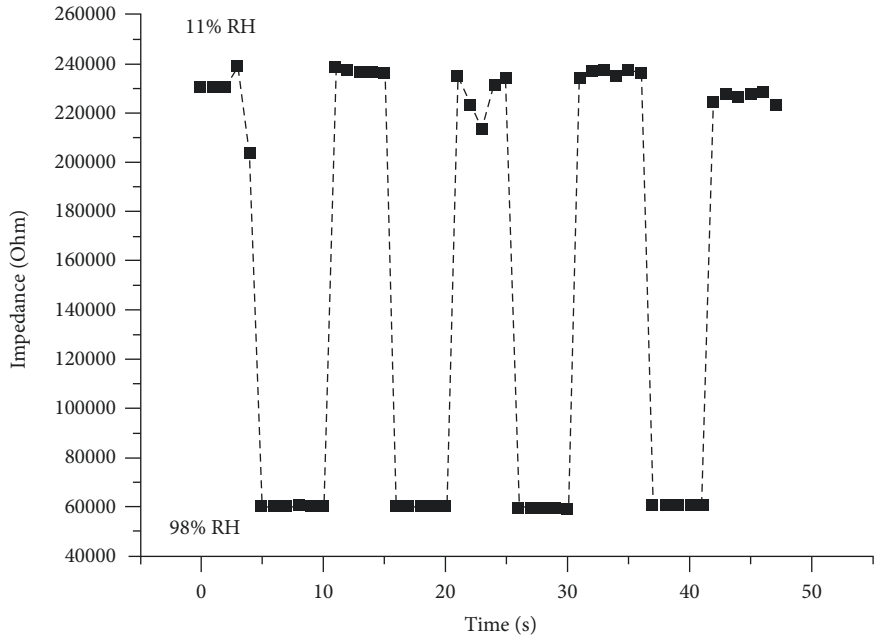


Figure 9: The humidity sensor response/recovery curve.

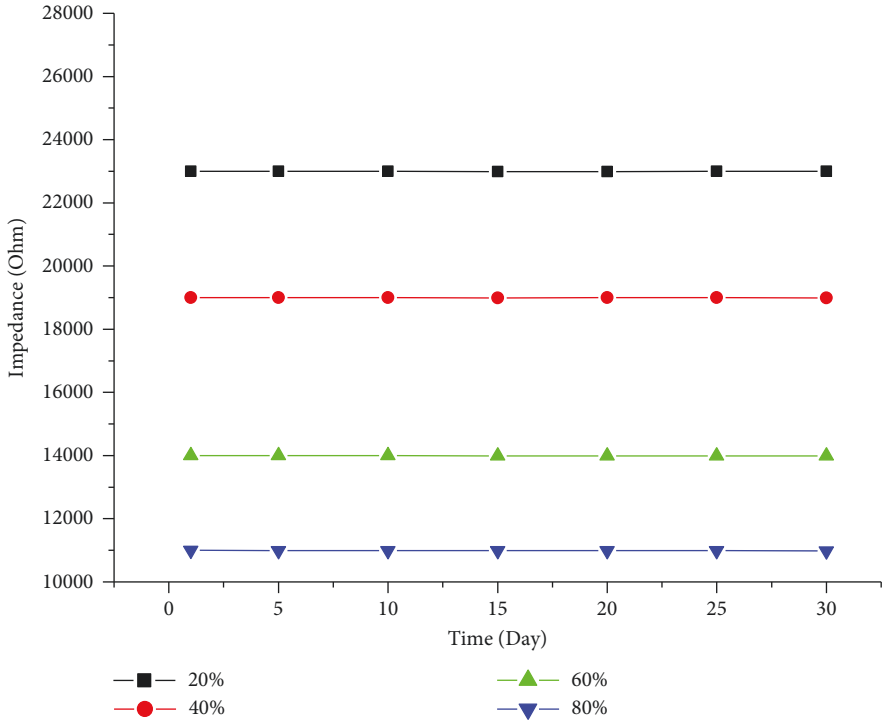


Figure 10: The stability of the sensors in the one-month period.

Figure 9 shows the response/recovery curve of the MEMS humidity sensor based on copper oxide nanofibers. From the figure, we can conclude that this type of sensor exhibits good reversibility during repeated experiments in the humidity range of 11–98%. It shows that the sensor has a very ideal ability for rapid response and recovery, and its response and recovery time is only about 1 s. Therefore, even in the process of high-speed driving, the sensor can timely and efficiently give feedback on the ground humidity.

Figure 10 shows the stability of the sensors in the one-month period. One can see that the resistance of the sensors changes slightly for different humidity cases, indicting the good humidity stability of the gas sensor.

Figure 11 shows the changing trend of the surface temperature and humidity of the sensor located behind the car tire during acceleration and deceleration while the car is driving. From the figure, we can find that when the car is accelerating, the surface temperature of the sensor increases,

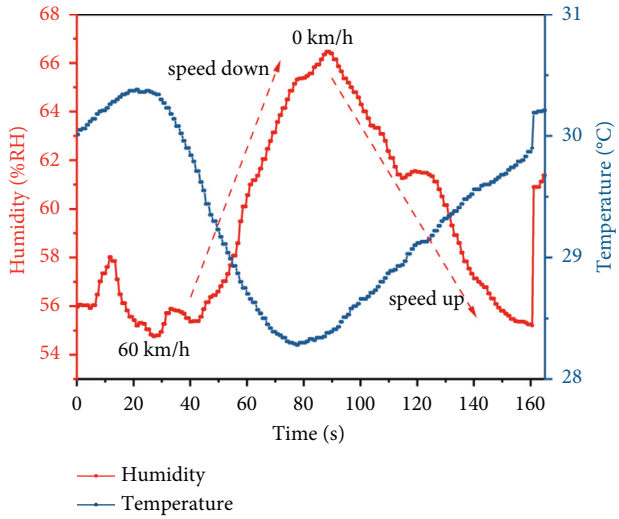


Figure 11: The changing trend of the sensor surface temperature and humidity during the acceleration/deceleration of the car.

but its humidity decreases significantly. On the contrary, during the deceleration of the car, the temperature decreases and the humidity increases. This is because, in the same humidity environment, when the speed of the car increases, the rotational speed of the wheels also increases, which results in a stronger updraft, and the air rubs against the sensor surface to increase its temperature. However, the strong air movement causes fewer water molecules to be adsorbed on the sensor surface, which explains why the humidity decreases with increasing vehicle speed.

4. Conclusion

In this work, we prepared copper oxide nanofibers by electrospinning and fabricated MEMS sensors based on copper oxide nanofibers by traditional methods. The humidity sensitivity performance of the sensor was tested in different humidity environments. We found that the MEMS humidity sensor based on copper oxide nanofibers can detect the change of humidity in the environment over a large humidity range. Its fast response/mixing speed (1 s), good stability, and sensitivity make it to fully adapt to the high speed of the car. In addition, based on the significant changes in the humidity and temperature of the sensor during acceleration and deceleration, the MEMS sensor can also monitor the speed of the car, which can realize braking adjustment for autonomous driving.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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Research Article

Resilient Public Transport Construction in Mega Cities from the Perspective of Ecological Environment Governance

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With the rapid development of the social economy, environmental and resource constraints of economic growth are becoming more and more serious. Therefore, for cities, we should take the road of green development and sustainable development. On the one hand, we should fully implement the basic policies issued by the central government. On the other hand, we should fully integrate the actual situation of the city to make it better implemented, which will help to improve the ability of ecological environment governance and consolidate the ecological advantages of the city. With the development of the urban economy and the continuous increase of population, the development pressure faced by cities is also increasing. Innovating urban construction mode has increasingly become the focus of the development of the new era. The main reason is that the continuous growth of the urban population, environmental pollution, traffic congestion, and ecological damage has caused great trouble to urban residents. The traditional public service governance model has been unable to meet the current public service needs of urban residents. Based on this background, major cities around the world have begun to study urban resilience in order to prevent and resist the interference and impact brought by the outside world and maintain the sound development of the urban system. Based on the demand for ecological environment governance, this study analyzes the current situation and causes of urban ecological environment governance in China and the problems existing in urban resilient transportation construction in China, and puts forward corresponding countermeasures for ecological environment governance and the current situation of urban resilient public transportation construction. This study has great theoretical and practical significance to promote the sustainable development of the Chinese ecological environment and the resilience construction of urban transportation.

1. Introduction

Lu Xinyuan, vice president of the China Environmental Science Association, said in his 2012 visit report that since 1996, the incidence of environmental mass events in China has increased at an average annual rate of 29%, and environmental problems have become the fastest-growing disease of concern to our people [1]. Recently, Chai Jing, a famous female reporter for CCTV who has left her job, made a documentary entitled "under the dome" at her own expense, which aroused people's extensive attention and discussion on urban ecological and environmental problems and the harm to the environment to the human body [2]. Environmental problems have become major living, economic and political problems that our country and people must face and deal with [3]. At present, the environmental problems in Chinese cities mainly include exhaust pollution, acid rain, photochemical smoke, greenhouse effect, dust sandstorm, building noise, car noise, and electromagnetic field pulse radiation. Even more serious concerns are plastic bag pollution, battery pollution, and wastewater discharge.

In the report of the Third Plenary Session of the 18th CPC Central Committee, "ecological civilization" appeared three times in total, and the conference clearly proposed to delimit the "ecological red line," which reflects the great importance attached by the party and the state to ecological civilization [4]. In recent years, a series of urban problems such as smog, drinking water pollution, noise pollution, population explosion, and greenhouse effect caused by excessive carbon emissions have been highlighted in the public's vision. In

order to alleviate and solve the urban ecological environment problems in the process of urbanization, it is imperative to explore and study the urban ecological environment governance [5]. As can be seen from the chart, China's cities with high carbon emissions are big cities like Jinan, Shanghai, and Guangzhou, mainly because there are too many means of transportation in big cities, while China's second-and third-tier cities have relatively small carbon emissions.

Figure 1 shows the total carbon dioxide emissions of 30 cities in China from 2007 to 2016. Public transport has the greatest impact on the urban ecological environment because urban development is accompanied by disaster risks [6]. In recent years, more and more attention has been paid to the sustainable development of the transportation industry and environmental protection [7]. The current complex and diverse transportation problems show that the original comprehensive transportation system can not meet the transportation power strategy and the goal of green development. Therefore, people are more inclined to find ways to build sustainable transportation. Ecological transportation has gradually come into people's sight, which has aroused heated discussion among scholars from all walks of life [8]. As can be seen from the figure, China's megacities, such as Shenzhen, Shanghai, and Beijing, have good green transportation construction, but compared with 2018, they show a downward trend. With the decline of urban scale, the construction intensity of urban green transportation has also shown a decreasing trend, which is directly related to the economic development intensity of the city.

Figure 2shows the construction of green transportation in various types of cities in China. The development of any work in China needs the support of the system, and the implementation of the system needs the cooperation of corresponding departments [9]. The governance of the urban ecological environment is a "thorny" problem involving the comprehensive governance of multiple departments [10]. Moreover, in the process of urban ecological environment governance in China, due to various factors inside or outside the system, The governance of the urban ecological environment basically presents a state of "fragmentation," and the tenacity governance theory is to solve the problems of "fragmentation" and "thorny." This kind of "thorny" and "fragmentation" in China's urban ecological environment governance just coincides with the theory of holistic governance [11]. Therefore, based on the needs of ecological environment governance, this study analyzes the current situation and causes of urban ecological environment governance and the problems existing in urban resilient transportation construction in China and puts forward corresponding countermeasures for the current situation of ecological environment governance and urban resilient public transportation construction. It is of theoretical and practical significance to explore the theory of resilience governance to solve the strategy of urban ecological environment governance road and urban public transportation construction in China.

2. Theoretical Research

2.1. Overview of the Connotation of Urban Toughness. From the perspective of origin, the word toughness originated from Latin (resilio), which means the ability to reset an object to its original state. With the development of society, the concept of resilience has been applied to various fields [12]. In engineering, with the development of western industrial technology, scholars use toughness to express the recovery ability of an object after deformation or injury under the action of the outside world; In psychology, resilience is used to describe resilience after mental or psychological setbacks. By the end of the 20th century, with the popularity of the concept of resilience in the research and development of various disciplines, the concept of resilience has been gradually applied to many disciplines, such as ecology, economics, sociology, geography, psychology, and engineering. The understanding, research, and application of resilience in various disciplines are also very different as shown in Table 1 [13].

Resilience has the characteristics of dynamic and collaborative evolution. As a necessary element of urban high-quality development, its concept has been widely used in urban development and evolved into "urban resilience" [14]. Urban resilience refers to the ability of a city to operate normally and smoothly under the interference of uncertain factors in its development and quickly recover to its initial state when impacted. In the development of urban resilience, different scholars in different countries have conducted different scientific research on urban resilience. Through analysis and research, the resilience alliance points out that the development of urban resilience mainly includes four aspects: urban social resilience, urban engineering resilience, urban ecological resilience, and urban economic resilience. Urban Engineering resilience describes that the perfect urban infrastructure construction provides a solid guarantee for the development of urban resilience. It can effectively prevent or reduce disasters when disasters come [15]. At the same time, accumulating experience can optimize urban engineering resilience to reduce the risk brought by such disasters [16]. Urban ecological resilience describes the ability of the urban ecosystem to recover to its original state when subjected to sudden and uncertain interference or impact, mainly including the resistance of the urban ecosystem to natural disasters, adaptation to natural changes in ecosystem, and so on. Urban economic resilience describes the ability of the urban economy to return to its original state when it is subjected to external interference and impact. To sum up, urban resilience is the ability of a city to operate its urban system normally in the face of uncertain and unknown interference or impact [17].

2.2. Theoretical Research on Ecological Environment Governance. "Governance" comes from Latin and ancient Greek. It originally means control, guidance, and manipulation. It has been applied to economics, politics, sociology, and other fields. It is generally believed that Rosenau is the main founder of governance theory. His representative

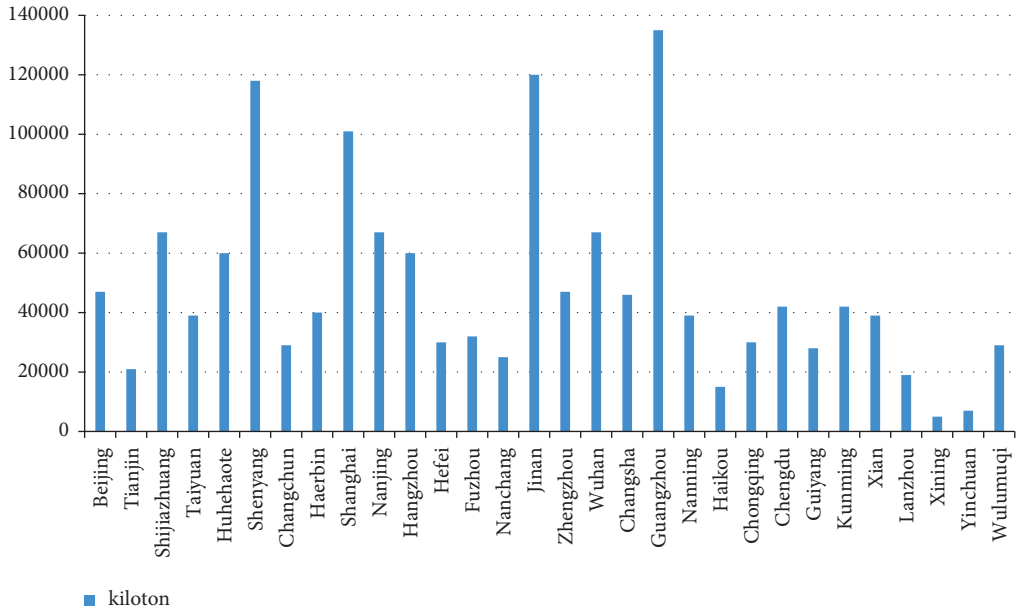

Figure 1: Total carbon dioxide emissions of 30 cities in China from 2007 to 2016.

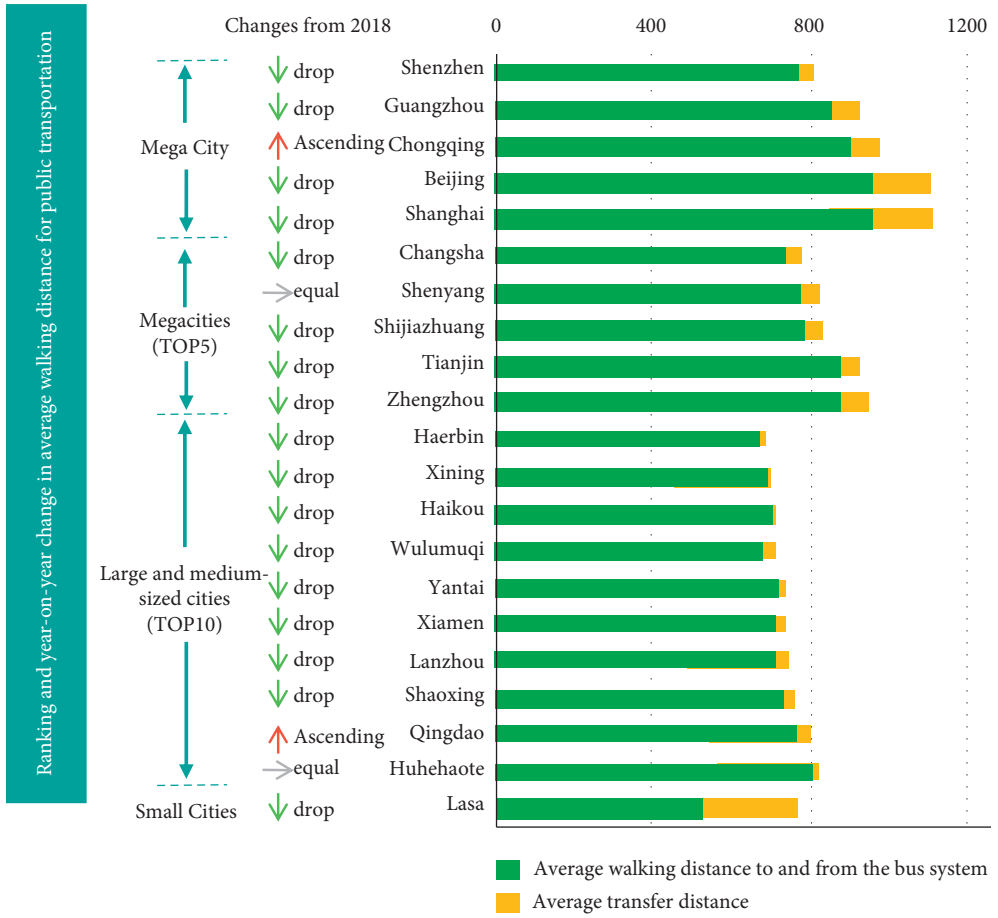

Figure 2: Construction of green transportation in various types of cities in China.

works are governance in the 21st century and governance without government [18]. He believes that governance is a regulatory mechanism, which can play an effective role even without formal authorization. "Unlike governance, governance refers to an activity supported by common goals. The main body of these management activities may not be the

Table 1: Evaluation index of urban toughness.

Target level and index level	Secondary index layer	Unit and nature	Index meaning
Urban infrastructure resilience	Urban road area per capita (XS)	M2/person (+)	Traffic accessibility
	Urban construction land area (XG)	Square kilometers (+)	Land use
	Length of drainage pipe (XM)	Km (+)	Infrastructure construction
	Per capita domestic water consumption x1)	Ton/person (−)	Water resources supply
	Per capita power consumption (xn)	KWh/person (−)	Power supply
	Total LPG supply (x13)	Ton (−)	LPG supply
	Number of internet broadband access users (x14)	Household (+)	Network popularity
Urban ecological resilience	Per capita green area (xis)	M2/person (+)	Urban environmental level
	--Comprehensive utilization rate of general industrial solid waste (x16)	% (+)	Comprehensive utilization level of waste
	Centralized treatment rate of sewage treatment plant (x1)	% (+)	Sewage treatment intensity
	Greening coverage rate of built-up area x1)	% (+)	Urban greening level
	Harmless treatment rate of domestic waste (x19)	% (+)	Environmental pollution control ability
Urban economic resilience	Public revenue (xn) Financial revenue status		10000 yuan (+)
Amount of foreign capital actually used in the current year (X21)	USD 10000 (+)	Dependence on foreign capital utilization	
	Resident RMB savings deposit balance (x2)	10000 yuan (+)	Resident financial capital
	GDP per capita (x2)	Yuan/person (+)	Total economic development
	Proportion of secondary industry in GDP (x24)	% (+)	Economic structure
	Proportion of tertiary industry in GDP (X2S)	% (+)	Economic structure
	Public expenditure (XX)	10000 yuan (−)	Financial input
	RMB deposit balance of financial institutions at the end of the year (xn)	10000 yuan (+)	Capital reserve capacity
	Balance of RMB loans of financial institutions at the end of the year (XX)	10000 yuan (−)	Capital lending capacity
	Total retail sales of social consumer goods (X29)	10000 yuan (+)	Consumption capacity
	Per capita investment in fixed assets (cx3o)	Yuan/person (+)	Investment level

government, nor does it need to rely on the coercive force of the state." As an authoritative scholar of governance theory, Gerry stoke believes that governance is a new development direction of government rule [19]. It includes not only government mechanisms, but also non-governmental mechanisms. Ecological environment control includes air pollution prevention and control, soil environment comprehensive control, forest area ecological restoration and wetland protection, desertification prevention and control, soil erosion prevention and control, and so on. Ecological environment governance is a strategic decision put forward by China to protect and build the ecological environment and realize sustainable development. Mainly through carrying out trees and grass, soil erosion control, desertification control, ecological agriculture, and other ways, the construction of beautiful mountains and rivers of the motherland.

In the theory of ecological environment governance, structural functionalism is an important branch. Parsons, an American sociologist, is the leader of the school of structural functionalism. His structural-functional analysis focuses on the mechanism of promoting the stability and order of the social system. He believes that a complete system should have four functions: adaptation, goal realization, integration, and mode maintenance, as shown in Figure 3.

In ecological environment governance, simple cross-border cooperation cannot constitute holistic governance. To distinguish whether a government's management form is holistic, the government needs to judge from the degree of relationship between the two dimensions of objectives and means [20]. According to whether the policy objectives and means of the organization are mutually beneficial, the governance forms of the government are divided into five types: progressive government, Lord government, overall government, fragmented government, and collaborative government, as shown in Figure 4.

From the perspective of urban ecological environment governance, we can analyze the above five forms of government governance in this way. In progressive government governance, driven by the interests of regions and

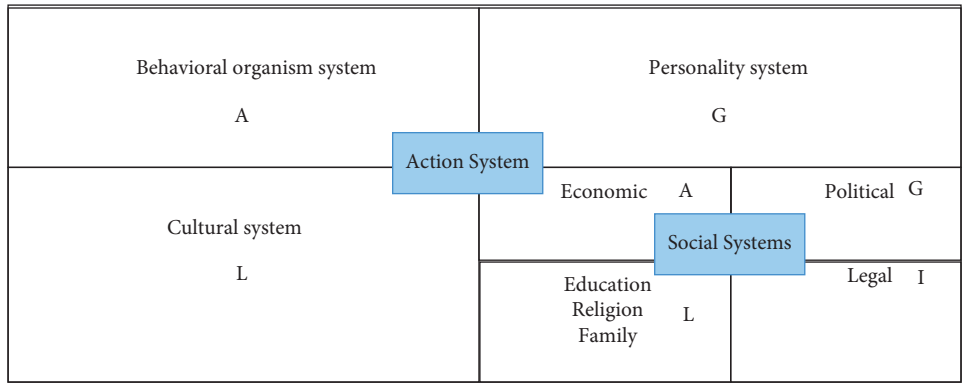

Figure 3: Parsons' functional analysis model.

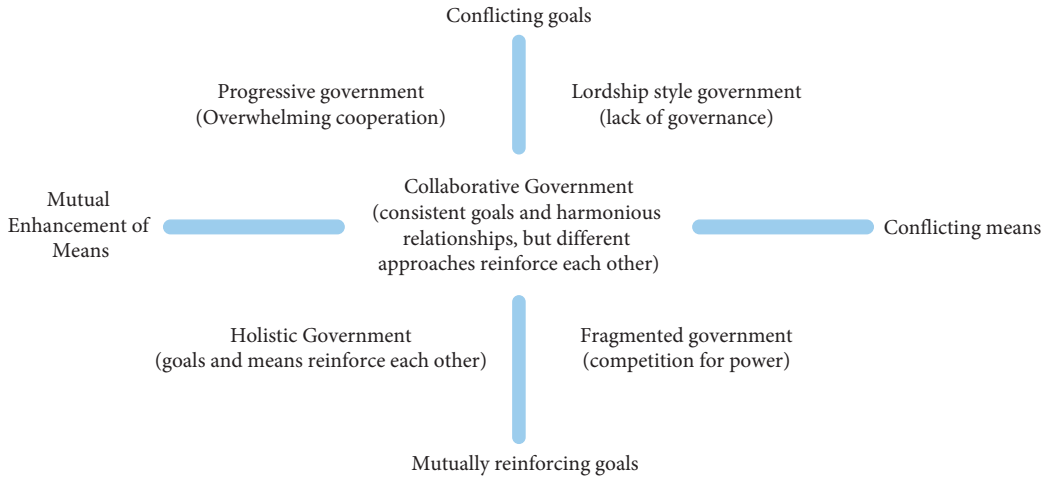

Figure 4: Relationship between objectives and means.

departments, before the evaluation of superior departments, all departments and regions do not communicate with each other and act in their own way. It can be said that their objectives are conflicting in their respective areas of jurisdiction. However, when facing some joint problems, they have to cooperate. In this case, due to the limitations of regional scale and departmental interests, it is difficult to form a centralized overall governance strategy for urban ecological environment governance.

3. Ecological Environment Problems Existing in Mega Cities in China and the Current Situation of Resilient Transportation Construction

3.1. Problems and Causes of Urban Ecological Environment Governance in China

3.1.1. Control Fragmentation. The fragmentation of governance function means that under the joint topic of urban ecological environment governance, the relevant functional departments have not achieved the overall governance effect of mutual coordination. In China, as the main body of urban ecological environment governance, the government should use policy, system, economy, culture, law, and other means to achieve mutually reinforcing effects on the goal orientation and means of urban ecological environment governance. However, in reality, due to the division of functional departments, the goals and means can not echo each other. On the whole, China is not only a developing country but also the country with the largest population in the world. The per capita economic strength is still a certain distance from that of western developed countries. Especially in the past few decades, the primary task of governments at all regions and levels is almost to develop the economy, and the economic development of many places is almost at the cost of destroying the balance of the urban ecological environment.

3.1.2. Insufficient Participation of the Public and Other Governance Subjects. The subjects of urban ecological environment governance include government, citizens, enterprises, and environmental NGOs. Although the government plays a leading role in this system, the role of other governance subjects can not be ignored. However, due to the influence of various internal and external factors, the participation and role of citizens, enterprises, environmental NGOs, and other non-governmental governance subjects in China's urban ecological environment governance are not high and obvious. The environmental NGO project was

established by China Development Bulletin for environmental NGOs, which is supported by the Ford Foundation and has an advisory committee composed of representatives from China Environmental NGOs as the consultants of the project. By the end of February 2015, the State Administration for Industry and Commerce of the people's Republic of China announced that the number of enterprises in China was 18.7149 million, while the data of the Ministry of environmental protection showed that from 2007 to 2014, only 14665 enterprises in China had obtained environmental mark certification, including some enterprises with invalid environmental mark certification, which is the tip of the iceberg compared with the number of enterprises actually registered in China, It is far from western developed countries.

3.1.3. The Management Mode Is Rigid and Outdated. At this stage, China implements a management system in which governments at all levels are responsible for local environmental quality, environmental protection administrative departments implement unified supervision and management, and relevant departments implement supervision and management, that is, the management mode of direct control by the government. Under this model, the governance of the urban ecological environment means that the government should directly invest a lot of financial and material resources. The governance of the urban ecological environment is a long-term and expensive project, and the long-term financial expenditure of the government is inevitably unable to support it. The mode of direct government control means the excessive use of administrative means. Although administrative means have the characteristics of being fast, efficient, compulsory and authoritative, their effects are not long-term. The excessive use of administrative means by the government is not only not conducive to the good absorption and utilization of social resources in urban ecological environment governance, but also consumes too many administrative resources, reducing the social recognition of environmental management. This is in contradiction with the persistence of urban ecological environment governance.

3.1.4. Causes of Urban Ecological Environment Governance Problems in China. The self-interest characteristics of the government. The school of public choice theory represented by Buchanan brings the behavior of the government and government staff into the hypothesis of "economic man," and believes that the government and government staff have a self-interest orientation. They pursue the maximization of individual interests. When the public interests conflict with their own interests, they choose their own interests more. At present, the important measurement standard for the assessment and selection of officials in China is GDP. Even if there are assessment indicators such as people's livelihood improvement, social progress, and ecological benefits, GDP still occupies the main position, which is easy to lead the local government and officials to reduce the standard of environmental access and introduce some enterprises with high pollution and high energy consumption at the cost of destroying the environment and natural resources in order to promote the economic growth of their jurisdiction, Turn a blind eye to their pollution and destruction, and even interfere with the law enforcement of the environmental department.

3.2. Problems in Urban Traffic Toughness Construction. Generally speaking, the basic meaning of resilience is to effectively mitigate the impact of external shocks, maintain the operation of main functions, and quickly recover from the crisis. At present, the problems existing in the construction of urban resilient transportation include the following aspects.

3.2.1. Serious Traffic Pollution. The increasing development of the social economy has brought about the rise in car ownership and the increase in exhaust emissions. The resulting environmental and noise pollution has become an important problem faced by many cities, which will not only interfere with people's normal life and work but also affect everyone's health. Automobile exhaust contains carbon dioxide, sulfur dioxide, and nitrogen oxides, which aggravates the deterioration of the greenhouse effect and destroys the ecological environment. Table 2 shows the carbon emission factors of main automobile fuels. According to the table, among all fuels, natural gas has the highest carbon emission factor, at 99%, followed by kerosene and fuel oil, while gasoline and diesel are also relatively high, at 98% and 98.2%, respectively. Traffic noise pollution is an important part of urban noise pollution. The noise brought by the subway and expressway makes many surrounding residential areas seriously affected by traffic noise. According to statistics, environmental noise exposure from road traffic and other sources seriously endangers health. It is estimated that at least 1 million healthy life years are lost in Western Europe every year, mainly due to sleep disorders, troubles, and cardiovascular diseases.

3.2.2. Road Traffic Congestion. The transportation network undertakes the function of urban transportation distribution, promotes regional economic development, and greatly improves the efficiency of urban operation. In recent years, Fujian Province has strengthened road reconstruction and vigorously built expressways, which has alleviated the traffic pressure to a certain extent. However, the traffic congestion problem caused by holidays and morning and evening peaks is still significant. The daily congestion period is mainly concentrated in the morning and evening peaks, which will last for 2 hours or even longer. The main reason is that the central urban area undertakes a large number of residents and jobs in a small area, and the business district is mostly concentrated in important sections of the central area. The parking lot is in short supply and the "one in one out" parking mode aggravates the traffic congestion. In addition, the illegal parking of motor vehicles and the occupation of motor vehicle lanes by electric vehicles increase the

Table 2: Carbon emission factors of main fuels.

Fuel	Carbon	Gasoline	Kerosene	Diesel oil	Fuel oil	Natural gas
CCF	27.28	18.9	19.6	20.17	21.09	15.32
HE	192.14	448	447.5	433.3	401.9	0.384
COF (%)	92.3	98.0	98.6	98.2	98.5	99.0

probability of accidents, which is also one of the reasons for traffic congestion. Figure 5 shows the variation coefficient of ecological traffic efficiency of China's megacities from 2007 to 2016. Traffic congestion not only affects people's normal travel but also causes great resistance to social development and the environment. Delays, excessive fuel consumption, and higher vehicle emissions caused by traffic congestion are the deep-seated effects of traffic congestion, which have caused huge economic losses to the transportation system.

4. Countermeasures for Improving Urban Ecological Environment Governance Capacity and Urban Resilient Traffic Construction

4.1. The Urban Development Planning Is Scientific and Reasonable. For cities, coordinated development is very important. If there is a large gap in the economic level of regional development of a city, there will be great differences in its ecological construction; At the same time, there will be some differences between urban ecological construction and township ecological construction. The existence of these differences will mean that urban green construction cannot be carried out uniformly, and it is difficult to form an urban ecological circular economy. Based on this, urban development planning should reflect scientificity and rationality, adjust the ecological plan against the background of economy and society, focus on solving the problem of inconsistency in urban planning, and carry out ecological construction in different areas; At the same time, fully combine the central top-level design and the specific practice of the city, and integrate the ecological environment governance into all aspects of social construction based on the SWOT analysis framework. The SWOT analysis framework is shown in Figure 6. SWOT analysis is a method to systematically evaluate the various factors, so as to select the best business strategy. Therefore, SWOT analysis is actually a way to synthesize and summarize all aspects of the internal and external conditions of an enterprise, analyze its advantages and disadvantages, opportunities and threats, and then help enterprises to make strategic choices.

4.2. Improve Laws and Regulations on Urban Ecological Environment Governance. In order to pursue economic interests, some industrial enterprises have not attached great importance to the specific requirements of ecological construction. Although the cities have taken regulatory measures and investigated them one by one, it is difficult to avoid omissions. Based on this, the legal and regulatory system of urban ecological environment governance should be further improved. Taking Shaanxi Province as an example, by 2019, the province had issued 23 environmental protection standards, including the emission control standard of volatile organic compounds, the comprehensive sewage discharge standard of the Yellow River Basin in Shaanxi Province, the emission standard of air pollutants for key industries in Guanzhong area, the emission standard of air pollutants for boilers, and the emission standard of water pollutants for rural living sewage treatment facilities, including nine pollutant emission (control) standards.

4.3. Pay Attention to the Development of Green Travel Mode. Ecological transportation emphasizes the low-carbon, ecological, and green environmental protection of travel mode, which needs to meet the harmonious development of nature, economy, and society. Therefore, urban traffic construction must focus on green development, uphold the concept of sustainability, and reduce the negative impact on the environment, such as exhaust emission and noise pollution, on the basis of meeting people's travel needs. At the same time, when carrying out transportation planning and construction, we must realize that land resources are limited, reasonably plan urban land and adjust measures to local conditions. Eco city transportation needs to actively develop and use new energy vehicles, such as trams, taxis, and electric buses, encourage and guide people to use new energy vehicles, and improve charging piles and other facilities. Using new energy vehicles as the main body instead of motorized travel mode is conducive to reducing air pollution, saving resources, and promoting the development of sustainable transportation. Table 3 shows the potential for energy conservation and emission reduction in cities.

4.4. Building a Green and Resilient Transportation System. To build a transportation system with public transport as the main body and establish a perfect public transport system, we should strive to form a functional level perfect urban public transport structure system with public transport as the framework, conventional public transport as the basis, and various modes as the supplement, and improve the public transport service facility system. On the other hand, public transport stations should do a good job in the slow connection channel, solve the transfer problem to the greatest extent, improve the service level and attractiveness of public transport, and reduce the travel distance of residents. Finally, it is necessary to appropriately increase or reduce the departure frequency and the number of buses according to the traffic travel needs of different periods and regions and set the phase of bus lanes and special signals to ensure bus priority and improve the efficiency of public transport.

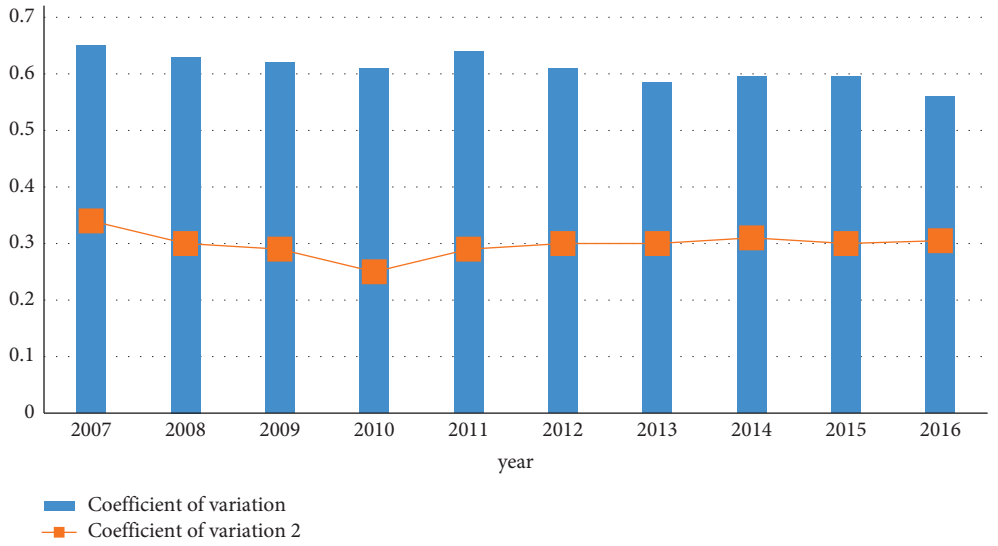

Figure 5: Average and coefficient of variation of national urban traffic efficiency.

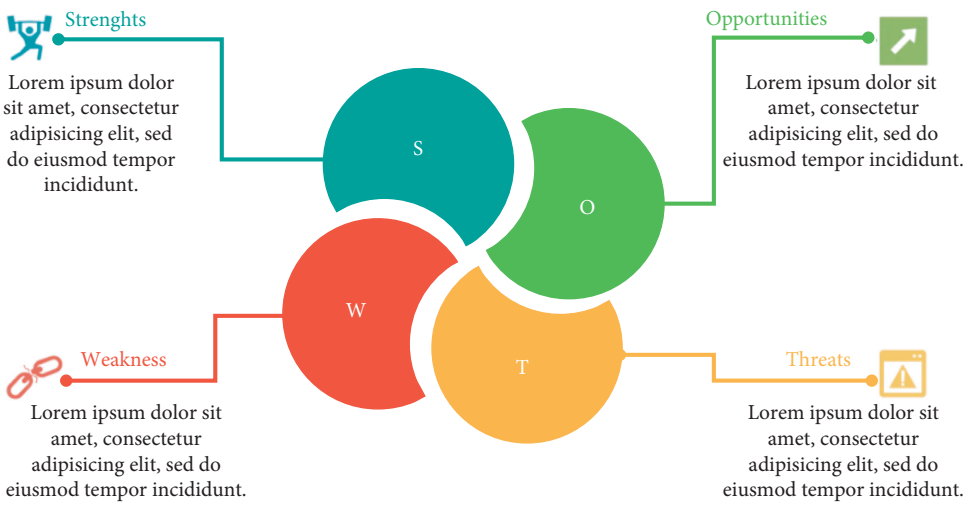

Figure 6: SWOT analysis framework diagram.

Table 3: Energy conservation and emission reduction potential in all cities of China.

City	Energy saving potential	Emission reduction potential
Beijing	0.26	0.65
Tianjin	0.14	0.22
Shijiazhuang	0.21	0.27
Taiyuan	0.11	0.18
Hohhot	0.15	0.2
Shenyang	0.19	0.4
Changchun	0.12	0.28
Harbin	0.09	0.15
Shanghai	0.35	0.52
Nanjing	0.12	0.39
Hangzhou	0.03	0.28
Hefei	0.01	0.27
Fuzhou	0.08	0.11

Table 3: Continued.

City	Energy saving potential	Emission reduction potential
Nanchang	0.11	0.25
Jinan	0.13	0.52
Zhengzhou	0.25	0.34
Wuhan	0.04	0.21
Changsha	0.03	0.19
Guangzhou	0.19	0.53
Nanning	0.08	0.18
Haikou	0.02	0.17
Chongqing	0.05	0.13

5. Conclusion

The construction and rapid development of resilient urban transportation promote the rapid development of urbanization, which not only facilitates people's travel but also better promotes communication between cities as a link connecting various urban districts. However, with the rapid development of urbanization, there is a contradiction between people's demand for high-quality life and the limitation of urban resources. The traditional demand-oriented development model has been unable to meet the severe traffic problems. The disorderly development within the city makes the coordinated development of the region difficult and slow, which runs counter to the requirements of green development and the construction of a beautiful China. Based on the demand for ecological environment governance, this study analyzes the current situation and reasons for urban ecological environment governance in China and the problems existing in the construction of urban resilient transportation in China. Based on this, this study puts forward the countermeasures to optimize the urban ecological environment governance mode and build the urban resilient transportation system. This study has important reference significance for promoting the sustainable development of green transportation and urban transportation.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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Retraction

Retracted: Synergistic Effect Analysis of Ecological Protection and Environmental Law and Ecological Civil Code

Journal of Environmental and Public Health

Received 20 June 2023; Accepted 20 June 2023; Published 21 June 2023

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.

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[1] L. Zeng and S. Zhang, "Synergistic Effect Analysis of Ecological Protection and Environmental Law and Ecological Civil Code," *Journal of Environmental and Public Health*, vol. 2022, Article ID 9631782, 11 pages, 2022.

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Journal of Environmental and Public Health
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Research Article

Synergistic Effect Analysis of Ecological Protection and Environmental Law and Ecological Civil Code

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Academic Editor: Wen Zeng

In order to further curb the damage to the ecological environment from the perspective of legal synergistic supervision, a synergistic analysis method between the ecological protection environmental law and the ecological Civil Code is proposed. Coordinated supervision, with the new Civil Code as the research background, from the perspective of interpretation, explores the solution to the problem of "ecological environmental damage" in the newly promulgated Civil Code for behavior that damages the ecological environment. The research results believe that, from the perspective of rights, environmental rights should be regarded as the concentrated expression of rights in the sense of private law in the ecological environment law. Article 1234 of the Tort Liability Section stipulates that "the state-specified agency or the law-specified organization" as the representative of environmental public interests proposes damage. The request resolves the legitimacy of relevant agencies and organizations as civil subjects to represent environmental public interests. Finally, it clearly stipulates the responsibility for ecological restoration, expands the way of undertaking tort liability caused by environmental damage, and solves the problem that it was limited to "restoration" in the past and could not be actually performed.

1. Introduction

The promulgation of the Civil Code can be said to be a milestone event in the process of China's legalization in the new era. The promulgation of this code also truly marks that China's civil law has entered a new stage of development. From the general legal concept, civil law is different from other laws, its status is relatively high, and it is even called "the source of all laws." China's Civil Code will inevitably have a greater impact on other legal-related fields [1]. At the same time, at the current stage, ecological environmental protection is a cause that China is vigorously developing. In the process of vigorously promoting the construction of ecological civilization, the promulgation and implementation of the Civil Code has a great impact on the theoretical and practical implementation of laws related to the important ecological environment impact. Relevant issues were mentioned in the General Provisions of Civil Law issued in 2017, and the academic circles regard it as the beginning of the compilation of the Civil Code. Ecological research and ecological civilization construction have laid a solid foundation, and the newly promulgated Civil Code also clarifies ecological protection and "green principles," which fully reflects the Civil Code for China's ecological civilization, systematic response, and determination for construction and ecological protection. This article is based on this background and discusses the synergy between the two from the perspective of the Ecological Environmental Protection Law and the Civil Code, as shown in Figure 1 [2].

2. Literature Review

Huang et al. found the path of ecological environment damage relief. There are currently three theoretical classifications in the academic world: one is the theory of civil law regulation, the second is the theory of dual regulation of civil law and environmental law, and the third is the theory of environmental law regulation [3]. In comparison, Hamid

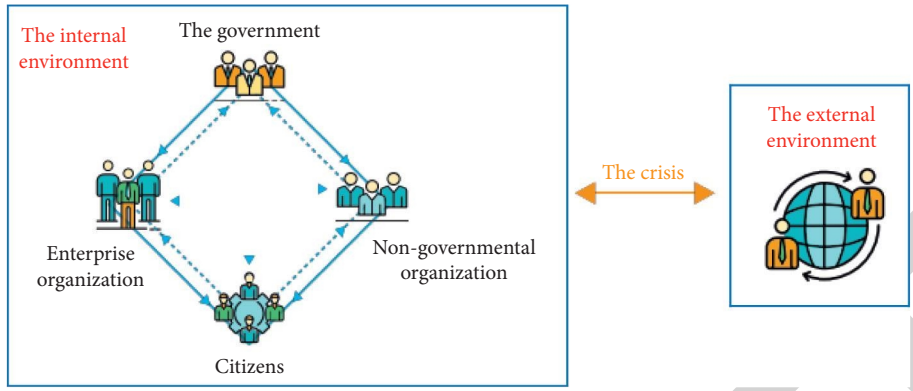

Figure 1: Public crisis collaborative governance system.

et al. who hold the first two views have recognized that the civil tort liability system before the revision of the Civil Code has many deficiencies in dealing with damage to the ecological environment. Different methods and paths have been proposed to damage the deficiencies of legal regulation [4]. However, scholars such as Robinson who discovered the regulatory path of environmental law put forward a diametrically opposite view with the regulatory path of civil law. Based on the standard of civil law and environmental law, they believe that to maximize the relief of damage to the ecological environment, it is necessary to combine environmental law and civil law. The theorists of civil law regulation try to remedy the damage to the ecological environment by improving the Tort Liability Section of the Civil Code and taking the path of private law that is the traditional legal framework and logic [5]. However, Melnykova and Hradoboyeva found that scholars trying to achieve ecological damage relief by this approach were divided. Some scholars try to break through the existing legal logic and the traditional subject-object dichotomy. From the perspective of subject-object monism, some scholars hope to use a single civil law regulation method on this theoretical basis to compensate for the damage to the ecological environment [6]. Murshed et al. believe that this approach has had a subversive impact on the existing legal logic and system of civil law [7]. Bildirici et al. believe that some scholars also hold this view, but different from the aforementioned subversive methods, the scholar is more moderate and only wants to expand the content of civil law, so as to realize the direct relief of ecological environment damage by civil law [8]. Jiang et al. said, for example, that they hope to directly define land, mineral deposits, and other asset-type elements as the object of real rights, and when these elements are damaged, some ecological and environmental interests stipulated by the law can be realized through the compilation of civil law property rights or tort liability [9]. R. Arundati, H. T. Sutiono, and I. A. Suryono found that establishing a private law-led ecological environment damage relief mechanism coincided with the state ownership in private law [10]. Gangwar et al. found that there are also many advocates of dual regulation by environmental law and civil law. For example, it is believed that the damage to the ecological environment is different from the damage of private interests such as personal and property regulated in the tort liability system of the civil law. This kind of damage of private interests is essentially in conflict with the public welfare and social nature of the ecological environment. As a result, the two cannot be fully integrated in regulating ecological environmental damage [11]. Liao and Henneberg believe that it is precisely because of this that the civil tort liability system is indeed insufficient in relieving ecological and environmental damage, and it is necessary to "go beyond the concept and wisdom of civil law" to find relief methods from environmental law, and the two should work together to govern [12].

3. Private Law Remedies for Damage in the Ecological Environment

3.1. The Distinction between Ecological Damage and Traditional Damage. First of all, it is necessary to clarify the relationship between ecological environment damage and traditional personal and property damage. Starting from the definition of the environment in Article 2 of the Environmental Protection Law, air, water, and oceans in the listed environmental elements are used as samples for analysis. The details are shown in Table 1.

To sum up, different from traditional personal and property damage, ecological environment damage can be considered as damage caused by the impact on the ecological environment itself, specifically referring to the damage to the ecological environment itself, which is side by side with personal damage and property damage [13]. The ecological environment pollution damage includes four aspects, as shown in Figure 2.

The specific performance is shown in Table 2.

The confirmation of personal injury is divided into two types (see Figure 3), and the specific performance is shown in Table 3.

3.2. Type Analysis and Remedy Ways of Ecological Environment Damage. Ecological environmental damage includes damage to environmental elements and damage to ecosystem functions, but from the perspective of analyzing ecological environmental damage, environmental pollution

Table 1: Definition of "damage" in the separate law on environmental protection.

Environmental Protection Single Act	Clause	Specific contents
Air Pollution Prevention And Control Law (2018 Amendment)	Article 125	If the discharge of air pollutants causes damage, it shall bear tort liability according to law.
Water Pollution Prevention and Control Law	Article 102	Water pollution refers to the change of chemical, physical, biological, or radiological characteristics of water body due to the intervention of certain substances, thereby affecting the effective use of water, endangering human health or destroying the ecological environment, resulting in the deterioration of water quality.
Marine Environmental Protection Law	Article 94	Marine environmental pollution damage refers to the direct or indirect introduction of substances or energy into the marine environment, resulting in harmful effects such as damage to marine biological resources, harm to human health, damage to fisheries, and other legal activities at sea, damage to the quality of seawater use, and impairment of environmental quality.

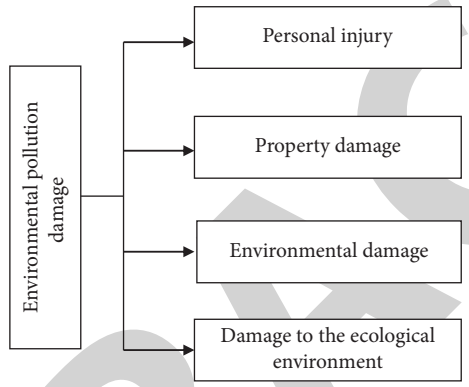

Figure 2: Types of ecological environment pollution damage.

Table 2: The specific performance of ecological environment pollution damage.

Type	Environmental damage	Personal injury	Property damage	Damage to the ecological environment
Specific performance	An observable or measurable adverse change in human health, property value, or the ecological environment and its ecosystem services due to environmental pollution or ecological damage	Violation of human life, health, or body due to environmental pollution, resulting in human disease, disability, death, or observable or measurable adverse changes in mental state	Property damage or reduction in value directly caused by environmental pollution or ecological damage, as well as necessary and reasonable expenses to protect property from loss	Observable or measurable adverse changes in the physical, chemical, or biological properties of the ecological environment, as well as disruption or impairment of the ability to provide ecosystem services, as a result of direct or indirect digging of the environment by polluting the environment or destroying it

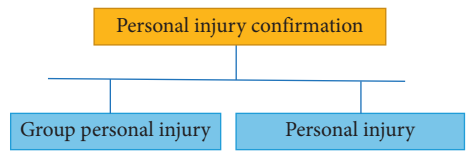

Figure 3: Types of personal injury confirmation.

Table 3: Specific manifestations of personal injury.

Type	Personal injury confirmation	Group personal injury confirmation
Specific performance	Individuals who died: those who were clearly diagnosed as disabled in accordance with the "Standards for the Identification of the Degree of Injury and Disability in the Human Body" specific or severe nonspecific clinical symptoms or signs, abnormal biochemical indicators, or physical examination results were found in clinical examinations and were diagnosed according to the "diseases and related health problems." The International Statistical Classification (ICD-10) clearly diagnoses one or more diseases; although it is not determined as death, disability, or disease, clinical measures must be taken to prevent irreversible organic or functional damage to the human body (treatment or behavioral intervention).	Epidemiological surveys show that there are significant differences between the surveyed population and the control population in disease frequency (such as morbidity and mortality), physiological and biochemical indicators, or clinical physical examination results: spatial analysis shows that the surveyed population disease frequency (such as disease, death, death, and disability) aggregates in significant space.

and ecological destruction generally cause three types of personal injury, property damage, and ecological environment damage. The types of damage to the ecological environment can be specifically divided into two types: one is the damage only in the ecological environment itself, that is, pure ecological environmental damage; the other is in addition to personal and property damage, plus damage to the ecological environment itself (Figure 4).

On this basis, combined with "environmental pollution and ecological damage caused by human activities, thereby causing damage to other people's property or physical health," Figure 5 is constructed on the basis of Figure 4 to analyze the consequences of environmental pollution and ecological damage and then pave the way for the research on how to obtain timely and efficient relief for ecological environmental damage in the second type below [14, 15].

Combined with the analysis in Figure 5, generally speaking, on the premise that environmental criminal responsibility is not constituted, among the personal and property damage and ecological environment damage caused by polluting the environment and destroying the ecology, the personal and property damage is subject to environmental civil private interest litigation (that is Environmental Tort Litigation) and the relief of ecological environmental damage belongs to the category of environmental public interest litigation and ecological environmental damage compensation litigation (see Table 4) [16, 17].

3.3. Legislative Analysis of Private Law Remedies for Ecological and Environmental Damage. The Civil Code Tort Liability Section includes ecological environmental damage into the tort liability system. Therefore, it is necessary to conduct a comprehensive analysis with the help of the development and changes of the relevant provisions in the Tort Liability Section. The article on environmental infringement in the draft is the object (Figure 6) for research [18, 19].

Looking at Figure 6, it can be found that although the provisions on environmental torts in the various stages of the Tort Liability Law refer to "pollution of the environment" and do not include "destruction of the ecology," however, in the original civil law (draft) in the first review draft of the Tort Liability Law in Volume 8,"infringing the person and property of others" and "causing damage to others" gradually expanded into "causing damage," which means the scope of damage caused by environmental torts. It is not only limited to personal and property damage, but also leaves room for the relief of ecological environment damage.

3.4. Practical Exploration of Private Law Remedies for Ecological and Environmental Damage. Further analysis is made by searching for cases in the intersection of civil law and environmental law on how to use the adjustment method of civil law and environmental law to solve environmental disputes, using the advanced search function of "Judgment Documents Network" to "Cause of Action: Civil" "Case Type: Civil," "Trial Procedure: Civil First Instance," "Legal Basis: Article 65 of the Tort Liability Law" "Judgment Date: 2015-01-01 to 2021-01-01" and "Document Type: Judgment" are the search elements. A total of 2,008 environmental civil litigation cases were found, including 112 cases with "restitution to the original state" as the keyword (including 4 cases in 2015, 11 cases in 2016, 26 cases in 2017, 20 cases in 2018, 20 cases in 2019, and 41 cases and 10 cases in 2020), to study the types of judgment results in 88 cases in which the court upheld the judgment in 112 cases [20, 21] (Figure 7 was made according to the type of verdict in the case studied).

According to the analysis of the statistical results, in environmental civil litigation cases, the court has evolved the application of "restoration to the original state" in the judgment of the plaintiff's application for relief of ecological environmental damage and flexibly applied the concept of restoration to solve ecological and environmental problems and is committed to fundamentally solve ecological and environmental problems, refine the way of assuming responsibility for environmental pollution and ecological damage in individual cases, and flexibly adjust the way of responsibility for ecological restoration, so that the way of assuming restorative responsibility plays an actual role in environmental infringement and produces obvious benefits. In the judicial practice of environmental infringement in China, more attention should be paid to the relief of the damaged ecological environment.

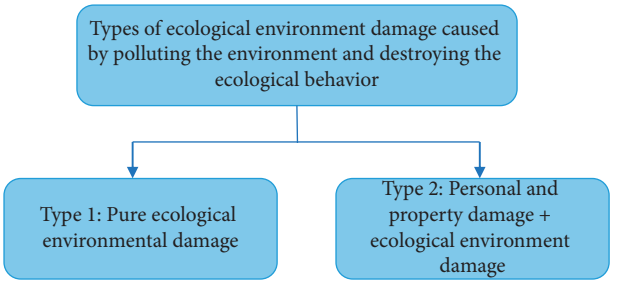

Figure 4: Two types of ecological environment damage consequences caused by environmental pollution and ecological destruction.

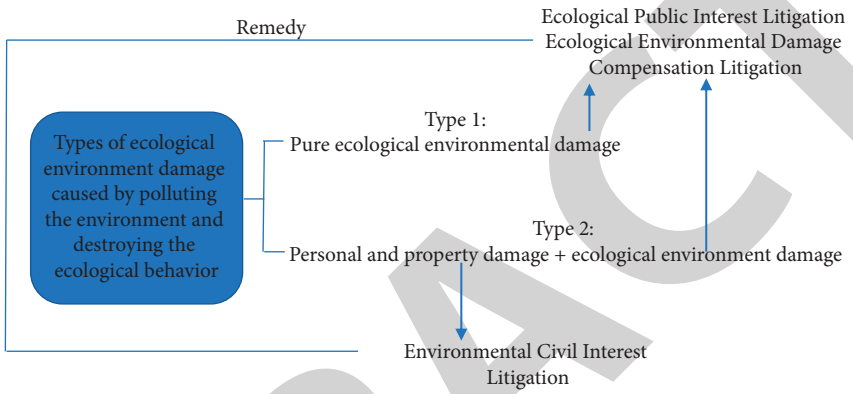

Figure 5: Relief ways for the damage caused by polluting the environment and destroying the ecology.

Table 4: Comparison of types of relief approaches for ecological damage.

Type comparison	Environmental public interest litigation		Environmental damage compensation lawsuit	Environmental criminal procedure
	Civil public interest litigation	Administrative public interest litigation		
Conditions for filing a lawsuit	Behaviors that pollute the environment, damage the ecology, and damage public interests of the society	Administrative organs with supervisory and management positions in the fields of ecological environment and resource protection illegally exercise their powers or fail to act, resulting in infringement of national interests or social public interests	Large, major, or particularly major environmental emergencies that seriously affect the consequences of damage to the ecological environment, and no agreement has been reached or cannot be negotiated after consultation	Those who pollute the environment and destroy the ecology constitute a crime
Subject of litigation	Statutory authority social organization procuratorate	Procuratorate	Landlords, people's government, and administrative organs	Procuratorate
Correspondence basis	Environmental protection law code of civil procedure judicial interpretation of environmental civil public interest litigation	Administrative procedure law	Several provisions of the supreme people's court on trial of compensation cases for ecological environmental damage (trial)	Environmental protection law criminal law judicial interpretation of criminal cases of environmental pollution

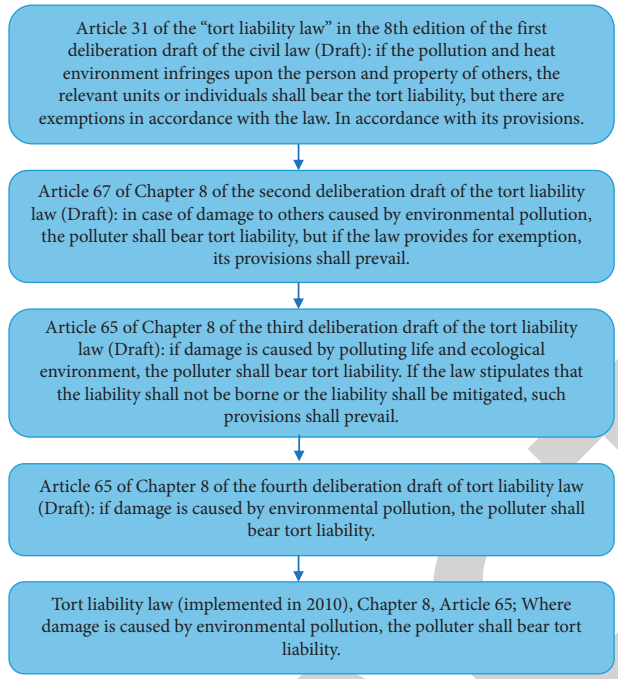

Figure 6: Statements about environmental torts in the various stages of the introduction of the Tort Liability Law.

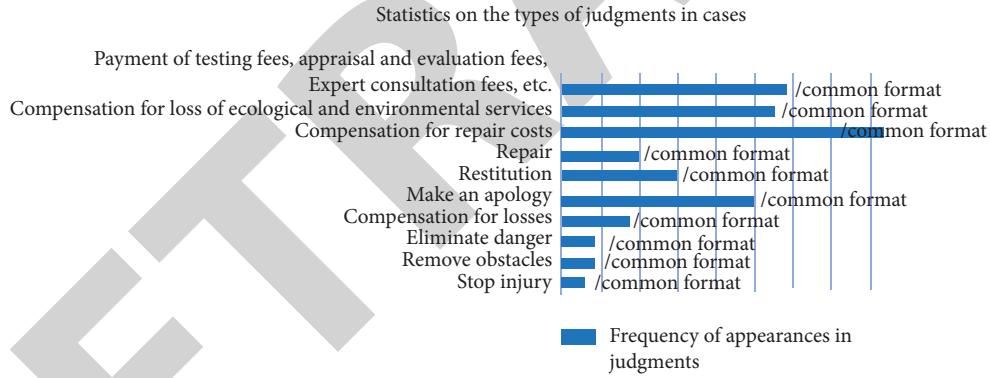

Figure 7: Types of verdicts in cases in which the court upheld the request.

3.5. Reinforcement and Adjustment of Private Law Remedies for Ecological and Environmental Damage

3.5.1. Give Specific Private Parties the Right to Request Restoration Responsibility. The details are shown in Table 5.

Although most of the claims were not supported in the judgments, 11.61% of the 112 environmental civil cases shown in the table above also supported the claims of private parties for relief of ecological and environmental damage, which reflects from the side that it is feasible for the private subject to realize the relief of ecological environment damage in the private law system, so the private subject can become the subject of the right to claim for relief of the ecological environment damage to the public interest in the second type.

In addition, a comparative analysis is made on the subjects who have the right to request relief for ecological and environmental damage stipulated in the relevant laws. Article 551 of the Civil Procedure Law stipulates that "legal organs, organizations, and procuratorates" have the right to initiate lawsuits, and Article 582 of the Environmental Protection Law has made a corresponding limit to the "organization" in the Civil Procedure Law. In coordination with the Civil Procedure Law, some separate laws on environmental protection have also made the following provisions (see Table 6).

Comprehensive analysis of the above table shows that the Water Pollution Prevention and Control Law stipulates that the "representatives of the parties" who have suffered damage shall file a lawsuit, which means that the competent environmental protection department and social groups are not allowed to file a lawsuit. The Law on the Prevention and Control of Air Pollution does not clearly stipulate who has the right to file a lawsuit but only stipulates that those who

Table 5: Subjects of "restoration" claims in 112 environmental civil cases unit/case.

Types of subject matter of "reinstatement" claims	Court upholds verdict	Court does not uphold judgment
Villagers group	3	0
Natural person	8	20
Farmers' professional cooperative	1	0
Corporate	0	2
State-owned forest farm	1	0
Environmental protection organization	20	1
Prosecutor's office	55	1

Table 6: Subjects requesting relief for ecological and environmental damage in the separate law on environmental protection.

Environmental Protection Single Act	Water Pollution Prevention and Control Law	Air Pollution Prevention and Control Law	Soil Pollution Prevention and Control Law	Solid Waste Pollution Prevention and Control Law	Marine Environmental Protection Law	Noise Pollution Prevention and Control Law
Clause	Article 99	Article 125	Article 96 (3) and Article 97	Article 121 and Article 122	Article 89 (2)	Article 61
Request body	Elected representative	Unspecified	Party; relevant agencies and organizations	Relevant agencies and organizations; local people's government or its designated departments, institutions, and organizations	The part that exercises the right to supervise and manage the marine environment	Units and individuals

pollute the air and cause damage should bear tort liability; the Soil Pollution Prevention Law stipulates that "parties" and "relevant organs and organizations" can file lawsuits.

Inevitably, the public nature of the ecological environment determines that civil disputes over environmental infringement and public welfare are inextricably linked, that is, a mixture of public interest and private interest. In the second type of damage, private interest and public interest lawsuits are accompanied with partial relief of private interest lawsuits (such as cessation of infringement, removal of obstacles, and elimination of danger). Initiating public interest lawsuits and private interest lawsuits may lead to multiple prosecutions, repeated prosecutions, and repeated evidence production for damage to environmental pollution and ecological damage, which is not conducive to improving the economy and efficiency of litigation. Therefore, when relieving the ecological environment damage in the second type, the private subjects who have an interest in the ecological environment damage in the second type can be eligible to file an environmental civil lawsuit together to remedy the ecological environment damage (see Figure 8), which will help to improve the efficiency of relief for damage to the ecological environment.

The conflict between the new Judicial Interpretation on Environmental Tort Liability Disputes (revised in 2020) and the Civil Code Tort Liability Series regarding the right of private entities to request restoration liability cannot be ignored. The "infringed person" in "the infringed person requests to restore the ecological environment" in the first paragraph of Article 14 of the Judicial Interpretation of Environmental Tort Liability Disputes (revised in 2020) is interpreted in a narrow sense, and it is framed as the same as the second one. In the scope of the infringed persons related to the damage to the ecological environment in the type, they are given the right to request for restoration responsibility in Article 1234 of the Civil Code, so as to use the power of private subjects to provide timely and effective relief protection for environmental damage of the second type.

4. Synergy between Environmental Law and Ecological Civil Code

4.1. The Ecological Orientation of the Civil Code. In the process of ecological expansion in the traditional legal field, the ecologicalization of civil law is a matter of great concern. As mentioned above, the essence of ecologicalization in the traditional legal field is to revise the established legal values and functions to a certain extent, so as to partially introduce and accept ecological interest demands. When it comes to the ecologicalization of civil law, the first thing that needs to be clarified is whether the traditional civil law concepts and systems are compatible with the demands of ecological interests and in what direction to carry out its own ecological expansion and transformation. On the whole, "Civil and commercial law emphasizes making the best use of things, which is a choice for maximizing benefits, in fact, a choice for maximizing profits, and a choice for the utilitarian principle of efficiency." ① The basic characteristics of ecological interests are mainly nonutilitarian, multilevel, and beneficial symbiosis. ② If we compare and analyze the basic positioning of traditional civil law and the basic characteristics of ecological interest demands, we can see that there

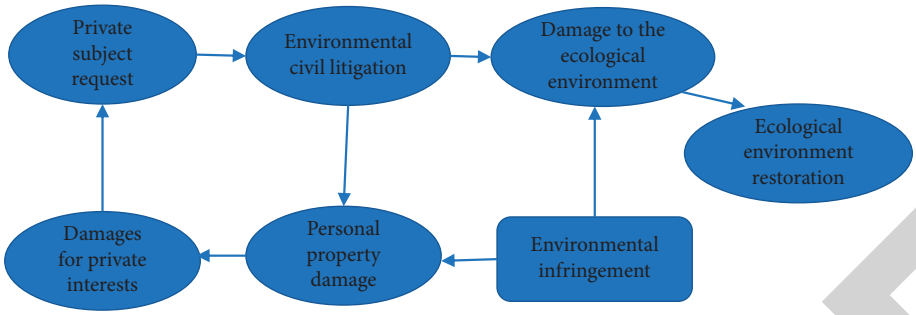

Figure 8: The second type of damage relief.

are obvious differences in orientation between the two, but there is also the possibility of mutual compatibility. The symbiotic characteristics of ecological interests can be roughly interpreted from two aspects, namely the symbiosis of ecological interests and economic interests, and the symbiosis of individual interests and public interests [22, 23]. ③ It is not difficult to see from the complex interest structure contained in the demands of ecological interests that it is feasible for civil law to adjust itself in part and to introduce and accept ecological interests. First of all, economic interests and individual interests have always been the core categories of civil law, and the realization of ecological interest demands requires the coordination of conflicts between different types of interests in a complex interest pattern in which economic interests and ecological interests coexist and individual interests and social interests coexist. To ensure the realization of ecological interests within a certain limit. In the process of interest coordination, civil law, as the most important legal expression of economic interests and individual interests, needs to respond to the institutional needs of interest coordination and introduce ecological interests and public interests as external considerations for the protection and realization of economic and individual interests. Secondly, with the development and changes of the times, the values of traditional civil law are constantly being partially revised. Among them, the socialization of civil law is an irreversible trend. "The so-called socialized legal system since the 20th century is to correct the bias of the 19th century legislation that over-emphasized individuals and rights and ignored social interests. Its basic starting point has not been separated from the concept of individuals and rights. looking at the future trend of civil law, only in the seek for the reconciliation between individuals and society." ④ From the perspective of development trends, civil law has rich connotations for the reconciliation of individuals and society, and its focus is on the conflict and coordination of individual interests and public interests. Civil law introduces ecological interests in some parts and acceptance conforming to the socialization development trend of civil law.

On the basis of demonstrating the feasibility of the ecologicalization of civil law, it is necessary to further clarify the main orientation of the ecologicalization of civil law. In a nutshell, the biggest difference between the basic orientation of civil law and the institutional demands of ecological interests is that civil law is obviously utilitarian, while the most basic feature of ecological interests is nonutility. Therefore, the main orientation of the ecologicalization of civil law should be determined as a nonutilitarian transformation in a specific field. Specifically, the partial non-utilitarian transformation of civil law should take the following four areas as priority areas of action.

First, the types of civil interests are expanded. When it comes to civil interests, the traditional concept of civil law mainly refers to individual private interests. With the development of the times and the prominence of environmental problems, public interests related to environmental protection gradually occupy a place in the civil field. How to determine civil attributes, how to determine the representation of public interests in the civil context, and how to design relief methods should all be given full attention in the process of ecologicalization of civil law.

Second, the necessary restrictions on civil rights should be considered. In the context of traditional civil law, rights mean advocating freedom, encouraging competition, and pursuing maximization of interests. The externalities involved in the emphasis on rights in traditional civil law are closely related to the emergence of environmental problems in the modern sense. Therefore, from the perspective of environmental protection, it is necessary to impose necessary restrictions on the exercise of civil rights to balance the relationship between individual freedom and environmental protection. Third, the scope of civil rights and interests is expanded. The traditional civil law is based on the word "profit" and is implemented in the protection of civil rights and interests, mainly focusing on the material level, while the specific content of the ecological interest appeals formed by civil subjects based on environmental issues involves property, life safety, physical health, etc. In addition to material content, there are also clear spiritual needs, such as the need for a good and suitable environment [24, 25]. The scope of protection of civil rights and interests needs to be expanded accordingly, which is in line with the multilevel nature of ecological interests. Fourth, timely adjust the orientation of civil liability and the way of undertaking it. In traditional civil law, whether there is liability for breach of contract or tort, the principle is actual compensation, and the main method is the direct performance of the person responsible. This is based on the fact that traditional civil damage can be fully quantified. The ecological damage

involved in environmental problems has the characteristics of uncertainty, long-term, and professionalism, and it is difficult to quantify and perform responsibilities. The original actual compensation and direct performance of civil liability are often difficult to achieve. The timely adjustment of the orientation of civil liability and the way of undertaking it should become the key issue of the ecological practice of civil law.

4.2. The Related Provisions of the Ecological Civil Code and the Environmental Law. First, we have the "Green Principles" in the general provisions and the relevant provisions on environmental protection obligations in the subsections. Article 9 of the General Provisions of the Civil Code stipulates that "civil subjects engaged in civil activities shall be conducive to saving resources and protecting the ecological environment." This provision is called the "green principle" and is a normative design for the ecological program of the Civil Code. The introduction of the "green principle" is an important innovation of China's Civil Code, and it is the response of the civil law rule system to the current prominent environmental problems. ① The "green principle," as a programmatic requirement for ecologicalization in the Civil Code, will play an important leading role in the establishment of basic concepts of ecologicalization and the setting of obligations related to environmental protection. From the perspective of basic legal concepts, the "green principle" declares the acceptance and implementation of ecological expansion in the Civil Code and provides a clear principle basis for the systematic interpretation of the application of environmental protection norms in the Civil Code, ensuring the consistency of the internal logic and orientation of norm application in the ecological background of Civil Code. In addition, the "Green Principles" also put forward general requirements for the setting of relevant environmental protection obligations in other subsections of the Civil Code. As mentioned above, balancing the relationship between individual freedom and environmental public interests through the necessary restrictions on civil rights is one of the important orientations of the ecologicalization of civil law. In addition to its declarative function, the more important function of the "green principle" is to "set environmental protection obligations for civil legal acts by establishing the concept of ecological environmental protection," and the establishment of environmental protection obligations is necessary for the exercise of civil rights. ② The setting of environmental protection obligations necessarily restricts the exercise of civil rights to achieve the goal of environmental protection. On the basis of the general requirements set by the "Green Principles" for the environmental protection obligations of the Civil Code, other subdivisions have also made corresponding institutional arrangements, including the obligatory requirements for the owners of the owners' buildings in the property rights department (Article 286), the obligatory provisions for the construction of buildings (Article 293) in the adjacent relationship part, the obligatory provisions for the owners of real estate rights (Article 294), the obligatory requirements for the establishment of usufructuary rights in the usufructuary part (Article 346), the obligatory provisions on the exercise of the rights of the usufructuary (Article 326), the obligatory provisions on the performance of the contract in the contract (Article 509), etc.

Second, we have the relevant provisions of personality rights. In addition to clearly enumerating some personality rights that already have a typological basis in Article 990, paragraph 1 and making special chapters later, Article 990, paragraph 2, also includes specific personality rights. The protection of personality rights and interests makes a general provision: "In addition to the personality rights stipulated in the preceding paragraph, natural persons enjoy other personality rights and interests based on personal freedom and personal dignity." This provision is of great significance to reflect the ecological expansion of the Civil Code. Personality interests in the legal context are based on people's ethical values and are the concentrated expression of "the reason why people are people." People's ethical values have different needs and interpretations at different stages of social development. The basic social contradiction in China has been transformed into a contradiction between the people's ever-growing needs for a better life and unbalanced and inadequate development, which means that the people's demands for the rule of law, fairness, justice, security, environment, etc. are growing day by day. We hope The protection of rights is more adequate and effective, and the rights demands formed based on the environment must be included. Therefore, the general provisions on the protection of personality rights and interests formed "based on personal freedom and personal dignity" in the Personality Rights of the Civil Code provide an invaluable help in identifying and confirming basic environmental rights and interests in the context of environmental law from the attributes of personality rights. The premise that is missing is an important opportunity to confirm and shape the attributes of environmental rights.

Third, the tort liability is set out in a special chapter on liability for environmental pollution and ecological damage. In the process of compiling the Civil Code, how to reflect the need for environmental damage relief in the tort liability part has always been the focus of legislative departments and academic circles. As far as the relevant content of the Tort Liability Section of the Civil Code is concerned, a relatively sufficient response to this issue has been made. The Tort Liability Section stipulates a special chapter on "Liability for Environmental Pollution and Ecological Destruction," which clearly reflects the ecological orientation of civil law in at least the following aspects: first, the civilization of environmental public interests. The damage caused by environmental pollution and ecological damage is mainly reflected in the infringement of environmental public interests, and the damage liability is included in the category of tort liability, which indirectly confirms the civil nature of environmental public interests. The establishment of this premise lays a legitimate foundation for the formation of civil legal mechanisms related to environmental public interest protection and relief and also provides an important opportunity for the formation of private law logic in environmental law. Second, the "Liability for Ecological

Damage" and "Liability for Environmental Pollution" are juxtaposed, expanding the types and scope of civil liability for environmental damage. Thirdly, confirm the civil subject status of environmental public interest representatives. Article 1234 of the Tort Liability Section stipulates that "organizations prescribed by the state or organizations prescribed by law" make claims for damages as representatives of environmental public interests, which solves the question of the legitimacy of relevant organs and organizations as civil subjects to represent environmental public interests. Finally, it clearly stipulates the responsibility for ecological restoration, expands the way of undertaking tort liability caused by environmental damage, and solves the problem that it was limited to "restoration" in the past and could not be actually performed.

5. Conclusion

The transformation and adjustment trend of the traditional legal field to deal with environmental problems in the modern sense can be summarized as "ecologicalization." From the perspective of the relevant content of the Civil Code, it systematically reflects the theoretical assumption of the ecologicalization of civil law. The ecological Civil Code makes it possible to synergize the environmental law with the Civil Code. In order to achieve the goal of synergy with the Civil Code, the environmental law must awaken its own inherent logic of private law and clarify its basic aspects at the levels of rights, obligations, and responsibilities. Through the coordination of environmental law and related legal fields, a systematic and holistic legal system design to respond to the legal needs of environmental issues will become an important trend in the evolution and development of the law in the context of ecological civilization as a whole, development, and cooperative response to environmental law. The General Provisions of the Civil Code and other relevant editions have made systematic institutional arrangements on issues related to environmental protection, which systematically reflect the basic orientation of the ecological Civil Code, which is an important innovation of China's Civil Code. The ecological Civil Code has laid the concept and rule foundation for the coordination of environmental law and Civil Code. On this basis, environmental law should respond in a timely manner. The rediscovery of the logic of private law in environmental law is the basic foothold for the conformity of environmental law and the ecological Civil Code. The research on the logical deduction of private law in environmental law should be based on the basic orientation and rule design of the Civil Code ecologicalization and based on the unique value orientation of environmental law itself; the rights and obligations in the sense of private law in environmental law should be considered. It analyzes and interprets its responsibilities and forms a complementary and cooperative relationship with the legal norms that carry the ecological mission in the Civil Code, so as to jointly promote the realization of the synergistic goal of environmental law and the Civil Code.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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