

Research on Optimization Strategy of Shanghai Industrial Heritage Protection and Reuse Based on Multi-source Data

——Take the creative industry park as an example

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Abstract

In the context of urban renewal, the combination of cultural industries and the protection of urban old industrial buildings has become a current trend. With the great success of the transformation of Soho in the United States, the cultural and creative industries and the renewal of old industrial buildings have become an upsurge. Shanghai is the city with the richest industrial heritage in China. The main way to activate its industrial heritage is to develop cultural and creative industries and serve as a mechanism for urban transformation. However, in the face of so many industrial heritage transformations of creative gardening, how to evaluate from the perspective of users is a topic rarely mentioned.

In this context, this article selects excellent transformation cases from the transformation of Shanghai's industrial heritage into a creative industrial park, and uses the subjective evaluation method of the POE evaluation method to evaluate the transformation of the industrial heritage from the subjective point of view of the user; combined with the objective and use AutoNavi POI, space syntax, big data analysis, field surveys, on-site questionnaires and other methods analyze and evaluate the transformation strategy of Shanghai's industrial heritage from the aspects of park function, business format, and physical space, summarize the transformation strategies, and propose optimization Strategies

Keywords

Shanghai Industrial Heritage Protection and Reuse; Cultural and Creative Industry Park; Gaode POI; POE Evaluation Method; Space Syntax

1 Introduction

As one of the most important modern industrial cities in China, Shanghai has developed from a self-sufficient workshop-style and family-style operation to a more purposeful, organized and managed international industrial system [1], in the 50s and 60s of the 20th century. The era has a pivotal position in industry and trade, and all types of modern and modern industries in China can find their starting point and development trajectory in Shanghai [2]. The quantity and quality of Shanghai's industrial heritage are unique in China, and it has values such as age, rarity, and representativeness [3]. Therefore, it is very important to protect the industrial heritage, continue the cultural heritage of the industrial heritage, and protect the characteristic space of the city [4]. Shanghai has made active explorations in the protection and reuse of industrial heritage, and issued relevant laws and regulations to protect industrial heritage[5],

The creative industry is the product of the common development of urban culture, economy, and technology [6]. Scott (2005) pointed out that the main factor that attracts agglomeration of creative enterprises lies in the city's brand image and geographic location [7]. It is believed that the sustainable

development of creative industry parks lies in the formation of a diversified industrial chain [8]. British scholar Richard Florida (2002) (Florida) proposed the three elements of the ideal model of creative industry parks, namely, the "3T" theory of Talent, Technology and Tolerance [9]. The rise of creative industries requires distinctive architectural spaces. The transformation and renewal of the old industrial factory area combined with the creative industry aims to realize the reuse of resource space through the reconstruction of space and matching new resource demands, and to carry out the three elements of place spirit: "person", "psychological process" and "place". Reproduce and realize the social value of heritage [10]. Judging from the history of industrial heritage protection at home and abroad and the development process of cultural and creative industrial parks, the symbiosis of creative industrial parks and industrial heritage is a common phenomenon. As a new industry of creative industry, relevant practitioners will inevitably develop together and form a cluster of creative industries. Creative industry clusters are intelligent and knowledge-based high value-added industries, combined with strong penetration and radiation, and are a major expansion of the capital market to the cultural field [11]. Shanghai Creative Industry Park originated from urban industrial parks. After rapid development [12], there are 136 creative parks in Shanghai as of 2021 (Figure 0-1). The knowledge-intensive nature of the creative industry park is different from the traditional manufacturing industry's huge demand for land, energy and other resources. It can overcome the bottleneck constraints of Shanghai's land and resources to maintain continuous and rapid development. Services are integrated [13]. As early as the 1990s in Shanghai, there were successful cases of private entrepreneurial industrial parks reusing industrial heritage that spontaneously emerged. In Shanghai, commercial-oriented artists, private developers of creative industries, and "creative industry clusters" policies have made important contributions [14].

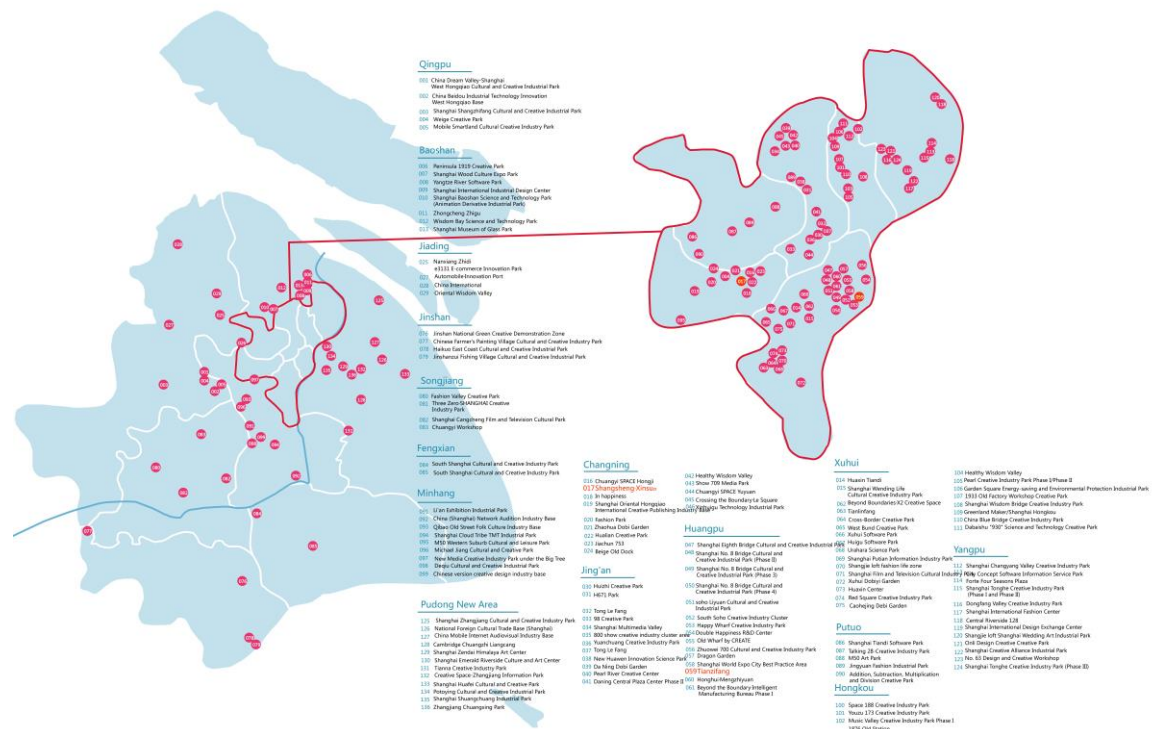


Fig.1-1 List of Shanghai Creative Industry Parks, source: Based on Shanghai Investment and Reformation

As more and more industrial heritage is being transformed, whether the transformation of industrial heritage into a creative industrial park is successful or not is a question that people must explore. This article uses literature research methods and big data analysis such as Meituan and Dianping (Table 1- 1) Select the new research institute with a large amount of comments and industrial heritage as the

research object. Then use AutoNavi POI data field survey and photo questionnaire methods to analyze the status quo, sort out the transformation strategies, and then use the POE evaluation method from the physical space level of the park [15]: road traffic, etc. and spiritual level: the overall safety and cultural heritage of the park Impressions and other two major aspects, 9 small levels and 22 impact factors, combined with space syntax, evaluate the park and find out the optimization strategy (Table 1-2).

Table 1-1 Research object selection information table

Owned administrative district	Serial number	Name of original heritage	Current name	Location	Area (m ² /mu)	Building area (m ²) (scale)	Park type	Year of opening	Social attention (as of July 2021, Meituan and Dazhong Dianping's comments)
Minhang District	1	Non-industrial heritage	Qibao Old Street Folk Culture Industry Base	Youth Road	—	—	—		Meituan: 22370; Dianping: 20750
Huangpu District	2	Shanghai Linong Factory	Tianzifang	Lane 210, Taikang Road		20000	Artistic creation	1998	Meituan: 26396; Dianping: 17746
Changning District	3	Sunke Villa, Columbia Country Club, Navy Club and affiliated swimming pools and many industrial buildings	Shangsheng-Xinsuo	1262 Yan'an West Road	More than 70 acres	50,000 square meters	Fashion creation	2018	Meituan: 11654; Dianping: 10049
Yangpu District	4	Site of the original Shanghai Seventeenth Cotton Textile Factory	Shanghai International Fashion Center	2866 Yangshupu Road	128000	130000	Fashion culture	2013	Meituan: 10725; Dianping: 8748
Hongkou District	5	Former slaughterhouse of Shanghai Municipal Bureau of Industry	1933 Old Factory Workshop Creative Park	611 Liyang Road	6340	31700	Fashion culture	38930	Meituan: 10429; Dianping: 9795

Table 1-2 The evaluation factor table for the research object this time

Evaluation factor	First-level evaluation factor	Secondary evaluation factor	Variable name
Physical space level	A.the road and traffic	1. The convenience of public transportation	A1
		2. Internal traffic conditions	A2
		3. Parking conditions	A3
		4. Slow travel system	A4
	B.public space	5. Number and scale of public space	B1
		6. Cleanliness of public spaces	B2
		7. Acoustic environment in public space (with or without noise pollution)	B3
	C.construction space	8. The overall image of the building	C1
		9. The degree of coordination between industrial buildings and surrounding buildings	C2
		10. Utilization of the internal space of the building	C3
	D.Supporting service facilities	11. The perfection of park facilities (marking system, trash cans, rest facilities and lighting facilities, etc.)	D1
		12. Stairs, elevator installation situation (location, quantity)	D2
		13. Catering and commercial facilities	D3
	E.Green landscape	14. Landscape greening in the park (richness of plant species, etc.)	E1
		15. Landscape facilities in the park (sculptures, sketches, etc.)	E2
	F.indoor environment	16. Decoration design style (color, wall, material, etc.)	F1
		17. Indoor temperature, humidity, air quality	F2
		18. Indoor lighting and lighting conditions	F3
Spirit level	G.Park security	19. Security of the park (fire protection, security, etc.)	G1
		20. Satisfaction of the park management model	G2
	H.Overall impression of cultural heritage	21. Inheritance of historical context in the park	H1
		22. Industrial culture atmosphere	H2
	I.Overall evaluation of the park		Y

2 Overview of the study area

2.1 Location analysis

Shangsheng Xinsuo, located at No. 1262 Yan'an West Road, is mainly composed of Sunke Villa, Columbia Country Club, Navy Club, 3 historic buildings, 11 industrial renovation buildings, and 4 contemporary buildings. Shangsheng Xinsuo focuses on fashion and creativity, including open-air shows, swimming pool restaurants, art performances, fashion bookstores, etc., and is positioned as a fashion and creativity creative park [16] (Figure 2-1).



Fig.2-1 location of Shangsheng Xinsuo

2.2 Evaluation of the status quo of the park based on comment big data

As of August 16, 2021, the Meituan Dianping data platform has 11,735 reviews on Shangsheng Xinsuo, and the key words of the evaluation are popular (Figure 2-2). As of August 16, 2021, Dianping commented on the Shangsheng Xinsuo to have 10,127 reviews, with key words such as pets allowed, etc. (Picture 2-3)

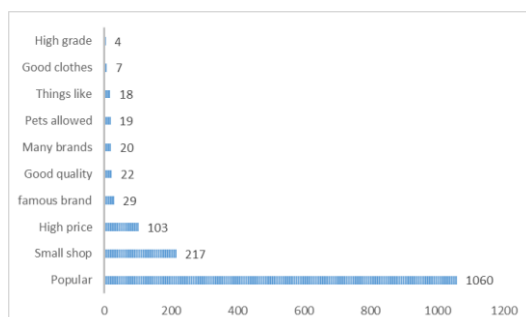


Fig.2-2 List of evaluation keywords for Shangsheng Xinsuo Meituan

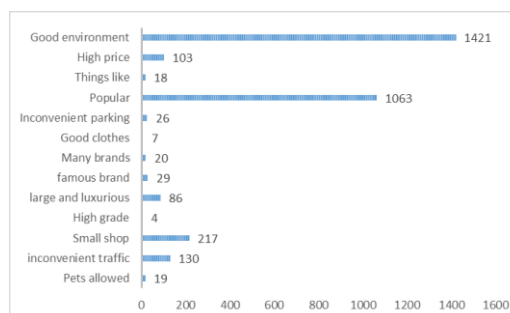


Fig.2-3 List of evaluation keywords of Shangsheng Xinsuo public comment

2.3 Analysis of Park Regional Function Based on POI

Through AutoNavi API and third-party software Mai Gao map, download data including: cultural media, education and training, food, hotels, shops, finance, corporate enterprises, leisure and

entertainment, sports, real estate, life services, government agencies, parking spots, Bus station, medical care, education and scientific research, etc. 17 sub-categories. After cleaning the data, the data is classified into four categories: life, business, leisure and entertainment, and public services. (table 2-1)

Table 2-1 The collation of Gaode POI data of Shangsheng Xinsuo

Category	Type	Quantity	Percentage
Lifes	Food, education and training, life services	452 Article	20.54%
Business, businesses	Real estate, corporate enterprises, office buildings, cultural media, shops, hotels	881 Article	38.73%
Leisure and entertainment	Sports bodybuilding, leisure and entertainment, bars	284 Article	13.78%
Public Service	Medical facilities, bus stations, parking lots, government agencies, cultural facilities, education and scientific research	484 Article	26.95%
total		2101 Article	100.00%

The core density analysis of life, business, leisure services, public services and other facilities in the 1.5km range of the Shangsheng Xinsuo as the research unit shows that Shangsheng Xinsuo is at the core of leisure and entertainment services, and the commercial and business facilities are relatively relatively small. Many, living services and public service facilities are relatively poor. The functions of leisure and entertainment and business are outstanding, which are in line with the fashion and creativity positioning of Shangsheng Xinsuo [17] (Figure 2-4).

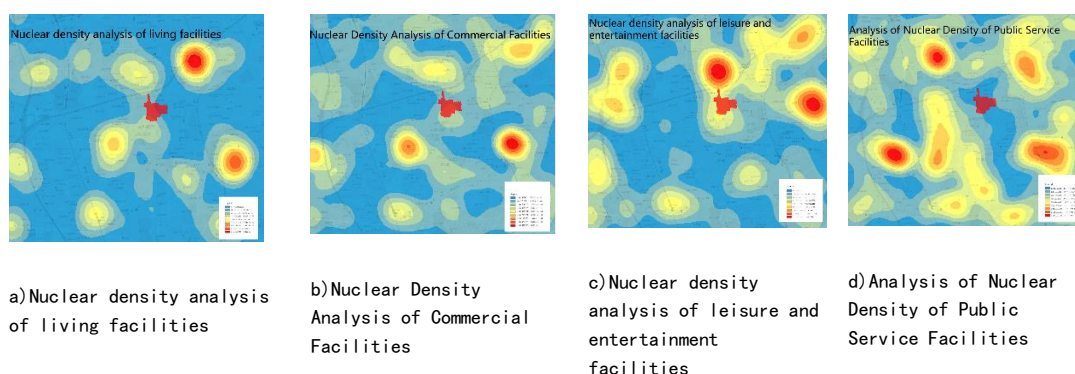


Fig. 2-4 Analysis of Nuclear Density of Various Service Facilities of Shangsheng Xinsuo

3 Evaluation of strategies for the status quo of industrial heritage reconstruction based on multivariate data

3.1 Research on the status quo strategy of industrial heritage reconstruction based on status quo investigation

(1) Public space strategy

① Road traffic strategy

The park has entrances from different directions. The internal roads are hardened with asphalt and hard pavement. Some roads are branched by people and vehicles. Vehicles cannot span the entire park. Ecological parking lots are set up outside (Figure 3-1).

② Streets and Lanes Square Space Strategy

Demolish some non-reserved and poor-quality buildings, reshape the texture of streets and lanes, and harden the original grassland to create a suitable enclosed space for streets and lanes (3-2). Demolition of non-historical protected buildings, adding node spaces of different scales and functions (red carpet square and central festival square) (Figure 3-3), (Figure 3-4)

(2) Greening landscape strategy

The park retains the original trees, and then implements three levels of greening, including trees, shrubs, and potted plants.

(3) Architectural space strategy

Use the idea of symbiosis to update the urban industrial heritage buildings [18]. The current reconstruction demolishes a small number of low-quality buildings built in the base, and the renovation of the existing buildings on the base in the design is divided into three types: the protection of historical buildings, the renovation and reconstruction of existing buildings, and the new construction (Figure 3-5). The Colombian General Assembly and Sunke Villa have historical buildings that protect their identity, follow the minimum intervention and recognizable principles required by cultural relics and historic sites, and restore their historical features and charm through the restoration of facades and key protected spaces. The Leprosy Building retains the appearance of modernism. The south facade is under lighting requirements. It is replaced by large glass windows, and the facade is decorated with modern new materials (Figure 3-6); a mirrored stainless steel curtain wall is added to the original pressure control pump room in the northwest corner. (Picture 3-7) to improve the quality of construction.

(4) Humanistic environment strategy

Shangsheng Xinsuo actively introduces social capital for multi-party co-construction and sharing. Participants include governments, academic institutions, social organizations, residents, and real estate companies. The original industrial plant was transformed into an open urban meeting room with multiple functions such as business, office, leisure, culture, and community services.



Fig.3-1 Renovation of internal roads of Shangsheng-xinsuo



Fig.3-2 Street space enclosed by Shangsheng-xinsuo



Fig.3-3 Red Carpet Plaza of Shangsheng-xinsuo



Fig.3-4 Plan of trees reserved in the central assembly square of Shangsheng · xinsuo
Source:www.baodu.com

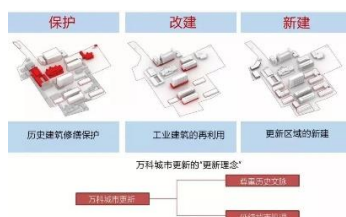


Fig.3-5 Building renovation status of Shangsheng·xinsuo, source: Vanke plan



Fig.3-6 The south facade of the former Leprosy Building of Shangsheng Xinsuo after renovation, source: Internet



Fig.3-7 The original pressure control pump room of Shangsheng · Xinsuo adds glass curtain wall

3.2 Evaluation of industrial heritage transformation strategy based on POE

Friedman (1990) (A. Friedman) and others believe that: "POE is a degree evaluation: the built environment must meet people's explicit or implicit needs [19]." Wolfgang FEPreiser (1988) and others Architecture scholars believe that: "POE focuses on the needs of building users, the success or failure of architectural design, and the performance evaluation of the building after a period of completion, which will provide the basis and foundation for future architectural design [20]." Domestic scholars believe that POE refers to the collection of users' evaluation data on the built environment through a scientific system program, and through scientific analysis to understand their evaluation of the target environment several years after its completion [21].

The post-use evaluation (POE) discussed in this article is mainly aimed at the application of the environmental design field of the reconstructed buildings of Shanghai's industrial heritage and a certain area around it. On-site surveys, on-site interviews, online and offline questionnaires are conducted on the reconstructed industrial heritage. Ways to collect people's satisfaction evaluation of the built environment. Use the Likert scale method to assign a questionnaire to the various indicators specified by the park [22], analyze the correlation with the overall satisfaction of the park, analyze which index is greater for the overall satisfaction, and guide the optimization of the subsequent strategies According to analysis, there are 100 valid questionnaires online and offline.

First, conduct a survey of the personnel visiting the park:

Table 3-1 Basic Information of Visitors from Shangsheng Xinsuo

Research question	Options	Frequency	percentage(%)	Cumulative percentage (%)
1. Your gender	A. Male	50	50	50
	B. Female	50	50	100
	B. 18-30 years old	64	64	64
	C. 31-45 years old	30	30	94
	D. 46-60岁	6	6	100
	B. Junior high school	3	3	3
	C. High school or technical secondary school	4	4	7
	D. Junior college	3	3	10
	E. Undergraduate	78	78	88
	F. Master's degree and above	12	12	100
4. When do you usually visit the local area?	A. Before going to work	6	6	6
	B. During lunch break	18	18	24
	C. After get off work	18	18	42
	D. Weekend	35	35	77
	E. Holidays	23	23	100
5. Your role in the park	A. Park manager	14	14	14
	B. Businesses settled in the park	12	12	26
	C. Tourists	73	73	99
	D. Other	1	1	100
6. What is your usual purpose of coming here?	A. Leisure, pastime	18	18	18
	B. Play, sightseeing	31	31	49
	C. Participate in activities	15	15	64
	D. meet friends	13	13	77
	E. Feel the history and culture	14	14	91
	F. Shopping	5	5	96
	G. Entertainment and Consumption	4	4	100
7. The means of transportation you take to get here	A. Subway	33	33	33
	B. Bus	14	14	47
	C. Private car	13	13	60
	D. Taxi	10	10	70
	E. Motorcycle or electric car	11	11	81
	F. Bicycle	14	14	95
	G. Walking	5	5	100
total		100	100	100

The proportion of men and women visiting the park is the same; visitors to the park are 18-45 years old (96%), making up the majority. Most of the people visiting the park are tourists (73%); the purpose of the people visiting the park is somewhat scattered, Leisure, recreation (18%), play, sightseeing (31%), participation in activities (15%); in terms of the means of transportation used by visitors to the park, the number of people taking the subway is the largest (33%), followed by buses (14%), bicycles (14%) and private cars (13%), motorcycles (11%), walking (5%), because the Shangsheng-Xinsuo subway is not very convenient, the nearest subway station is 15 minutes walk from the park Minutes or more.

(2) Evaluation and analysis of park satisfaction

Enter 100 valid questionnaires from the Creative Park of Shangsheng New Research Institute into the computer, and use Excel software and SPSSAU software to perform satisfaction evaluation and analysis [23][24][25]. The correlation analysis of the various evaluation factors of the park is carried out,

and the average value of each factor and the analysis of the correlation coefficient of the overall satisfaction degree of the park are shown in Table 3-2.

Table 3-2 The average value of each index of the Creative Park of Shangsheng Xinsuo and the correlation coefficient with overall satisfactio

First-level evaluation factor	Secondary evaluation factor	Average value of first-level evaluation factors	Average of secondary evaluation factors	Correlation coefficient between the overall evaluation of the park and the first-level evaluation factor	The correlation coefficient between the overall evaluation of the park and the secondary evaluation factors
the road and traffic	1. The convenience of public transportation	3.57	3.51	0.602**	0.565**
	2. Internal traffic conditions		3.7		0.564**
	3. Parking conditions		3.51		0.657**
	4. Slow travel system		3.55		0.621**
public space	5. Number and scale of public space	3.73	3.62	0.588**	0.486**
	6. Cleanliness of public spaces		3.69		0.583**
	7. Acoustic environment in public space (with or without noise pollution)		3.88		0.694**
construction space	8. The overall image of the building	3.62	3.82	0.593**	0.559**
	9. The degree of coordination between industrial buildings and surrounding buildings		3.52		0.545**
	10. Utilization of the internal space of the building		3.53		0.674**
Supporting service facilities	11. The perfection of park facilities (marking system, trash cans, rest facilities and lighting facilities, etc.)	3.64	3.52	0.597**	0.492**
	12. Stairs, elevator installation situation (location, quantity)		3.72		0.613**
	13. Catering and commercial facilities		3.69		0.687**
Green landscape	14. Landscape greening in the park (richness of plant species, etc.)	3.62	3.77	0.604**	0.628**
	15. Landscape facilities in the park (sculptures, sketches, etc.)		3.47		0.579**
indoor environment	16. Decoration design style (color, wall, material, etc.)	3.74	3.63	0.602**	0.563**
	17. Indoor temperature, humidity, air quality		3.71		0.597**
	18. Indoor lighting and lighting conditions		3.88		0.665**
Park security	19. Security of the park (fire protection, security, etc.)	3.81	3.86	0.632**	0.621**
	20. Satisfaction of the park management model		3.75		0.642**
Overall impression of cultural heritage	21. Inheritance of historical context in the park	3.64	3.61	0.647**	0.660**
	22. Industrial culture atmosphere		3.66		0.634**
Overall evaluation of the park		3.88	3.88	1	

* p<0.05 ** p<0.01

It can be seen from the above table that the respondents are very satisfied with the overall evaluation of the park (3.88 points). Among them, the safety satisfaction rating of the park is the highest (3.81), and the public space (3.73) and architectural interior space (3.74) are also rated higher first; the overall impression of other cultural heritage (3.64), green landscape (3.62), and supporting facilities (3.64), architectural space (3.62) and road traffic (3.57) (Figure 3-8).

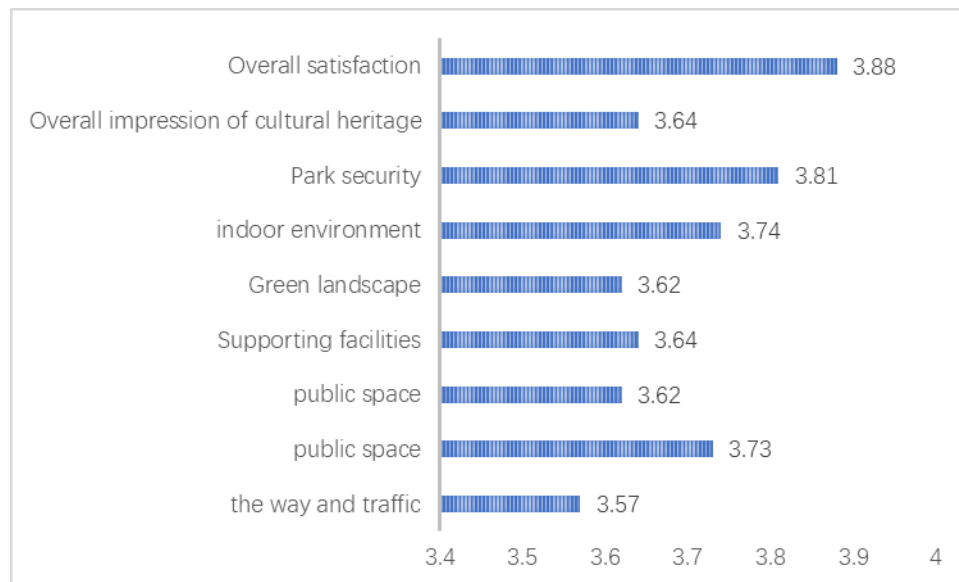


Fig.3-8 The average value of satisfaction evaluation of each first-level evaluation factor of Shangsheng Xinsuo

① Road traffic satisfaction analysis

Respondents have a slightly lower evaluation of road traffic satisfaction in the park (3.51), including public transportation convenience (3.51); internal traffic (3.7); internal parking (3.51) and chronic system (3.55). The survey found that the subway traffic of Shangsheng Xinsuo is not very convenient, and after AutoNavi POI analysis, Shangsheng Xinsuo is not in the core area of traffic, and the road traffic satisfaction evaluation is slightly low.

② Public space satisfaction analysis

Respondents have a high degree of satisfaction with public spaces in the park (3.73), including the number and scale of public spaces (3.62), the cleanliness of public spaces (3.69) and the acoustic environment of public spaces (3.88).

The public space is very clean and chic, with the red carpet gathering square and the central festival square highlighting the characteristics of the park. The main traffic road in the surrounding cities is Yan'an West Road. However, although the entrance to the park is on Yan'an West Road, the main park is far away from Yan'an West Road, and there are tall trees for sound insulation (Figure 3-9).

③ Analysis of building space satisfaction

Respondents have a rather uneven evaluation of the building space in the park, with an average overall satisfaction rating of 3.62 points, of which the overall evaluation is 3.88 points; the degree of coordination between industrial buildings and surrounding areas is 3.52; the use of internal space in the building is relatively high at 3.53.

The architectural style of the park is very different. To the northwest of the park is Capitel Yindu International Plaza. The height of the building is very high, far exceeding the other buildings of the Shangsheng Xinsuo, and the degree of coordination with the surrounding buildings is not very good. The internal space function replacement of the building is reasonable. The original site of Sunke Villa is well preserved and the original landscape is preserved. Now it has become the green core of the park (Figure 3-10); the Navy Club retains the original architectural style and indoor outdoor swimming pool for people to visit. The internal function is changed to a restaurant, the blue water surface and the chic architectural space complement each other. Creating a comfortable and beautiful dining environment and photo environment (Figure 3-11) is a major attraction of the park. Columbia Country Club retains the baroque facade of the original building, and replaces the internal space function into a bookstore, the famous Takuya Bookstore (Figure 3-12), which increases the artistic atmosphere and vitality of the park.

④ Satisfaction analysis of supporting facilities

Respondents had a relatively high rating of 3.64 for the satisfaction of supporting facilities in the park. The perfection of the park facilities is 3.52, which is relatively low. The stair setting in the park is 3.79; the layout of catering and commercial outlets in the park is 3.69.

The internal supporting facilities are relatively complete, with an exquisite park identification system (Figure 3-13), and a reasonable configuration of trash cans, but there are fewer recreational facilities in the park. The main seats in the park are those at the entrance of Starbucks, and the central festival square retains large tree flower beds. For tourists to rest and sit. The seats on both sides of the Navy Club swimming pool can only be used for meals. The park is fully equipped with catering and commercial outlets.

⑤ Satisfaction evaluation of park greening landscape

The overall satisfaction of the park's green landscape (3.62) was relatively high. Among them, the satisfaction of the park's green landscape and the richness of vegetation were 3.77, which was the highest; the setting of landscape facilities in the park was 3.47, which was relatively low.

The greening of the park is uneven, and the Sunke villa area has a high vegetation coverage rate and abundant plant species.

⑥ Satisfaction evaluation of indoor environment

The overall satisfaction degree of the indoor space is 3.74, among which the decoration design style is 3.63, the indoor temperature, humidity, and air quality are relatively high 3.71, and the indoor lighting and lighting conditions are the highest at 3.88.

People are more satisfied with indoor space. The interior decoration style is both Chinese and Western. For example, the Tsuta House Bookstore basically retains the original European and American column style, solid and gorgeous colonnades (Figure 3-14), and the original fireplace in the room is deliberately preserved. Now it is a bookstore that displays masterpieces. Place (Figure 3-15). There are air conditioners in the room to control temperature and humidity, etc., and the satisfaction is high.

⑦ Safety Satisfaction Evaluation

The overall satisfaction rating of the park's safety is 3.81, of which the park's safety (fire protection and security) is the highest at 3.86, and the park's management model is 3.75, which is relatively high.

During the investigation, there were people at the entrance of the park to check the health of the people who entered the park during the whole process, and they needed to wear a mask before entering the park. The park is patrolled by staff, and each building is equipped with fire-fighting equipment. The

cleaning staff in the park keeps the park clean and tidy at all times, and the management mode is highly satisfied.

⑧ Overall impression satisfaction evaluation of cultural heritage

The overall impression of the industrial cultural heritage in the park is not very high at 3.64. Among them, the industrial historical context is the lowest in the park at 3.61 and the industrial cultural atmosphere is 3.66.

Shangshengxin's performance in the transformation of industrial heritage cultural heritage is not very good. The industrial cultural atmosphere of the park is not strong.



Fig.3-9 Tall arbor at the entrance



Fig.3-10Sunke Villa View



Fig.3-11 Navy Club Swimming Pool



Fig.3-12Facade of Tsutaya Bookstore



Fig.3-13Park model signs



Fig.3-14 Internal Colonnade of Tsutaya Bookstore



Fig.3-15 Tsutaya Bookstore Fireplace

4 Research on optimization of industrial heritage reconstruction strategy based on multivariate data

Based on the above, the analysis of the satisfaction evaluation of various first-level indicators and the overall satisfaction evaluation of the park, and the analysis of the correlation between the first-level indicators and overall satisfaction can be seen (Figure 4-1). It can be seen from the figure that each of the first-level indicators has a significant correlation with the overall satisfaction of the park, including the overall impression of cultural heritage (industrial cultural atmosphere), park safety, park green landscape (setting of landscape sketches), park road traffic, etc. There are significant correlations, so priority is given to optimization strategies in these areas.

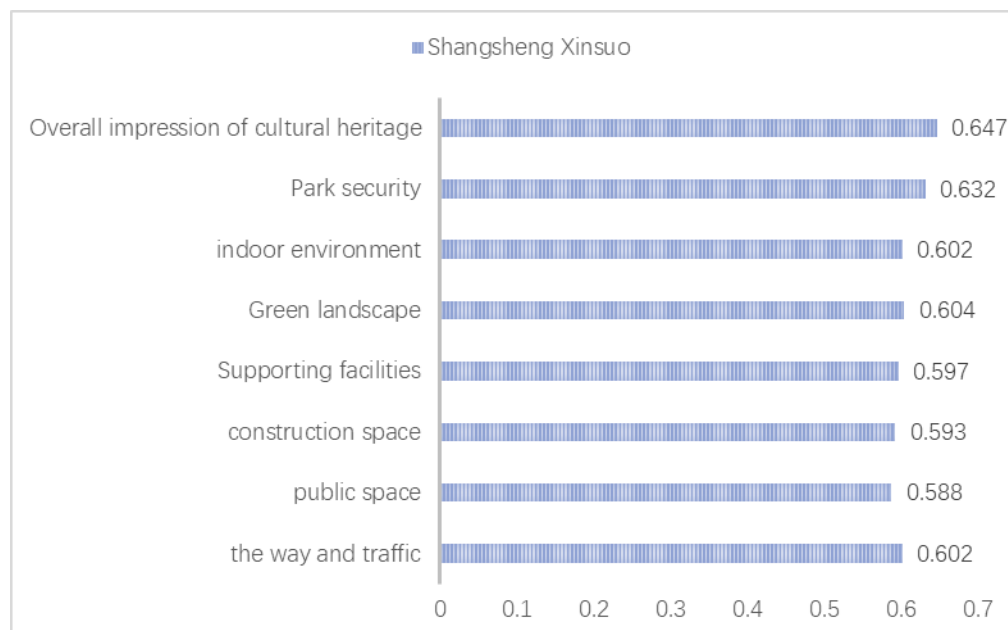


Fig. 4-1 Correlation between two park level indicators and overall satisfaction

4.1 Strategies for creating external space environment

(1) Improve roads and traffic in the park

From the analysis of AutoNavi's POI data (Figure 2-4) and the current situation investigation, the Shangsheng Xinsuo is not on the core of transportation services, and the regional transportation convenience is poor. Select the road network system within 1km of the research area, extract the road centerline to generate the axis line network analysis [26]. Use spatial syntax software to perform calculations. According to the analysis of spatial syntax connectivity, it can be seen that Yan'an West Road where the main entrance of the Shangsheng Xinsuo is located is a busy section of urban traffic (4-2), which will cause traffic congestion and other traffic inconveniences. It is recommended to place the main entrance Go to Panyu Road to the south to improve the safety of the park.

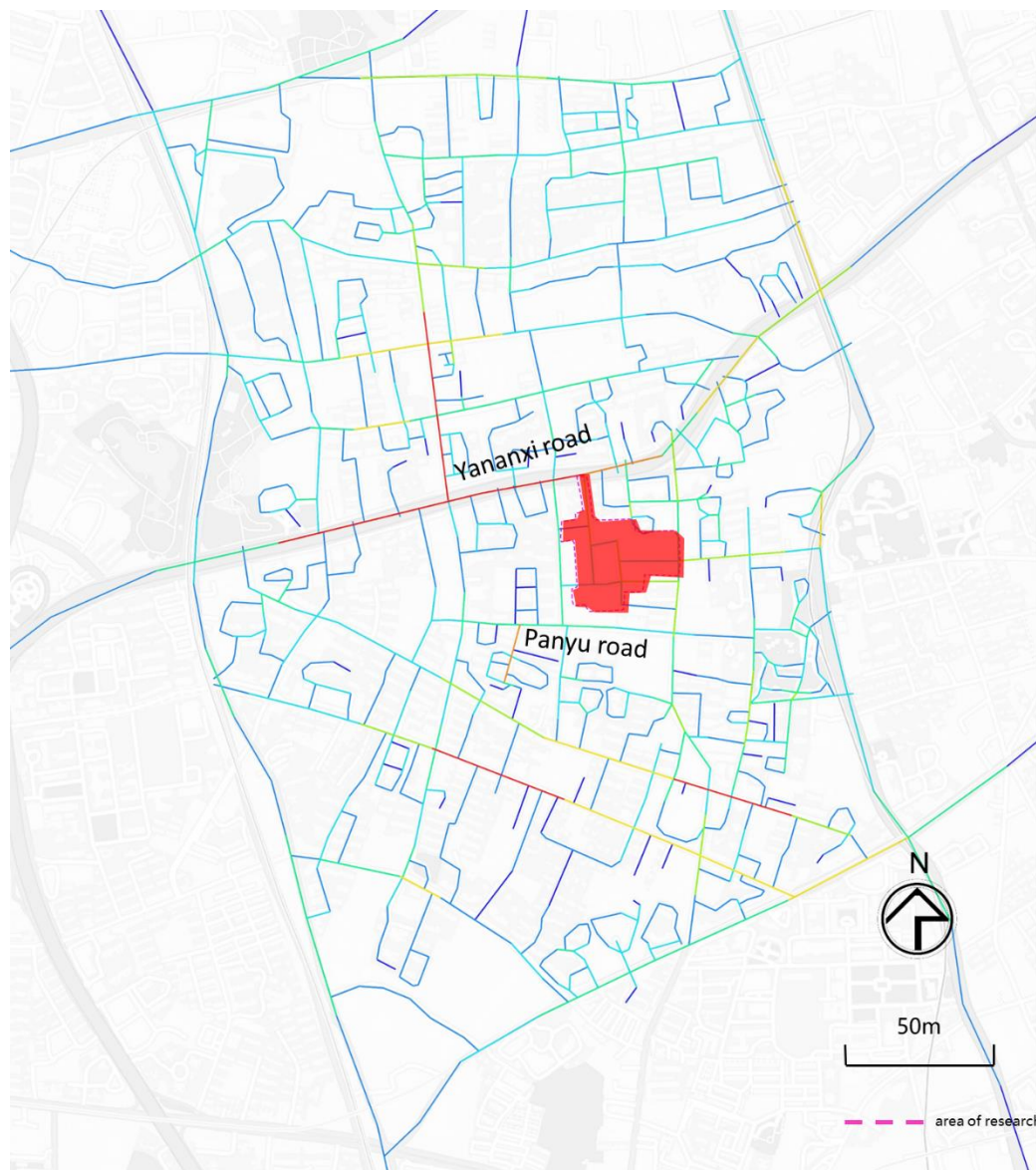


Fig.4-2 Analysis of road crossing in Shangsheng Xinsuo, the warmer the color, the higher the crossing

(2) Improve the spatial quality of streets and squares

According to on-site survey and POE evaluation, the public space satisfaction rating of Shangsheng Xinsuo is high, but the space has defects. The problem with public space is that the space is large and not delicate. The red carpet square has only water spray installations and lacks greenery. Greening and artistic seating should be added to the streets between the Columbia Country Club and the Navy Club to make the space more comfortable, like the artistic seating set on the No. 8 Bridge in Shanghai (Figure 4-3).

(3) Improve the green landscape of the park

According to the current situation investigation and POE evaluation, the satisfaction evaluation of park greening is not very high. After analysis and research, the following strategies are given.

1) Improve the greening rate of the park

Shangsheng Xinsuo retains the original trees as the basic greening of the park, but the greening of the park is unevenly distributed, and the green area of the park should be increased. Reduce the

hardened area of the park and make the park greening balanced. It is possible to consider using vines for greening of building facades. For example, Huashan 1914 Creative Park, using vines for greening of building facades, enriches building facades and increases the greening rate (Figure 4-4);



Fig.4-3 Shanghai "Eighth Bridge" Art Seat



Fig.4-4 Facade Greening of Huashan 1914 Creative Park

2) Smart ecological strategy

The energy-saving and intelligentization of the park buildings is not strong, so the intelligent control system can be embedded in the park to create a smart park [27]. Formulate the following ecological strategies:

The building quality of the Shangsheng Xinsuo is relatively good. While considering intelligence and intelligence, it also considers the energy-saving treatment of the park buildings (Figure 4-5). Add smart energy-saving technologies to the park buildings, such as geothermal pump technology, rainwater collection systems, photovoltaic power generation systems, smart shading systems, roof greening, reclaimed water recycling systems, dense tree canopies and other strategies to make the park more energy-efficient and smarter.

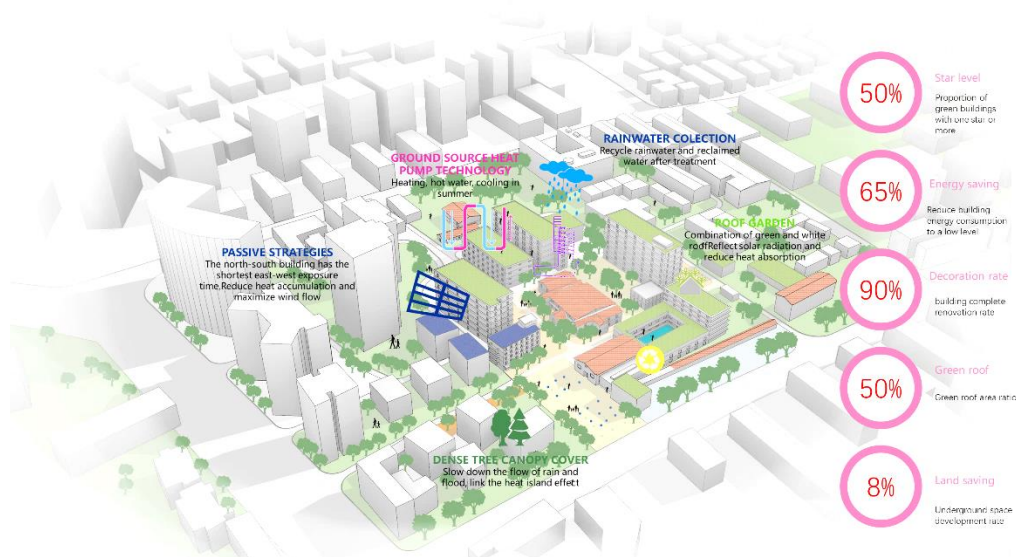


Fig.4-5 The smart energy-saving landscape strategy of Shangsheng-Xinsuo

4.2 Strategies for building space environment creation

According to the current situation investigation and POE evaluation, it can be seen that the environmental satisfaction of the building space of the Shangsheng Xinsuo is relatively poor, and the supporting facilities are defective. The specific strategy is as follows:

(1) Building and improving the external space environment

1) Setting of recreational facilities

The setting of recreational facilities is to provide a place for creative workers in the park to rest and communicate, and at the same time to provide a place for tourists who come to the park for tourism and leisure to stop, which has a high impact on the satisfaction evaluation of the park.

Recreational facilities should be creative and artistic. It is not only necessary to set up public seats that meet the basic service needs, but also pay attention to the creative design of the seats. For example, in the renovation project of the Genk coal mining plant in Belgium, Carmela Bogman industrial design company designed the special seats on the square, using flexible design techniques, cloud-like shapes and bright red, rendering the industrial atmosphere and artistic atmosphere. (Figure 4-6)

2) Setting of identification facilities

The sign system of the park is relatively complete, and the evaluation satisfaction is also high, but the creativity is not enough. The park should upgrade the sign system and add color classification signs. To guide (Figure 4-7).

(2) Build and improve the internal space environment of the building

1) Division of plant

Vertical partition and horizontal partition

Industrial production plants generally have a higher single-story height, a larger span, and a larger area of the plant space, which requires vertical addition and horizontal division of buildings in order to adapt to the use of different functional formats. When adding layers vertically in old buildings, lighter components should be used as much as possible to maintain the stability of the original structural components of the building. Ensure the security of the added layer. Keep the original building structural components from damage, and try to use lightweight components to ensure the structural safety of the added layer. When the large-space building is divided horizontally, the space is divided according to the building structure and the needs of the developer. The large-space horizontal partition is adopted, and the wall or iron foam board is added for the space partition.

2) Shaping the indoor landscape

In the creative industry park's indoor space landscape environment shaping, attention should be paid to: indoor lighting, indoor acoustic environment, and indoor air quality.

① Indoor lighting conditions

First, increase natural lighting: old industrial buildings have insufficient indoor lighting due to their own reasons. You can increase the window area, open windows on the roof, or use glass materials to increase indoor and outdoor permeability, increase lighting, and save energy. .

Second, design the indoor lighting: the lighting transformation of the creative park needs to be designed for different formats and functions, and the lighting is used to adjust the indoor atmosphere. For example, restaurants need darker and warmer lights, and bars need colorful lights. Offices, studios

and other places need bright lighting design. For example, in the lighting design of the Tuguya Bookstore of Shangsheng Xinsuo, white and soft yellow light make the reading experience better (Figure 4-8).

② Indoor acoustic environment

First of all, in the renovation of the plant space, the dynamic and static division of the plant should be considered. For museums, exhibition halls and other places that require quietness, sound insulation treatment, such as adding green plants, laying carpets, etc., reduces noise.

③ Improvement of indoor air quality

For industrial plants, the ventilation effect of the plant is not very good, and the air quality of the plant space is affected. The improvement measures are as follows: First, open windows and skylights to increase the permeability of indoor and outdoor spaces. The second is the use of air conditioners to adjust indoor air quality. Third, a variety of green plants should be used to improve the air quality of the environmental space.

4.3 Humanistic environment construction strategy

According to the preliminary investigation and analysis and POE evaluation analysis, the average satisfaction of the overall impression of cultural heritage of the first-level impact factor park is relatively high (3.64) and the overall satisfaction evaluation of the park has a significant correlation. Therefore, the following optimization strategies for the park are given:

Suggestions for the inheritance of historical context

1) Increase the industrial heritage symbol

Shangsheng Xinzheng did not do well in the historical inheritance of industrial heritage. Except for some text descriptions, no traces of industrial heritage can be seen, and landscape sketches showing the industrial production scene of the year should be added. For example, Shanghai Hongfang uses the steel of the former Shanggong No. 10 Plant to produce landscape sketches for display, adding an artistic sense and an industrial cultural atmosphere (Figure 4-9).

2) Setting up a museum

The museum can directly preserve the tangible cultural heritage and intangible cultural heritage of the park, and use it as an attraction point of the park, attracting more people to visit and stay and remember the industrial history and culture.



Fig.4-6: Seat setting on the plaza of Genk Coal Mining Plant, source: "Leaf Space" public account



Fig.4-7: Sign at the entrance of Wuhan Hanyang Creative Park, source: Internet



Fig.4-8: Interior lighting conditions of Shangsheng·Xinsuo



**Fig.4-9: Landscape sketches of
Shanghai Hongfang Creative
Park, source: Internet**

5 Conclusion

According to relevant literature and research, protection and reuse is undoubtedly the most advantageous and effective method for dealing with the problem of urban old industrial heritage. This paper mainly uses the methods of commenting big data, AutoNavi POI and on-site survey questionnaires to analyze the status quo of the park, and then uses the POE evaluation method to evaluate the strategy, and optimizes the strategy based on the relevant evaluation using space syntax. According to the type and basic situation of the transformation of Shanghai's old industrial plants into creative industrial parks, and the establishment of an evaluation index system based on relevant literature research, qualitative and quantitative research and analysis of the transformation of Shanghai's industrial heritage. Established 9 first-level indicators such as road traffic and park public space, and 22 second-level indicators such as public transportation convenience for satisfaction evaluation analysis and correlation analysis with the overall evaluation, and the following conclusions were formed:

(1) According to current research and POE analysis, Shangsheng Xinsuo District has diverse architectural styles and exquisite and fashionable public spaces, especially the Takuya Bookstore, which has become the business card of the park. The level of greening structure in the park is unreasonable. The greening coverage of Sunke Villa's garden is very High, and other areas are clearly insufficient. Potted plants and shrubs can be used to balance the green coverage. Add industrial art landscape sketches to make up for the shortcomings of the industrial culture in the park. However, it is a good idea to transform Shanghai's excellent creative park, and the overall satisfaction rating is very high.

(2) According to the current situation investigation and the POE evaluation of the park, the factors that have a greater impact on the satisfaction of the park are the overall impression of the park's cultural heritage (Figure 3-1), park safety, green landscape, internal space environment, road traffic, The supporting facilities, architectural space, and public space in the park highlight cultural consumption and spatial experience.

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Annotation

1. The pictures and tables in the text are drawn or photographed by the author unless there are special instructions
2. The industrial heritage in this article refers to the industrial heritage factory area with a certain architectural scale.