

International Journal of Civil Engineering and Machinery Manufacture

Volume 7, Issue 1, March, 2022

President: Zhang Jinrong

Chief Planner: Wang Liao, Qiao Jun

Executive Chief Editor: Zhang Qiong, Pei Xiaoxi, Chen Shuqin

Editorial Board: Li Shu, Wang Yawen, Gao Shufen, Wei Zhang, Su Daqi, Sun To, Yu Borui,
Souza, Pei Liu, Yang Lu, Guoquan Min, Meng Yu

Audit Committee: Zhitang Song, Xu Lijuan, Dong Peiwang, Su Jianmin, Ali Coskun, You Wenying,
An Xin, Yan Yanhui, Tang Ming, Yang Ming, Zhi Zhong, Xiao Han, Sun Wenjun,
Licheng Fei, Bom Sook Kim, Lijie Li, Jin Hong Cha, Tan Ker Kan,
Wenzhong Shen, Zhaohui Zhong, Yong Shao, Vikram Kate

Publisher: HongKong New Century Cultural Publishing House

Address: Unit A1, 7/F, Cheuk Nang Plaza, 250 Hennessy Road, Wanchai, Hong Kong

Tel: 00852-28150191

Fax: 00852-25445670

Contents

Research on Protection Strategy of Industrial Building Sites Driven by Cultural Industry	
<i>Yong Yang</i>	(1)
Study on Digital Protection Strategy of Ancient Architectural Heritage	
<i>Guoqing Zhu</i>	(7)
Study on Optimization Strategy of Historic Relics Site Protection	
<i>Xiancheng Liu, Zhuo Chen</i>	(11)
Research on Measurement Method of Concave-Convex Depth of Precast Beam End based on 3DLaser Scanning	
<i>Lin Tang, Jianguang Xie</i>	(15)

Research on Protection Strategy of Industrial Building Sites Driven by Cultural Industry

Yong Yang

School of Urban Construction, Yangtze University, Jingzhou, 434000, China

Abstract: Taking the industrial building site as the research object, from the perspective of cultural industry, the corresponding protection strategies of industrial building site are formulated. This paper expounds the concepts of industrial building sites and cultural industries, and describes in detail the status quo of protection of industrial building sites at home and abroad. By identifying the performance characteristics of industrial building sites, evaluating landscape cultural elements in the context of cultural industry, and establishing a sound protection mechanism, the goal of formulating protection strategies for industrial building sites can be achieved from three aspects.

Keywords: Cultural industry; Industrial building sites; Historical imprint; Visual arts; Protection strategy; Cultural elements

1. Introduction

The important territory of human industrial development is industrial buildings, and many historical industrial buildings are engraved with the brand of The Times. In the research field of modern Chinese architectural history, historical industrial building sites have certain research and protection value. In reality, the protection and renewal of historical industrial building sites are the continuation of a city's historical context and the best exhibits of the industrial era [1,2]. With the advent of the era of economic integration and globalization, the protection and research of industrial relics in the world are deepening, and exchanges are strengthening. Scholars and enthusiasts concerned with the preservation and research of industrial relics generally recognize the inevitable trend and necessity of international cooperation. Industrial sites are the precious wealth left by history to every city, including both material wealth and spiritual wealth [3,4]. They witnessed the industrial development of the city and even the country. However, this witness is on the verge of disappearing in the renewal of the city. After the 1950s, the world's research on the protection of cultural sites entered a new stage, and the concept of sites was generalized. In 1978, the third International Congress of Industrial Monuments was held in Sweden, and the International Commission for the Protection of Industrial Sites was formally established. Since then, the concept of "monument" has been replaced by "industrial heritage", which has become the unified object of international industrial archaeology research. In addition, the old industrial buildings and ruins in the city are rede-

efined as the industrial landscape in the city. During this period, the research on the protection and utilization of industrial heritage developed rapidly and became increasingly perfect. There were many cases of development and transformation of old industrial areas or single sites of industrial buildings. The International Commission for the Preservation of Industrial Sites is concerned with the investigation and preservation of historical industrial buildings, industrial equipment and site remains. Members come from all walks of life, including industrial researchers, conservators of cultural relics, historical researchers, social activists, museum researchers, university teachers and students, architecture enthusiasts and others who are interested in historical industrial relics. Selective and effective protection or transformation of it is not only to preserve or protect a historical building or site, but more importantly to protect the physical evidence of a city's history, which has not been destroyed by human behavior. While pursuing modern values, many industrial historical buildings with historical and cultural values are gradually disappearing in people's memory, only a few historic sites can be spared. For a long time, China's industrial building sites have been mainly concentrated in ancient smelting sites, mining sites, kiln sites, Bridges, wine making and water conservancy projects. As modern and modern industrial sites to be protected are hanyeping coal and iron factory, Qingdao brewery, Qiantang River bridge, Nantong Dasheng gauze factory, Daqing oil well, Qinghai nuclear weapons base and other 13, resources are not rich. Based on the existing practice and theoretical background: Compared with western developed countries, China

started relatively late in the research on industrial sites, and the research is still in a relatively preliminary stage. The relevant theoretical research is scattered and lacks systematic analysis and perfect planning system for protection and utilization. For these deficiencies, we urgently need to find effective strategies for the protection and utilization of China's industrial sites to meet the objective needs of China's urban development.

2. Description of Relevant Concepts

2.1. Industrial building sites

From the combination of words, we can divide industrial sites into two parts. One part is "industry", which is defined as the work and process of processing collected raw materials into products [5, 6]. The other part is "site", which refers to the remains left by human activities, including construction groups or sites left by industrial activities. Industrial architectural heritage includes the material and intangible cultural heritage left over from the process of industrial development, including the production architectural heritage of workshop, warehouse building and mine, as well as the transportation, trade and management architectural heritage equipped with industrial production. So in general, industrial sites refer to the remains left by people after they carried out industrial activities. In addition, it also includes achievements in the field of social engineering brought about by new technologies and materials, such as roads, canals, railways, Bridges and other transportation, storage, and delivery buildings.

2.2. Cultural industry

Ruins of the cultural industry is not a single one industry, but a kind of profit-making career collectively, including all kinds of site protection work and site resource development object, refers not only to simply in the industry of social development, culture and related industry refers to provide public cultural products and related products production activities of a collection of [7]. And cultural heritage protection services into the cultural industry system, it can be seen that the broad sense of cultural industry system is more realistic and farsighted. At the same time, it is also included in the national economic system, including private enterprises, individuals, and state-owned institutions. It not only refers to profit-making enterprises and public institutions, but also refers to all kinds of scientific research institutions and protection institutions of sites with public welfare or enterprise funded by the state.

3. Protection Status of Industrial Building Sites

3.1. Foreign research status

Foreign research on industrial heritage was first started in Britain in the middle of the 19th century. "Industrial archaeology" has triggered people's awareness of the protection of industrial heritage, and its objects are mainly machinery and equipment or monuments during the industrial Revolution. It advocates the recording and preservation of industrial heritage during the industrial Revolution, which belongs to the initial stage of research. Some scholars who have examined many American cities have concluded that vibrant streets and neighborhoods are rich in diversity, while failing urban areas tend to have a pronounced lack of diversity. Faced with this situation, urban renewal in western countries began to change their thinking, focusing on reconstruction and solving urban environmental, economic and social problems instead of simply demolishing old buildings and building new ones. In the 1970s, when the research entered the development stage, people gradually broadened their horizons on the basis of "industrial archaeology" and turned to "industrial sites". Subsequently, western countries set up relevant research organizations on the protection of industrial heritage. In terms of the research and development process of different countries, The UK is generally considered to be the country with the greatest contribution to industrial heritage research and the most outstanding achievements. In addition, Germany has many successful practical cases in the combination of the protection and utilization of industrial sites and landscape planning, which are recognized and respected by the world. Its achievements are extremely outstanding and of pioneering significance.

3.2. Domestic research status

Compared with foreign countries, the study of industrial sites in China is relatively backward, but as a new academic field, more and more scholars are working hard in it. Our country in the 1970 s began to make a study of history of industrial building and reform has studied the history of industrial building for more than 40 years, including on macro structures in different locations and building s, on microscopic including different architectural function, architectural form, the transformation of technology and other aspects have abundant achievements, It provides a variety of development modes and transformation strategies for the transformation and reuse of old industrial buildings. Before 2002, few domestic scholars "industrial sites in this area," in the ninety s, an article about "port industrial area construction", we are the earliest visible academic papers relating to the "industrial sites", but in this paper, as to the discussion of industrial sites just passing, is not deep. However, the transformation of historical industrial buildings in China is basically from the perspective of culture, art and aesthetics, and lack of research and practice from the perspective of the overall environment and landscape

ecology. There are many problems such as lack of details, high energy consumption and environmental pollution. Since 2002, domestic scholars have gradually begun to pay attention to the protection and research of industrial sites. After more than ten years of development, academic research on such issues has been deepening, and relevant papers have been greatly improved in both quantity and quality. Industrial heritage protection and research has become a new subject and received widespread attention in academic circles. In general, compared with the level of foreign developed countries, the research on the reconstruction of historical industrial buildings in China started late and has not formed a complete theoretical system, so there are some problems in the practice of the reconstruction of old industrial buildings in China, but the development prospect is good.

4. Formulating Protection Strategies for Industrial Building Sites Driven by Cultural Industries

4.1. Identify the features of industrial building sites

Industrial sites have different characteristics due to their different generation times, different regions and different forms of industry [8-9]. Industrial buildings or structures, industrial machinery and equipment or land for industrial activities retained in industrial sites often have unique characteristics because of their special use functions and historical environment, which bring distinct industrial history marks to the site. Industrial sites include two parts. One is industrial heritage, which mainly refers to material cultural heritage resources in industrial heritage. Second, brown field, mainly refers to the industrial idle land resources that can be reused after protection and transformation. The specific characteristics of industrial building sites are shown in Figure 1:

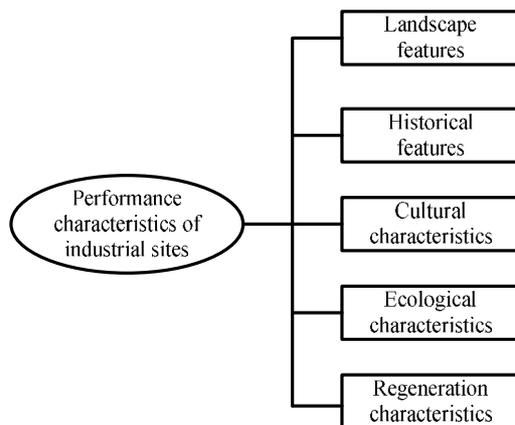


Figure 1. Features of industrial building sites

As can be seen from Figure 1, the features of industrial building sites include landscape features, historical features, cultural features, ecological features and regeneration features. For example, the huge amount of industrial activity waste left on the site; Factory buildings engaged in industrial production; Abandoned railway roads or artificially mined waterways and so on have strong landscape effects, distinctive landscape characteristics, with a strong appreciation. Industrial architectural heritage is of great cultural value [10-11]. First of all, in terms of production technology and technology, some industrial architectural heritages have completely retained the technology of the industrial age, but now these skills have disappeared or are disappearing. Therefore, industrial architectural heritages are an important basis for the research, protection and restoration of these skills. Industrial sites as an important part of human cultural heritage, on the one hand, he witnessed the progress of human technology and industrial civilization, is irreplaceable. On the other hand, industrial replacement and resource abuse have led to a series of social problems such as economy, employment and security, which are worth our reflection, but this special history has endowed us with special memories. There are some ecological problems in the abandoned industrial land. Industrial architectural heritage is not only of great value in science and technology, but also representative in architectural design and aesthetic tendency of the same period. Some industrial buildings completed by well-known architectural designers can reflect their specific design schools and architectural styles, with unique artistic value. The logic, order and mechanical aesthetics embodied in the current industrial architectural heritage all reflect the aesthetic and cultural value tendency of the industrial age. Its vacant factory buildings and abandoned industrial facilities can be directly inherited or received, with the characteristics of reuse. Through artificial reasonable repair and transformation, it can be sustainably used. In addition, some industrial architectural heritage records important technological changes in the process of technological development, as well as the associated processes, materials and equipment, which are of great scientific value. At the same time, industrial buildings in different periods adopt different designs, structures, materials and construction techniques, which can be used to study the development process of technology and also have obvious cultural characteristics.

4.2. Evaluating landscape cultural elements in the context of cultural industry

The core of industrial site cultural industry cluster is the site and the culture contained in the site. The protection of site is divided into the site itself and the protection of site culture. Therefore, cultural factors are one of the indispensable factors for the collaborative development

of industrial site protection and cultural industry cluster, mainly including the continuation and exploration of the cultural connotation of the site. Background characteristics: The generation of industrial site cultural industry must be based on the special background of industrial site, and the "cultural property" of industrial site determines the "cultural property" of cultural industry of industrial site, that is, it has profound historical and cultural deposits [12-13]. Industrial site culture connotation is very full, the unique status of the information given in the cultural level, its cultural value is extremely high, is the historical, political and economic aspects of a powerful carrier of information, is we understand information database of han dynasty, the continuation of its cultural connotation is a key task of the protection work. Content features: The industrial site culture industry includes not only business enterprises, but also enterprise units for site protection and display, scientific research and cooperation. Compared with general cultural enterprises, they are more diversified in nature and more public welfare and social. Characteristics of spatial distribution: the spatial distribution of cultural industries in industrial sites is mainly concentrated in the industrial site area, and there are also scientific research and cooperation units and production units of cultural products related to the site outside the site area. Core layer of cultural industry: site park, museum, archaeological institute, planning and design unit, etc. Enterprise institutions include: site museum, site theme park, site management unit, site tourism scenic spot, planning and design unit, ancient construction company, site exhibition planning company, tourism company. Cultural industry in the industrial site is a cultural enterprise, has a unique social attribute, a variety of production and operation in site business is given priority to with cultural protection and development and utilization, but from the perspective of the national economy, sites of cultural industry in order to obtain economic benefits for the purpose, is an economic sector, in the process of its development, there are independent of cultural enterprises, Only cultural enterprises with the same connotation can form aggregation effect. Therefore, the cultural connotation of cultural industry is an indispensable factor. There is a close relationship between visual art and architecture. Architecture is considered as an important part of visual art. For example, perspective comes from architecture and is a simplification of visual thinking, which also changes the design concept of western classical architecture. Postmodernism holds that the development of architectural design has in turn influenced the development of visual arts. Postmodernism takes culture as the destination of visual investigation. From the visual point of view, architecture is integrated with historical symbols, which makes architecture have typical visual characteristics. The buildings of the handicraft era, such as palaces and

churches, have strong artificial marks, and the craftsman's ingenuity is condensed in the bricks and tiles, and his feelings and aesthetics of architecture are conveyed visually. Cultural industry periphery: handicraft company, book publishing house, film and television company. Enterprise institutions include: site books and newspapers publishing house, cultural relic reproduction products company, site image product manufacturing company, site virtual imaging and network communication, other handicraft company. Site cultural industry related layer: antique toy factory, antique clothing factory, hotels and restaurants.

4.3. Establishing a sound protection mechanism

Based on foreign experience and research, we can see that the first step of industrial site protection is often driven and guaranteed by relevant mechanisms. Because industrial sites are often the product of social obsolescence, people do not pay enough attention to them, so to seek their benign development, it is necessary to establish a sound protection mechanism. The promotion of protection education and the establishment of protection consciousness of historical industrial building sites include professional education, student education, public popularization and museum display. First of all, professional education on the history, protection methods and transformation methods of historical industrial buildings should be carried out in universities and vocational colleges. It should include relevant laws and regulations, the introduction of a clear industrial heritage appraisal charter, etc. At the same time, the relevant protection mechanism should be jointly formulated by government departments, relevant enterprises and developers. Advocate and encourage primary and secondary school students to visit and read specialized materials on industrial history and industrial heritage. Thirdly, public interest in industrial sites and recognition of their historical, cultural, technological and aesthetic values should be improved, because public popularization is the most reliable way to protect industrial heritage [14-15]. Through exhibitions and media publicity organized by relevant departments, the value of all aspects of industrial heritage will be displayed, and people can be easily approached, visited and interact with the exhibits. After the mechanism is established, it should also be made known to the public, a census should be conducted, and suggestions should be solicited for appropriate changes. The establishment of a sound protection mechanism can effectively promote the development of relevant protection. The renewal of industrial sites involves different aspects such as history, economy and environment, so the overall planning and arrangement should first explore the potential of the site itself in urban development, and achieve sustainability in the city along with environmental remediation and rational development. It is an effective

tive way to promote the conservation education of historical industrial building sites and establish the public awareness of conservation through the establishment of professional industrial and technical museums and the exhibition of the protected industrial heritage. The cultural relics departments of the central and local governments should organize experts as soon as possible to carry out the nationwide survey, identification and classification of historical industrial building heritage and summarize the heritage list. Systematically organize the archives of the heritage in the form of photos, drawings, texts and audio, etc. The collected forms include interviewing the masses and describing the information recalled by relevant parties, and establish the industrial heritage database. Thirdly, the overall adjustment of the nature of industrial land should be made to advocate the mixed development and use of land. For example, the old industrial zone in the city can be updated to be used for business, park green space, residential and other different types of urban land. With the transformation of the industrial society to the post-industrial society, the protection planning of industrial sites has gradually shifted from the protection of sites only to the overall comprehensive development based on the original industrial sites. In this way, industrial sites can be better integrated into the society, comprehensively updated and effectively preserved. Conservation and utilization are often synergistic and indispensable. Establish the value evaluation system of historical industrial buildings as soon as possible to systematically identify the remaining industrial buildings, landscape types, structures, machinery and technological processes. The evaluation system and protection methods and utilization measures should follow international standards as far as possible, so as to enter international lists and databases in the future. In addition, the endangered historical industrial heritage should be identified and rescued as soon as possible so that effective measures can be taken to reduce the risk of destruction and appropriate conservation and reuse plans can be made. For industrial sites in the city's development, we can't just talk about protection, protection for industry alone has been the decline of the site itself, no development, should be in accordance with the "protection is Lord, rescue first, reasonable use, strengthen the management" of the guidelines for the protection of cultural relics and will protect and make use of the joint, promote each other, is the industrial site of an effective way to sustainable development in cities. The basic principle of the development of industrial cultural industry should be the protection of the site, and the industry must be developed on the basis of the protection of the site. Adhere to the basic principle of not destroying the site, the industrial selection and layout should also consider to minimize the risk of destroying the site. The site is the foundation of industrial development, without the

protection and continuation of industry, there will be no industrial form attached to it. For the industrial sites listed in the list of cultural relics, we focus on the protection and restoration, and make use of their internal space without changing their appearance to give full play to their social functions. The protection of industrial sites is the preservation of their history, and the exploration of their protection and utilization is also the objective need of constructing characteristic urban development and integrating urban resources. The construction of museums (exhibition halls) should be placed in a prominent position in the protection and display of cultural relics. Museums play an important role in the protection and display of cultural relics, drive the development of relevant industries, and play a key role in attracting visitors and spreading culture. In the process of protection and development of industrial sites, we can learn from the successful planning schemes at home and abroad, but on this basis, we must put forward innovative protection and utilization measures according to different site conditions and combine innovative thinking.

5. Conclusion

Through the comparison of the conclusions on the protection of industrial sites at home and abroad, we find the existing problems in the protection of China, combined with the relatively perfect protection system of western countries, mainly believe that the protection of industrial sites should be considered from two major aspects. On the one hand, considering the simple preservation protection, there should be the establishment of a perfect protection mechanism, including the establishment and implementation of perfect relevant laws and regulations, as well as the active and reasonable cooperation of relevant departments. In history, on the other hand, the way of protection and renovation of industrial buildings, and should not be blind reconstruction, to consider the historical industrial building the future sustainable development and the historical and cultural heritage, through the protection and research of industrial sites, make us to our country the development of the historic industrial buildings have a deeper understanding, enable us to better to planning the urban and industrial area. Our understanding of conservation should not stop at the level of conservation, but focus on the relationship between conservation and utilization. In addition, the preservation of industrial sites requires holistic planning, including the industrial site itself and its relationship to various aspects of the city.

References

- [1] Mitten A.J., Howell L.P., Clarke S.M., et al. Controls on the deposition and preservation of architectural elements within a fluvial multi-storey sandbody. *Sedimentary Geology*. 2020, 401, 105629.

-
- [2] Kozlu H., Oruh L., Oke A. Use of augmented reality in the preservation of architectural heritage: case of the aqueduct kuru kopru (Kayseri, Turkey). 2021.
- [3] Suprapti A., Sejati A.W., Sardjono A.B., et al. Toward sustainable preservation of cultural heritage buildings: a combination of digital mapping and architectural mapping for omah pencu in the historic area of kodus kulon. *Teknik*. 2020, 41(3), 201-211.
- [4] Terenzi G., Fuso E., Sorace S., et al. A case study of modern heritage building: base isolation seismic retrofit for preservation of its architectural distinguishing features. *IOP Conference Series: Materials Science and Engineering*. 2020, 960(3), 032056 (10pp).
- [5] Fadeev A.V., Nasybullina R.A. Research of documents on the architectural heritage protection in terms of the preservation of the Samara historical urban nucleus. *IOP Conference Series Materials Science and Engineering*. 2020, 775, 012015.
- [6] Raimo N., Turi I.D., Ricciardelli A., et al. Digitalization in the cultural industry: evidence from Italian museums[J]. *International Journal of Entrepreneurial Behaviour & Research*, 2021, ahead-of-print(ahead-of-print).
- [7] Martín X, Martínez A, Rentería ID. The Integration of Campsites in Cultural Landscapes: Architectural Actions on the Catalan Coast, Spain. *Sustainability*. 2020, 12.
- [8] Pastukh O, Gray T, Golovina S. Restored Layers: Reconstruction Of Historical Sites and Restoration of Architectural Heritage: the Experience of The United States And Russia (Case Study Of St. Petersburg). *Architecture and Engineering*. 2020. 5(2), 17-24.
- [9] Pravdolyubova S, Vekilyan M, Nechiporuk G, et al. The Practice of Using the Golden Section In Architecture in the City of Ryazan. *Architecture and Engineering*. 2021, 6(1), 50-57.
- [10] Gudina M, Prokofiev E. Preservation of the structure of the building in the process of renovation of industrial architecture. *E3S Web of Conferences*. 2021, 274, 01006.
- [11] Iik M, Yaar L. The Little Prince in Bookstagram in the Context of the Culture Industry: From Asteroid B-612 to Social Media Planet. *MANAS Sosial Araştırmalar Dergisi*. 2021, 1199-1213.
- [12] Malshina NA, Firsova AA. Quantitative Analysis of the Cultural Industry in the Russian Federation in 1990—2018. *Observatory of Culture*. 2020, 17(2), 125-138.
- [13] Al-Sakkaf A, Ahmed R, Afifi M. Risk Assessment Model for Heritage Buildings: Case Study of Yemen. *Journal of Architectural Engineering*. 2020, 27(2).
- [14] Subbotin OS. Updating the architectural heritage of the Krasnodar Territory, in the context of its preservation and restoration. *IOP Conference Series Materials Science and Engineering*. 2021, 1083(1), 012026.