Study on Post-Transformation Assessment and Green Renewal of Binjiang in Shanghai

Pan Hongyan^{1*}, Zhang Gaijing¹

¹Shanghai Research Institute of Building Science Co., Ltd.

Abstract: This paper takes the Binjiang industrial zone of Shanghai as the research object, based on the transformation and development of Binjiang in Shanghai and the renewal of existing urban industrial buildings in recent years, takes green building as the focus to vigorously promote the sustainable and energy-saving development of the region. With the goal of improving the vitality and quality of the city, it explores a progressive and sustainable organic regeneration model for the riverfront industrial zone. Through the research and analysis of "green growth and ecological renewal", it establishes a comprehensive post-transformation impact assessment system for the Binjiang industrial belt with three dimensions of transformation connotation: assessment object, functional positioning and transformation direction. Binjiang in Yangpu District and Binjiang in Xuhui District are used as cases for assessment and analysis, and four aspects of industrial function upgrading, building green growth, environmental quality improvement, and industrial culture inheritance are proposed to develop green renewal development strategies for the transformation and development of Binjiang, which provide technical support for the transformation of the future urban Binjiang industrial belt.

1 Introduction

The master plan of "Shanghai 2035" proposed to make Shanghai a desirable city of innovation, humanities and ecology, with the goal of improving the vitality and quality of the city. It actively explores a progressive and sustainable organic renewal model, preserves and inherits urban culture, promotes the use of space to intensive and compact, functionally complex and low-carbon efficient. Binjiang in Shanghai has become an important area to carry the core functions of the global city in the "Shanghai 2035" urban master plan. Similar to the de-industrialization process of urban waterfronts worldwide^[1], Binjiang in Shanghai has undergone a development of functional metabolism and green renewal, with the former industrial functions being re-substituted by new functions such as entertainment, commerce and offices, the quality of the ecological environment being upgraded, and the waterfront public open space shared by citizens being full of urban vitality. In such a context, this paper establishes a comprehensive impact assessment system for the post-transformation of the riverfront industrial zone through relevant studies, standards and theories and other literature studies^{[2][3][4]}, and proposes a green renewal strategy for the transformation and development of the riverfront industrial zone to provide an important supporting force for the transformation of the city's riverfront industrial belt.

2 The post-transformation assessment system

Binjiang in Shanghai experienced the push of the city expo, urban renewal, and in ecology, culture, industry import, functional positioning has been greatly enhanced as well as the promotion and support of the policy at the government level. The impact of policy, economy, and environment etc. needs to be assessed from the heritage protection, green transformation, ecological environment improvement, and the existing industrial zone of functional form enhancement development to carry out the comprehensive assessment of the impact after the transformation.

2.1. Assessment model

Taking the Binjiang industrial belt as the object to establish a post-transformation comprehensive impact model from three dimensions of assessment object, functional positioning and transformation^[5], we create a first-level objective of post-transformation comprehensive impact assessment covering planning and development, operation and management, cultural continuation, ecological regeneration and vitality perception around macro conditions, protection and utilization, ecological quality, personnel feeling and operation mode.

*Corresponding author's e-mail: panhy_sribs@163.com

Figure 1. Comprehensive Impact Assessment Model

2.2. Post-assessment Objectives

Based on the comprehensive impact model, a post-assessment target system is established, in which the planning and development impact assessment targets focus on comprehensive economic strength, functional positioning matching degree, and policy implementation degree. The operation management influence focuses on the operation management mode, green economic benefits, and the creation of innovative demonstration projects. Cultural continuity impact focuses on historical longevity,

cultural memory, iconic initiatives, increase in cultural and creative enterprises, and satisfaction with cultural full atmosphere. The impact of site regeneration focuses on the natural environment of the site, sustainable use of resources, green building ratio, plant community creation, and greening coverage ratio. Vitality perception influence focuses on public open space vitality, traffic convenience, shared intelligent facility experience, cultural activity richness, and service facility diversity.

Based on literature research, combing relevant standards and norms, questionnaire surveys and statistical analysis of big data, the post-assessment target system indicators are assigned in Table 1~Table 5.

Table 1. Goals of planned development impact assessment

Assessment factors	Assessment score	Assessment Objectives
Comprehensive economic strength	0 points	The GDP growth of the district where the project is located doesn't not meet the target value.
	2 points	The GDP growth in the district where the project is located meets the target value.
Matching rate of Functional positioning	0 points	The functional positioning of the project meets the requirements of the preliminary planning.
	1 point	The functional positioning of the project does not meet the requirements of the preliminary planning.
Degree of policy implementation	1 point	At least 1 incentive policy has been implemented in the project for the functional upgrading and transformation of existing urban industrial areas.
	2 points	At least 2 incentive policies have been implemented in the project for the functional upgrading and transformation of existing urban industrial areas.
	4 points	At least 3 incentive policies have been implemented in the project for the functional upgrading and transformation of existing urban industrial areas.

Table 2.Goals of O&M impact assessment

Assessment factors	Assessment score	Assessment criteria
Operations Management Model	2 points	The management body has obtained the relevant management system certification, with ISO14001 environmental management system certification, and ISO9001 quality management system certification
	4 points	Have a complete management system, including management departments, division of responsibilities, management content, management processes, etc.
	6 points	The management model includes energy and water saving performance assessment incentives in the work assessment system
	0 points	No significant improvement in green economics compared to the previous year

Green Economic Benefits	2 points	Significant improvement in green economy compared to the previous year
Creating innovative demonstration projects	0 points	No honours for demonstration projects
	1 point	Awarded the honorary title of Model Project

Table 3. Goals of cultural continuity impact assessment

Assessment factors	Assessment score	Assessment criteria
Historicity	1 point	Existing industrial areas newly built over 50 years ago
	2 points	Existing industrial areas newly built over 70 years ago
	4 points	Existing industrial areas built over 100 years ago
Cultural memorability	0 points	Not retaining elements of the original character of the industrial area as a cultural landscape
	2 points	The original character of the industrial area has been preserved as a cultural landscape
Iconic initiatives	2 points	A landmark innovation in the renewal process
	4 points	Two landmark innovations in the renewal process
	6 points	Three landmark innovations in the renewal process
Increase in cultural and creative enterprises	3 points	$0 < Z \leq 3\%$
	5 points	$3\% < Z \leq 7\%$
	8 points	$7\% < Z \leq 10\%$
	10 points	$10\% < Z \leq 15\%$
	15 points	$Z > 15\%$ "Z" indicates the increase in the number of cultural and creative enterprises over the previous year
Cultural atmosphere satisfaction	3 points	Satisfaction survey pass rate $\geq 60\%$
	6 points	Satisfaction survey pass rate $\geq 75\%$
	9 points	Satisfaction survey pass rate $\geq 90\%$

Table 4. Goals of ecological regeneration impact assessment

Assessment factors	Assessment score	Assessment criteria
The natural environment of the site	1 point	One or more of the site's wind, thermal and runoff simulations meet the standards.
	2 points	Two or more of the site's wind, thermal and runoff simulations meet the standards.
	3 points	Three or more of the site's wind, thermal and runoff simulations meet the standards.
Sustainable use of resources	1 point	Three dimensions of sustainable resource use: $\geq 1\%$ renewable energy use, $\geq 1\%$ non-conventional water use, 50% recycling of C&D materials. Achievement of 1 or more of the above requirements.
	2 points	Achievement of 2 or more of the above three requirements.
Percentage of buildings going green	1 point	The proportion of green buildings in new buildings $\geq 50\%$, the proportion of energy consumption per unit of floor area reduced by $\geq 10\%$ after green renovation of existing buildings.
	2 points	The proportion of green buildings in new buildings $\geq 70\%$, the proportion of energy consumption per unit of floor area reduced by $\geq 15\%$ after green renovation of existing buildings.
Plant community creation	2 points	$0.2 < N \leq 0.4$
	4 points	$0.4 < N \leq 0.6$
	7 points	$N > 0.6$ "N" indicates native woody plant index.
Greenery coverage	1 point	$30\% \leq \text{green space ratio} < 35\%$
	3 points	$35\% \leq \text{green space ratio} < 50\%$
	5 points	Green space ratio $\geq 50\%$

Table 5. Goals of Vitality Perception Impact Assessment

Assessment factors	Assessment score	Assessment criteria
Public open space vibrancy	1 point	300 coverage of public open space vitality nodes of no less than 80%.
	3 points	300 coverage of public open space vitality nodes of at least 90%.
Accessibility	1 point	No less than 70% coverage of 500 service radius of bus stops.
	2 points	No less than 80% coverage of 500 service radius of bus stops.
	4 points	No less than 90% coverage of 500 service radius of bus stops.
Shared intelligent facility experience	1 mark	At least three human-accessible public facilities with intelligent experience features.
	2 points	At least five human-accessible public facilities with intelligent experience features.

Recreational activities	3 points	$20\% \leq X < 30\%$, and $30\% \leq Y < 50\%$
	6 points	$30\% \leq X < 40\%$, and $50\% \leq Y < 60\%$
	9 points	$40\% \leq X < 50\%$, and $60\% \leq Y < 70\%$
	12 points	$X \geq 50\%$, and $Y \geq 80\%$ "X" indicates the frequency of recreational activities, and "Y" indicates the type of recreational activity.
Diversity of service facilities	2 points	At least 5 types of service facilities and at least 90% compliance with features.
	5 points	At least 7 types of service facilities and at least 80% compliance with features.
	8 points	At least 9 types of service facilities and at least 70% compliance with the characteristics.

2.3 Analysis of Binjiang Assessment

Around the vision of Shanghai to build "an excellent global city", according to the unified plan of the municipal government, according to the requirements of "hundred years plan, century fine", Binjiang in Yangpu District and Binjiang in Xuhui District and other "riverfront industrial zone" adhere to the "ecology first, function first" based on "reproducing the style and reshaping the function". They

focus on the riverfront public space through the project, accelerate the planning, pay attention to the construction, connect the breakpoint, focus on reflecting the characteristics, and inherit industrial civilization. Efforts are made to build it into a public space and living shoreline that serves the public for fitness and leisure, sightseeing and tourism. Combining the development and characteristics of the two cases [6] [7] [8] [9], the comprehensive impact assessment analysis after the transformation is carried out. The assessment is as follows.

Case assessment		Binjiang in Yangpu District	Binjiang in Xuhui District
Primary goal	Secondary goals	Assessment	Assessment
Planning and development	Comprehensive economic strength		
	Matching rate of functional positioning		
	Degree of policy implementation		
Operation and management	Operation and management model		
	Green economic benefits		
	Creation of innovative demonstration projects		
Cultural continuity	Historical longevity		
	Cultural memorability		
	Iconic initiatives		
	Increase of cultural and creative enterprise		
	Cultural atmosphere satisfaction		
Ecological regeneration	Natural environment of the site		
	Sustainable use of resources		
	Ratio of green building		
	Plant community creation		
	Greening coverage rate		
Vitality perception	Vitality of public open space		
	Convenience of transportation		
	Experience of shared intelligent facilities		
	Richness of cultural and recreational activities		
	Diversity of service facilities		

Figure 2. After the transformation of the growth of the riverside evaluation schematic

Its planning and development and operation management for supporting the transformation of the riverfront industrial zone is an important foundation, while the industrial history and culture, architectural style, and cultural memory, etc. are also important factors for the continuation of the Binjiang industrial history and culture, and activation of post-transformation development. As a measure of post-transformation sustainable aspects, good ecological environment quality to enhance the green quality of the riverfront space, including for the use of resources and energy, building green regeneration, the creation of landscape plant communities, etc.,

construction and operation of the growing riverfront is gradually open to positive development, and evaluation of the riverfront live strength of some factors are becoming an important basis for judging the attractiveness of the riverfront, such as important nodes of public space live strength, shared Intelligent service facilities in Binjiang, cultural and creative activities, etc. Binjiang in Yangpu District has achieved a good demonstration in public space and architectural art level, and the West Coast has also had a positive impact in terms of intelligence and cultural creativity.

3 Strategy for green renewal in Binjiang

According to the transformation and development of Binjiang in Shanghai and the model of post-assessment comprehensive influence, from the upgrading of industrial functions in the early stage, to the green renewal of current buildings, from the improvement of environmental quality, to the inheritance of industrial culture, the transformation and upgrading of the industrial zone of Binjiang are carried out by formulating a sustainable development strategy of green renewal.

3.1. Upgrading of industrial functions

Create a waterfront area that is suitable for business, living, fun and tourism, build an ecological industrial development system in the riverside area, and create a cultural cluster with regional characteristics along the river. Binjiang in Yangpu District is gradually developed into an innovative development belt with international influence. From "industrial rust belt" to "industrial show belt", it has transformed into a "people's city for the people" model place. Binjiang in Xuhui District is aligned with the Left Bank of Paris and the South Bank of London, and has opened a chapter of urban renewal from a production-oriented shoreline to a living-oriented shoreline, and has updated its positioning for art, sports, business, culture and technology functions, implementing the "Double A" plan for the West Bank, namely "ART" art and "AI" artificial intelligence, aiming to create a diversified industrial and cultural ecology.

Figure3. Artificial Intelligence Center in Binjiang, Xuhui District , South Dock Public Space in Binjiang, Yanpu District

3.2. Green growth of buildings

The transformation of the waterfront industrial zone brings new growth space for urban construction, and the new buildings create green and healthy class buildings, and provide green indoor space for the people living and working through the construction of high standard and high quality green building groups, while encouraging green transformation for buildings with certain historical significance that can be reused to achieve the goal of saving resources and protecting the environment for the whole life of the buildings. Take the former building of the tobacco company as an example, although the age limit of the construction and the craftsmanship don't have a conservation value, in the context of enhancing the overall landscape appearance and playing the demand of the maximum utilization of the building, the building is

retained for green renewal, making it an urban riverfront complex integrating municipal infrastructure, public green space and public supporting services. It utilizes the retreat of the planned green space on the north side of the current Chinese tobacco warehouse to extend the city side, forming a gentle slope to access the city, mulching and planting on the slope to build a park, and arranging parking and other basic services under the slope so that people can stroll from the city to the riverbank unconsciously^[10].

Figure4. Cigarettes Factory and Green hill after transformation

3.3. Improvement of environmental quality

By improving soil quality, we can create a reasonable plant community, improve the quantity and quality of plants, better play its value in the ecosystem, maintain the balance of the ecosystem, and adopt an ecological restoration strategy. At the same time, the water-friendly platform and public space have changed the old environment along the river, improved the waterfront ecological environment, created a riverfront landscape and water-friendly public space, improved the overall image of the city, and realized the "returning the river to the people", and Greenland Plaza has created a sponge park landscape by practicing development with low impact.

Figure5. Xuhui River Public Open Space

3.4. Heritage of industrial culture

The industrial zone along the riverfront carries many cultural memories. The protection and inheritance of these historical elements with industrial cultural values is not only an important carrier for the protection of public awareness of history and culture, but also a cultural memory for the protection of public life from generation to generation. Through the protection of historical culture, historical style buildings and industrial relics along the riverfront, we inherit the spirit of sea culture and urban culture, and inject cultural connotation into the development of the Binjiang. Taking the Longhua Airport in Binjiang, Xuhui District as an example, the renovated Longhua Airport runway shows the imprint of aviation history, adopts the design concept of urban trajectory, organizes streets and parks into a unified runway system with diversified linear spaces, intersperses water systems and greenland, and sets up rain gardens in combination with the sponge city concept, transforming the former Longhua Airport runway into a runway for cars, bicycles, people and rivers, forming a beautiful urban public space integrating history and landscape.

Figure6. Xuhui Runway Park

4 Conclusion

Based on the transformation and development of Binjiang in Shanghai in recent years, this paper explores a progressive and sustainable organic regeneration model for the riverside industrial zone with the goal of improving the vitality and quality of the city. Through the research and analysis of "green growth and ecological renewal", we have established a comprehensive impact assessment system for the transformation of the riverfront industrial zone with three dimensions of transformation connotation, including assessment object, functional positioning and transformation. Taking Binjiang in Yangpu District and Binjiang in Xuhui District as the cases for assessment and analysis, we have proposed a green renewal development strategy for the transformation and upgrading of the Binjiang in four aspects: industrial function upgrading, green building growth, environmental quality

improvement and industrial culture inheritance, and provided technical support for the transformation of the Binjiang industrial belt in the future.

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