

COMPARISON STUDY OF TYPOLOGY TRANSFORMATION IN WATERFRONT INDUSTRIAL DISTRICT: ARSENAL IN VENICE AND YANGPU RIVERSIDE IN SHANGHAI

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ABSTRACT

Nowadays, human and water are becoming more and more connected in waterfront cities. This paper makes a comparison between Yangpu riverside in Shanghai and Arsenal in Venice. Both them were the most important waterfront industrial area in history, undergone , rebirth because of water and typology transformation.

Arsenal in Venice was developed for navy and shipping. After World War II, Industrial migration caused the Arsenal losing its production capacity. Until 1980, the first Venice Architecture Biennale, the Arsenal began to be reused as an exhibition place, still facing the conflict between lagoon and its defense. Yangpu riverside is the birthplace of Shanghai's modern industry. With the industrial migration, shipyards and textile mills declined one after another. Until 2013, public cultural activities such as SUSAS brought new vitality to the region.

Through a diachronic study, the typo-morphology study of waterfront industrial area can be presented in several diagrams. The article makes a comparative and graphical analysis focusing on the four times typology transformation, water rearing, industrial migration, Industrial Wasteland, cultural intervention, and climate changing threaten. Based on the typological reading, the article also analyses the influence of ecological foundation, social and economic factors on morphology of industrial area, and how to deal with the relationship between human and water.

Finally, the author summarizes the significance of typology transformation facing crisis in two area, aiming to provide guidance reference for the development of waterfront cities.

INTRODUCTION

In 21 century, the relationship between human and water are becoming more and more connected in waterfront cities.

The research focus on waterfront industrial district crisis. The industrial revolution and the development of the shipping industry led to the emergence of many important port cities around the world, such as Hamburg, Shanghai, Hong Kong, Rotterdam, Cape Town and New York. The development of ports has led to the flourishing of waterfront industrial zones, which are built on water and offer efficient production, transport and sales. With the advent of the post-industrial era, each port city is faced with the ecological and socio-economic crisis caused by the relocation and transformation of industrial areas and the abandonment of industrial sites.

This paper makes a comparison between Yangpu riverside in Shanghai and Arsenal in Venice. Both them were the most important waterfront industrial area in history, undergone, rebirth because of water and typology transformation. Through the analysis of two typical cases, the opportunities and problems of the historical changes in the industrial heritage, are summarized, as well as the different solutions of the two cities, thus providing a significant reference.

METHODOLOGY

This paper adopts a combination of literature review and case analysis. Firstly, the existing theoretical studies on the waterfront and industrial heritage will be reviewed, and the development process, the relationship between the waterfront and urban space will be summarized, providing theoretical support for the renovation and protection of *Arsenal in Venice* and the Yangpu Riverside. At the same time, collect typical examples of the development of the two areas in four historical periods, and summarize their urban form, functional substitution and planning ideas.

1. Industrial production period, water raring

The first construction of the Arsenal in Venice began in 1104. As the military production base of the Venetian Republic, it developed into the largest industrial complex in Europe. At the same time, the Arsenal produced most of the merchant ships used in Venice's trade, bringing wealth and power to the city. During nearly 1000 years, Arsenal of Venice's typological transformation. has developed step by step. The arsenal was enclosed by a 2-mile wall, from the original castle, to the expanding shipyards, to the gradually developing northeastern part of the site.



Figure 1 typology transformation of Arsenal in Venice (13 century, 16 century, 18 century, 19 century)

Yangpu riverside is located in the northeast of Shanghai. It is the birthplace of modern Chinese industry and has a hundred-year history of Yangpu industrial civilization. Yangpu Riverside industrial zone is probably the largest in Shanghai, accounting for 70% of the total amount. Yangpu's municipal facilities such as water, electricity and coal were built early and in large scale. It was once the energy supply center of Shanghai, a metropolis in the Far East. In the south section of Yangpu Riverside where a large number of industrial heritages are gathered, a total of 24 historical buildings with 66 buildings are planned to be preserved. In addition, a large number of distinctive industrial relics are also preserved.



Figure 2 Yangpu Riverside industrial heritage

2. Industrial migration

Both of the cities faced the Industrial decline crisis. As for Venice, After World War II, Industrial migration caused the Arsenal losing its production capacity. The industry on the main island of Venice changed from the traditional shipbuilding to a more complex industrial complex, and the location was moved to the Magra region. Arsenal of Venice lost its industry production, absence of good use for a long time.

The Yangpu Riverfront is the city's main energy supplier. Until the 1990s, Shanghai gradually entered the post-industrial era, the city was faced with industrial restructuring and upgrading, and traditional industries were forced to shut down and relocate, leaving behind a depressing scene. The Yang Shupu Water Plant, China's first tap water plant, is still in operation. The Yang Shupu Power Plant has been relocated due to its high level of pollution.



Figure 3 Yangpu Riverside and the Central City of Shanghai

3. Cultural Intervention

The third part is the functional Transformation, especially cultural intervention.

Until 1980, the first Venice Architecture Biennale, the Arsenal began to be reused as an exhibition place, undertaking world-class cultural and artistic events including the Venice Biennale of Movie, Architecture, Art and Music. The success of Venice's transformation from a decaying city of trade and commerce to a city of culture and art.

As for Shanghai, until 2013, public cultural activities such as SUSAS brought new vitality to Yangpu Riverside. At the same time, new urban design gives Yangpu riverside vitality, highlighting the combination of cultural experience, ecology and science and technology. Yangpu riverside changed from industrial port to living port and smart port, open to the public. After the transformation, the industrial zone not only retains the characteristics of historical buildings, but also puts in cultural functions.

4. Climate changing threaten

In recent years, Venice has often been affected by floods, with warming of the climate leading to a 60-year flood in 2019. The Arsenal is being used again for the Venice MOSE Project, a flood protection system that protects the tides of the Venetian lagoon. And thanks to the lagoon, Venice's waterfront is obviously more friendly and close to people.

Shanghai's biggest climate challenge, however, is also flood control. In order to combat the once-in-a-century flooding, 2 to 3 meter high embankments have been built along the Huangpu River. In 2015, Shanghai launched a three-year project to connect the spaces along the Huangpu River. This initiative, along with extensive landscape and architectural renewal, creates a continuous open public space for the public. In order to prevent flood in Yangpu River, high dams prevent people from connecting with water

FINDINGS

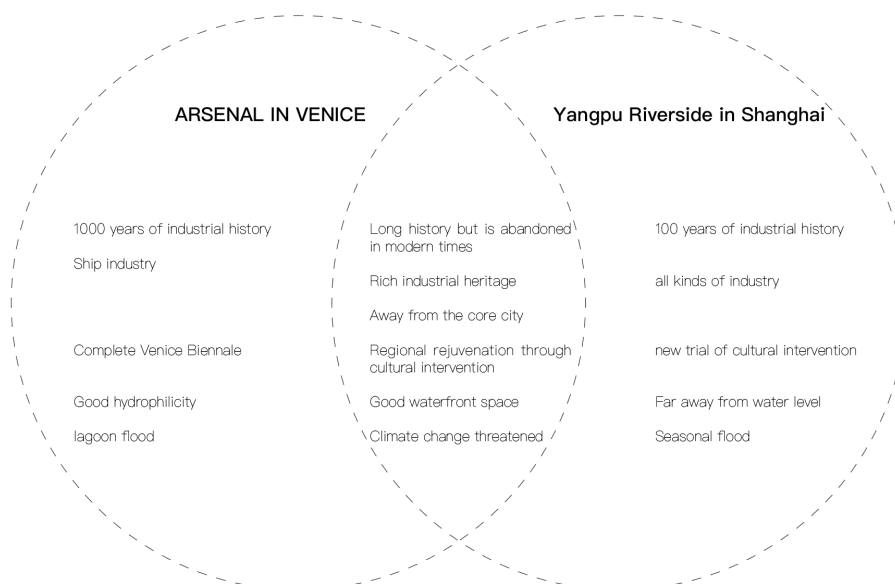


Figure 4 Comparison between Arenal in Venice and Yangpu Riverside in Shanghai

I summarizes the significance of typology transformation facing crisis in two area, aiming to provide guidance reference for the development of waterfront cities.

First of all, the two cities have something in common, the two waterfront industrial areas have a long history, and after abandonment, have become a historical heritage. Both are far from the central city, and with the expansion of the city, they have become sub-centres, facing urban renewal. As a well protected historical city, Venice retains the existing buildings to the maximum extent and provides Shanghai with a lot of development experience in the process of renewal. As a city with rapid urbanization process, adopting renewal strategy in the process of renewal is also an attempt and breakthrough. Here are some of the solutions taken by the two cities.



Figure 5 Real photos of Arsenal in Venice and Yangpu Riverside in Shanghai taken by the author.

1. Typo-morphology transformation on urban form level

Spatial form as the dominant factor, the morphological structure of the waterfront orientation can fundamentally drive the non-material and micro-adjustment. Public space along the waterfront, strengthen the relationship between land and water, increase waterfront trails, public squares and public buildings, and increase the public space along the waterfront. At the same time, the construction of new roads to reach the waterfront will enhance the accessibility of the waterfront. Traffic flow integrated with a public tour line increased walkability.

2. Functional transformation

Cultural intervention, industrial transformation, such as the transformation of large industrial buildings into art spaces, the organization of large-scale art season activities; as an opportunity to adopt a top-down approach to gradually drive the micro-level renewal, such as the introduction of outdoor public activities, jogging, hiking, outdoor singing, roller skating, play space. Making the waterfront area become a place of daily life for the public, at the same time, can attract tourists to sightseeing, participate in special activities, enhance the flow of people. Finally, the differentiated use of historic buildings to renovate industrial. Some industry buildings can be converted into large

museums, some can be converted into restaurants and tea rooms, some can be converted into art activity centers, loft office space and so on.

3. Micro-improve the quality of space

The original space suitable for industrialized large scale, rough style, and lack of humanization is gradually shifting to the direction of sectional scale, refinement, and humanization while restoring the cultural memory of industrial heritage through the spatial operation. For example, as for the Yangpu Riverside, boat piles were transformed into seats and steel pipes into street light, realizing the transformation from industrial scale to human scale. The giant cranes preserved in Arsenal in Venice waterfront and Yangpu Riverfront have become the monuments of the riverfront area, evoking memories and further shaping the industrial heritage culture.

4. Build the ecological foundation and the quality of greenery and landscape

In the face of increasingly severe climate change and the increasing demand for quality waterfront landscapes, the emphasis is on green sustainability. First of all, the most important thing for waterfront areas is to prevent flooding and to deal with the relationship with water, we can use multi-level levees to reduce the height of flood control to a pleasant scale. At the same time, improve the quality of the waterfront landscape and the greening rate. Gradually change the dependence and fear of people on the water to the harmonious coexistence of people and water.

CONCLUSIONS

In conclusion, through the comparative case study of the Arsenal in Venice and the Shanghai Yangpu Riverside, we summarized the waterfront industrial zone in the face of the water crisis, the solution taken, from the type of morphological adjustment, functional transformation, space quality enhancement, ecological infrastructure construction several aspects, summarized the waterfront industrial renewal strategy. Finally, the paper summarizes the significance of typology transformation facing the crisis in two areas, aiming to provide guidance reference for the development of waterfront cities.

REFERENCES

Zhu Haiming, Wang Haolin. Research on the creation of urban waterfront space landscape in Yangpu, Shanghai[A]. Proceedings of the Academic Exchange Conference on Industrial Architecture, 2020 (middle volume)[C]. Zhongye Architecture Research Institute Limited:Industrial Architecture Magazine,2020:4.

Yao Mingguang. Thinking about the Enhancement of Tourism Function and Service Level of the South Section of Yangpu Riverfront, Shanghai[J]. Shanghai Art Review,2020(04):8-10.

Liu Kexin. Research on Landscape Renewal Design of Old Waterfront Industrial Zone Based on the Concept of Sustainability: An Example of Yangpu Riverfront Park, Shanghai[J]. Garden,2020(08):74-80.

Liu Kexin. Research on Landscape Renewal Design of Old Waterfront Industrial Area Based on Sustainable Concept: An Example of Yangpu Riverfront Park, Shanghai[J]. Garden,2020(08):74-80.

The New Bright Spot of Yangpu Riverside with High Quality Party Building[J]. Shanghai Party History and Party Construction,2020(08):66.

Wang Shuo. Opening the free space - side note of the 16th Venice Architecture Biennale[J]. World Architecture,2018(08):116-119.

Yin Dan. Theatricalization and didacticism: from the two adjacent national pavilions of the Venice Armory[J]. Pictorial,2017(10):61-64.

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