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SPATIAL REUSE STRATEGIES OF OLD INDUSTRIAL BASES IN NORTHEAST CHINA: FROM THE PERSPECTIVE OF LANDSCAPE REVITALIZATION

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ABSTRACT

With the transformation of China's economic structure, the reuse and renewal of old industrial bases has become an important issue for urban development. This article takes the old industrial base in Northeast China as an example and explores strategies for spatial reuse from the perspective of landscape revitalization. This article lists cases of industrial base revitalization around the world, exploring how to revitalize the old industrial base in Northeast China. This article aims to analyze the current situation and existing problems of the old industrial base in depth, propose targeted landscape revitalization strategies, and provide new ideas and methods for the renewal and reuse of the old industrial base. After conducting on-site research on local residents, the problems that need to be solved in the spatial reuse of the old industrial base have been identified, and solutions have been provided. By leaving as much green space as possible, the overall ecological environment of the park can be restored. It can also activate idle abandoned space, and increase the economic and ornamental value of the park. Public art can be introduced, and when designing, the role of mass art should be fully utilized to promote industrial culture and shape local spirit. Finally, by digitizing the protection, display, and utilization of industrial heritage, it is possible to achieve comprehensive and efficient protection and revitalization of industrial heritage in a high-quality and efficient manner.

Keywords: *Old Industrial Base, Space Reuse, Landscape Revitalization, Industrial Transformation*

INTRODUCTION

Since the 1980s, China's economy has been developing rapidly and the industrialization process has been accelerating, leading to contradictions between economic development, environmental pressure, and resource constraints in many industrial cities and regions. Nowadays, as the economy enters a new stage of development, the traditional urban development concept of "planning first, land use later" is gradually being replaced by the concept of "land use first, planning later". The relationship between economic development and resource and environmental protection, as well as the improvement of social welfare, has become an important issue. Economic transformation has become an overwhelming theme, and the reuse of old industrial base space has become an important way for economic and social development.

This article conducts research on this issue. This article first introduces the relevant research in the field of space reuse in old industrial bases, and draws inspiration from their research to find solutions to this problem. Afterwards, the concept of landscape revitalization is introduced, and some successful cases of renovation are listed. Then, field research is conducted on the renovated areas to identify the issues that need to be addressed during the renovation process. Based on the obtained data, a renovation plan is designed, and finally, a summary of this article is provided.

1. RELATED WORK

Some people have tried to renovate the old industrial base. Based on the context of industrial cultural inheritance, Song Shihua, Shen Yi, and others explored spatial patterns and implementation paths that are compatible with cultural inheritance through the practice of Chengdu industrial heritage landscape renewal, and summarized their suitability and future directions. They combined diverse renewal modes to find a home for the wandering industrial culture. Therefore, integrating the inheritance of industrial culture into the renewal of industrial heritage landscapes is an important direction to solve the above problems [1]. Liu Yanxiao and others proposed an exploratory framework and indicator system for evaluating the tourism value of industrial heritage, and used 22 national level industrial heritage sites in Northeast China as examples for evaluation and verification. This indicator system closely follows the concept and connotation of industrial heritage as a tourism resource, providing theoretical support for the formulation of evaluation standards for the tourism value of industrial heritage, and also providing decision-making reference for the development of industrial heritage tourism [2]. Zheng Xin and Li Zhuo established the form of applying place dependence theory to post industrial landscape transformation through the analysis of place dependence and related concepts. They took the 77 Cultural and Creative Park in Beijing as an example, fully utilizing the node space to provide people with communication space and preserve the "sense of place" of the industrial landscape [3]. Chen Jing formulated a scientific overall plan for the unique regional resources, heritage history, and cultural environment of the historical and cultural district of Xiaoshan West Railway Station, clarifying its nature and positioning, which provided direction for the future operation of the neighborhood [4]. Based on their research experience, this article conducts research.

2. SPATIAL REUSE STRATEGY FROM THE PERSPECTIVE OF LANDSCAPE REVITALIZATION

2.1 CONCEPT OF LANDSCAPE REVITALIZATION

Landscape revitalization refers to the process of transforming, updating, and reusing landscape resources within a city or region to enhance their aesthetics, sustainability, and functionality. This concept emphasizes the combination of landscape design with urban planning, environmental protection, and community construction, creating a livable and pleasant living environment, and achieving the maximum development and value release of urban or regional landscape resources [5-6]. Urban greening, garden renewal, restoration of rivers and lakes, urban agriculture and nature reserves are the main areas of landscape activation. This is of great significance for improving urban environmental quality, enhancing residents' satisfaction with life, promoting social and economic development, protecting the natural

environment, and enhancing urban resilience and sustainable development [7-8].

2.2 RENOVATION CASES IN OTHER COUNTRIES

The Ruhr Industrial Base in Germany is one of the largest industrial zones in Europe, established in the 19th century, and was once a symbol of industrialization in Germany and even throughout Europe. However, over time, this industrial base has experienced many problems, including environmental pollution, aging industrial structure, economic crisis, etc. [9-10]. Before the renovation of the Ruhr Industrial Base, traditional industrial facilities such as factories and coal mines were numerous in the area, and the environment faced serious pollution. In addition, with a single economic structure, Germany's economic crisis has deeply affected the Ruhr region. After a long period of transformation and transformation, the Ruhr district has become one of the centers in the fields of renewable energy, culture, design, and more. In terms of environmental protection, the environmental quality of Ruhr district has been significantly improved, and the previously polluted rivers and lakes have also been restored and protected. Figure 1 shows a comparison before and after the renovation of the Ruhr district, where (a) represents the Ruhr district to be renovated and (b) represents the renovated Ruhr district. In terms of economic development, the Ruhr district has transformed from traditional heavy industry to high-tech industry and regional green economy, forming a diversified economic structure.

(a) Ruhr district before renovation (b) Ruhr district after renovation

Figure 1. Ruhr district before and after renovation

2.3 RENOVATION CASES IN CHINA

The Beijing 798 factory was once one of the largest electronic equipment factories in China, built in the 1950s with numerous industrial plants and modern production facilities. However, after years of operation, the factory gradually declined and did not stop production until the early 1990s. As Beijing sought to utilize abandoned industrial land for urban renewal and the development of cultural and creative industries in the late 1990s, the 798 factory area began renovation. It was transformed into an art district, attracting a large number of artists, designers, galleries, and cultural institutions to settle in. The original factory buildings have also been transformed into art exhibition halls, creative studios, design companies, galleries, etc. Now, the 798 Art District has become an important venue for various art exhibitions, cultural activities, and art festivals, including visual arts, photography, sculpture, installation, fashion, and design [11-12]. The renovated Beijing 798 Art District is famous for its unique atmosphere of industrial sites and the vitality of creative art, becoming a cultural gathering place full of creativity and art. Table 1 shows successful renovation cases in various countries.

Table 1. Renovation Cases

Nation	Example	Location	Time
Australia	Sydney High Line Park	Sydney	2015
Korea	LOG ROAD DAIKANYA MA	Seoul	2017
China	798 Art District	Peking	2002
Germany	Landschaftspark Duisburg-Nord	Duisburg	1994
Britain	The Iron Bridge and Tollhouse Museum	Sheffield	1990

INVESTIGATION

2.4 INVESTIGATION METHODS

To understand the actual situation of the old industrial areas in Northeast China and find design solutions that are in line with local characteristics based on field investigations, conducting research is essential. Researchers need to conduct on-site inspections of the old industrial base to understand its actual situation and potential problems, while conducting interviews and exchanges with relevant stakeholders (residents, enterprises, governments, etc.) to understand their needs and expectations. Due to the difficulty in accurately obtaining everyone's opinions, this investigation is divided into online and offline surveys. A total of 520 valid samples are collected [13-14]. In terms of the participating population category, netizens are the majority, accounting for 75%. Among them, the proportion of people aged 1-18 is relatively low, only 5%; 35% are aged 19-40; 40% are aged 41-60; 20% are aged 60 and above. The composition of the surveyed individuals is shown in Figure 2. By collecting opinions from local respondents and analyzing them, reasonable renovation methods can be found.

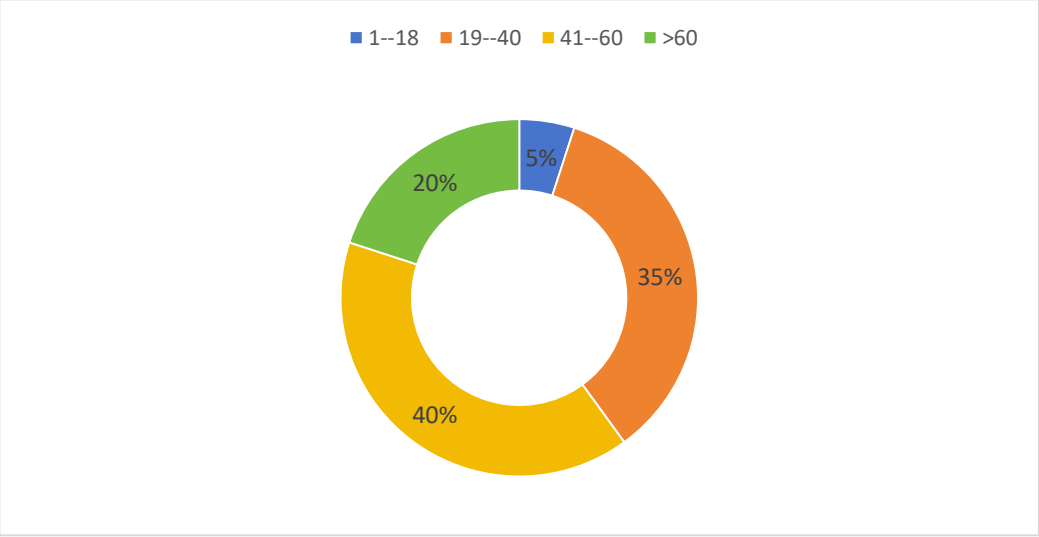

Figure 2. Age composition of the surveyed individuals

2.5 INVESTIGATION RESULTS

After on-site research, it was found that local people believe it is necessary to carry out renovation of the old industrial base. Many people consider that there are problems in the old industrial base that need to be solved.

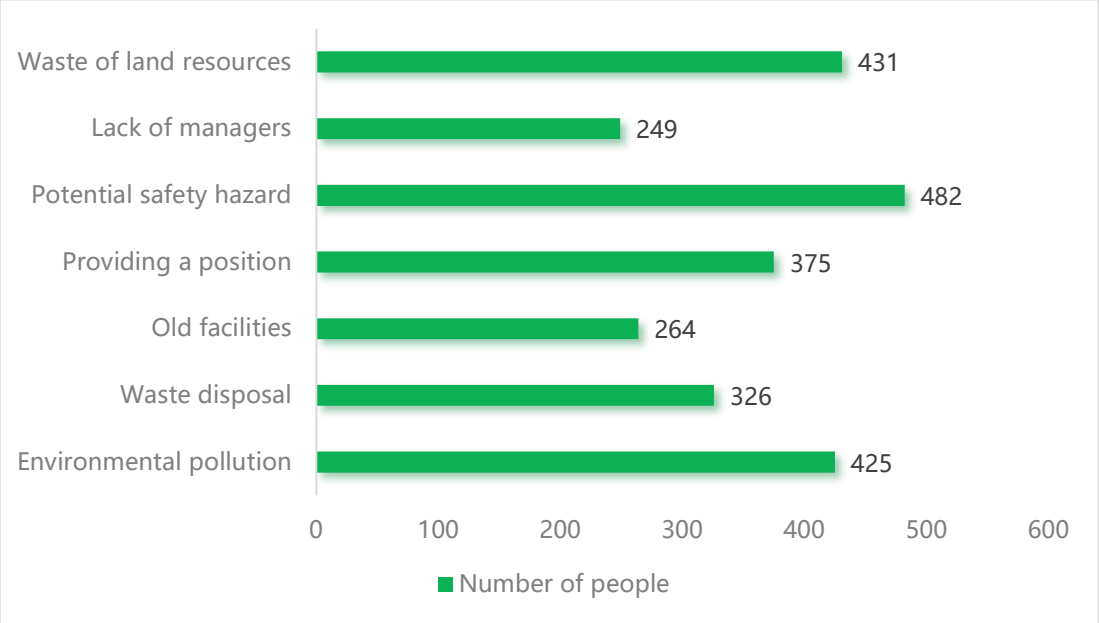

Figure 3. Issues believed by the surveyed individuals to exist

Figure 3 is a statistical figure drawn based on the results of field research. It can be seen from the figure that the surveyed people believe that there are many problems in the old industrial base. Among the surveyed individuals, 425 believe that environmental pollution needs to be addressed; 326 people want the retained waste to be disposed of; 264 people believe that old facilities need to be replaced; 375 people hope that corresponding positions can be provided after renovation; 482 people are concerned about the safety hazards of old facilities and other facilities; 249 people believe that managers are needed; 431 people believe that there is a waste of land resources in old facilities. The four most valued items by local people are safety hazards, environmental pollution, land waste, and whether renovation can increase job opportunities.

These issues need to be fully considered and resolved in the process of reuse to promote the sustainable development and successful transformation of the old industrial base.

3. RENOVATION METHODS

3.1 RENOVATION OF OVERALL SPATIAL STRUCTURE

Industrial bases are important carriers of urban history and cultural heritage, as well as witnesses of industrial civilization. Therefore, in the spatial planning of traditional industrial parks, it is necessary to respect and maximize the preservation of the design elements of the original base, and to carry out reasonable layout and optimization. At the same time, it is necessary to inject new vitality into the traditional industrial base, optimize industrial models, and create a good environment for the inheritance and innovation of industrial culture. The most important thing is to repair or replace facilities with safety hazards. From past cases, in order to achieve the transformation of industrial culture, there must be innovative industrial culture. The old industrial base covers a large area, and due to being mostly idle and abandoned, there are still some processing waste and industrial production waste that have not been fully utilized [15-16]. The spatial layout of traditional industrial zones is often arranged in the order of industrial production, and although this spatial organization model can play a certain industrial function, it lacks novelty and has a certain degree of exclusion towards new things, concepts, technologies, etc., gradually losing vitality in urban development. Therefore, in the renovation model of industrial buildings, it should not be limited to the diversified replacement of industrial building functions, but consider the landscape layout within the industrial area. In the renovation design, green spaces should be left as much as possible, such as landscape courtyards, rooftop gardens, etc. This can comprehensively restore the ecological environment of the base and activate idle abandoned spaces. For discarded industrial equipment and parts,

they can be transformed into sculptural landscapes, which not only effectively utilizes industrial waste but also adds economic and aesthetic value to the park [17-18].

3.2 REVITALIZATION OF LANDSCAPE ELEMENTS

With the continuous improvement of people's living standards, the basic conditions for their living environment are also increasing. They not only need to focus on functionality, but also consider safety, comfort, and aesthetics. Infrastructure includes the hardware and software facilities of the site, and high-quality hardware facilities are the basic conditions of the site, including roads, ground paving, lighting, etc. Software facilities refer to garden furniture that can soften the surrounding environment, such as pavilions, landscape chairs, etc. They are important components of the landscape environment, with characteristics of public and communication. They can express the individual characteristics of the site, making the space vibrant. Designers need to choose landscape furniture that conforms to the temperament of the site, or independently design according to the characteristics of the site [19-20].

Public art can also be introduced. Public art usually exists in special public space environments, and in practical functions and cultural psychology, it is closely related to the surrounding natural and cultural environment. Therefore, designers need to deeply explore the natural cultural resources of the place, extract cultural symbols, in order to create a shared, humanized, and aesthetically pleasing landscape space. There are various ways of expressing public art, including sculpture, painting, landscape, installation, etc. In public art, sculpture is an important form of expression that not only has a visual impact on spatial form, but also reflects the power of culture and ideas. The art of painting can be extended to the fields of graffiti, murals, etc. Its characteristics are simple operation, strong visual impact, and the ability to more fully describe the culture of the site. When designing, it is important to fully leverage the role of popular art, as well as its role in promoting industrial culture and shaping local spirit.

3.3 INTRODUCTION OF DIGITAL TECHNOLOGY

In today's increasingly advanced digital technology, by digitizing the protection, display, and utilization of industrial heritage, it is possible to achieve comprehensive and efficient protection and revitalization of industrial heritage in a high-quality and efficient manner. Through digital means, tourists can experience industrial culture, industrial spirit, industrial technology, and more from different perspectives.

4. CONCLUSION

In the context of sustainable and healthy urban development and the practical needs of the people, this article takes the spatial reuse of the Northeast Industrial Base as the research object, and a large amount of literature and relevant theories have been studied. Based on the perspective of site landscape revitalization, various research methods are used to conduct on-site investigations on the current situation of abandoned urban railways. This article provides a detailed analysis of excellent practice cases in various countries, summarizing and summarizing the design principles and methods for revitalizing urban abandoned railway landscapes. The application of landscape revitalization strategies and methods can not only effectively solve the problems faced by the old industrial bases in Northeast China, but also improve the environmental quality of cities and the quality of life of residents. In the future, diversified funding mechanisms, public participation models, and policy guidance methods should be further explored to promote the landscape revitalization and sustainable development of old industrial bases.

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REFERENCES

[1] Song Shihua; Shen Yi; Chen Yi. Research on the Practice of Chengdu Industrial Heritage Landscape Renewal in the Context of Industrial Culture Inheritance. Landscape Architecture, 2020, 27(7): 36-41.

[2] Liu Yanxiao, et al. Construction and Empirical Study of Industrial Heritage Tourism Value Evaluation Index System: A Case Study of Northeast China. Journal of Chinese Ecotourism, 2023, 13(2): 293-304.

[3] Zheng Xin; Li Zhuo.A Design Method for Post Industrial Landscape Renovation Based on Place Dependence Theory[J].Xiandai Horticulture,2023,46(20):75-77.

[4] Chen Jing.A Study on the Path of Industrial Relics Renovation and Renewal under the Background of the Grand Canal Planning -- Taking the Historical and Cultural Block of the West Railway Station Section in Xiaoshan as an Example[J].Architecture & Culture,2023,(10):181-183

[5] ANGELIS-DIMAKIS, Athanasios, et al. SWAN platform: A web-based tool to support the development of industrial solid waste reuse business models. *Waste Management & Research*, 2021, 39(3): 489-498.

[6] ZHANG, Yixin; DU, Lizhu; LIU, Jian. Identifying the reuse patterns of coal mining subsidence areas: A case-study of Jixi City (China). *Land Degradation & Development*, 2021, 32(1)7: 4858-4870.

[7] HERRERA, Jose Antonio; LOMBARDI, Angela. Introductory approach to eco-hydrological urbanism: the adaptive reuse of PEMEX former refinery in Reynosa, Mexico. International Journal of Environmental Impacts, 2021, 4(1): 1-13.

[8] MAO, Mao; LINGJUN, S. U. Rural revitalization construction and local landscape design: A case study of qili village, aijia town, dianjun district. Yichang. Journal of Landscape Research, 2022, 14(2): 33-38.

[9] VARDOPOULOS, Ioannis. Adaptive Reuse for Sustainable Development and Land Use: A Multivariate Linear Regression Analysis Estimating Key Determinants of Public Perceptions. Heritage, 2023, 6(2): 809-828.

[10] MAO, Mao; WENYAN, Zhou. Research and Practice of Agricultural Cultural Tourism and Vernacular Landscape Design under the Background of Rural Revitalization: a Case study of Jinse Time Agricultural Park in Fu'an Village, Dianjun District, Yichang. Journal of Landscape Research, 2021, 13(6): 37-47.

[11] MESDA, Yasemin; KURT, Sevinç. Industrial Heritage Buildings in Cyprus; Spatial Experience of the Nicosia Municipal Arts Centre. Prostor: znanstveni časopis za arhitekturu i urbanizam, 2021, 29.1 (61): 100-117.

[12] [12]HWANG, Soe Won; LEE, Seog Jeong. Unused, underused, and misused: an examination of theories on urban void spaces. Urban Research & Practice, 2020, 13(5): 540-556.

[13] LAK, Azadeh; GHEITASI, Mahdi; TIMOTHY, Dallen J. Urban regeneration through heritage tourism: Cultural policies and strategic management. Journal of Tourism and Cultural Change, 2020, 18(4): 386-403.

[14] BLAŽEK, Jiří; KVĚTOŇ, Viktor. Towards an integrated framework of agency in regional development: The case of old industrial regions. Regional Studies, 2023, 57(8): 1482-1497.

[15] ORLENKO, Mykola, et al. Ways of revitalization with the restoration of historical industrial facilities in large cities. The experience of Ukraine and Poland. International Journal of Conservation Science, 2020, 11(2): 433-450.

[16] ZHANG, Jiazhen; CENCI, Jeremy; BECUE, Vincent. A preliminary study on industrial landscape planning and spatial layout in Belgium. Heritage, 2021, 4(3): 1375-1387.

[17] BUGARIN, Dejan; KRSMANOVIĆ, Veličković Sanja; TUCOVIĆ, Miloš. Potentials of cultural-historical and tourism heritage for the development of tourism in the Timok region. Serbian Journal of Management, 2021, 16(1): 201-212.

[18] e P F, Lee M Y, Wong J W C. Assessing community attitudes toward industrial heritage tourism development[J]. Journal of Tourism and Cultural Change, 2020, 18(3): 237-251.

[19] Lu N, Liu M, Wang R. Reproducing the discourse on industrial heritage in China: Reflections on the evolution of values, policies and practices[J]. International Journal of Heritage Studies, 2020, 26(5): 498-518.

[20] Della Torre S. Italian perspective on the planned preventive conservation of architectural heritage[J]. Frontiers of Architectural Research, 2021, 10(1): 108-116.