Philosophical Thinking and Practice on the Preservation of Place Memory in Urban Regeneration and the Spatial Design of Abandoned Industrial Heritage

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Abstract: This article explores the importance of abandoned industrial heritage in urban regeneration and the theory and practice of its spatial design. First, the article elaborates on the theoretical basis of urban regeneration and place memory, emphasizing the historical, cultural and economic value of abandoned industrial heritage. Then, successful reuse cases at home and abroad are analyzed to demonstrate the embodiment of place memory in design. The article further explores the application of philosophical thinking in the spatial design of abandoned industrial heritage, pointing out the influence of sustainable development, humanism, aesthetics and ethical philosophy on design. Subsequently, the article analyzes the challenges faced by the spatial design of abandoned industrial heritage and proposes corresponding countermeasures. Finally, the article looks forward to the future design trends of abandoned industrial heritage spaces in cities, including the development of intelligent technology, green ecological concepts, multicultural integration and community participation. These trends are of great significance to the development of Chinese cities and provide new ideas and motivation for achieving sustainable urban development.
Keywords: Place Memory; Urban Regeneration; Spatial Design; Abandoned Industrial Heritage

1. INTRODUCTION

With the acceleration of globalization and urbanization, many once prosperous industrial areas have gradually been abandoned and become " ruins " of urban development. These industrial heritages not only carry rich historical and cultural memories but also reflect the identity of local residents. However, the transformation and elimination of traditional industries has caused many industrial heritages to be idle or demolished. Although this process has brought economic growth, it has also caused the loss of historical culture and communities. Fading of memory. In this context, urban regeneration has become an important coping strategy(Hoteit, 2015). It is not only the transformation of old spaces but also the comprehensive revitalization of urban society, economy, and culture. These heritage properties can be transformed through regeneration into new cultural and commercial spaces, restoring their vitality in urban

life while promoting social inclusion and enhancing community cohesion(Lak & Hakimian, 2019). Preserving the memory of place is particularly important in urban regeneration, helping maintain a community's identity and enhancing residents' sense of belonging and pride(Milligan, 2007; Ujang & Zakariya, 2015). In reusing abandoned industrial heritage, designers face a series of complex challenges, such as how to introduce modern functions while retaining architectural features, and how to balance commercial development and cultural protection. By rationally reusing these heritage sites, we can not only enhance the image and attractiveness of the city, but also inject new vitality into the local economy, attract tourists and investment, and promote local employment and economic development. Therefore, studying the spatial design of abandoned industrial heritage and its relationship with place memory has important theoretical and practical value, providing valuable experience and inspiration for future urban planning.

2. THEORETICAL BASIS OF URBAN REGENERATION AND PLACE MEMORY

2.1 Concept and Development of Urban Regeneration

Urban regeneration refers to the improvement of urban functions and sustainable development through the comprehensive transformation and renewal of urban space, economy, society and environment. The concept originated in Western countries in the mid -20th century, initially to solve urban decline, environmental degradation and social problems that occurred in the process of urbanization(Healey, 1991; Roberts, 2000). Urban regeneration is not only the renewal of physical space, but also the adjustment of social structure and the restoration of economic vitality. The development of urban regeneration has gone through several stages. In the 1950s, urban renewal focused mainly on the reconstruction of physical spaces, emphasizing infrastructure improvements and building renovations. By the 1970s, as social problems intensified, urban regeneration began to focus on social equity and community participation, emphasizing the role of residents in the regeneration process. Entering the 21st century, urban regeneration has gradually shifted towards sustainable development, emphasizing the protection of the ecological environment and the preservation of cultural heritage. In recent years, the concept of urban regeneration has been further expanded to include emerging fields such as smart city construction and green city development. Smart cities

improve urban management efficiency and residents' quality of life through the application of information technology, while green cities emphasize eco- friendliness and resource conservation. The diversified development trend of urban regeneration reflects the complexity and diversity of cities in responding to globalization challenges and localization needs(Gao et al., 2020).

2.2 The Connotation and Characteristics of Place Memory

Place memory refers to people's emotional and cognitive memory of a specific place. It includes not only the memory of the physical space, but also the memory of the historical, cultural and social relationships carried by the space. The memory of place is an important part of individual and collective identity(Falanga, 2022; Lak & Hakimian, 2019). Through the memory of place, people can establish connections with the past and form expectations for the future on this basis. Memory of place has several distinctive characteristics. First, it is multi-layered, including both individual and collective memories. Individual memory is an individual's unique experience of a particular place, while collective memory is a group's shared memory of a place. Secondly, place memory is dynamic. With the passage of time and social changes, place memory will be constantly reconstructed and reproduced. In addition, place memory is emotional. It is not only the memory of facts, but also the memory of emotion and meaning. Memory of place plays an important role in urban development. It not only affects the lifestyle and social relations of urban residents, but also has a profound impact on urban planning and design. In the process of urban regeneration, how to effectively retain and activate place memory is the key to achieving sustainable urban development.

2.3 The Relationship between Urban Regeneration and Place Memory

There is a complex and close relationship between urban regeneration and memory of place. One of the goals of urban regeneration is to activate place memory through the transformation of old spaces, making it an important part of urban culture and social vitality. The preservation and regeneration of place memories not only help maintain the historical continuity of the city, but also enhance the residents' sense of belonging and identity. In the process of urban regeneration, the preservation of memory of place faces many challenges. The process of modernization and globalization often leads to the dissolution and forgetting of the memory of traditional places. Therefore, in urban regeneration, innovative design

and planning strategies are needed to integrate place memory into new urban spaces. Through the protection of historical buildings, the organization of cultural activities and the promotion of community participation, the memory of place can be effectively activated so that it can be rejuvenated in the new urban environment(McDonald et al., 2009). The relationship between urban regeneration and place memory is also reflected in the protection and utilization of urban cultural heritage. Through the reuse of abandoned industrial heritage, it can be transformed into new cultural and economic resources, injecting new impetus into urban development. In this process, the preservation and regeneration of place memories not only help to enhance the cultural value of the city, but also promote social harmony and stability.

2.4 Application of Relevant Philosophical Theories in Urban Regeneration

In urban regeneration, philosophical theories provide important guidance and inspiration. Phenomenology emphasizes the experience and perception of place, believing that place is an important foundation for human existence. In urban regeneration, a phenomenological perspective helps to understand residents' emotions and meanings towards places, thereby better integrating place memories in design. Deconstruction focuses on challenges to tradition and authority, emphasizing diversity and difference. In urban regeneration, the concept of deconstruction can help break traditional planning models, encourage innovative and diverse designs, and promote diverse expressions of place memory(Adair et al., 2000). Postmodernism emphasizes the reinterpretation of history and culture and advocates the creation of new cultural forms through reflection on the past. In urban regeneration, the perspective of postmodernism helps to re- examine and utilize the historical heritage of the city, giving it new meaning and function through the reinterpretation of the memory of place. Ecological philosophy focuses on the harmonious coexistence of man and nature and emphasizes sustainable development. In urban regeneration, the concept of ecological philosophy guides the protection of the natural environment and the rational utilization of resources, promoting the green development of the city and the ecological expression of place memory.

2.5 Case Studies of Urban Regeneration and Place Memory at Home and Abroad

Successful cases of urban regeneration at home and abroad provide rich experience for the retention and regeneration of place memory, as shown

in Figure 1. Abroad, the industrial heritage regeneration project in the Ruhr area of Germany is a typical case. By transforming abandoned industrial facilities, the Ruhr Area has successfully transformed them into cultural and tourism resources, activating local place memories and promoting regional economic development(Park, 2013). Domestically, Tianzifang in Shanghai is a successful example of combining urban regeneration with place memory. Tianzifang retains the city's historical memory by protecting and reusing traditional Shikumen buildings, while introducing modern art and commercial elements to create a vibrant cultural space. These cases show that the combination of urban regeneration and place memory can not only enhance the cultural value and attractiveness of the city, but also promote social harmony and sustainable development. In practice, through the protection of historical buildings, the organization of cultural activities and the promotion of community participation, place memory can be effectively activated and revitalized in the new urban environment.

Figure 1: Germany Ruhr District and Shanghai Tianzifang

3. THE VALUE AND CURRENT SITUATION OF ABANDONED INDUSTRIAL HERITAGE

3.1 The Value of Abandoned Industrial Heritage

As an important material cultural carrier left over from the urban development process, abandoned industrial heritage carries rich historical and cultural value(Kang, 2007). They not only record technological changes and social development in the process of industrialization, but also reflect the economic, social and cultural characteristics of specific historical periods. Industrial heritage, such as old factories, mines, railways, etc., are often witnesses of the urban industrialization process and have irreplaceable historical value. At the cultural level, abandoned industrial heritage is an important part of collective memory, embodying the lifestyle, labor culture and social relations of the working class(Kochetkova & Petrova, 2022). Through the protection and reuse of these heritage sites,

we can stimulate the public's interest in and recognition of history and enhance the city's cultural cohesion. In addition, industrial heritage also has an educational function and can provide the public with vivid historical education and cultural experience by displaying industrial history and technological progress. The economic value of abandoned industrial heritage is mainly reflected in the economic benefits brought about by its reuse. Through reasonable protection and development, these heritages can be transformed into tourism resources, cultural and creative industry bases or commercial complexes, thus driving the development of the local economy. Take Germany's Ruhr area as an example. Through its successful transformation of abandoned industrial heritage, the area has attracted a large number of tourists and investors and has become a model of economic transformation. In addition, the reuse of abandoned industrial heritage can also promote urban renewal and increase land value. Through the transformation of these heritage properties, the land value of surrounding areas can be enhanced, attracting new investment and population inflow, thus promoting the sustainable development of the city. According to relevant studies, reuse projects of abandoned industrial heritage can usually bring significant economic returns, and their return on investment is often higher than that of traditional real estate development projects.

3.2 Spatial Characteristics and Utilization Potential of Abandoned Industrial Heritage

Abandoned industrial heritage usually has unique spatial characteristics, such as long-span factory structures, complex mechanical equipment and unique architectural styles. These features not only provide rich possibilities for its reuse, but also provide opportunities for diverse and innovative development of urban space(Bottero et al., 2019). Through the reasonable design and transformation of these spaces, public spaces and cultural venues with unique charm can be created. In terms of utilization potential, abandoned industrial heritage can be transformed into multi-functional urban spaces, such as cultural and art centers, creative industry parks or ecological parks. The reuse of these spaces can not only meet the diverse needs of urban residents, but also enhance the overall image and competitiveness of the city. In addition, the reuse of abandoned industrial heritage can also promote the sustainable development of cities and reduce the consumption of natural resources and environmental damage through the effective use of existing resources.

3.3 Current Status and Problems of Abandoned Industrial Heritage

My country's abandoned industrial heritage is numerous and widely distributed, covering many industries from mining and metallurgy to textiles and machinery. However, due to the long-standing lack of awareness of industrial heritage protection, many heritage sites are at risk of being demolished or abandoned. According to the "China Industrial Heritage Protection List", only a small part of the industrial heritage nationwide has been effectively protected and utilized. Currently, the main problems facing the protection and utilization of abandoned industrial heritage in my country include: the lack of systematic laws, regulations and policy support, resulting in a lack of standardization and sustainability in protection work; insufficient financial investment, and many heritage properties are gradually destroyed due to lack of maintenance; public participation Not high, because society has insufficient awareness of the value of industrial heritage. In addition, some local governments and developers, driven by interests, tend to demolish heritage sites to gain land development benefits, while ignoring their potential cultural and economic value(Xie, 2015). Abroad, rich experience has been accumulated in the protection and utilization of abandoned industrial heritage. Taking the UK as an example, it has established a complete industrial heritage protection system through legislation and policy support. The protection of industrial heritage in the UK not only focuses on the preservation of material heritage, but also emphasizes the inheritance of intangible cultural heritage, such as the protection of craft technology and worker culture. Germany's Ruhr region has successfully transformed abandoned industrial heritage through cross-sector cooperation and public participation. The region has successfully attracted a large number of tourists and investors by transforming industrial heritage into cultural tourism attractions and creative industry parks, becoming a successful case of economic transformation. In addition, the French city of Lille created one of Europe's largest cultural and creative industry parks by transforming abandoned textile factories, becoming a model of urban revitalization. These successful experiences show that the protection and utilization of abandoned industrial heritage requires multi- party cooperation, combined with policy support, public participation and market operations, in order to maximize its value. By learning from foreign experience, our country can make improvements in policy formulation, financial investment, and public participation to better protect and utilize abandoned industrial heritage and achieve sustainable urban development.

4. REFLECTION OF PLACE MEMORY IN THE SPATIAL DESIGN OF ABANDONED INDUSTRIAL HERITAGE

The reuse of abandoned industrial heritage is not only the reshaping of physical space, but also the continuation and regeneration of historical memory. As a manifestation of collective memory, place memory plays a crucial role in space design(Bottero et al., 2019; Protomastro, 2022; Zhou et al., 2024). Through the combination of in-depth understanding of place memory and design practice, effective protection and innovative utilization of industrial heritage can be achieved, as shown in Table 1.

Table 1: Place Memory in the Design of Abandoned Industrial Heritage Space

Element	Description	Case Study
Extraction and Integration of Place Memory Elements	Extract structural features of historical buildings, the forms of industrial equipment, traces of production processes, and related socio-cultural backgrounds through detailed historical research and site surveys to ensure that the design reflects the historical value accurately.	Ruhr Area, Germany: Retained steel structures, chimneys, and tracks, transforming them into modern cultural spaces.
Integration of Space Layout and Place Memory	Achieve the organic combination of historical memory and modern functionality through rational space layout, considering the historical context and spatial characteristics to ensure harmonious coexistence of new and old elements.	M50 Creative Park, Shanghai: Re-planned factory spaces, combining art studios and public areas.
Resonance of Architectural Form and Place Memory	Innovate moderately while respecting the historical architectural form to meet modern usage needs, preserving the rugged beauty of the industrial era and the openness of modern spaces.	798 Art District, Beijing: Moderately altered industrial buildings to enhance historical sense and cultural connotation.
Expression of Place Memory through Landscape Design	In landscape design, retain and redesign original elements to achieve a vivid expression of historical memory, focusing on the integration of aesthetic and cultural values.	Loire Valley, France: Combined industrial waterways with modern landscape design, creating a vibrant public space.
Connection of Material Selection and Place Memory	Material selection influences visual effects and the transmission of place memory; through the reuse of historical materials and innovative applications of new materials, *a* profound expression of place memory can be achieved.	Turin, Italy: Retained brick walls and steel structures while introducing modern glass and metal materials to enhance spatial transparency.

4.1 Extraction and Integration of Elements of Place Memory

In the spatial design of abandoned industrial heritage, the extraction and integration of place memory elements is the first step. The elements of place memory include the structural characteristics of historical buildings, the shape of industrial equipment, traces of production processes, and the related social and cultural background. The extraction of these elements requires detailed historical research and on-site investigation to ensure that the design plan can truly reflect the historical value of the site. For example, in the Ruhr area of Germany, designers successfully transformed industrial heritage into cultural spaces with modern functions by retaining and reusing elements such as steel frame structures, chimneys, and tracks of industrial buildings. This design not only preserves the historical memory of the place, but also gives it new life through new functions.

4.2 Integration of Spatial Layout and Place Memory

Spatial layout is a key link in the reflection of place memory in design. Through reasonable spatial layout, the organic combination of historical memory and modern functions can be achieved. During the design process, the historical context and spatial characteristics of the place need to be fully considered to ensure the harmonious coexistence of old and new elements. In the M50 Creative Park in Shanghai, designers re-planned the original factory space to organically combine art studios, exhibition spaces, and public activity areas. This layout not only retains the original industrial atmosphere but also provides flexible space for artistic creation. This spatial layout design strategy effectively integrates place memory into modern urban life.

4.3 The Echo Between Architectural form and Place Memory

Architectural form is the direct carrier of place memory. In the regeneration design of abandoned industrial heritage, the retention and innovation of architectural form are important ways to achieve place memory. Designers need to make appropriate innovations while respecting the historical architectural form to meet the needs of modern use. In Beijing's 798 Art District, designers moderately transformed the appearance and structure of the original industrial buildings so that they not only retain the rough beauty of the industrial era, but also possess the openness of modern art spaces. This design strategy of architectural form not only enhances the historical sense of the place, but also injects new cultural connotation into it.

4.4 Landscape Design and Expression of Place Memory

Landscape design is an important means of expressing place memory. In the regeneration process of abandoned industrial heritage, landscape design must not only consider aesthetic value, but also pay attention to the inheritance of historical memory. By retaining and redesigning the original landscape elements of the site, a vivid expression of the memory of the place can be achieved. In France's Loire Valley, designers recreated the landscape of abandoned industrial sites, combining original industrial waterways and vegetation with modern landscape design to create a public space that is both historical and vibrant. This landscape design strategy effectively integrates the memory of place into the natural environment and enhances the cultural value of the site.

4.5 The Connection Between Material Selection and Place Memory

Material selection is one of the details where the memory of place is reflected in the design. In the regeneration design of abandoned industrial heritage, the choice of materials not only affects the visual effect of the building, but is also directly related to the conveyance of the memory of the place. Through the reuse of historical materials and the innovative application of new materials, a profound expression of the memory of the place can be achieved. In Turin, Italy, when renovating old industrial buildings, designers chose to retain the original brick walls and steel structures while introducing modern glass and metal materials. This material selection strategy not only retains the historical texture of the building, but also enhances the transparency and modernity of the space through the use of modern materials. This clever use of materials allows the memory of the place to continue in the blend of old and new. Through the extraction and integration of elements of place memory, the integration of spatial layout and place memory, the echo of architectural form and place memory, the expression of landscape design and place memory, and the correlation between material selection and place memory, the spatial design of abandoned industrial heritage not only achieves It not only respects and protects history, but also injects new vitality and significance into modern urban life.

5. APPLICATION OF PHILOSOPHICAL THINKING IN THE SPATIAL DESIGN OF ABANDONED INDUSTRIAL HERITAGE

The spatial design of abandoned industrial heritage is not only a

transformation of the physical space, but also a reinterpretation of cultural, historical and social values. Philosophical thinking provides a profound theoretical foundation and practical guidance in this process, helping designers achieve innovation and regeneration while retaining the memory of the place.

5.1 Sustainable Development Philosophy and Abandoned Industrial Heritage Design

The philosophy of sustainable development emphasizes the rational utilization of resources and the harmonious coexistence of the environment. In the design of abandoned industrial heritage, this philosophy prompts designers to focus on the reuse of resources and the restoration of the environment. Through the recycling of building materials and efficient energy management, designers can give new life to abandoned spaces while reducing environmental burdens. For example, in the industrial heritage transformation project in the Ruhr area of Germany, designers achieved resource regeneration and environmental improvement by transforming old factories into ecological parks and cultural centers. In specific design practices, the philosophy of sustainable development requires designers to consider all stages of a building's life cycle, from material selection to construction processes to use and maintenance. Data shows that projects that adopt sustainable design strategies can reduce energy consumption by more than 30% and waste emissions by more than 50%. Not only does this help reduce environmental impact, it also makes urban regeneration economically viable.

5.2 Humanistic Philosophy and Space Design

Humanistic philosophy emphasizes people-centeredness and focuses on individual needs and experiences. In the spatial design of abandoned industrial heritage, this concept prompts designers to focus on accessibility, comfort and diversity of space. By re-planning space functions, designers can create multi-functional public spaces that meet the needs of different groups of people. For example, in the renovation project of the Guggenheim Museum in Bilbao, Spain, the designers successfully transformed an abandoned industrial area into a vibrant urban cultural center by introducing open public spaces and diverse cultural activities.. This transformation has not only improved the quality of life of local residents, but also attracted a large number of tourists, injecting new vitality into the urban economy. Humanistic philosophy also emphasizes the

importance of community involvement. During the design process, designers interact with community residents to understand their needs and expectations, thereby creating a more inclusive and belonging space. This people-centered design approach not only improves the efficiency of space use, but also enhances community cohesion.

5.3 Aesthetic Philosophy and the Aesthetic Value of Abandoned Industrial Heritage

Aesthetic philosophy focuses on the form and perception of things, emphasizing the visual and emotional experience of design. In the design of abandoned industrial heritage, aesthetic philosophy prompts designers to explore the unique aesthetic value of abandoned spaces and give them new artistic life through innovation in design techniques. Designers often create spaces with a sense of history and modern art by retaining and displaying the historical traces of industrial heritage. For example, the Musée d'Orsay in Paris, France, was transformed from an old train station. The designer retained the original architectural structure and incorporated modern art elements, making it a cultural landmark with both historical and modern beauty. Aesthetic philosophy also emphasizes the emotional resonance of design. By creating a spatial atmosphere, designers can evoke people's memories of history and longing for the future. This emotional experience not only enhances the attractiveness of the space, but also enhances people's sense of identification with the place.

5.4 Ethical Philosophy and Social Responsibility of Abandoned Industrial Heritage

Ethical philosophy is concerned with moral responsibility and social justice. In designing abandoned industrial heritage, this philosophy drives designers to focus on social responsibility and public interest. Through the rational use of abandoned spaces, designers can create more public value for society. Designers often face the challenge of balancing commercial interests and social responsibilities during projects. Ethical philosophy requires designers to give priority to public interests and social equity during the design process. For example, in the renovation project of the Tate Modern Art Museum in London, England, the designer provided an open cultural exchange platform for society by transforming an abandoned power plant into a public art space. Ethical philosophy also emphasizes respect for history and culture. During the design process, designers conducted in-depth research on the historical context to ensure that the

design plan respected and preserved the historical memory of the place. This respect for cultural heritage not only helps protect historical heritage, but also provides rich cultural resources for future development.

5.5 The Impact of Philosophical Thinking on Design Methods

Philosophical thinking not only provides theoretical guidance for the design of abandoned industrial heritage, but also profoundly affects the innovation and development of design methods. During the design process, philosophical thinking prompts designers to think from multiple angles and levels and explore new design possibilities. Through philosophical thinking, designers can better understand and grasp the complexity and diversity of space. In the design of abandoned industrial heritage, designers often need to face the redefinition of space functions and the reconstruction of structures. Philosophical thinking helps designers maintain a grasp of integrity and attention to details during this process, thereby creating design solutions that are both innovative and in line with actual needs. Philosophical thinking also prompts designers to pay attention to uncertainty and complexity in the design process. When faced with uncertainty, designers can better cope with changes and challenges and explore new design paths through philosophical thinking. This open and flexible design approach not only improves the adaptability and innovation of the design, but also provides more possibilities for the regeneration of abandoned industrial heritage. Through the discussion of the application of philosophical thinking in the spatial design of abandoned industrial heritage, it can be seen that philosophy not only provides a profound theoretical basis for design, but also provides rich guidance for design practice. Through philosophical thinking, designers can better understand and grasp the complexity and diversity of design, thereby creating design solutions that are both innovative and in line with actual needs. This combination of philosophy and design not only enhances the depth and breadth of design, but also provides new possibilities for the regeneration of abandoned industrial heritage.

6. PRACTICAL CASE ANALYSIS OF ABANDONED INDUSTRIAL HERITAGE SPACE DESIGN

6.1 Analysis of Domestic Successful Cases

In China, with the acceleration of urbanization, many industrial heritages are gradually abandoned. However, these heritages are not without merit,

and many cities transform them into new urban spaces through innovative design strategies. Beijing's 798 Art District is a typical success story. The 798 Art District was originally the state-owned 798 Factory. It was built in the 1950s and is a typical Bauhaus-style building complex. With the transformation of industry, factories gradually ceased production and factories were idle. After 2000, artists and designers began to move in and transform it into an art creation and exhibition space, as shown in Figure 2. The success of the 798 Art District lies in its preservation and reuse of the original building structures(Yang & Qian, 2024; Yin et al., 2015). During the renovation process, the designers tried to maintain the original style of the building and only modernized it when necessary. For example, the tall space in the factory building is reserved for the display of large-scale art installations, while the original red brick walls and steel structures have become iconic elements of the art district. In this way, 798 not only retains the historical memory of the industrial heritage, but also injects new cultural vitality into it.

Figure 2: Beijing 798 Art District

6.2 Analysis of Foreign Successful Cases

Internationally, the Ruhr area in Germany is a model for the regeneration of abandoned industrial heritage, as shown in Figure 3. The Ruhr area was once Europe's largest coal and steel production base, but with the adjustment of industrial structure, a large number of industrial facilities were abandoned. The German government and designers have transformed these abandoned facilities into cultural and leisure spaces through a series of innovative designs. Among them, Duisburg North Landscape Park is one of the most representative projects. The park was transformed from an abandoned steel factory. The designer added modern landscape elements while retaining the original industrial facilities. Blast

furnaces have been transformed into observation decks, cooling towers into diving centers and abandoned railway tracks into bicycle paths. In this way, the Ruhr area not only retains the historical value of its industrial heritage but also provides new leisure spaces for local residents(Couch et al., 2011; Liebmann & Kuder, 2012).

Figure 3: Abandoned Industrial Heritage in the Ruhr Region of Germany

In the above cases, the preservation and innovation of place memory are the core of the design. The 798 Art District allows visitors to feel the weight of history by retaining the original building structures and materials. At the same time, the presence and creation of artists have injected new vitality into it, making 798 a symbol of Beijing's cultural and creative industry. The design of the Ruhr area puts more emphasis on the innovative use of place memory. By transforming industrial facilities into modern landscape elements, the designer allows history and modernity to coexist in the same space. For example, the observation deck and diving center in Duisburg North Landscape Park not only retain the appearance of industrial facilities, but also give them new life through the conversion of functions. In terms of design strategies, both the 798 Art District and the Ruhr Area adopt the approach of " equal emphasis on retention and innovation ". The 798 Art District continues the historical memory by retaining the original structure and materials of the building. At the same time, 798 has become a vibrant cultural space by introducing artists and cultural activities. According to the Beijing Cultural and Creative Industry Development Report, the 798 Art Zone attracts more than 4 million tourists every year, making it one of the most popular cultural tourism destinations in Beijing. The design strategy of the Ruhr area puts more emphasis on the conversion of functions. By converting industrial facilities into modern landscape

elements, the Ruhr area not only preserves historical memories but also provides new leisure spaces for local residents. According to the German Tourism Board, the Ruhr Area attracts more than 5 million tourists every year, making it one of Germany's most popular tourist destinations. The regeneration design of abandoned industrial heritage requires finding a balance between preserving historical memory and innovative utilization. When designers carry out space renovation, they should fully consider the historical value and cultural connotation of the original building and inject new vitality into it through innovative design. At the same time, support from the government and all sectors of society is also the key to success. Through policy guidance and financial support, the government can provide strong guarantees for the regeneration of abandoned industrial heritage. In the future, with the continuous advancement of urbanization, the regeneration design of abandoned industrial heritage will face more challenges and opportunities. Designers need to constantly explore new design methods and strategies to respond to the changing urban environment and social needs. Through in-depth analysis of successful cases, we can better understand the complexity and diversity of regeneration design for abandoned industrial heritage, and provide useful reference and guidance for future design practices.

7. CHALLENGES AND COUNTERMEASURES IN SPACE DESIGN OF ABANDONED INDUSTRIAL HERITAGE

The reuse of abandoned industrial heritage is not only an important part of urban regeneration, but also the protection and inheritance of historical culture. However, there are many challenges faced during the design and implementation process.

7.1 Challenges of Technology and Craftsmanship

Abandoned industrial heritage often has complex structures and unique architectural styles, which brings technical challenges to design and construction. Due to their age, aging building materials and unstable structures, many industrial sites have brought difficulties to modern transformation. In addition, how to incorporate modern design concepts while retaining the original architectural features is also an urgent problem to be solved. Addressing these technical challenges begins with a detailed building assessment and structural analysis to ensure the safety and feasibility of the building. Advanced Building Information Modeling (BIM

) technology can be used to accurately evaluate the load-bearing capacity and renovation potential of the building structure through three-dimensional modeling and simulation analysis. In addition, combined with the development of modern material science, suitable repair materials and processes are selected to enhance the durability and safety of the building. In terms of craftsmanship, the combination of traditional craftsmanship and modern technology is the key. Through in-depth research on traditional craftsmanship, combined with modern construction technology, it is possible to improve construction efficiency and quality while retaining the original architectural style. For example, in the repair of masonry structures, modern reinforcement techniques, such as carbon fiber reinforcement, can be used to enhance the stability of the structure.

7.2 Financing and Resource Limitations

The reuse of abandoned industrial heritage usually requires a large amount of capital investment, including early assessment, design, construction, and later maintenance and operation. However, lack of funds often becomes a major obstacle to project advancement. Many abandoned industrial sites are located on the edge of cities or in economically underdeveloped areas, lacking sufficient financial support and market appeal. To solve the funding problem, we can raise funds through multiple channels, including government grants, corporate sponsorships, social donations, and cultural tourism development. The government can encourage companies and individuals to participate in the protection and reuse of industrial heritage by setting up special funds or providing tax incentives.In addition, with the rise of cultural tourism, industrial heritage can be transformed into cultural and creative parks or tourist attractions to attract tourists and investors, thereby achieving self-healing functions. In terms of resource utilization, rational planning and efficient use of existing resources are key. Through resource integration and sharing mechanisms, resource allocation is optimized and unnecessary waste is reduced. For example, during the design process, existing building materials and facilities can be fully utilized and the use of new materials can be reduced, thereby reducing costs.

7.3 Issues of Social Cognition and Participation

The lack of social cognition and lack of public participation is another challenge faced by the reuse of abandoned industrial heritage. Many people lack understanding of the historical value and cultural significance of

industrial heritage, resulting in low public participation and even opposition. Improving social awareness requires strengthening publicity and education, and popularizing the historical value of industrial heritage and the significance of reuse to the public through media, exhibitions, lectures and other forms. Community activities can be organized to invite residents to participate in discussions and decisions on heritage protection and reuse to enhance public participation and responsibility. In terms of public participation, establishing an effective public participation mechanism is key. Encourage residents and stakeholders to participate in project planning and implementation through the establishment of public advisory committees or community participation platforms. Increase public trust and support for projects through transparent decision-making processes and open communication channels.

7.4 The Influence of Laws, Regulations and Policies

Imperfect or unclear laws, regulations and policies often hinder the reuse of abandoned industrial heritage. In some areas, there is a lack of specific laws and regulations for the protection and reuse of industrial heritage, resulting in many legal obstacles encountered during project advancement. Improving laws and regulations is the fundamental way to solve this problem. The government should formulate and improve relevant laws and regulations to clarify the protection standards and reuse requirements of industrial heritage. At the same time, a sound regulatory mechanism should be established to ensure the effective implementation of laws and regulations. In terms of policy support, the government can introduce a series of incentive policies, such as providing financial subsidies, simplifying the approval process, and setting up demonstration projects, to promote the reuse of industrial heritage. In addition, coordination and cooperation between departments should be strengthened to form policy synergy to ensure the smooth implementation of the project.

7.5 Cultural Conflict and Coordination

The reuse of abandoned industrial heritage often involves conflicts and coordination issues between different cultures. During the design process, how to incorporate modern cultural elements while retaining the original industrial culture is a question that requires careful consideration. In resolving cultural conflicts, we first need to conduct in-depth cultural research to understand the historical background and cultural connotation of industrial heritage. On this basis, traditional culture and modern culture

are organically combined through design innovation. For example, in architectural design, the cultural value of industrial heritage can be reinterpreted through the expression of modern art. In addition, it is crucial to respect and protect the cultural practices and lifestyles of local communities. During project implementation, the cultural needs and living habits of local residents should be fully considered, and understanding and integration between different cultures should be promoted through community participation and cultural exchange activities. Through the above multi-faceted efforts, we can effectively respond to the challenges in the spatial design of abandoned industrial heritage and achieve an organic combination of historical and cultural protection and modern urban development.

8. TRENDS IN SPATIAL DESIGN OF ABANDONED INDUSTRIAL HERITAGE IN FUTURE CITIES

In the context of the accelerating global urbanization process, the reuse of abandoned industrial heritage has become an important issue in urban regeneration. With the advancement of science and technology and the evolution of society and culture, the space design of abandoned industrial heritage presents new trends and prospects. In future designs, smart sensors will be widely used to monitor the health of building structures to ensure their safety and stability. Through real-time data analysis, designers can adjust design plans in a timely manner to adapt to environmental changes and user needs. In addition, the application of virtual reality and augmented reality technology will make the design process more intuitive, and users can experience the actual effect of the space during the design stage, thereby improving user participation and satisfaction in the design. Degree of intention. The use of renewable materials and energy-saving technologies will become the norm during the design process. The use of clean energy such as solar energy and wind energy will greatly reduce the carbon footprint of buildings. In addition, ecological design elements such as green roofs and vertical greening will be widely used, which not only beautifies the urban landscape but also improves the city's microclimate. In design, the combination of traditional cultural elements and modern design techniques will become a trend. Through in-depth research on historical culture, designers can integrate modern art and design concepts on the basis of retaining the original characteristics of industrial heritage to create a space that has both a sense of history and a sense of modernity. The

integration of multiculturalism is also reflected in respect for the needs of different cultures. Designers will take into account the differences in space usage among users with different cultural backgrounds, and meet the needs of different groups through flexible space layout and diverse functional settings. Community participation plays an increasingly important role in the design of abandoned industrial heritage spaces. Future designs will pay more attention to the participation of residents, and ensure that the design plan meets the actual needs and expectations of the community through community consultation and public participation.

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