Research on sharing and integration of public open space in Shenzhen Bay Street, Nanshan district, Shenzhen

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Abstract. Due to the shortage of land space resources and the uneven distribution of urban space resources under the current development model, the existing urban public open space is distributed discretely in urban space, lacking systematic integration and full-cycle guidance and control which highlights lacking publicity. The existing urban public space can not meet the needs of public life of citizens, while the building public open space attached to the building plots that has not been utilized effectively possesses great potential for development and utilization. In recent years, the Shenzhen Bay Street complex in the Nanshan District of Shenzhen has become one of the few practical cases of the joint development design and integrated construction of urban public open space and building public open space in China. The systematic study from it can provide valuable reference for the integrated development and guidance and control of public open space in Chinese cities.

1. Building public open space
As the core carrier of urban public life, the public open space in urban areas mainly includes the following two kinds. One is the urban public open space with independent land, such as the civic square, park, the green space. The other is the public open space of the buildings located in the development and construction land, which can also be called building the public space. This kind of public open space has not been paid an effective attention. The design and development, utilization and operation, supervision and evaluation of each block are all separate, lacking guidance and control. This has resulted in the inefficiency and loss of publicity in the utilization of land space resources, which is thus in great need of unified guidance and sharing integration.

The integrated development of public open space can strengthen the link between the different building public open space under multiple subjects’ participation, the combination between building public open space and urban public open space, as well as the sharing and mixed utilization of public open space and the varied business space surrounding. Simultaneously, not only public space is in efficient use, but also continuous and integrated spatial experience is formed, existing space structure is optimized, and building public open space is integrated into the overall system of public open space in urban areas. Under the background of open and sharing era, the sharing and integration of building public open space will become an important factor to improve the total amount and the quality of public open space in urban areas.
2. Excellent cases of building public open space in sharing and integration

2.1. Roppongi Hills, Japan

In view of the poor public environment and awful public security around Roppongi, Tokyo government put forward the Roppongi Hills construction plan in 1986, aiming to build a city within a city and devoting itself to building a high-quality urban complex featuring art, landscape and public space. In the planning of the Roppongi Hills, the regional development combined with the overall planning of the city. On the basis of retaining the original water system and greening system, more than half of the land will be used as outdoor open space. By coordinating public transport system of the entire region, the new urban area of Roppongi Hills is perfectly harmoniously integrated into the entire Tokyo metropolitan area, and the influx of people from the surrounding areas brings vitality to Roppongi Hills. Multidimensional traffic forms an efficient spatial pattern, and the vertical distribution of public space also leads people to higher places, making a closer connection between public spaces in Roppongi and its surrounding.

The redevelopment of Roppongi Hills is led by Mori Building Co. Ltd. and government with other companies partly engaged. Over the past 14 years, Mori Building Co. Ltd. had conducted thousands of negotiations with more than 400 land owners, and finally they reached a consensus on the development mode, the scope of renovation, and the compensation plan, which took into account the interests of various parties. As role of a private developer, Mori Building Co. Ltd. successfully integrated the public space in the Roppongi, by utilizing and designing green space, ancient trees, open-air squares, Maori garden and other elements to enhance the environmental quality of the entire space in the core area of the city where the real estate zone is highly prized.

The development of Roppongi Hills attached great importance to not only publicity but also artistic. The developer has set up 8 public works of art and 11 works of art installation throughout the area, combining public art design on a variety of themes which have become important landscape components of the Roppongi area. After several years of negotiation and integration, the vibrant Roppongi Hills is showing the world that it successfully achieved the combination of commercial space of private property and public open system of the city.
2.2. Sin Yi District, Taipei City

In 1977, Taipei launched the Sin Yi plan -- *sub-urban center planning case*, which took Sin Yi district as the sub-center to form a pattern of polycentricity, so as to disperse the congestion pressure of the western Taipei caused by automobile exhibition shows and the old center in the Ximenting area and built it into a demonstrative new region. The Sin Yi plan adopted an advanced planning concept and made clear provisions on the uses and ownership of each land. In the Sin Yi district, the zonal open space and the internal open space of the plot have been clearly integrated, and the largest air walking system in Taipei has been built. The design and guidance and control of the Business Skyway System are completed by the government. The main part of the repair and later maintenance management have been taken charge of by the commercial companies surrounding. The total length of the Business Skyway System is 2.293km, among which 2.260km was built by private enterprises, accounting for 98.27%.

Taipei Sin Yi Business Skyway System connects major institutions in the commercial area, including Taipei 101 Tower, Taipei World Trade Center, ATT 4 FUN, Vieshow Cinemas, Shin Kong Mitsukoshi, Bellavita Square, Breeze Songgao Breeze Sin Yi and so on. Through the diverted traffic of people and vehicles, the pedestrian system was reorganized and the accessibility of commercial space was increased. The public pedestrian system with elevated level activated the economic vitality of the second and third floors, forming a good and vibrant public open space with rich multidimensional spatial experience. According to the Sin Yi plan, in the plot of the Sin Yi commercial district, there are many scattered open spaces planned which were integrated together by Sin Yi pedestrian system to form a continuous public space system.

![Figure 5. Distribution diagram of public open space in Taipei Sin Yi business district](https://you.ctrip.com/photos/Sight/taipeicity360/r136567-152657788.html)

![Figure 6. Taipei Sin Yi district walking system](https://you.ctrip.com/photos/Sight/taipeicity360/r136567-152657788.html)
of the urban construction, by the means of planning, the government has established the principles and ideas of designing and constructing the public open space in the Sin Yi district. Besides, the location, shape and scale of public open space have been defined clearly in the urban planning, which is helpful to the implementation and construction of it. Secondly, in terms of planning and construction, Sin Yi district has the most distinctive features in the planning, design and construction of a number of zonal public open spaces across different blocks with two kinds of width, that is, 5m and 4m. They have been organized into a crisscrossed network of public spaces, integrating the scattered block-like public open spaces together to provide users with continuous spatial experience. Finally, at the aspect of key blocks, Sin Yi district sets up targeted development plans for specific areas, development goals and principles, such as the Skyway System in Sin Yi commercial district. It is strong management and control that improves the quality of public space construction, enhances the controllability of public space development, and provides a valuable reference for the sharing and integration of public open space in urban area.

3. Background of Shenzhen Bay Street, Nanshan District, Shenzhen
Shenzhen, as one of the first cities in China issuing statutory planning plans, also put the systematic construction and management of public open space into practice. In 1998, the international bidding for urban design of the core area of Nanshan Commercial and Cultural Central District (short for Nanshan Central District the following), Shenzhen, was submitted, and the Brisbane Urban Comprehensive Design Institute, Australia, won the bidding. The concept of Urban Village proposed by them emphasized the planning idea of humanistic environment, environmental and ecological protection, and sustainable development.

The innovative proposal integrated the public open space of different areas and streets through a two-story aerial corridor with a height of 6m, a length of 880m and a width of 20m. The west side was linked with other residential and commercial plots in the central area, while the east was the second phase of Nanshan Central District construction, and the north and south were connected seamlessly to a large shopping center of A office space, a star-rated hotel and a public square (Hyde Square). The design has realized the the distraction of people and vehicles and formed the central axis of Nanshan Central District. Besides, the second floor platform of Shenzhen Bay Street has been integrated into the Shenzhen Bay air walking system. The concept of sharing and integration of public open space has innovatively solved the rational allocation of functions and spaces by unifying and integrating the public space of scattered buildings to enhance the efficiency of space utilization and create an active commercial atmosphere.

Figure 7 Bird ‘s-eye view of urban design of Nanshan Central District in Shenzhen
(Source: Comparative study on urban spatial morphology of the central business district of Shenzhen)

4. Analysis of the current situation of Shenzhen Bay Street public open space sharing and integration

4.1. Function partition
Nanshan Central District takes a pedestrian commercial street as the core axis, with a theater, a three-star hotel, two five-star hotels, three shopping centers and seven office buildings distributed on both
sides, which has formed a series of rich urban space and life sequence. Drived by core business, the surrounding entertainment and cultural industries combining with public square green space have jointly made the Nanshan Commercial and Cultural Central District an abundant, pluralistic and vibrant urban experience space, which has highlighted the features of Nanshan and created a high economic value. On average, every 10 square meters of public space serves 12,000 square meters of buildings, and 150,000 people per day during holidays. Therefore, it has become a model case of high efficiency in mixed use of public open space in Shenzhen.

Figure 8 Schematic diagram of building public open space of the second floor aerial corridor in Shenzhen Bay Street (Source: drawn by the author)

4.2. Spatial structure
As the picture shown below, the sequence of building public open space of the second floor aerial corridor in Shenzhen Bay Street is mainly divided into three parts from west to east:

West entrance Central plaza East entrance
Figure 9 Plan of aerial corridor in Shenzhen Bay Street (source: Shenzhen Bay Street landscape design plan)

Figure 10 The west entrance of Tianli Central Business Plaza (Source: photo by author)
Figure 11 The front square of central Coast City (Source: photo by author)
Figure 12 The east side of aerial pedestrian corridor (Source: photo by author)

The first part is the west entrance square including the Wenxin Square at the west entrance, the municipal street overpass, and the Tianli Central Business Square which is of high quality, regular and balanced in square layout, and cleverly organized in the design of people flow. The second part is the central square which is the climax of the linear public space sequence. Set diagonally and cleverly towards the flow of people, in terms of horizontal aspect, it combines with the front square of the Coastal City, connecting the indoor public space of the Tianli City, the Coastal City and the Coastal City building, which makes it become the core of the whole public space on the second floor. It not only sets up landscape sketches of tree arrays and markers, but also vertical stairs and elevators as
pivots of vertical transportation. The third part is the east entrance square whose surrounding main public space is Poly Culture Square, including theater, museum, multiplex cinema, science and technology expo center and shopping center, five comprehensive cultural industry projects. The east entrance is close to the subway station and has great advantages of traffic.

4.3. Traffic organization
The location of Shenzhen Bay Street has good accessibility with two subway stations and 12 bus stations in the 500-meter walking circle. Traffic on the aerial floor is covered by four sets of vertical elevators, 17 sets of escalators and 12 staircases. There are 14 garage entrances around the area.

4.4. Landscape features, sketches and markers
Through the integration of public space of Shenzhen Bay Street and commercial space surrounding, a rich multi-level landscape greening system has been formed. Combined with the tree arrays of the two-storey aerial platform of Coastal City Square and the movable flower boxes, the retreat garden of Coastal City, the roof garden of the west tower of Coastal City, the vertical greening of Tianli Central Business Square, have formed a set of top-down multidimensional landscape system. In order to unify the overall appearance of the pedestrian public space, the ground paving, landscape sketches, rest seats and the building facades on both sides of it are combined to coordinate and unify the materials, colors and the style of textures. The changing facades reinforce the sense of pedestrians’ experience and the hierarchy of the central public space by combining with the building public open space ‘s retreat and continuous arcades.

5. Evaluation on sharing and integration of public open space in Shenzhen Bay Street
The space around Shenzhen Bay Street is diversified in commercial forms. Through the aerial pedestrian public space on the axis, the utilization rate of the space is improved, and the diversion of people and vehicles is realized, and so is the organic integration of the dependent public space occupied by multiple subjects and the independent public space of city. Through the aerial pedestrian system, the public open space and street space of several buildings in different ownership are designed as a whole to create an integrated space system, increase the utilization rate of space and gather the commercial atmosphere. Abundant public passages, vertical traffic, aerial pedestrian and other outdoor public space are designed in combination with the building public open space, forming an ample public space system. Shenzhen Bay Street pedestrian system combines different kinds of indoor and outdoor public open space in series, such as outdoor square space, green space, traffic space outdoors, half-indoor arcade, indoor chambers, overpass with roof, interior atrium, roof garden, traffic space indoors, which are designed comprehensively and planned overall, forming a rich and intensive public space system.

However, there are still deficiencies in the actual use. Through the interview of the actual users, we found the following problems:
The first is the unreasonable vertical industries setting, paying too much attention to the upper space of the platform leading to insufficient consideration to the space under the platform. The busy traffic creates a large noise, and the closed aerial layer intensifies the noise effect, which has a bad impact on the underlying commercial industries, with poor commercial in actual operation. Secondly, there is a lack of exquisite humanistic care. The overall public space is mainly dynamic and short of high-quality static rest space. The pedestrian space on the second floor lacks shelter and insufficient green vegetation, which is not suitable for the hot regional climate in south of the Five Ridges. Thirdly, although the main public spaces meet the requirements of accessibility and opening to the public, some public spaces are still artificially closed and forbidden to the public. Such as, the retreat garden on the top floor of Coastal City Mall, and the roof garden on the top floor of Coastal City west building. Finally, the theme and artistic of public space, are slightly insufficient. Space elements lack originality and identification. Compared with Roppongi Hills in Japan and Rockefeller Center in the United States, there is a lack of public art and the overall environmental quality is unsatisfactory.

6. Inspiration

Shenzhen Bay Street in Nanshan Central District is developed in the mode of government guidance and overall design. First of all, an independent two-story platform system was built to limit the public open space in Nanshan Central District, and simultaneously, the open spaces of the scattered buildings were integrated, which was its biggest innovation. Although there are still deficiencies such as lack of publicity, poor artistry and little exquisite care, the innovation of development mode and utilization of policy still provide references for the subsequent practice of sharing and integration in building public open space.

In the recent 20 years of urban construction, in a broad sense, many urban public spaces, public buildings or public facilities have been built, such as large city squares, parks, green spaces, cultural centers and so on, the extensive planning and management mode still leads to the problem of insufficient publicity in the actual operation. The separative management of urban public open space and building public open space also affects the whole public space system in urban areas. As a good public space system of aerial pedestrian in Shenzhen, the design and management of urban public space in Nanshan Central District has certain reference significance. Under the background of insufficient urban space resources, poor quality of public open space and intensive development of urban space, the sharing and integration of urban public open space and building public open space will become an inevitable trend of urban development.

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