

Policy, Implementation and Management of the Inclusive Design of Open Space for Visually Impaired Persons

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Abstract

Purpose - This study addresses policy, implementation and management, the three stages of inclusive open space. It compares both the level of design and implementation of open space in Beijing, Hong Kong and Taipei by following the inclusive guidelines. It also identifies recommendations for policy, implementation and management of inclusive open space and its facilities.

Design/methodology/approach - Field observations were conducted in twenty-seven parks within three cities. In-depth interviews were conducted with a variety of participants, including visually impaired persons, government officers, representatives of non-governmental organisations, local communities and experts.

Findings - Most of the so-called inclusive environments and facilities have not been user-friendly in actual practice. The findings suggest that policies are an essential precondition; however, implementation and management must not be ignored because they ensure the effectiveness of inclusive design.

Research limitations/implications - Comprehensive and continuous studies on the proposed framework are recommended throughout the policy, implementation and management processes.

Practical implications - The findings serve as a reference and direction for taking a holistic approach to inclusive design of open space in densely populated cities.

Social implications - This study examines the levels of inclusive open space and illustrates how to provide barrier-free environments that can be used by the widest spectrum of people.

Originality/value - This study evaluates policy, implementation and management in the three cities based on twenty-nine guidelines generated from seven principles of inclusive design. A research framework is proposed for researchers and policymakers to consider how to achieve effective inclusive open spaces.

Keywords: Accessibility, Inclusive design, Openness, Public facility management, Universal design, Visually impaired persons

Paper type Research paper

Introduction

Open space is considered a kind of public environment, and its facilities are critical to our daily lives. It is related to ‘design for all’, ‘open to all’, ‘non-private’ and ‘belongs to all’, allowing the public to gather, relax and communicate with one another (Aubock and Cejka, 1996; Hsia, 1994; Lynch, 1990; Siu, 2010). In densely populated cities, open spaces are especially important because they provide space for recreation and facilities for the public to use (Engel, 2006). In areas with a high population density, residents are more likely to close their doors and alienate themselves from the community (Forrest *et al.*, 2002). Recent research suggests that walking can promote mental and physical health (Southworth, 2005). Open spaces, such as parks and squares, play an important role, allowing residents to escape from the ‘concrete jungle’ and take a temporary break.

Many urban cities face the challenges of an ageing society. Due to the promotion of healthy living and advancements in medical care, the average lifespan has increased. Improving accessibility can enrich elderly people’s lives and strengthen their self-esteem and independence. The changing population structure creates challenges for developers and designers when designing community facilities.

Visual impairment is reduced vision that cannot be corrected by glasses or contact lenses. According to the World Health Organisation (2017), there are three classifications of visual impairment: moderate vision impairment, severe vision impairment and blindness. Although the rates of visual impairment have decreased since the 1990s, many people still suffer from some degree of vision loss. For instance, in Hong Kong, 174,800 people have visual impairments, accounting for 2.4% of the total population. Of these people, 84.9% are aged 60 years or older (HKSAR Census and Statistics Department, 2014).

In recent decades, growing awareness of disability rights has led to the belief that disabled persons should have equal access to public spaces and services (Mitchell, 2003; Story *et al.*, 1998). However, land scarcity and high population density make it difficult to provide safe and continuous barrier-free access in many Asian cities. In this regard, a more holistic design approach coupled with conventional barrier-free facilities should be adopted to improve accessibility of the built environment (Architectural Services Department, 2007). As a result, researchers, architects, designers, professionals and policymakers have attempted to improve the facilities within open spaces. Certain planning guidelines, laws and regulations related to barrier-free environments have been promulgated to build an inclusive society, and in many urban areas,

standards for facilities, spaces and services with detailed content have been developed. However, the implementation and management of these facilities are often quite different from their original purpose. Moreover, most of the policies focus on individuals with mobility problems. Attention has seldom been given to those with sensory disabilities, such as the visually impaired (Faruk *et al.*, 2008). Due to a lack of consideration of people with special needs, most open spaces have been designed for people with ‘average’ fitness (Burton and Mitchell, 2006; DfEE, 2001). The physically disabled, and especially the visually impaired, have been directly or indirectly excluded (Siu, 2012).

For nearly three decades, Beijing, Hong Kong and Taipei have issued policies and laws related to inclusive design. However, most of the so-called inclusive open spaces have not been user-friendly for visually impaired people. For instance, visually impaired people have been unable to access such spaces due to poor design, implementation and management. It is an opportune time to examine the extent to which open spaces are planned using inclusive designs for visually impaired persons. This study reviews the definition of inclusive design, and the policies, laws, regulations and guidelines for the inclusive design of open space in Beijing, Hong Kong and Taipei. Based on seven principles of universal design, we evaluate and compare inclusive open space for visually impaired persons from three aspects: policy, implementation and management. Ultimately, through this comparative study, we hope to provide some insights for researchers and policymakers into how to approach high-quality open spaces and facilities that cater to the widest spectrum of users.

Literature review

Inclusive design

Inclusive design, similar to ‘universal design’ and ‘design for all’, has grown from the concept of barrier-free design. Both ‘universal design’ and ‘design for all’ have the same literal meaning, which originated from the design of built environment and websites, while inclusive design originated from the design of products (OCAD University, 2012). The target population for built environment designs, is the whole city’s population, in which case these three approaches have an equivalent meaning (Waller *et al.*, 2015). Both ‘universal design’ and ‘inclusive design’ are interchangeable in **terms of built environment**. In effect, it is not always possible for one product

to meet the needs of an entire population, but these approaches insist that all mainstream design should be accessible to as many users as possible (Preiser and Ostroff, 2001).

The British Standards Institute defines inclusive design as ‘the design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible...without the need for special adaptation or specialised design’. British Standard BS 7000-6 (2005) provides guidance on managing inclusive design in all types of organisations including the public and not-for-profit sectors. The concept of barrier-free design focuses on designing specialised features for people with special needs, whereas inclusive design aims to provide barrier-free environments for the widest spectrum of people, regardless of their age, ability or situation, without any need for adaptation (Clarkson, 2007; De Couvreur & Goossen, 2011; Luck, 2018). Based on Microsoft’s (2003) survey on breakdowns in vision, hearing, cognition and other difficulties for American adults, Hosking et al. (2010) propose a ‘population pyramid’ model that represents an appropriate design response to diversity (see Figure 1). The model shows how inclusive design broadens the number of target users while accepting that a specialist solution may be required to satisfy the needs of those at the top of the pyramid (Waller et al., 2015). It is derived from satisfying the needs of more people by applying an understanding of user diversity to the design of mainstream products (Bichard & Gheerawo, 2013; Clarkson et al., 2011; Coleman et al., 2003).

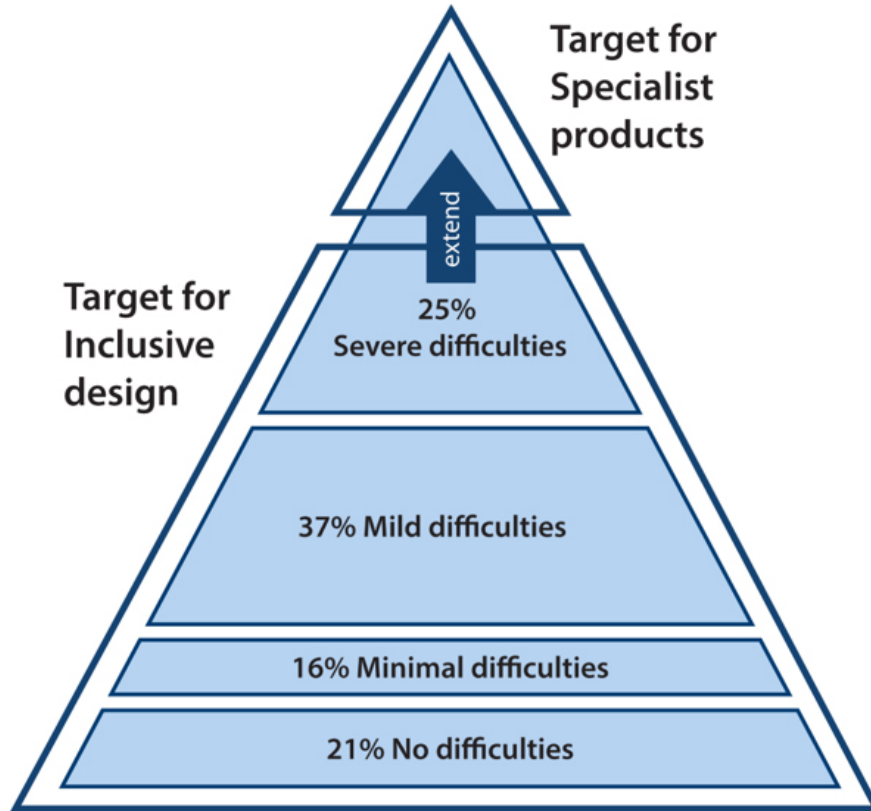


Figure 1. Population pyramid

Furthermore, the Center for Universal Design at North Carolina State University has established seven principles of universal design: P1) equitable use, P2) flexibility in use, P3) simple and intuitive use, P4) perceptible information, P5) tolerance for error, P6) low physical effort and P7) size and space for approach and use (Center for Universal Design, 1997). Continuity and connectivity are considered two key factors in designing inclusive open spaces (Center for Universal Design, 1997). In effect, there are no specific guidelines for the term 'inclusive design'. However, given the equivalent meaning of 'inclusive design' and 'universal design' in the context of built environment, the seven principles of universal design stated above can still be applied in the discussion of inclusive design of open space. Inclusive design strategy is crucial during the early stage of designing a built environment (Richard & Gheerawo, 2013). Accessibility means more than eliminating physical barriers for commuters or providing barrier-free access and toilets (Architectural Services Department, 2007). A well-conceived inclusive design should be invisible, rather than providing a series of codes, signs or other designations to identify it (Null, 2013).

Policies and guidelines related to inclusive design in mainland China, Hong Kong and Taiwan

The concept of a barrier-free environment is not new to Chinese law. An article calling for the ‘gradual realisation’ of barrier-free design for urban roads and building was promulgated as early as 1990 (Law on the Protection of Persons with Disabilities, 1990). In 2008, it was amended by the addition of specific requirements that the state adopts measures to construct barrier-free facilities enabling disabled people to participate in social life on an equal basis (Law on the Protection of Persons with Disabilities, 2008). As part of the implementation of the new regulations in 2012, the 2001 version of the administrative rules, the *Codes for Design on Urban Accessibility*, were amended and re-published (Codes for Accessibility Design, 2012). The Codes describe the standards for different types of facilities, such as providing tactile paths, accessible entrances, and wheel chair ramps. The regulations are designed to create a barrier-free environment to ensure that the disabled and other members of society can equally participate in social life.

In Hong Kong, the *Disability Discrimination Ordinance* was enacted by the Equal Opportunities Commission in 1995. This ordinance prohibits discrimination against disabled persons based on the failure to provide access to places the public is allowed to enter or use, or by refusing to provide appropriate facilities for the disabled (Disability Discrimination Ordinance, 1995). The first guidelines related to inclusive design were launched by the Hong Kong Building Department in 1997 and amended in 2008. They set out the design requirements for providing proper access to buildings and the appropriate facilities within buildings for both persons with disabilities and those who at times may have the same needs as disabled persons (Design Manual: Barrier Free Access, 2008). According to the *Building Ordinance* (2012), buildings must be designed to facilitate access to them, and the use of the buildings and their facilities must be accessible to persons with disabilities. In 2015, the Planning Department of the HKSAR government (2015) issued the *Hong Kong Planning Standards and Guidelines*, providing that open spaces must be visible from public roads and the accessibility requirements of all segments of the population, including those with disabilities, should be taken into account to provide the widest usage possible. The inclusiveness concept is clear, given that ‘all segments of the population’ are to be considered.

In Taiwan, the *Disabled Citizen Welfare Law* (renamed the ‘People with Disabilities Rights Protection Act’) was enacted in 1980, bringing the concept of barrier-free environments to

the state. An article entitled *Facilities for Persons with Disabilities in Public Buildings* was added as the *Amendment of Building Technic Regulations* (1988). *The Amendment of Building Technic Regulations* (1996) requires that the types of barriers must consider both the hearing impaired and the visually impaired. Unlike mainland China and Hong Kong, the law related to the ‘barrier-free environment’ was published in the Taiwan Constitution, the highest law in the land. It compels the state to ‘guarantee the availability of insurance, medical care, barrier-free environments, education and training, vocational guidance, and support and assistance in everyday life for physically and mentally handicapped persons, and shall also assist them to attain independence and to develop their potential’ (The Additional Articles of the Constitution of the Republic of China, 1997).

Case studies in Beijing, Hong Kong and Taipei

In January 2017, in collaboration with Hong Kong Blind Union, Taiwan Foundation for the Blind and The Hong Kong Society for the Blind, we began to conduct comparative study in urban cities. The implementation of policies related to inclusive design have varied from locality to locality. For example, the feasibility of policies on barrier-free environments in urban and rural areas have been distinct from each other due to their different social, cultural and economic contexts. In this study, three urban cities, Beijing, Hong Kong and Taipei, were chosen for comparison because for nearly three decades each of them has issued policies and laws related to inclusive design. Qualitative data were generated from multiple sources: (1) documentation was used by adopting content analysis to have a comprehensive understanding on the inclusive open spaces policies among three cities; (2) both semi-structured and unstructured interviews were carried out with different stakeholders, including visually impaired persons, governmental officers, non-governmental organisations (NGOs), local communities and experts; and (3) observations were made in 27 selected parks in three cities. Twelve participants were further recruited to visit the parks following the interviews. The data collection and analysis procedures are described below.

Documentation

Mainland China, Hong Kong and Taiwan’s general inclusive open space policies, standards and guidelines were reviewed. The documents included constitutions, laws, regulations, rules,

ordinance, policy agendas and research reports. Except for Taiwan, no documents directly related to inclusive open space policies, standards or guidelines were found in the review. When no such documents were identified, documents related to open space and documents related to inclusive, accessible or universal design were targeted. The inclusive elements in the open space documents and the open space elements in the inclusive design documents were then identified and included in this review. Other documents found during the research process were also included in this review when their contents related to the concepts of inclusiveness or open space.

Content analysis was adopted as a way to review the documents. All texts directly or indirectly related to inclusive open spaces for visually impaired people were categorised in line with the seven principles of universal design. Keywords referencing the requirements for inclusive design for visually impaired persons were defined, focusing on access routes, connectivity and interfacing elements, furniture and equipment, way finding and orientation, detectable surfaces, colour and luminance contrast, and safety (Architectural Services Department, 2007). The analysis began with reading the documentation to acquire an understanding of the overall policy requirements and the essential features of the texts. Words or short sentences related to different degrees of requirements (i.e., referenced, recommended and obligatory) were marked.

Interviews

Our research team was composed of urban theorists, researchers and designers. Since 2005, the research team has conducted a series of studies on visually impaired people in Hong Kong. We found most of this population to be naturally cautious, in the interest of self-protection. In particular, being surrounded by several interviewers may make such people feel uncomfortable and nervous. To enable our study participants to express their opinions freely, we designated an experienced researcher to conduct interviews in the field, rather than two or more interviewers.

Both semi-structured and unstructured interviews were carried out in different phases with different participants. We recruited 24 participants who had good connections with associations for the blind in the three cities to express their attitudes on open space facilities. Their ages ranged from 18 to 75 years old (seven were 18-44, nine were 45-64, eight were >65). Among the 24 participants, 11 were female and 13 were male. The participants included 13

people with low vision (moderate and severe vision impairment) and 11 people with total blindness. To protect the privacy and to maintain the dignity of the interviewees, all of them were informed that they would appear in the photographs and their consent was obtained. The interviews included questions such as ‘How do you feel about the existing open spaces?’, ‘Have you encountered any difficulties in open spaces?’ and ‘To what degree are the implementation and management of open spaces in terms of inclusive design?’. Unstructured interviews, characterised as ‘conversations’ rather than interviews, allowed them to freely express their views and attitudes without a pre-planned set of questions (Gray, 2009). During the field visits, unstructured interviews were concurrently used with participant observations to gather in-depth information. Most of the questions were generated contemporaneously during the observations.

Semi-structured interviews were also conducted with various parties from, for example, governmental offices (e.g., Architecture and Building Research Institute; China Association for the Blind; China Disabled Persons’ Federation), NGOs (e.g., Hong Kong Blind Union; Taiwan Foundation for the Blind; The Hong Kong Society for the Blind), local communities and experts to collect data and comments on the policies and management of open space facilities. Each interview took about 60 to 90 minutes. The semi-structured interviews included questions like, ‘Have any policies and measures on inclusive open space design been issued?’ ‘To what degree are the policies and measures implemented in line with the principles of universal design?’ ‘Are there any acceptance checks during or after the installation of public facilities?’ ‘Have you ever participated in the process of evaluations?’ and ‘What measures would be taken if the quality of the design does not meet the standards?’ In these cases, notes were made to document their answers during or after the interviews. The data collected from the interviews were transcribed and reproduced in a single document. The document was divided into two columns: one each for the respondents’ words and the researcher’s notes. Both descriptive and In Vivo coding were used.

Observations

Observations were made across time and space. The whole observation period lasted for six months. There were numerous open spaces in each city, but due to time limitations and the nature of the study, it was impractical and unnecessary to research all of them. Instead, to investigate inclusive design in open spaces, the researchers visited 27 open spaces of various sizes in

Beijing, Hong Kong and Taipei. The open spaces were diverse and stratified in terms of their spatial characteristics, and included both small seating areas and large parks in different districts.

However, only a few visually impaired people appeared in the parks and gardens during their daily routines, and most of them did not trust others, especially strangers. To protect themselves, they were unwilling to speak with the researchers in the open spaces, making it difficult to access their opinions, despite observing them. Less face-to-face contact with these individuals meant more natural behaviour on their part. Unobtrusive observations, rather than interviews, were carried out with these people. Twelve participants were further recruited to visit the nearest park or garden. The participants' behaviour and the physical settings were observed. Photographs, videos and notes were taken during the observations. For those participants who were not willing to be captured on camera, notes were made to supplement the data. The collected data included the following: (a) the issues with and contents of existing open spaces; (b) the ways in which visually impaired persons act in open spaces; and (c) the implementation and management of inclusive design currently.

Using the inclusive design of open space in Beijing, Hong Kong and Taipei as case studies, the following sections identify the **policy, implementation and management of inclusive open spaces for visually impaired persons in more detail**. The pictures of the documented issues are shown in Tables 1-3 and the results of the evaluation of implementation and management are shown in Table 4.

Findings and discussion

Inclusive open space?

In line with the issues and design considerations set forth in the *universal accessibility for external areas, open spaces and green spaces* proposed by the Architectural Services Department (2007), seven categories (access route; connectivity and interfacing elements; furniture, equipment and fittings; way finding, orientation and signage; detectable surfaces; colour and luminance contrast; safety) were identified. Table 1 shows the issues and content of inclusive design for open space facilities in Beijing. It should be noted that there were many challenges and dangers to visually impaired persons wanting to access the open spaces. Obstacles such as sharing tactile paths with bikes and motorbikes existed. Bollards were set in front of many

entrances to prevent cars from accessing the parks. Although tactile paths were provided everywhere, most were broken up and in disrepair due to their lack of maintenance, and some were designed without visual contrasts with the ground. Maps were only provided in large scale parks, without any sensory information. To differentiate the areas of parks and streets, some parks were built on a higher horizontal level, resulting in substantial inconvenience for persons with disabilities.

In Hong Kong, as shown in Table 2, most of the access routes were smooth. Both stairs and ramps with handrails were provided when necessary. Tactile paths were provided at the entrance of most of the open spaces managed by the local governments. However, no hints were provided to guide the visually impaired until they stepped onto the paths. Because no paths or sensory information were provided from the main streets to the open space, it was difficult for the visually impaired to identify that there was a park nearby, especially the first time. To provide information perceptible to visually impaired persons, tactile maps were provided in most of the small-scale sitting areas and large parks within the different districts. However, some of the tactile paths were said to be inappropriately paved. At the entrance of Kowloon Park, a tactile path guided visually impaired persons to a map without any sensory assistance (audio, tactile model and braille). In most cases, the parks were built on the same horizontal level as the street to make them available to all users. Nevertheless, some of the parks had to be built with a ramp to access them and were on a higher horizontal level due to the nature and complexity of land in Hong Kong, and they could be more difficult for certain users to access.

In Taipei, the entrance to the parks and the main access routes were paved smooth. In terms of connectivity and interfacing elements, red lines were drawn on the ground to prohibit parking in front of the entrances. Accessible ramps with slip resistant materials were installed, which all users could access. However, in several community parks, the tiles on the ground were placed in loose arrangements corresponding with the style of gardening. Most of these were in the pathways rather than the main routes given that they were a kind of decoration. Nonetheless, some were on pathways leading to recreational equipment and other facilities. To make the environment clean and easy to maintain, in Hong Kong, all tree roots were surround by stone bases. In Taipei they were not. This could be dangerous if visually impaired persons stepped onto the soil by mistake. Moreover, seating benches were installed on the soil in some cases, making it difficult for people with disabilities to access (Table 3).

Evaluation of policy

Based on the seven principles of universal design established by the Center for Universal Design at North Carolina State University, twenty-nine associate guidelines have been proposed (Connell *et al.*, 1997). To provide a clear understanding of the achievements of inclusive open spaces, the different stages, from policy to management, should be considered. Table 4 shows the evaluation of policy, implementation and management in the inclusive open spaces of Beijing, Hong Kong and Taipei, in accordance with the twenty-nine guidelines. Data on policies were collected from the documents, and data on implementation and management were collected from the interviews and observations.

Some of the seven principles and twenty-nine guidelines are significantly related to visual impairments. However, the relationships between some of the principles, such as ‘low physical effort’, and visually impaired people may not be obvious. Nevertheless, our interviewees mentioned all of the principles either directly or indirectly. Some respondents emphasised that the information overload sometimes disturbed them. For instance, they mentioned that too many tactile paths created a maze-like environment and often misled them, and they consequently had to spend much time and effort getting around.

The distribution of policy in terms of recommended and obligatory requirements and references were quite similar among the three cities. In Beijing, twelve guidelines were obligatory, seven were recommended and four were for reference. Six guidelines were unmentioned. Similarly, in Hong Kong, twelve guidelines were obligatory and six were recommended. Nine were unmentioned. In Taiwan, fourteen guidelines were obligatory, two were recommended, and eight were unmentioned. Among the seven principles, P1 (equitable use), P5 (tolerance for error) and P7 (size and space for approach and use) were considered to be the most significant principles. According to the laws, regulations and rules of the three cities, most of the associated guidelines in P1, P5 and P7 were essentially mandated, for instance, ‘provide the same means of use for all users (P1a)’, ‘avoid segregating or stigmatizing any users (P1b)’, ‘make provisions for privacy, security, and safety equally available to all users (P1c)’, ‘arrange elements to minimise hazards and errors (P5a)’, ‘provide warnings of hazards and errors (P5b)’, ‘accommodate variations in hand and grip size (P7c)’, and ‘provide adequate space for the use of assistive devices or personal assistance (P7d)’.

In Hong Kong, there is no specific category for open spaces, green areas or squares

pertaining to the extent of accessibility design. Nevertheless, according to the Building Ordinance (2012), for all common areas of buildings including domestic buildings, non-domestic buildings and composite buildings, accessibility designs must facilitate access for persons with disabilities. In this regard, most of the obligatory design requirements for open spaces refer to building (planning) regulations (2012) and the design manual: Barrier Free Access (2008) (an updated version of the Design Manual: Barrier Free Access 1997). Compared to Beijing and Taipei, Hong Kong's regulations and codes prescribing various uses of buildings by persons with visual/hearing impairments are described in detail. For instance, in accordance with P2d, P4a and P5b, ramps must be provided with a landing of not less than 1200 mm long for each 10m length of horizontal run or part thereof, with handrails on both sides; and tactile warning strips must exist at the head, foot and landing, if the gradient of the ramp is 1:20 or steeper. However, most of the requirements related to sensory disabilities have only been recommended or are mandatory within specific conditions, rather than obligatory.

In contrast to Hong Kong, where open spaces have not been well defined, legislation and administrative regulations pertaining to inclusive open spaces in Taipei were identified. Although several ordinances specifically related to inclusive open spaces have been enacted (Codes for Barrier-free Facilities for Urban Parkland and Green Spaces, 2014; Codes for Barrier-free Facilities for Activity Spaces, 2015; Codes for Design for Taipei City Park, 2002), most of the requirements catering to persons with disabilities have only been briefly described. For instance, P4a, P4b and P4d provide effective information for users, regardless of the ambient conditions or an individual's sensory abilities. They require that sensory systems in braille, or other tactile and verbal facilities be provided at the main entrance if floor plans, boards or signs are provided. However, unlike the codes in Hong Kong, they do not include any specifications or detailed illustrations of the sensory systems, making it difficult for designers and builders to follow up.

Evaluation of implementation and management

According to the user interviews and field observations, the implementation and management of open space facilities is quite different from the original requirements identified by the laws, regulations and codes, especially in Beijing. In Beijing, most of the obligatory guidelines are implemented at a low level (e.g., LV1), which sinks even lower at the management stage. In this study, only five obligatory guidelines were implemented at LV2 (i.e., partial), whereas seven of

them were implemented at LV1 (i.e., only a few). The obligatory requirements were also rather weak at the management stage. Most of the so-called access routes were not equally available to all users. For instance, P5a, an obligatory requirement, mandates that the paving of tactile paths be continuous, with no obstacles. However, at several sites in the selected parks, the tactile paths were neither continuous nor smooth. Some of the paths were broken and in disrepair due to lack of maintenance. Further, some sharing bikes and motorbikes were parked directly on the tactile paths and access routes, making it difficult and even dangerous for visually impaired persons to use (Figure 2). As a result, participants with visual impairments said they barely used the tactile paths in their daily activities.

Respondent: Actually we seldom use the tactile paths ... they are not reliable ... you know ... most of them are broken and not well repaired. Who is in charge of managing them? I heard that a blind person fell into the drain and was seriously injured while he was walking along the paths a few days ago.

Although P5a and P5b are obligatory, no warnings of hazards and errors had been provided to prohibit improper behaviour, and in several of the community parks no hazardous elements had been removed.



Figure 2. Sharing bikes parked directly on access routes in Beijing

In Taipei, among the fourteen obligatory guidelines, four were implemented at LV3 (i.e., all), five at LV2, and five at LV1, or they were not implemented at all. As mentioned above, to avoid unconscious actions requiring vigilance (P5d), the legislation not only mandates that access surfaces be firm and slip-resistant (P5d), but also requires that the materials used to surface the ramps be different from the adjacent areas. Findings from the field observations showed that all of the surfaces of ramps were paved in a distinctive slip-resistant material and were well maintained. To eliminate such hazardous elements, the local government prohibited motorbikes and cars from being left at the front of open space entrances. Signs and red lines were provided as warnings to discourage improper behaviour. Illegal parking was fined or vehicles were towed away by the local authorities. As shown in Figure 3, due to strict management, no cars or motorbikes were parked in front of the entrances.

Respondent: Motorbikes were parked everywhere a few years ago. ... It was very

difficult for me to access the parks. Nowadays, however, motorbikes are not allowed to park in the front of the entrances. It is good for us.

In general, in some community parks a board with important information, including the location, park sponsor and neighbourhood chief was set up. Residents could contact the neighbourhood chief directly, who was then able to facilitate the problem's solution, if an improper situation had occurred. The findings also showed that some guidelines not mentioned in the laws and regulations were nonetheless put into practice (e.g., P3b, P6a and P7b), even if at a low level.



Figure 3. Due to strict management, no cars or motorbikes were parked in front of the entrances in Taipei

Compared to Beijing and Taipei, more inclusive guidelines were implemented in Hong Kong. Four guidelines were implemented at LV3, twelve at LV2, and thirteen at LV1, or they were not implemented. The twelve obligatory guidelines were only partially implemented in

some of the cases. In accordance with P4a, tactile maps and paths were provided at the entrances of most parks, especially in public open spaces. Any broken and uneven access routes were repaired timely by the Highways Department of the Hong Kong SAR. However, in some privately-owned open spaces, the implementation and management of design guidelines were quite different from the public open spaces managed by the local authorities. For instance, to maintain coordination and a good appearance, the colour of the edges in many privately owned open spaces had a low contrast with the stairs, making it difficult for visually impaired persons to recognise. Tactile maps and paths were also rare in privately owned open spaces.

Respondent: We navigate our surroundings by hearing, touching and smelling. Some tactile maps are provided, however, most of them are full of dust. The sound devices are often invalid when I press the button.

Furthermore, some differences between implementation and management were observed. In effect, any changes to stairs were difficult for many people to navigate, including both wheelchair users and visually impaired people. To implement guidelines minimising hazards and discouraging unconscious actions that required vigilance, the access routes were paved smoothly, and the entrances were free from steps and other barriers. However, at the management stage, to prevent cars from accessing the park, bollards were installed in front of the main entrance in several cases, which not only segregated wheelchair users but also created a dangerous condition for the visually impaired (Figure 4). According to the interviews, the guidelines were easier for builders to implement in Hong Kong than in Beijing and Taipei because most of the regulations and codes in Hong Kong are described in detail. In this regard, guidelines that only refer to or recommend in legislation were only implemented in some of the cases.



Figure 4. Bollards were installed in front of the main entrance, which not only segregated wheelchair users but also created a dangerous condition for the visually impaired

Considerations

The designs of the existing open spaces are not user-friendly for everyone, especially the visually impaired. It is therefore imperative that researchers and policymakers reconsider how to effectively achieve inclusive open spaces. From this comparative case study, it is obvious that policies related to inclusive design are an essential precondition. However, implementation and management must not be ignored because they ensure the effectiveness of the inclusive design. Although there were similarities and differences between the inclusive open spaces for visually impaired people in the three cities, the key concerns and major issues found through our documentation, observations and interviews provide a comprehensive picture of inclusive design of open spaces in dense urban areas. In the interviews, aspects of implementation and management, such as evaluation, maintenance and supervision, were frequently mentioned. The interview transcripts were coded and 12 categories were identified based on 3 main stages: policy, implementation and management. Figure 5 shows the framework of an inclusive design for open space.

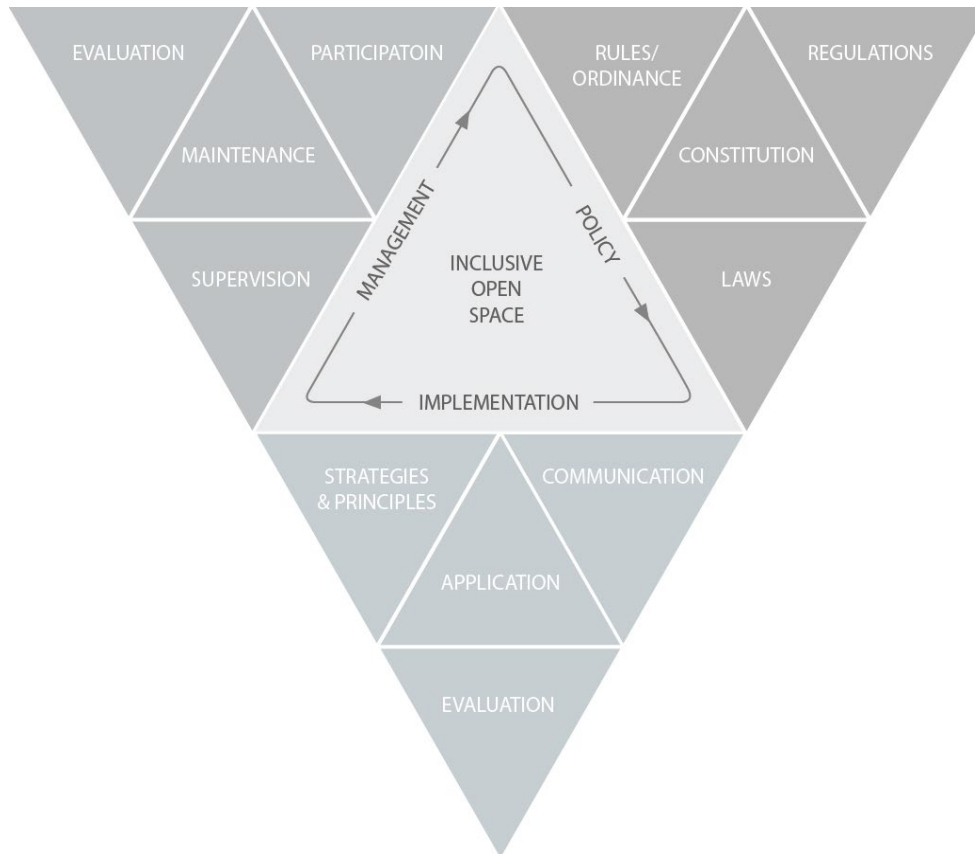


Figure 5. Framework of design for inclusive open space

Constitutions, laws, regulations, ordinances and rules are different levels of policy, promulgated by different government departments. The policies enacted by a sovereign organ can facilitate the formation of laws, regulations and rules by the local authorities. In terms of public open spaces, having a systematic top-down policy related to inclusive design is very important. However, even comprehensive legislation from the constitution to the local rules, are not enough to ensure effective implementation of the requirements. Legislation should include specific requirements for people to follow, rather than create general obligatory requirements. For instance, ordinances and rules regarding inclusive open space should address the standards and the extent of their application. In other words, the requirements for inclusive open spaces should be addressed in detail in both the mandatory and recommended sections. Examples and illustrations can help designers and builders to implement the requirements appropriately. In terms of inclusiveness, legislation should not only focus on wheelchair users, elderly people and children, but also on those with sensory impairments. Minimum provisions should be addressed where there are specific situations.

Implementation is an essential stage in planning inclusive open space, putting the policies and guidelines into actual practice. One of the difficulties has been implementing inclusive designs according to legislation that satisfies the real users, rather than the local government. In this study, most of the so-called access routes were not equally available to all users. Thus, the duties and responsibilities of all relevant departments must be clarified. Licenses cannot be issued for open spaces if they fail to provide inclusive design as required by legislation. Another difficulty is the transmission of the design requirements from policymakers to builders. There have been some gaps among policymakers, developers and builders in terms of their understandings of the legislation and rules. Although certain inclusive facilities have been provided in open spaces, as required, some have been incorrectly implemented due to a failure to understand the requirements. To help builders understand the legislation and follow it, some legislative design strategies and principles are necessary. Agreements on inclusive designs, such as access routes and facilities, should be made and approved by local administrative departments at the beginning of implementation. Effective communication between those in charge and the builders throughout the entire process is essential. Further, after building open spaces, both the inclusive design of the space and the facilities should be evaluated by experts. Evaluations must be conducted on various types of open spaces, even in small-scale spaces such as sitting-out areas. For some privately owned open spaces, economic incentives can be given to the developers for the appropriate provision of inclusive designs.

Management is a key stage that ensures the effectiveness of inclusive open spaces. In the broadest sense of the term, it encompasses maintenance, evaluation, supervision and participation. Inclusive open space can be put into use after the implementation stage, however, it still faces challenges during the management stage. Some errors and improper phenomena from the original planning may appear at this stage. Maintenance conducted in time can ensure the quality of inclusive open spaces and help users maintain trust in public services. On the one hand, evaluations and checks regularly conducted by responsible departments are necessary. On the other hand, some bottom-up participatory activities such as public collaboration and supervision can be organised in most open spaces. References to open space in Taipei provide some insight for community participatory design aimed at enhancing the quality of management. Both park sponsors (e.g., individual, companies) and neighbourhood chiefs elected by the community are responsible for managing the spaces. In this regard, anyone can report damage or

defects directly to the neighbourhood chief. Close collaboration between users and the responsible departments can facilitate the solutions to problems.

Conclusion

Open space is necessary for the public because it provides a place for recreation in densely populated cities. Open spaces that are user-friendly and accessible and can be enjoyed by the widest spectrum of users are the most sustainable. Inclusive design concepts should be considered and implemented in early design stages to enable cost savings and provide marketable facilities. If accessibility is not considered early, later alternations may be needed after building work. In such cases, abortive work and wastage may occur (Architectural Services Department, 2007). To provide high-quality open space facilities for an inclusive society, three stages must be comprehensively considered: policy, implementation and management. Within the past three decades, laws, regulations, rules and various guidelines related to inclusive environments have been promulgated to build an inclusive society. However, most of the policies have focused on individuals with mobility issues rather than those with sensory disabilities, such as the visually impaired. Further, due to inappropriate implementation and management, many existing open spaces have become quite different from their original purpose.

This study identifies the nature of open space and addresses the policies related to inclusive design in Beijing, Hong Kong and Taipei. Comparing the inclusive designs for open space in the three cities, showed that most of the so-called inclusive designs were not user-friendly in actual practice, especially in Beijing. This study further evaluated the policy, implementation and management among the three cities based on twenty-nine guidelines generated from seven principles of universal design. The results showed that the distribution of policy in terms of references, recommendations and obligatory requirements was quite similar among the three cities. Most of the inclusive guidelines were recommended or mandatory, however, the levels of implementation and management were quite different.

This study also proposed a research framework and considerations for researchers and policymakers on how to achieve inclusive open spaces in dense urban areas. It suggests that policies are an essential precondition, however, implementation and management must not be ignored because they ensure the effectiveness of the inclusive design. Having a systematic top-down policy related to inclusive open space is important, however, even comprehensive

legislation from the constitution to local rules is not enough to ensure implementation. Policies should include specific requirements for people to follow, rather than various obligatory but general requirements. Two difficulties exist at the stage of implementation: how to implement inclusive design according to legislation to satisfy real users rather than local governments; and how to transmit the requirements from policymakers to builders. In this regard, the duties and responsibilities of all relevant departments must be clarified, and effective communication and evaluations are also necessary. Management, should additionally include maintenance, evaluation, supervision and participation. Inclusive open space facilities must be maintained in good working order so that users can rely on them and enjoy an accessible environment.

In summary, this study examines the implementation of policies related to inclusive open spaces and proposes some considerations based on its findings and discussions. Admittedly, it may not be easy for policy makers as well as designers to implement inclusive design open for visually impaired persons because of many existing barriers and practical limitations. This study does not provide a universal set of strategies for the inclusive design of open space facilities at the global level. The findings and considerations from this study may not be applicable to different situations with other living contexts (e.g., suburban areas, low-density areas). Nevertheless, the concept and design strategies of inclusive design are necessary. They provide insight into inclusive open space in densely populated areas. A comprehensive framework of inclusive design and considerations have potential in educating the community and approaching sustainable built environment. It is thus important for designers, researchers, experts as well as policy makers to bear in mind that inappropriate policy, implementation and management of inclusive open space may fail to improve quality living environments for the community. Future research will be more convincing if proposed considerations are examined through empirical studies in similar areas. Action research, which is an approach used to improve conditions and practices, can be adopted in further studies. Long-term and continuous action on different levels of policy, implementation and management should be made, to provide a more comprehensive understanding of the inclusive design of open spaces.

Table 1. Issues of inclusive design for open space facilities in Beijing

Issues	Descriptions	Cases	Contents
Access route	Some tactile paths were shared with bikes and motorbikes		Walkways, stairs and steps, ramps, dropped kerbs, railings and handrails
Connectivity and interfacing elements	Carparks located around the community park, and many parking poles on the ground		Spatial changes, horizontal and vertical movement
Furniture, equipment and fittings	A short bollard lies in front of the entrance to prevent cars/motorbikes from accessing the park		Guardrails, handrails, bollards, seating benches, bins, recreational equipment
Way finding, orientation and signage	No maps were provided in community parks. Maps were only provided in large scale parks, without any sensory information		Dimension, location, display information, maps
Detectable surfaces	Broken up and unrepaired tactile paths		Tactile path
Colour and luminance contrast	Some tactile paths were designed without any visual contrasts		Sensory perception, visual contrast
Safety	Obstacles such as parking poles and bike sharing appeared in the main entrances		Slip resistance, safety for persons with visual impairment

Table 2. Issues of inclusive design for open space facilities in Hong Kong

Issues	Descriptions	Cases	Contents
Access route	Most of the routes were smooth. Both stairs and ramps with handrails were provided when necessary		Walkways, stairs and steps, ramps, dropped kerbs, railings and handrails
Connectivity and interfacing elements	Tactile paths were provided, however, there were no hints to guide the visually impaired to the park		Spatial changes, horizontal and vertical movement
Furniture, equipment and fittings	Bollards placed in front of the entrance to prevent cars from accessing the park		Guardrails, handrails, bollards, seating benches, bins, recreational equipment
Way findings, orientation and signage	Tactile maps were provided in most of the small community parks and large parks. However, some audio systems were out of service		Dimension, location, display information, colour and lighting, maps, sensory and psychological needs
Detectable surfaces	A tactile path guided visually impaired persons to a map, but without any sensory assistance (audio, tactile model and braille)		Tactile path, other detectable elements/cues (sensory cues, difference in materials), tactile map and sign, tactile model, and braille
Colour and luminance contrast	In terms of the colour, some edges were in sharp contrast to the ground whereas some were in low contrast		Sensory perception, visual contrast
Safety	The recreational equipment was installed on a ramp. Both handrails and informed tactile paths were provided		Slip resistance, safety for persons with visual impairment

Table 3. Issues of inclusive design for open space facilities in Taipei

Issues	Descriptions	Cases	Contents
Access route	Some community parks were designed in a garden style, with loose arrangements of tiles on the ground		Walkways, stairs and steps, ramps, dropped kerbs, railings and handrails
Connectivity and interfacing elements	Cars were not allowed to park in front of the entrances		Spatial changes, horizontal and vertical movement
Furniture, equipment and fittings	Some seating benches were installed close to or on kerbs		Guardrails, handrails, bollards, seating benches, bins, recreational equipment
Way findings, orientation and signage	No maps were provided in the community parks. Maps were only provided in large scale parks, without any sensory information		Dimension, location, display information, maps
Detectable surfaces	Areas with different functions (e.g., recreational equipment) had different materials		Detectable elements/cues (different in materials)
Colour and luminance contrast	Red lines were drawn on the ground to prevent parking in front of the entrances		Sensory perception, visual contrast
Safety	Slip resistant materials were applied on the floors of the ramps		Slip resistance, safety for persons with visually impairment

Table 4. Policy, implementation and management of open spaces in terms of inclusive designs in Beijing, Hong Kong and Taipei

Guidelines	Policy			Implementation			Management		
	Beijing	Hong Kong	Taipei	Beijing	Hong Kong	Taipei	Beijing	Hong Kong	Taipei
P1a	***	***	***	LV1	LV2	LV2	LV1	LV2	LV2
P1b	***	***	***	LV2	LV2	LV2	LV1	LV2	LV2
P1c	***	***	***	LV1	LV2	LV1	LV1	LV2	LV1
P1d	*	-	-	-	-	-	-	-	-
P2a	**	**	*	LV1	LV1	-	LV1	LV1	-
P2b	-	-	-	-	-	-	-	-	-
P2c	***	-	-	LV1	LV1	-	-	LV1	-
P2d	*	***	***	LV1	LV2	LV2	-	LV2	LV2
P3a	**	**	**	-	LV2	LV1	-	LV1	LV1
P3b	-	-	-	-	LV1	LV1	-	LV1	LV1
P3c	-	-	-	-	LV1	-	-	LV1	-
P3d	**	***	*	-	LV1	-	-	LV1	-
P3e	*	*	*	-	LV1	-	-	-	-
P4a	**	***	***	-	LV2	-	-	LV2	-
P4b	***	**	***	LV1	LV2	LV1	LV1	LV2	LV1
P4c	***	**	*	LV2	LV2	LV2	LV2	LV2	LV2
P4d	**	-	***	-	-	-	-	-	-
P5a	***	***	***	LV2	LV3	LV3	LV1	LV2	LV2
P5b	***	***	***	LV1	LV2	LV2	-	LV2	LV2
P5c	-	-	-	-	-	-	-	-	-
P5d	***	**	***	LV1	LV3	LV3	LV1	LV2	LV3
P6a	-	***	-	-	LV2	LV2	-	LV2	LV2
P6b	*	*	*	-	LV2	LV2	-	LV2	LV2
P6c	**	-	**	-	-	-	-	-	-
P6d	***	***	***	LV1	LV3	LV3	LV1	LV3	LV3
P7a	-	**	***	-	-	LV1	-	-	LV1
P7b	**	-	-	-	LV1	LV1	-	LV1	LV1
P7c	***	***	***	LV2	LV2	LV2	LV2	LV2	LV2
P7d	***	***	***	LV2	LV3	LV3	LV1	LV2	LV3

Notes: *=Reference; **=Recommended; ***=Obligatory; - =None; LV1=Only a few; LV2=Partial; LV3=All;

P1a. Provide the same means of use for all users; P1b. Avoid segregating any users; P1c. Make provisions for privacy, security, and safety equally available to all users; P1d. Make the design appealing to all users; P2a. Provide choice in methods of use; P2b. Accommodate right-or left-handed use; P2c. Facilitate the user's accuracy; P2d. Provide adaptability to the user's pace; P3a. Eliminate unnecessary complexity; P3b. Be consistent with user intuition; P3c. Accommodate a wide range of language skills; P3d. Arrange information consistent with its importance; P3e. Provide effective feedback; P4a. Use different modes for essential information; P4b. Maximise 'legibility' of essential information; P4c. Differentiate elements in ways; P4d. Provide compatibility with techniques for people with sensory limitations; P5a. Minimise hazards and errors; P5b. Provide warnings of hazards and errors; P5c. Provide fail-safe features; P5d. Discourage unconscious actions that require vigilance; P6a. Allow users to maintain a neutral body position; P6b. Use reasonable operating forces; P6c. Minimise repetitive actions; P6d. Minimise sustained physical effort; P7a. Provide a clear line of sight to important elements; P7b. Make reach to all components comfortable; P7c. Accommodate variations in hand and grip size; P7d. Provide adequate space for

assistive devices

Acknowledgments

The authors would like to acknowledge the Hong Kong Research Grants Council's Humanities and Social Sciences Prestigious Fellowship Scheme (RGC 35000316) for the data collection and the preparation of the paper. The authors would also like to thank The Hong Kong Polytechnic University for supporting this study. The authors thank the Architecture and Building Research Institute, China Association for the Blind, China Disabled Persons' Federation, Hong Kong Blind Union, Taiwan Foundation for the Blind, and The Hong Kong Society for the Blind for providing a lot of useful information.

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