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Research Article

Analysis of Modern Public Art Design Integrating Traditional Elements under Interactive Technology

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In order to give full play to the carrier role of modern public art design and inherit the traditional elements whose vitality is gradually losing, this paper analyzes the modern public art design integrating the traditional elements under the interactive technology. Firstly, it analyzes the origin of modern public art design, which is manifested in the rational product of science and technology and the materialized form of cultural aesthetics. Then, it analyzes the current development situation of blindly seeking internationalization, over-reliance on modern tools, and insufficient design education level, and discusses the classification of modern public art integrating traditional elements and the inheritance problems it faces; under the interactive technology, the traditional elements and features are transmitted imperceptibly through a variety of carrier forms to realize the modern public art design integrating the traditional elements. The experimental results show that the resource utilization and benefit of modern public art are increasing exponentially year by year. With the increase of government investment in modern public art design activities, the complete contour map can be obtained by extracting the marked points.

1. Introduction

In the thousands of years of civilization construction of the Chinese nation, many valuable material and intangible cultures have been developed and inherited [1, 2]. Modern public art with traditional elements is a material culture created and shared by groups in a long life. It is not only a modern public art culture with high comprehensive value, but also a traditional folk culture with many ideologies [3]. Under the interactive technology, modern public art, as the mother of art, should not only conform to the application of modern reality, but also convey the aesthetic spirit and moral concept of the traditional nation [4]. The change of times and national cultural construction are witnessed by modern public art, and the integration of contemporary characteristics and traditional elements of The Times is reflected by art design. Modern public art design and traditional elements are closely related and complement each other in the process of promoting social development [5].

There has been a lot of research on this; Zhou [6] proposed the fusion of Chinese traditional elements and

modern architectural design; This sentence should be revised to read: As China has a long history and many kinds of traditional culture, modern architectural decoration design needs to comprehensively analyze various traditional cultural elements, enhance the artistic expression of the whole design, and give architectural decoration a vitality. Zhang et al. [7] put forward regional culture elements in the urban public art design, the application of through elaborated the importance of regional culture in city public art design, analysis of urban public art design, and the main reasons for the lack of regional cultural features and discuss the regional culture elements in the urban public art design in the practical application. Wang and Wan [8] put forward the research on the correlation, measures between enterprise capital intervention and public art operation based on computer correlation analysis, expounds the advantages of computer science correlation, and discusses the current situation and optimization of enterprise capital intervention and public art operation for readers' reference. Reference [9] describes socialism and proposes public art design in East Germany. Writing art history in East Germany usually needs to deal with the influence of West Germany and the West during the Cold War, as well as the influence of the Soviet Union and countries within its sphere of influence.

Although the above research has made some progress, the research on interaction is not sufficient. Therefore, the analysis of modern public art design integrating traditional elements under the interaction technology is proposed. It analyzes the origin of modern public art design, which is manifested as the rational product of science and technology and the materialized form of cultural aesthetics. Then, it analyzes the development status of blind pursuit of internationalization, excessive reliance on modern tools, and inadequate design education level. It classifies modern public art with traditional elements and discusses the inheritance problems. Under the interactive technology, traditional elements and features are imperceptibly transmitted through various carrier forms. The research content of the innovation is based on the analysis of contemporary public art design in the process of interactive technology which is put forward; at the same time, fusion of traditional elements, resource utilization and efficiency of modern public art index rising trend year by year, the government of modern public art design activities into increased year by year, extracting markers can get complete profile.

2. Tracing Back to the Origin and Development of Modern Public Art Design

2.1. Tracing the Origin of Modern Public Art Design. Modern public art is inseparable from culture. It can be said that culture is a necessary condition for the existence of modern public art. Considering the development and origin of modern public art from the perspective of culture is a clear and necessary research angle. When thinking about the existing form of an art, tracing the source can better highlight the significance of the art. Modern public art, as a cultural concept of contemporary art, appeared in the USA in the 1960s. It is different from the general traditional concept of environmental art and has a close relationship with the development of cities [10, 11]. The social division of labor, the intensive living environment, and the evolution of commodity exchange make the city develop continuously. The development of the city has prepared a solid foundation for the emergence of modern public art.

The formation and development of modern public art are the historical product of Western social culture. Traceability is represented by the following:

- (1) The product of scientific and technological rationality: the top manifestation of creation is art design, which evolves creative thinking into concrete forms. The development of science and technology is synchronized with art design. Whether macro or micro, the emergence of new forms has a strong stimulating effect on designers' creative inspiration [12, 13].
- (2) Materialized form of cultural aesthetics: modern public art design is a key component of social material production, and the materialized form must

also be aesthetic and practical [14]. For example, the modern public art design of packaging should not only reflect the gift value, but also promote consumption on the premise of maintaining economic order, so that the cultural aesthetic psychology can be displayed through materialized art design.

- 2.2. Development Status of Modern Public Art Design. The main structure of the development status of modern public art design is shown in Figure 1.
 - (1) Blindly seeking internationalization: economic globalization gradually assimilates art design forms. With the development of economy, a large number of Western modern industrial design concepts and related works have poured in and penetrated into every corner of social life. The parts they reach are gradually westernized, and the national cultural connotation and charm are increasingly lost [15].
 - (2) Over-reliance on modern tools: information technology constantly updates design software. Most designers often use the existing materials and programming design methods of the Internet to complete art design through patchwork. Excessive reliance on modern design tools not only makes the works lack of cultural heritage, but also leads to monotonous design results.
 - (3) Insufficient level of design education: under the influence of Western modern design thoughts and education, China's modern public art design education is more mechanical imitation and one-sided copying, and the regional characteristics and national historical charm have disappeared. Due to the lack of local connection, the national characteristics are no longer [16]. The rapid development of design education and the increasing number of design students year by year have also led to disorderly competition among colleges and universities, resulting in the obvious backwardness of the education level.

2.3. Classification of Modern Public Art with Traditional Elements and its Inheritance

2.3.1. Modern Public Art Category Integrating Traditional Elements. Modern public art under interactive technology, which integrates traditional elements and accounts for a high proportion, has many types and a wide range. Its main categories are divided into 10 categories, and its specific forms are shown in Table 1.

It can be seen from Table 1 that the heritage of modern public art integrating traditional elements is extremely rich and brilliant. Traditional music, traditional calligraphy, and traditional painting have accumulated for thousands of years, have made great innovations, and are imbued with the profound cultural heritage of a 5000 –year-old civilization. It is not only the precious wealth of the Chinese nation, but also the precious wealth of all mankind. With its strong local

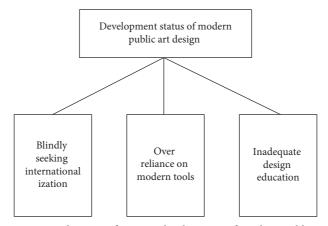


FIGURE 1: Structure diagram of current development of modern public art design.

Table 1: Categories and specific forms of modern public art integrating traditional elements.

Serial number	Category	Form
1	Music	National music, new music, Chinese music, Chinese traditional music, etc.
2	Calligraphy	Seal script, official script, running script, regular script, cursive script, etc.
3	Painting	New Year pictures, lantern paintings, fan paintings, prints, murals, etc.
4	Traditional opera	Kunqu opera, Hunan opera, Qin opera, Sichuan opera, Henan opera, Jin opera, Han opera, etc.
5	Clothes	Silk flower, wedding dress, insole, jewelry, flannel, etc.
6	Sculpture	Wood carving, dough sculpture, stone carving, color sculpture, bamboo carving, etc.
7	Embroidery, dyeing, and weaving	Tie dyeing, batik, pad dyeing, brocade, printed cloth, etc.
8	Food	Candy modeling, cake model, pastry modeling, etc.
9	Paper-cut	Embroidery patterns, window decorations, etc.
10	Weave	Bamboo, straw, paper, wicker, etc.

flavor, mellow artistic connotation, and vivid historical traces, Chinese traditional art is more and more loved and appreciated by people all over the world, and has become the common cultural "feast" of mankind. It is a long cultural scroll that reflects the social and historical life of China through the understanding of humanities, society, and environment.

- 2.3.2. The Existing Inheritance of Modern Public Art. Like other intangible cultural heritages that integrate traditional elements, modern public art forms are unable to truly implement the protection concept of folk art to all relevant personnel in terms of inheritance. In particular, the internationalization process has deepened in recent years. Although the attention of intangible cultural heritage has gradually increased, there are still many little-known cultural heritage in the forgotten stage, among which the most representative is modern public art [17, 18]. Based on the influence of the current world background and values, the inheritance problems faced by modern public art include the following factors:
 - (1) Insufficient support from relevant local departments. Relevant departments have a great impact on the vitality of modern public art, and their support directly determines the development trend of modern

- public art [19, 20]. With the increasing attention, although China has carried out legislative treatment, it still fails to work for the modern public art, which needs someone to inherit and continue, integrating traditional elements.
- (2) Insufficient market acceptance. The mismatch between the modern public art form integrating traditional elements and the current market demand is also a reason for its gradual desolation. In particular, the market environment pursuing economic benefits has also prompted more people to abandon the intangible cultural heritage integrating traditional elements [21, 22]. For the inheriting group, it has been unable to weigh the dispute between the original ecology and marketization of modern public art.
- (3) Insufficient public promotion. Only under the joint protection of the departments and the public, modern public art can fundamentally guarantee the inheritance of such intangible cultural heritage. Some private art groups are scattered and cannot well promote modern public art forms, while the popular art groups have poor ways to make profits and are difficult to continue to inherit [23]. Most of the relevant departments are researchers of modern public art. Inheritors who really understand modern

- public art skills have limited ideas and have less contact with official institutions, which is not conducive to improving the popularity of the culture and is increasingly submerged in the modern art trend.
- (4) The impact of foreign culture is too strong. The greatest impact on modern public art is due to foreign cultural factors. In recent years, the rapid development of information technology has led to Earth shaking changes in national culture and thought. Many intangible cultural heritage cultures have fallen into the embarrassing situation of no successor, such as Shaanxi shadow play, Yunnan batik, and Naxi ancient music which are disappearing day by day, and some typical objects of folk art and culture have been lost overseas. Some art colleges also take Western sketch and oil painting as the main art teaching content and form of expression, but rarely mention the information of Chinese modern public art, which blocks the cognitive channel of contemporary young people to traditional elements and weakens their sense of national identity.

3. Modern Public Art Design under Interactive Technology

Before the traditional elements were integrated into modern public art, the way of transmitting information was release-transmission-reception. This way spread the information of the creator of the work one way. The audience can only passively accept the established information. At the same time, the creator cannot get any feedback from the audience. However, under the interactive technology, the modern public art design integrating traditional elements has realized the two-way information transmission. The design concept of interactive technology has become the mainstream of modern public art.

3.1. Interactive Technology. The translation of "interaction" involves interaction, exchange, communication, cooperation, mutual influence, and interaction. In short, interaction means two-way interaction. Interaction is mutual action, performing actions opposite to each other [24]. For example, chatting, playing table tennis, playing chess, symposiums, etc., all belong to the category of interaction. The advantage of interactive technology is about creating a new user experience. Its purpose is to enhance and expand the way people work, communicate, and interact. Interaction design is described as the design of human communication and interaction space; interaction design supports people's behavior, which is another embodiment of human nature.

Interaction is also a sociological concept, which refers to the interaction, promotion, and causality between various factors. "Interaction" in the digital era is more widely used in the Internet, digital television, and other related fields based on digital platforms [25]. It has become a way of communication between people and things, through

which the purpose of information exchange can be achieved; at the same time, "interaction," as a medium, links art and technology, art and audience, works and authors, and authors and audiences, and produces the relationship of interaction and interaction. The "interaction" referred to in this article is a kind of two-way communication, a process of participation, and the interaction and interaction in participating in modern public art design activities or works, including thinking interaction, behavior interaction, five sense language interaction, and psychological interaction [26]. It emphasizes the two-way communication between information input and output, so as to achieve the purpose of information docking between the author and the audience. The interactive technology structure is shown in Figure 2.

According to Figure 2, interaction technology changes people's way of designing modern public art and also changes people's emotional cognition and thinking mode, thus making interactive thinking come into being. The concept of interaction design is a kind of thinking concept that takes "interaction" as the ultimate ideal of design. As the core of this concept, "interaction" determines the way of thinking and methods of technicians and artists at the beginning and during design. Interactive thinking has changed the way of thinking and process of artistic creation in the past. It is a transformation of thinking from one-way to two-way and one-dimensional to multi-dimensional, and "interaction" runs through the whole process of artistic creation and display.

3.2. Modern Public Art Design Integrating Traditional Elements under Interactive Technology. The premise of modern public art design is based on the integration of traditional elements. As a historical successor, we should deeply understand that modern public art is the main body, and traditional elements are the starting point for doing anything. The calculation of correlation coefficient of modern public art design under interactive technology is shown in

$$G(t) = \frac{L_{\min} + k \times L_{\max}}{L_{ij} + Z_O + K_P}.$$
 (1)

In formula (1), G(t) represents the correlation coefficient of modern public art design under interactive technology at t time, L_{ij} represents the random vector of modern public art design, L_{\max} and L_{\min} represent the maximum and minimum values of vector weight given by modern public art design, respectively, Z_O and K_P , respectively, represent the standardized value of modern public art design, k represents the resolution coefficient of coupling degree, and generally, k is between 0.5 and 1.

Because modern public art design has too many and scattered correlation coefficients under the interactive technology, in order to facilitate calculation, the correlation coefficients of modern public art design at each time are concentrated near one value, and the average value calculation formula is used to process the correlation coefficient. The formula is

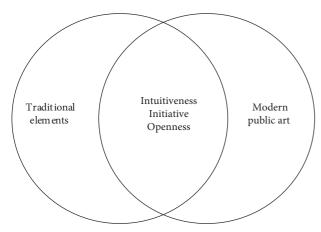


FIGURE 2: Interactive technology structure.

$$M_{ij} = \frac{1}{n} \sum_{i=1}^{n} G(t).$$
 (2)

In formula (2), M_{ij} represents the degree of correlation between modern public art design planning and traditional elements. By comparing the size of M_{ij} , we can quickly screen out the factors that have a great impact on modern public art design planning by traditional elements.

Modern public art, as a carrier of artistic image, subtly spreads traditional elements and characteristics through a variety of carrier forms when it spreads traditional culture. In the process of rapid construction and development, modern public art, as a carrier and medium, has thrown away the reflection of the spirit and consciousness of the essence of art form, integrated traditional elements into it, and sublimated it, making it functional in expression, and conveying the deep-rooted elements in culture, history, society, and other countries through structured media. The form of modern public art makes the traditional elements concentrated and representative, improves the cultural quality, artistic accomplishments, and self-feelings of art, and thus realizes the modern public art design integrating the traditional elements under the interactive technology.

4. Experimental Analysis

In order to verify the performance and feasibility of modern public art design analysis integrating traditional elements under interactive technology, experiments are designed. Under the interactive technology, different indicators of modern public art design planning are graded to obtain different levels of value ranges and assignment standards. The basis for assigning values to different indicators is the actual scores of different indicators. Select five items from the 10 categories in Table 1, and divide the different indicators into three levels, represented by A, B, and C, respectively, as shown in Table 2. The assignment criteria for different levels are 1.0 for level A, 0.5 for level B, and 0.01 for level C.

Let t represent a set of indicators of different states of modern public art, then the expected value and entropy of t

TABLE 2: Classification and weight of different indicators.

Evaluating indicator	Hierarchy	Weight
Music	A: >0.29%; B: 0.29%-0.09%; C: <0.09%	0.124
Calligraphy	A: >0.19%; B: 0.19%-0.09%; C: <0.09%	0.135
Painting	A: <29%; B: 29%–59%; C: >59%	0.116
Traditional opera	A: >0.10; B: 0.10-0.066; C: <0.066	0.086
Clothes and accessories	A: >490; B: 490–135; C: <135	0.046

accurate values to measure one indicator of modern public art are, respectively, expressed by formulae (3) and (4):

$$Qx = \frac{Qx_1 + Qx_2 + Qx_3 + \dots + Qx_t}{t},$$
(3)

$$Qn = \frac{\max(Qx_1, Qx_2, Qx_3, \dots, Qx_t) - \min(Qx_1, Qx_2, Qx_3, \dots, Qx_t)}{U}.$$
(4)

In formulae (3) and (4), Qx_t represents the index coefficient of modern public art, and U represents the total number of modern public art data.

Let $V = \{A, B, C, D, E\}$ represent the comment set of modern public art, and its value range is 0–1, where A, B, C, D, E represent poor, average, good, good, and excellent, respectively. The change range of comment value is shown in Table 3.

In the middle section of the modern public art index data, there are bilateral constraints, which are represented by $[F_{\rm inf}, F_{\rm sup}]$, so the expectation and entropy of the left and right sides take the 1/2 of the overall expectation and entropy, and then use the expectation and entropy of the cloud theory model to build a qualitative comment set. The expression formula is as follows:

$$\begin{cases} Qx_i = \frac{F_{\text{inf}}}{2} + \frac{F_{\text{sup}}}{2}, \\ Qn_i = \frac{F_{\text{inf}}}{2} - \frac{F_{\text{sup}}}{2}. \end{cases}$$
 (5)

In formula (5), Qx_i and Qn_i , respectively, represent the expected value and entropy of the evaluation value of a modern public art index.

After calculating the expected value and entropy of the evaluation value of modern public art indicators, a directional evaluation cloud generator is generated. According to the corresponding change interval between the cloud generator and the evaluation value of modern public art indicators, the change of cloud center of gravity can be obtained. Repeat the above operations until the value of modern public art indicators is obtained, which is the result of modern public art design.

Taking the annual data of the project-based learning mode of modern public art design in a province from 2012

TABLE 3: Change range of comment value.

Comment set	Variation interval
Poor grade	0.00-0.29
General grade	0.30 - 0.49
Better grade	0.50-0.69
Good grade	0.70-0.89
Excellent grade	0.90-1.0

to 2021 as the empirical analysis object, in order to ensure the authority and effectiveness of the obtained data of modern public art design, we fully visited the relevant modern art design project planning and management departments in the province, and sorted out the fund injection and management of modern public art in the province. Take the sorted annual data of modern public art services as input, and output the evaluation results of modern public art in the province. By analyzing the correlation coefficient of modern public art in the province, the results are shown in Figure 3.

According to the analysis of Figure 3, the resource utilization and benefit of modern public art in the province are increasing exponentially year by year. However, before 2016, the performance of modern public art services in the province increased slightly. Since 2017, the performance of modern public art services in the province has increased significantly. It shows that since 2017, the province has gradually strengthened the initiation and management of modern public art projects, which has greatly improved the service performance of modern public art projects in the province. Take the number of public sports planned by the government as the measurement index to further analyze the performance of modern public art design in the province. The results are shown in Figure 4.

According to the analysis of Figure 4, the number of modern public art design projects planned by the provincial government has increased year by year in different years. In 2020, the number of public sports activities planned by the provincial government reached 14, which has exceeded the average of once a month, indicating that the province has invested a lot of manpower and material resources in its modern public art design projects. With the increase of government investment in modern public art design activities, it also promotes the increase in the number of social organizations and improves the performance of modern public art design services.

In order to further verify the feasibility of this method, the pixel coordinates on the 3D point projection image reconstructed by modern public art and the corresponding pixel coordinates of the original image are determined. This experiment uses the image taken from the front of the digital camera, as shown in Figure 5.

According to Figure 5, mark points on the original image of modern public art, with box marks on the main line and circular box marks on the branch line. Through the automatic extraction of spatial marker points, the coordinates of the center, the matching of spatial image points, and the center coordinates can reach the pixel level. The design

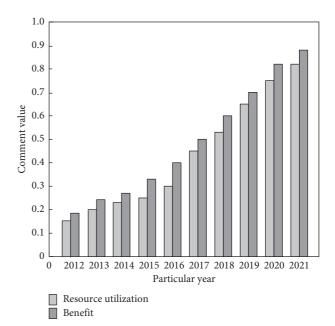


FIGURE 3: Evaluation results of primary indicators of modern public art service performance.

results of spatial reconstruction image of modern public art space are shown in Figure 6.

It can be seen from Figure 6 that a complete outline can be obtained by manually extracting the marked points in the modern public art space. Using this method can obviously reduce the projection error and then rationalize the three-dimensional vision of modern public art interior space design. The reason is that the method in this paper integrates traditional elements under interactive technology and increases interactive thinking, which can change the thinking mode and creative process of previous art creation, from one-way to two-way, one-dimensional to multi-dimensional thinking, and make "interaction" run through the whole process of art creation and display.

To sum up, the significance and functions of modern public art design integrating traditional elements are as follows:

Significance: China's 5000 years of cultural and historical deposits contain strong artistic emotions. Modern public art, which integrates traditional elements, as an art form that can fully demonstrate the national inclusiveness and sensibility, exposes the charm of the national spirit and cultural atmosphere. Therefore, modern public art design integrates the charm and elements of traditional elements, which not only helps to increase the connotation of modern design, but also helps modern public art to be inherited and carried forward imperceptibly. China's long history is surging, and the traditional culture is accumulating continuously. From the contention of various schools of thought to the profound modern tempering, this colorful modern public art feast is finally formed.

Modern public art forms are diverse, and their skills are also different. It has profound cultural connotations and profound cultural implications. In recent years, China has

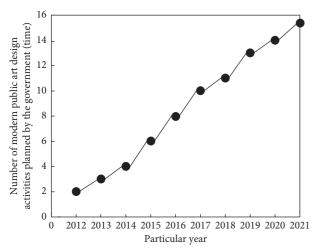


FIGURE 4: Times of modern public art design projects planned by the government in different years.

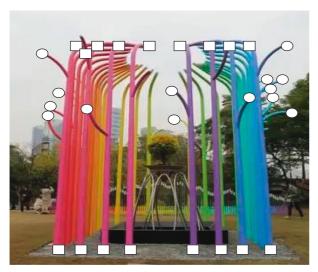


FIGURE 5: Original image of modern public art.

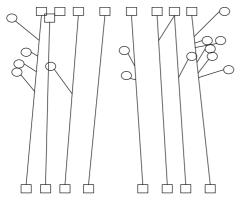


FIGURE 6: Reconstruction image design results of modern public art space.

become more and more influential in the world. Modern public art, which integrates traditional elements under interactive technology, has a great artistic shock and influence on Chinese people. At the same time, it also has a strong attraction to people with similar aspirations all over the world who yearn for art and pursue art. Based on the background of today's modern economic globalization, the world culture has aroused the global concern of the traditional culture of the Chinese nation through the exchange of what is needed, which makes the field of modern public art design also begin to pay attention to the rational use of traditional elements. It is hoped that the gaps and obstacles in modern public art design can be filled and broken with the help of the form of traditional elements. Traditional elements not only bring more developmental thinking and infinite creative inspiration to the field of modern public art design, but also make the design work more unique in the case of mutual penetration and inclusion, carrying forward and inheriting the artistic heritage and value of traditional elements.

Functions: Traditional elements are conducive to promoting the development of modern public art design. On the contrary, modern public art design is conducive to the inheritance and development of traditional elements. In other words, the integration of traditional elements in modern public art design can not only scientifically promote traditional elements, establish the concept of protection and promotion of intangible cultural heritage, inherit national culture and humanistic spirit, but also highlight the artistry and applicability of modern public art design. Traditional elements endow modern public art design with brand-new implication and charm, which greatly improves the level of aesthetic value and massiness of design. The effective integration of the two has been highly praised by artists, which has expanded the scope of influence from regional to international, and the influence has gradually developed in a globalized trend. With the integration of traditional elements, modern public art design has increasingly evolved into a carrier of traditional elements by virtue of its strong attraction.

To sum up, traditional elements are a relatively effective means of boosting the diversification and enrichment of modern public art design forms, and have an important practical significance in promoting the development of modern public art design. Modern public art design also provides a three-dimensional display platform for the development and inheritance of folk art and plays a subtle role in expanding the influence of traditional elements.

5. Conclusion and Prospect

5.1. Conclusion

(1) The resource utilization and benefit of modern public art in the province are increasing exponentially year by year. Gradually strengthening the project approval and management of modern public art projects can greatly improve the service performance of modern public art projects.

- (2) With the increase of government investment in modern public art design activities, it also promotes the increase in the number of social organizations and improves the performance of modern public art design services.
- (3) By manually extracting the marked points in the modern public art space, a complete outline can be obtained. Using this method can obviously reduce the projection error and then rationalize the threedimensional vision of modern public art interior space design.

5.2. Prospect

- (1) Up to now, many scholars have realized the necessity to protect the integration of traditional elements. At present, various cities have carried out activities from top to bottom to highlight the regional cultural characteristics by repeating the local historical context, such as emphasizing the "historical meaning" of the environment through the creation of public art works such as urban sculpture and murals, in order to improve the quality of the urban environment and enhance urban recognition. However, this surface modification did not bring about rich cultural transmission, but led to people's aesthetic numbness, reduced regional recognition, and even the dislocation of context and other follow-up problems.
- (2) The in-depth study of public art design from the perspective of urban context protection is an indepth excavation of how to improve the quality of urban environment. At present, the material input of construction and the quantity and scale of works are no longer the effective standards to judge the quality of urban environment. People are more concerned about whether the profound historical context and vivid collective memory have been perfectly interpreted, whether there is an appropriate field and integrated into it. Therefore, it is more necessary for researchers to determine relevant laws and regulations, formulate standardized management systems, and actively and positively publicize and enable more and more public to actively participate in the creation of urban public
- (3) With the continuous advancement of the urban process, people will eventually deepen their understanding of modern public art, and the focus of the urban public environment will gradually develop from the involvement of the representation material to the construction of urban connotation, such as paying attention to the promotion of the cultural spirit of the urban field. Modern public art creation also needs to create more works that reflect urban life, ideas, and spirit through systematic planning and research. Only in this way can we carry out

reasonable planning and layout of urban public space environmental resources and endow them with social significance that depends on context, so as to create high-quality and pleasant urban public space and improve the quality of urban public environment.

Data Availability

The raw data supporting the conclusions of this article can be obtained from the author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding this work.

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