Journal of Sociology and Ethnology (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/jsoce.2025.070105
ISSN 2616-2318 Vol. 7 Num. 1

Research on the Value Analysis with Industrial Heritage

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Keywords: Industrial Heritage; Value Analysis; Questionnaire; China

Abstract: Industrial heritage has become a hot topic in today's social life. In the process of social development, humans need to address three interrelated issues, the relationship between humans and nature evaluating the historical, economic, cultural, technological, and other aspects of industrial heritage. The objective of the research is to assess different kinds of value of industrial heritage in Beijing, Tianjin, Qinhuangdao, and Tangshan cities. Firstly, a questionnaire survey method was used to quantitatively evaluate the various values of industrial heritage, explaining the degree of public recognition of the value of industrial heritage. Among them, four cities showed a high degree of recognition of the historical and cultural value of industrial heritage. In terms of cultural value, the combination of industrial heritage with tourism and cultural industries in the process of continuous transformation and reuse has strengthened the leading role of culture.

1. Introduction

1.1. The Value Assessment Analysis of Industrial Heritage

Industrial heritage has become a hot topic in today's social life. In the process of social development, humans need to address three interrelated issues, the relationship between humans and nature (the development of productive forces), the relationship between humans (institutional changes), and the relationship between humans and themselves (the development of humans themselves). These three issues are closely related.

From the perspective of cultural relics, the values of industrial heritage lie in two sides. The material value means that as a facility, the industrial heritage could be used to meet the requirement of people's physical life. And the information value represents the history it witnessed. As a kind of modern heritage, the industrial heritage is a way to tell the history of the industry or city before[1].

Therefore, it is very important to explore suitable reuse measures for industrial heritage characteristics. Cultural industry has the advantages in promoting the conservation of industrial heritage and reusing the heritage from a creative way[2]. For example, cultural and creative industrial park are a typical case for industrial heritage renewal creatively.

However, the process of social development must gradually solve these problems step by step. The value of industrial heritage is highlighted by different value representations due to the different evaluation subjects[3]. For a city, the historical heritage accumulated from the old industrial zone sites can enhance the city's sense of solidity and enrich its historical and cultural connotations. For architects, industrial architecture and its spatial system confirm the top ten fast and simple production measures of industry, and their spatial layout and functional distribution are unforgettable. For artists, the changes and vicissitudes of industrial sites immerse them in reminiscing about the past and inspire creative insights that keep up with the times, while certain scenes scattered between cities silently express the development and changes of the city. Different groups of people interpret the value orientation of industrial heritage from different perspectives.

In recent years, there has been an increasing amount of research on the value of industrial heritage[4]. Liu B believes that industrial heritage is closely related to politics, economy, and culture, and is a faithful record of social development. Industrial architecture is the crystallization of human civilization and has high preservation value[5]. Zhu W stated that industrial heritage carries on cultural inheritance and embodies humanistic care[6]. Vecco explains the value of industrial heritage from the perspective of the use value of objects, highlighting the use value that is generally absent in its atmosphere and the witness value of special objects[7].

The value of industrial heritage in meeting human needs is its use value as a general object, and its witness value as a special object refers to the information value of industrial heritage, such as artistic value, historical value, technological value[8]. He believed that the main reason for conserving industrial heritage is that it is a special relic of the urbanization process, a carrier and witness of the development of human industrial civilization[9]. Li et al. expenditure on industrial heritage, as an important material carrier of industrial civilization, is a witness to the era of industrial civilization[10]. Its value mainly includes historical value, social value, and technological value.

1.2. The Feasibility of the Value Analysis with Heritage

Summarizing the value of industrial heritage into several main aspects is as follows[11]. The first historical research value is that industrial heritage witnesses the production and lifestyle of the industrial era, carrying the historical memory of different regions during the Industrial Revolution. The second value of science and technology is that industrial production is a concrete manifestation of technological practice, and industrial heritage, as a technological manifestation of the industrial revolution era, is the best explanation of the development process of human technology. The third is the humanistic and social value. Industrial heritage is the product of people's production activities during a specific historical period, which includes the memories of production and life of relevant groups. It not only becomes a common historical memory for people in the region, but also generates a strong sense of cultural identity and belonging. The fourth is the artistic value of architecture. Industrial heritage relies on certain construction techniques and is a landmark building of a specific era. In its industrial building design and internal space layout, it presents unique aesthetic viewpoints and design concepts. The fifth is economic value, which belongs to a renewable value. By conserving and reusing industrial buildings and structures, they can be fully utilized, their original functions can be realized, and new buildings can be avoided.

Wilson et al. stated that the special criteria for identifying certain categories of industrial heritage can be roughly summarized as representing the talents created by humanity, typical witnesses of cultural traditions, witnesses of important human historical processes, outstanding representatives of certain types of architecture, technological systems or landscapes, directly related to certain significant events, traditions, concepts, beliefs, art and literary works[13]. Therefore, in the process of evaluating the value of industrial heritage, it is necessary to base on the characteristics of industrial

heritage itself, adopt an objective attitude, reflect and record the history of industrial development as the criterion, and achieve coordination and unity in the comparison of old and new.

2. Methodology

Questionnaire survey measure is a widely used measure in social surveys, which expresses questions through questioning. Researchers use this controlled measurement to measure the studied questions and collect reliable data. Questionnaire measure shows that investigators analyze research problems through controlling questions and collect data or materials. The questionnaires are usually delivered by delivery, sending individually, sending in group.

2.1. Questionnaire Survey

The questionnaire survey measure is a commonly used quantitative analysis tool, which utilizes the Likert scale in the questionnaire setting process. The five-point scale is a commonly used attitude scale type, and respondents select answers ranging from one to five points for each evaluation. The five-point scale is relatively flexible in measuring the attitude of respondents and can accurately reflect the degree of their attitude.

For the completion of each survey questionnaire, multiple steps need to be taken. Firstly, a credibility survey is conducted before the questionnaire is distributed. All participants in this study used the same survey questionnaire. Before distributing the questionnaire, it is necessary to first clarify the purpose of the survey. The objectives of the questionnaire are firstly to investigate the values of industrial heritage through conservation, and secondly to analyze the feasibility of combining cultural industrial with industrial heritage.

2.2. Case Study and Data Collection

The four selected cities are all located in the northern region of China and also four cities with industrial heritage within Beijing-Tianjin-Hebei region. Based on the characteristics of Beijing, Tianjin, Qinhuangdao, and Tangshan will be the focus of this case study. Based on data from the 2018 List of Industrial Heritage Conservation of China, these four cities have 18 industrial heritage sites: the Shougang Group, the Beijing-Zhangjiakou railway, CRRC Beijing Locomotive Co., Ltd., the Beijing Coke-oven Plant, the Beijing Water Museum, China Navy Central Radio, the Beijing Banknote Printing Plant, the 718 Combined Plant, Dagu Dockyard, Tianjin Jintang Bridge, the Tianjin Soda Plant, Kailuan Coal Mine, the Tangshan Railway Site, the Luan River Iron Bridge, Chee Hsin Cement Co, Ltd. Plant, the Yaohua Glass Plant, the Tang Xu Railway Repair Plant, and the Tangshan Porcelain Plant.

The scale questionnaire was conducted using SPSS 27.0 software, which is a specialized software for conducting statistical analysis and can support data processing and analysis functions. The industrial heritage in China implied historical and material values, and reflected the Chinese industrial development history. The conservation of industrial heritage in China has been developing with the progress of cultural industry. And the analysis of industrial heritage in China has been combined with cultural industry in the past 20 century.

3. Results and Discussion

3.1. Reliability and Validity Testing

The results of the city-by-city test are shown in Table 1, which indicates that the Cronbach's

coefficients for all four cities are greater than 0.97 indicating a high level of reliability in the questionnaire data.

Table 1 presents the validity test results for questions. The closer the KMO value is to 1, the stronger the correlation between variables and the more suitable it is for factor analysis. In this study, the KMO values of the four sets of data were all greater than 0.85, and the Bartlett test results were all less than 0.001, indicating a certain correlation between the data variables.

Table 1. Reliability Analysis and Validity Analysis Results of the Value Analysis of Industrial Heritage

The name of cities	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	KMO	Bartlett test
Beijing	0.973	0.973	0.891	<0.001
Tianjin	0.982	0.982	0.851	<0.001
Qinhuangdao	0.989	0.989	0.910	<0.001
Tangshan	0.973	0.973	0.876	<0.001

3.2. Reliability and Validity Testing

The descriptive analysis results of Beijing's problems are shown in Table 2. Among which A (Tell historical stories in the form of museum, cultural properties or parks) and D (Map historical changes through immaterial processes such as technology and culture involved in industrial heritage) have the highest average scores of 4.37 and 4.27, respectively. It also confirms that industrial heritage has a high level of public recognition in the process of transmitting cultural and historical values. And among all the issues, reveal the lack of regional economic development, reflecting on the regional social development pattern, and reveal that problems exist in the lowest average score of regional social development, indicating that the public's value of industrial heritage in terms of social impact is not significant.

The descriptive analysis results of Tianjin city are shown in Table 2, where D (Map historical changes through immaterial processes such as technology and culture involved in industrial heritage) and O (Highlight the advantages of regional cultural development) have the highest average scores of 4.20 and 4.22, respectively. However, the average scores of the remaining answers are not significantly different, all above 4 points, indicating that Tianjin's industrial heritage is relatively balanced in reflecting multiple values, and the public has a high degree of agreement with the value of industrial heritage.

The descriptive analysis results of Qinhuangdao City are shown in Table 2, where the average scores for all issues are lower compared to Beijing and Tianjin, with only D (Map historical changes through immaterial processes as technology and culture involved in industrial heritage), N (Reflect the characteristics of regional cultural development), and O (Highlight the advantages of regional cultural development) having average scores exceeding 4 points, and all of these issues are related to cultural values. This is consistent with the previous analysis results, indicating that Qinhuangdao City needs to pay attention to value enhancement in the process of industrial heritage protection and reuse in the future, and these values are highly interconnected.

The descriptive analysis results of all questions in Tangshan City are shown in Table 2, where the average scores of all answers are higher than the other three cities. Among them, A (Tell historical stories in the form of museum, cultural properties or parks) and B (Retain the original architectural form tell the history of development) have the highest average scores of 4.50 and 4.46, respectively. The public's ratings for these two questions are close to very satisfactory. This is because Tangshan City has a deep influence on the public by telling the history of China's industrial development in the form of an industrial museum, which is also an experience that other cities can learn from.

Table 2. Descriptive Analysis of Industrial Heritage Values of Four Cities

Names of Cities	Question Nos.	Minimum	Maximum	Mean	Std. Deviation
Beijing	A	3	5	4.37	0.692
	B	2	5	4.14	0.917
	C	1	5	4.18	1.014
	D	2	5	4.27	0.750
	E	1	5	4.12	0.887
	F	1	5	4.04	0.958
	G	1	5	4.08	0.977
	H	1	5	3.86	1.077
	I	1	5	3.86	1.096
	J	1	5	4.08	0.913
	K	1	5	4.16	0.880
	L	1	5	3.86	1.000
	M	1	5	4.08	0.913
	N	1	5	4.10	0.922
	O	1	5	3.98	0.948
	P	1	5	3.80	1.149
Tianjin	A	2	5	4.17	0.818
	B	1	5	4.15	0.878
	C	3	5	4.19	0.754
	D	2	5	4.20	0.877
	E	3	5	4.17	0.795
	F	2	5	4.22	0.816
	G	2	5	4.09	0.784
	H	3	5	4.09	0.807
	I	2	5	4.06	0.878
	J	3	5	4.19	0.754
	K	3	5	4.19	0.803
	L	2	5	4.19	0.826
	M	3	5	4.15	0.737
	N	2	5	4.17	0.841
	O	3	5	4.22	0.769
	P	2	5	4.02	0.921
Qinhuangdao	A	1	5	3.92	0.987
	B	1	5	3.98	0.939
	C	1	5	3.90	1.015
	D	1	5	4.04	0.989
	E	1	5	3.88	1.003
	F	1	5	3.88	0.963
	G	1	5	3.92	0.987
	H	1	5	3.67	1.004
	I	1	5	3.83	0.985
	J	1	5	3.88	1.003
	K	1	5	3.98	1.000
	L	1	5	3.87	0.971
	M	1	5	3.94	0.998
	N	1	5	4.02	0.980
	O	1	5	4.08	1.026
	P	1	5	3.85	1.017
Tangshan	A	3	5	4.50	0.603
	B	3	5	4.46	0.631
	C	3	5	4.32	0.664
	D	2	5	4.36	0.699
	E	1	5	4.14	0.819
	F	3	5	4.23	0.738
	G	3	5	4.21	0.731
	H	2	5	4.04	0.894
	I	2	5	3.98	0.944
	J	2	5	4.16	0.757
	K	3	5	4.27	0.700

	L	2	5	4.11	0.824
	M	2	5	4.14	0.841
	N	3	5	4.30	0.685
	O	3	5	4.21	0.780
	P	2	5	4.05	0.862

4. Conclusion

By evaluating the historical, economic, cultural, technological, and other aspects of industrial heritage, we can better understand the significance of protecting and reusing industrial heritage. Firstly, a questionnaire survey method was used to quantitatively evaluate the various values of industrial heritage, explaining the degree of public recognition of the value of industrial heritage. Among them, four cities showed a high degree of recognition of the historical and cultural value of industrial heritage. In terms of cultural value, the combination of industrial heritage with tourism and cultural industries in the process of continuous transformation and reuse has strengthened the leading role of culture.

Acknowledgement

This research was supported by the Humanity-Society Scientific Research Program of Department of Education, Hebei Province, China, under Grant number QN2025809, the Support Projects of Tangshan Normal University No. 2023C01).

Disclosure statement

The author declares no conflict of interest.

Author contributions

A.L. conceived conceptualization, data curation, investigation, methodology, writing - original draft preparation. W.W. performed the supervision. M.I. did the editing.

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