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Studies on The Functionality of the Hong Kong's Footpath System

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Abstract. As the core pedestrian space in the city, the footpath is related to the walking experience and travel choices, affects the transportation system, promotes commercial, social, and cultural activities, and is a key carrier of urban vitality and safety. Hong Kong's footpath system is known for its multi-layered and three-dimensional structure, which effectively connects urban spaces through a complex network. However, Hong Kong still has problems such as insufficient ground crossing facilities and chaotic design and management. Future trends show that footpath design will pay more attention to pedestrian experience and needs, emphasizing functional diversity and refined services. The existing Hong Kong footpath strategy focuses on convenience, vitality, and diversity, while the design strategy emphasizes environmental, cultural integration, and sustainability. To meet the changing needs of people for footpath activities, it is necessary to strengthen guidance, greening, and cultural integration. By exploring the design of Hong Kong footpaths, this paper aims to provide a reference for a more comprehensive and systematic solution to the problems faced by the footpath system, thereby improving the quality of life of citizens and the overall livability of the city.

Keywords: Footpath; Hong Kong; Path system.

1. Introduction

As the most important walking space in the city, the quality of the walking experience of the footpath has a great impact on whether people will choose to walk, and then affects the city's transportation system. The function of pedestrian paths is closely related to human behavior, traffic safety, spatial order, commercial and public activities, spatial characteristics, etc. Its function involves an important impact on the vitality of pedestrian path space. Zhu et al. believed that walkability is one of the key attributes that determine urban vitality [1]. Chan et al. believed that pedestrian facilities and a safe and pleasant environment have long been considered as the key factors to encourage walking [2]. Stevens et al. believed that footpath should represent important components of the transport infrastructure and the entire transport network, however, the lack of an overall design approach may limit the level of safety, sense of place and ultimately pedestrian use [3].

In the process of its formation, the urban pedestrian path system is filled with a large number of commercial, social, cultural and other activities. Today, the pedestrian path system has enhanced interaction with people in daily life, and its functional requirements are more diversified. Ratnam believed that footpaths are complex, multi-layered and multi-dimensional spaces that blur the boundary between public and private spaces while facilitating transactional, formal and sometimes informal activities [4]. Cattell et al. believed that social interactions in space can reduce the complexity of daily life, maintain a sense of community, provide the opportunity to maintain connections or build bridges, and can influence tolerance and inspire people's spirit [5]. Grammenos et al. believed that Street connects different parts of the neighborhood to support social interaction and communication, and the street design makes a significant contribution to the quality and character of the community [6]. Greed believed that at present, urban area design lacks the understanding of people's needs and inclusive design principles, which reduces the opportunities for ordinary people to enter, walk comfortably and enjoy the city, and must pay more attention to the needs of users and the limitations of daily life [7]. Mitra et al. believed that the footpath is an important part of the living environment, affecting the layout, spacing and visual features of the houses it serves, and determining the flow of traffic [8].

In 2013, "Guidelines for Planning and Design of Urban Pedestrian and Bicycle Transportation Systems" of China pointed out that the planning of pedestrian systems needs to have the principles of safety, continuity, convenience and comfort. Hong Kong is a highly competitive international metropolis, a leading financial center and commercial hub, and a city with world-class infrastructure. Hong Kong is one of the world's three major financial centers, a trade center, a shipping center, and a tourist hotspot. Hong Kong's advantages continue to promote the gathering of Hong Kong's population and the development of various industries. The international population composition makes it have both Eastern and Western social characteristics, and the development of various industries makes the city's business format more complex. Therefore, more pedestrians and more public life are generated in the limited pedestrian space, and the interaction between people and the pedestrian system is more and more frequent. At present, there are relatively few studies on the functions of pedestrian systems in Hong Kong as an example in the literature. Scholars focus on the quality of the walking environment (greening, air pollution, etc.), the impact of urban planning and design on walking, and the friendliness of special groups. This paper discussed the current development status of Hong Kong's pedestrian system functions, future development trends, functional design strategies of Hong Kong's pedestrian system, and suggestions for it, aiming to provide reference for the functional design of pedestrian systems in the Greater Bay Area and other cities to meet diversified needs..

2. The Current Development Status of Hong Kong's Pedestrian System

There are many pedestrian paths in Hong Kong, consisting of pedestrian streets, sidewalks, pedestrian bridges, pedestrian tunnels, coastal corridors, self-service sidewalks, etc. Among them, Hong Kong has many pedestrian bridges and tunnels, which have exceeded 1,200 so far. A networked and three-dimensional pedestrian system has been established in the city center of Hong Kong. Compared with the traditional ground pedestrian system, the Hong Kong three-dimensional pedestrian system has greatly extended the types and lengths of pedestrian boundary, strengthened the connection between pedestrian paths and different functional spaces, and promoted the increase of interactions between different groups of people and pedestrian boundary.

Hong Kong's compact and high-density urban characteristics, terrain that is not suitable for urban construction, rapidly increasing population and increasingly serious conflicts between people and vehicles have caused problems such as narrow and congested pedestrian space in Hong Kong. Therefore, Hong Kong pays special attention to the construction of a multi-layer three-dimensional pedestrian system. The three-dimensional pedestrian system refers to the conversion of the traditional ground pedestrian system into a vertical and three-dimensional pedestrian space system, which promotes the development of pedestrian traffic by organizing pedestrian flows into different spatial planes. The three-dimensional pedestrian system consists of a ground pedestrian system, an aerial pedestrian system, and an underground pedestrian system. It adopts a development mode from horizontal to vertical, from a single horizontal dimension of ground pedestrian paths to three-dimensional ground pedestrian bridges, underground pedestrian passages, and ground pedestrian paths, forming an intricate three-dimensional pedestrian system.

As a representative of high-density cities, Hong Kong has many cars, many people, small space, and relatively complex traffic elements, but it has better handled the relationship between motorized traffic and pedestrian traffic, and its walking environment has been recognized worldwide. In 2014, the Natural Resources Defense Council (NRDC) conducted a pedestrian-friendly evaluation and analysis of 35 cities in China, scoring them from the indicators of policy and management, convenience, comfort, and safety. The report showed that Hong Kong ranked first, with scores far ahead of other cities, and was called a "walking paradise."

However, there are also some drawbacks. Hong Kong scholar Wu pointed out the problems of Hong Kong's pedestrian space construction: the ground crossing facilities are ignored, which reduces the attractiveness of ground paving; the design of pedestrian facilities outside subway stations is poor;

the design and management of pedestrian space facilities are chaotic; and there is insufficient sidewalk space. In response to the above problems, it is directly pointed out that the design strategy for building high-quality pedestrian space should not ignore the basic needs of pedestrians in the pedestrian space..

3. Future Trends in the Functional Design of Hong Kong's Pedestrian Path System

Hong Kong is surrounded by mountains, with winding seashores and numerous natural harbors. The overall pattern has formed a development around Victoria Harbor and mountains. Due to the large number of mountains, the development of various urban areas is concentrated on limited land and reclaimed land, forming an intensive urban form. According to statistics, the inland area of Hong Kong is 1,106.34 km², but the built-up area (statistics in 2016) accounts for about 24% of the total land area of Hong Kong. With the development of the city, the population of Hong Kong has grown rapidly. In mid-2022, the total population of Hong Kong reached 7,346,100 [9]. In addition, Hong Kong receives a large number of domestic and foreign tourists every year, reaching 55,913 in 2019. Faced with the problems of high-density population, building space, and land shortage, the comprehensive utilization of land has become very critical. It is precisely because of the compact and diverse space requirements around the boundaries of Hong Kong pedestrian paths and the high-density and diverse population needs that Hong Kong pedestrian paths show more diverse functions than ordinary cities.

With the continuous development of urban construction, people pay more attention to the refined service level of pedestrian space, requiring pedestrian paths to pay more attention to people's behavioral needs in addition to meeting basic safety functions. The traditional pedestrian path boundary function focuses on people's traffic behavior needs and achieves spatial separation and pedestrian safety by reasonably setting the boundary position and improving the boundary anti-collision level. However, with the development of streets, in high-density environments, the functional requirements of pedestrian path boundaries for traffic behavior have gradually increased, and the requirements for direction guidance and pedestrian diversion have continued to increase. At the same time, with the increase in non-traffic behaviors such as staying, finding ways, commercial promotions, and cultural exhibitions, the existing use of pedestrian paths has changed, and the disconnection between behavioral needs and existing functional provision has caused a decline in the walking experience.

In order to pay attention to and improve traffic safety, the Hong Kong Highway Administration has set up a large number of iron guardrails at the boundaries of pedestrian paths. However, this simple way of adding guardrails does not pay enough attention to the psychological and cultural needs of pedestrians; in high-density environments, the spread of various types of boundary commercial information causes the boundary form to be dirty and messy and affects direction identification. It can be seen that the pedestrian path system will pay more attention to the experience and needs of pedestrians in the future development and construction.

4. Functional Design Strategy and Recommendations

In 2016, the government formulated "Hong Kong 2030+: A Planning Vision and Strategy Beyond 2030" ("Hong Kong 2030+") based on "Hong Kong 2030", which is committed to improving Hong Kong's liveability, meeting new challenges and opportunities, and creating capacity for sustainable development. In planning a liveable high-density city, strategies involving the functions of pedestrian paths include:

(1) Making use of better pedestrian connections and connecting transport services, providing better advice to pedestrians and road users, and making it easier for citizens to reach transport facilities, public facilities, neighborhood facilities, employment places, recreational activities, and nature.

(2) Making streets more walkable, encouraging highly plastic designs and coordinated uses, and making streets more walkable.

(3) Protecting buildings with cultural value and historical atmosphere, and studying innovative buildings and layouts to meet the changes in citizens' living, working, and consumption.

Promoting unique urban characteristics: comprehensive waterfront planning, and promoting a "water-friendly culture." Reviewing the current policies: guidelines, functions, quality, design, accessibility, provision, and management of public and semi-public spaces (such as streets, sidewalks, footbridges, squares, pedestrian areas) [10]. The functional design strategy of the current Hong Kong pedestrian path system focuses on protecting the natural environment, highlighting regional characteristics, building a city image, and coordinating sidewalks and pedestrian connecting channels, all while focusing on people-oriented design. With changes in street life, in order to meet the changing needs of people for pedestrian activities, the following suggestions are put forward for the construction of Hong Kong's pedestrian path system:

(1) Strengthen the guiding function of the pedestrian path boundary: The pedestrian path boundary function should reasonably guide pedestrian traffic in the pedestrian path space, consider pedestrian safety, diversion, direction or location prompts, guidance, and other functions. Additionally, a barrier-free boundary design should be provided to promote the flow of pedestrians.

(2) Increase the green area in the pedestrian path system: When conditions permit, planting green plants in the pedestrian path system can alleviate the sense of oppression brought by high-density buildings, eliminate people's visual and psychological discomfort, increase the environmental greening rate, improve the neighborhood environment, and elevate the design level of ecological streets.

(3) Integrate regional culture into the design of the pedestrian path system: Incorporating regional cultural symbols into the pedestrian path system can effectively enhance cultural characteristics and atmosphere. Hong Kong, as a convergence of diverse cultures, offers numerous opportunities to highlight and strengthen its historical and cultural heritage through its pedestrian path system. The integration of the pedestrian path system with historical culture is particularly important around historical and cultural attractions..

5. Conclusion

Hong Kong's pedestrian path system has a well-developed three-dimensional network, including pedestrian streets, pedestrian bridges, pedestrian tunnels, and coastal corridors, which effectively alleviates the problem of spatial congestion in a high-density urban environment. However, although Hong Kong performs well in the global pedestrian-friendly evaluation, it still has problems such as insufficient pedestrian space design and unsatisfactory crossing facilities. Nowadays, the use of pedestrian paths has changed. The disconnect between behavioral needs and existing functional provision has caused a decline in walking experience. Rough pedestrian path transformation will bring some negative effects. The government has formulated the "Hong Kong 2030+" plan, which aims to improve the convenience of pedestrian paths, create vibrant streets, highlight diversity, and promote urban characteristics, while reviewing public space policies and management to ensure that the design is people-oriented and promote sustainable development.

In the future, the design of pedestrian paths in Hong Kong needs to pay more attention to pedestrian experience, strengthen the guiding function, and increase greening and cultural integration, so as to improve the environment and meet the changing needs.

This paper filled the gap in existing research on the development status, future development trends, and functional design strategies of Hong Kong's pedestrian path system. However, this paper still had some shortcomings. For example, in the analysis of specific issues, such as the details of pedestrian space design and changes in pedestrian behavior patterns, there was a lack of in-depth data support and case analysis. When proposing functional design strategies and suggestions, although the general

direction was pointed out, there were few specific implementation measures and detailed plans, and there was a lack of specific and operational guidance. In the future, case studies and empirical analysis will be deepened, and implementation strategies and guidance will be refined in order to obtain higher academic and practical value.

This paper analyzed the development status, functional design strategies, and future trends of Hong Kong's pedestrian path system, providing reference and help for a more comprehensive and systematic solution to the problems faced by the pedestrian path system, and promoting Hong Kong to move towards a more livable and sustainable city.

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