

Exploring ICT for policy improvement of more equity use of Privately-owned Public Open spaces

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Abstract

Public open space, regarded as one of the significant elements which contribute to the city's attractiveness and uniqueness, is essential to people's physical as well as mental health. Privately-Owned Public Open Space, or Public Open Space in Private Development (POSPD), as a supplementation of public open space, has become common policy to moderate the intensification of urbanisation. However, some access restrictions, both physical and information wise, were deliberately designed by developers and property owners to reserve the POSPD for their own gains, which further hampers the public ownership of public space, leading to the failure of POSPD to bear the social responsibilities.

Making use of ICT to extend the 'publicness' to the 'internet-based', this research regards the enhancement of 'Smart Access' as a way to revitalize the existing land stock. By redefining and rescheduling the availability of POSPD which have informational access problems, this research aims at proposing a policy framework of 'accessible and interactive platform' which could integrate public participation into the provision of responsive public space infrastructure to encourage the citizen to explore and better use the POSPD. Based on the 'Spatial-Data-Infrastructure' of Hong Kong, the accessibility and distribution of POSPD are analysed and simulated with GIS as the information base. Using the real-time user-generated data from volunteers as the information flow in response to the update of signage system, the proposed responsive POSPD platform will provide continuous positive feedback for policy improvement to help realize the sustainable development of the public open space.

Keywords: public open space in private development, smart governance, real-time, equity.

1. Introduction

Public open space (POS), regarded as one of the significant elements which contribute to the city's attractiveness and uniqueness, is essential to people's physical as well as mental health (Jennings et al., 2016). Over the past decades, a burgeoning number of researches have explored different aspects of POS, such as accessibility and distributional equity (Nicholls, 2001, Heckert and Rosan, 2016, Tang, 2017, Wolch et al., 2005, Pasaogullari and Doratli, 2004, Jennings et al., 2012); quality (Evans et al., 2018, de la Barrera et al., 2016); social attribute (Xu et al., 2017); and the design strategy of public space for the disadvantaged people (Yung et al., 2016). Scholars have reached a consensus that the public open space was barely satisfactory both in terms of quantity and quality (Tang and Wong, 2008), which to some extent leads to the emergence of Privately-owned Public Open space, or Public Open Space in Private Development (POSPD) as a supplementation of POS and a common policy to moderate the intensification of urbanisation.

Although POS are generally regarded as the 'space of opportunity' (Tang, 2017), some studies have shown that there exist an inequality of service among people (Lai, 2017). Meanwhile, the 'class tendency' concerning POS might be created and accelerated as the consequence of technology development (Chongming, 2015). While the urbanisation and privatisation have become a common social phenomenon (Jennings et al., 2012), some access restrictions were deliberately designed by developers and property owners to control these POSPD for their own gains, which further hampers the publicness of POS, leading to the failure of POSPD to bear the social responsibilities. At present, in compact cities like Hong Kong, POSPD still have problems in the aspect of 'information access' despite already facing the troubles of insufficient supply of POS. Since the inequality of information concerning people's needs and recognition of POSPD, the balance of supply and utilization needs to be repurposed urgently.

The current hot 'smart city' concept is supposed to include the dimensions of social and cultural and provide the citizens with the opportunity to interact with their city in an innovative way. People are empowered to make decisions for the city's future (Christopoulou et al., 2014). Instead of relying solely on fixed data, there emerged many platforms where the citizens could share their information depending on their willingness, which would allow the government to constantly improve the city environment based on citizen's real needs. Making use of Information and Communication Technology (ICT) to extend the 'publicness' to the 'internet-based', this research would take a different attempt to regard the enhancement of 'smart access' as a novel way to revitalize the existing land stock and reach a more balanced use of POS. This paper is structured as follows: firstly, the concept of smart city and smart access are explained, followed by the analysis and simulation of location and service area of POSPD in Hong Kong. Previous solutions and platforms are examined to offer directions, then, we proposed the design of our system, advocating integrating public participation into the built of responsive public space infrastructure to encourage the public to explore and use the POSPD. By redefining and rescheduling the availability of POSPD which have

informational access problems, this research aims at proposing a policy framework of ‘accessible and interactive platform’ which could integrate public participation into the provision of responsive public space infrastructure to encourage the citizen to explore and better use the POSPD. We end the article with an outlook on the next step for research to improve the utility of all kinds of public open space and its better management.

2. Smart Access and POSPD in Hong Kong

The Hong Kong government has announced ‘Smart Living’ as one of the main targets of ‘Smart City’ development plan. ‘Smart Living’ is a concept which improves people’s overall living experience in Hong Kong, in order to create a safer, more accessible and liveable society. Access, regarded as one of the dimensions of publicness and privateness by Benn and Gaus (1983), can be further understood from 4 subdimensions: physical places, interactive activities, resources and information. Among which, informational access, or ‘smart access’, as a prerequisite, makes the POS available to the public (Benn and Gaus, 1983).

POS is particularly scarce and important to the public in Hong Kong, a high-density city, where the average living space per person is only 13 square meters in 2014 (Yung et al., 2016). In this kind of compact city, provide more POS directly in the built environment is not an easy task owing to the limited land availability and high land costs (Lai, 2017). Public Open Space in Private Development (POSPD), open to the public but provided and managed by private developers, is thus encouraged by the Hong Kong Government policy. In 2011, The Development Bureau of Hong Kong Government released the <Public Open Space in Private Developments Design and Management Guidelines>, aiming at leading a proper design and management of POSPD. Being a reserve of public space in a compact city, the ambiguity of private and public interests has led to public concern. Unfortunately, many of the POSPD are still difficult to access, both physically and perceptually, poorly maintained and have shorter opening hours than required. For example, revealed by the local media HKFP, the land deck of the newly built Kerry Hotel in Hung Hom is supposed to be public, but in fact it only has an obscure sign showing its public status, very few people have knowledge about it.

The city infrastructure plays an important role in empowering and engaging citizens in using public spaces and promote their social interactions (Christopoulou et al., 2014). Hence, in this paper, we propose a system which link city infrastructure as well as people’s interaction to encourage a better use of POSPD. In the previous exploration, dashboards, often exists as a part of a larger information ecosystem which consist of many different service-oriented apps or online platforms, are common ways for smart governance and for providing informational accessibility for citizens at present.

3. System Design

The rising possibility for the city governments to get access to big data has encouraged the trends of building online urban dashboards as platforms, delivering the ability for the

authorities and general public to communicate in a better way (Lee et al., 2015). So, we then analysed the existing city dashboards, discussing its target audience, data type, and its drawbacks, and summarize the key characters that would benefit the new platform. Based on the preliminary exploration, we started to propose our system design. The related data for this study were collected from the website of Lands Department¹ and Buildings Department².

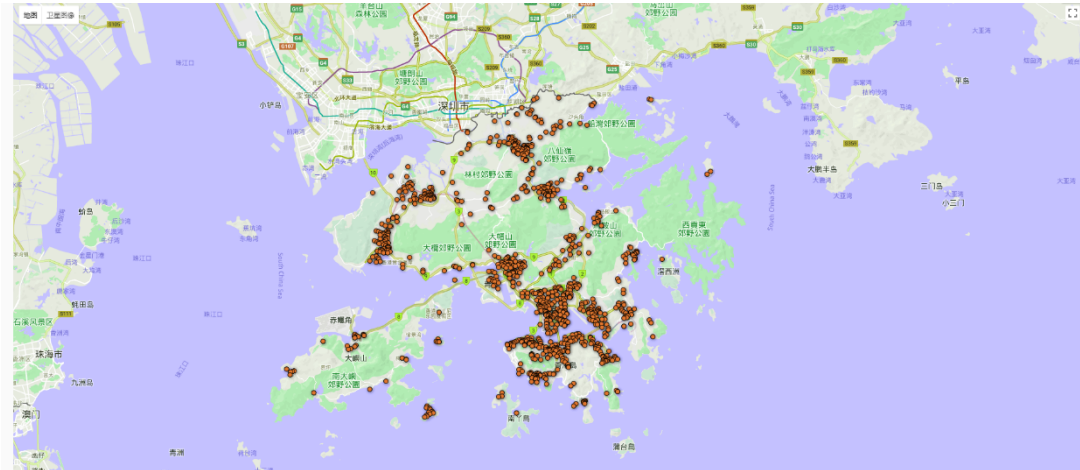


Figure 1 the Public Space Directory
Source: the Hong Kong Public Space Initiative

Previous research has examined that people prefer destinations which are closer to them (Koohsari et al., 2013). In this part, aiming at building an ‘accessible and interactive system’ of Privately-Owned Responsive Public Space based on the ‘Spatial-Data-Infrastructure’, the location and service area of POSPD in Hong Kong are simulated by GIS. For each POSPD, we identify its characters including the name, type, districts, manager, ways of contact, areas, location, transportation, opening hours, facilities, support activities, restrictions, etc. based on the Public Space Directory³ built by the Hong Kong Public Space Initiative (Figure 1).

Following this, carrying out a field research is essential for building the database. Observation, description, summary and classification of the spatial elements of the built environment of these POSPD by satellite map data and field investigation are used to finish the drawings of road network and public space distribution map. With the help of GIS, we calculate the shortcomings of accessibility of existing POSPD, such as its scope of services, betweenness, and connectivity. We also conduct a questionnaire survey to further understand people’s present perception of POSPD.

Last but not the least, we proposed our smart access system from the aspects of technical, informational, visual design and interaction design. The system would work as a platform to increase people’s perception of POSPD, to be a real-time data-sharing platform to give response to people’s current needs of public spaces by integrating people forming a feedback loop. Meanwhile, the platform could make the city governance more legible which would

¹ <https://www.landsd.gov.hk/en/legco/pfpd.htm>
² http://www.bd.gov.hk/english/dedicated_areas.html
³ <http://database.hkpsi.org/#sthash.sL7cxWvC.dpbs>

contribute to the establishment of trust between the government and citizens.

3.1 Build Database for POSPD

POSPD could contribute towards the provision of quality leisure and recreational space and improve Hong Kong’s living environment. Based on the information provided by Hong Kong Government, we build a database of facilities and/ or Open Space required under lease for use by the Public in Private Developments. In total, there exist 72 POSPD in Hong Kong. The database mainly consists of some basic information of POSPD in Hong Kong, such as the name, type, location, developer/ administrator (and their emergency contact information), area, transportation (way of accessing), open hour, facilities (seats, barrier-free facilities, age-friendly facilities), supported activities, capacity and restrictions.

In order to ‘Make data Actionable’ (Goldsmith and Crawford, 2014), a more dedicated analysis is carried out to make the spatial information of POSPD visualised. The spatial distribution of POSPD in Hong Kong was shown in the city map (Figure 2). Then, every POSPD’s spatial characteristic is calculated by GIS.

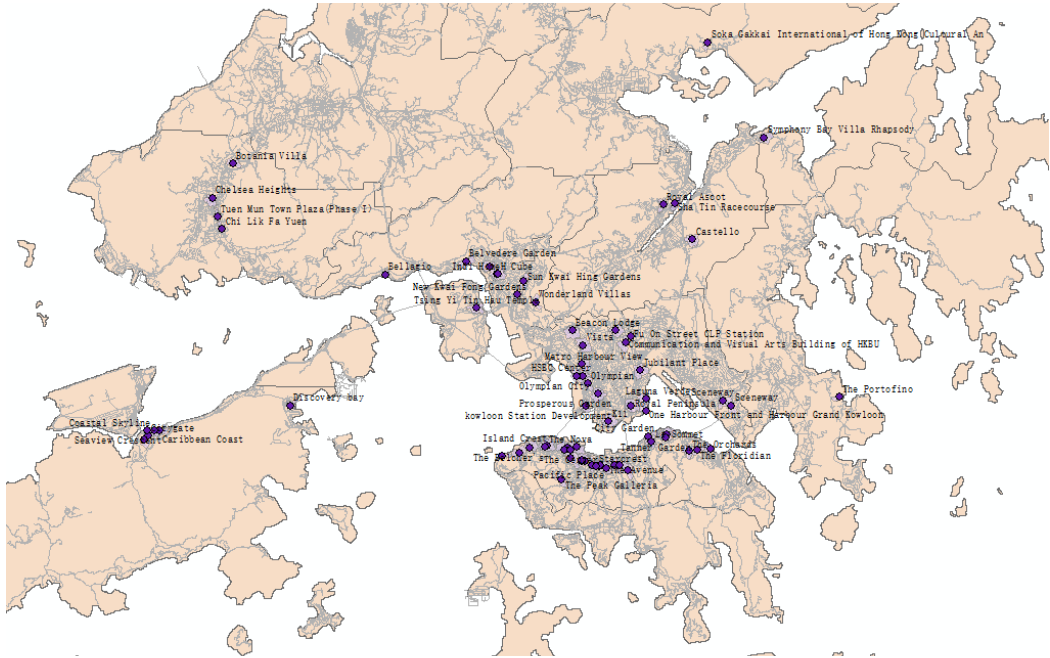


Figure 2 The spatial distribution map of POSPD in Hong Kong

Betweenness centrality, which means the number of times the vertex lies on the shortest path between other pairs of vertices, is also calculated in the area with the help of GIS. We compare the differences between the figures when $R=400m$, $R=800$ and $R=n$, and record it’s Betweenness. Apart from that, the connectivity and services area of the site are also calculated (Figure 3). For each site, we carry out the same steps and put all the results into a table, which would be integrated in the smart access system as the basic information.

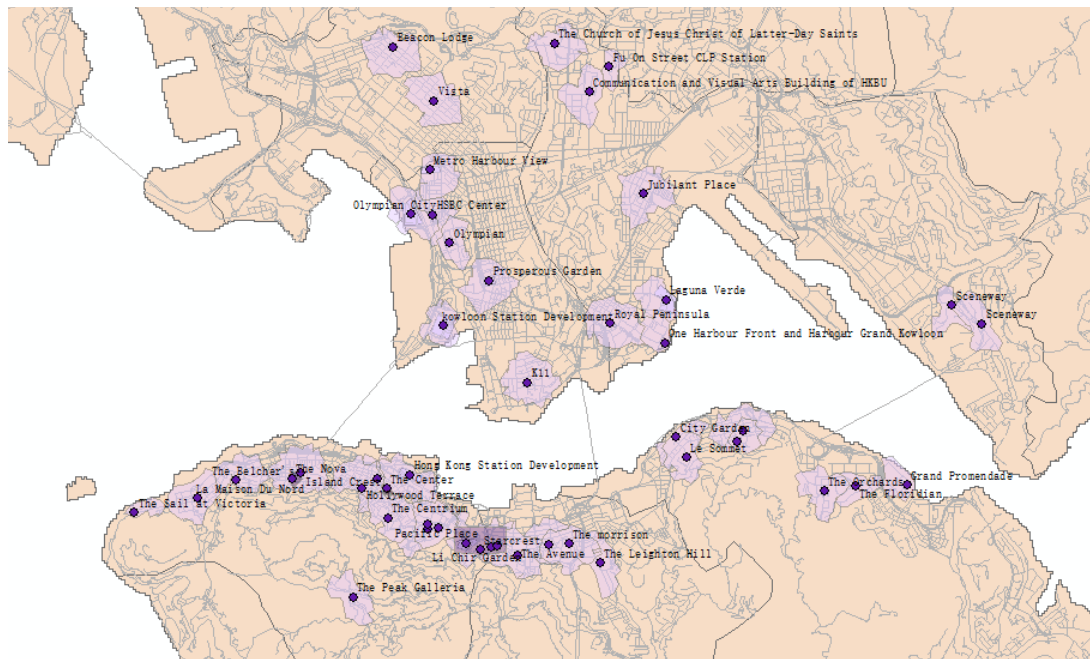


Figure 3 Service area

3.2 System Design

To integrate the diverse information and demands, a more dedicated system is designed here. The data visualization system provides smart access and citizen participation based on SDI. Real-name registration is required in the system to ensure safety.

System Interface

The system would originally look like google map with the POSPD highlighted by green colour while other places are grey (Figure 4). All of the 'POSPD Green' can be clicked. Once you do so, you will enter the *Street View Mode* and have a better understanding of the whole place before you arrived here (Figure 5). Under this interface, the basic information, including the aspects we mentioned earlier, would be shown in the box at the lower left corner. In the box on the right is the real-time comments from registered citizen. If you have registered before, you can also sign in and give comments to these POSPD. Moreover, users could personalise their interface to make it more suitable for their needs.



Figure 4 Original interface



Figure 5 Street View Mode

Citizen Participation

Cities are not just physical environment, infrastructure and services. Whilst the rapid urbanisation results in the similar infrastructure and city functions, every city has its own distinctive characteristics which represent the citizens and collective culture (Christopoulou et al., 2014). Citizens are the generator of urban flavour.

To encourage the participation of citizens, the system would gamify their engagement in the process of data devotion. Account level would be set to unlock many virtual image, virtual title, etc. Incentives like 'Virtual gold' would give to citizen if they make contribute to the real-time information in the system. Also, their account would able to link to their social media account, their comments or pictures uploaded to the system were able to gain 'likes' just like Facebook. If the citizens could aware that their (data-producing) behaviours are listened to, and would affect other people's choice, even the government's decisions, then they would be a positive part of all the process (Goldsmith and Crawford, 2014).

Establish an interaction Loop

After the data was carefully collected, official data analysis will be available. Tools would be designed to integrate people's feedback to the service. Users of the system could not only find their ideal public spaces to use, but also report problem feedback to the manager of the public space and other relevant departments, make recommendations for the future development, or even score the service. Users could view all the comments proposed by the public through the interface to foster social interaction. If their suggestion got a reply, the system would give them a notification to inform people immediately. Finally, the app will also introduce a push notification module to let users know about the service level and relevant information in real time. In this way, an interaction loop would be established, trust would be established between government and citizen. the smooth implementation of public participation projects and encourage further public participation in the future.

4. Conclusion and Discussion

Given the fact that POS is widely recognised as vital community resource among wider urban environment, existing land use patterns, especially in compact cities, tend to be fixed to some extent, making the adjustment and modification of land use to be more difficult. Thus, it is important to examine whether the stock space has been reasonably allocated and utilised.

It is worth to mention that the main purpose of this paper is to focus on proposing the framework of designing this kind of system. we bring up the steps of building the platform, the key concept we want to include, as well as the function and usage of the platform itself, instead of proposing the programming syntax or the detailed basic information of each site, which might be the future work. This system is still at fancy stage but since the Hong Kong government are actively pushing forward their Common Spatial Data Infrastructure (CSDI) project, it shows potential to reach the connection of material public space in private development with smart technology, to create a new way to link the objects and devices that comprise people's daily use of public space. It is also a platform where data can be directly applied to improving people's quality of life (Lee et al., 2015).

Our findings echoes the statement that a system that exploits city infrastructure and both people's and artificial intelligence in order to empower and engage them in social activities may enhance citizen participation and sense of belonging, also, it may enable urban social interactions (Christopoulou et al., 2014). Helped by the system, citizens can predict the real-time space quality and make adjustment of their choices of using public spaces. For urban service providers like the various departments of the government, the system would facilitate the integration of urban public space resources, centralised access to related data management and promote public space quality based on the available data. It enables a quicker reaction to real-time needs and allow more agile running of city services rather than static performance targets (Lee et al., 2015). Moreover, public-private partnerships should be aligned on mutually beneficial outcomes.

However, there still exist some difficulties and problems to make the system become reality:

data availability, integration of existing environmental sensors (Lee et al., 2015), relationships between different stakeholders, and encouraging people to participate. As a final goal, we hope the system could demonstrate real-time data, and gain real-time data from all users, to foster the equity of using public spaces in compact city, to benefit the citizen's daily life. Further research will be needed to dive into the details of the system as well as the specific data and polit study to test it.

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