BPLN0039_18137840_Dissertation

by Ziqi Dong

Submission date: 02-Sep-2019 12:48PM (UTC+0100)
Submission ID: 110408954
File name: 63573_Ziqi_Dong_BPLN0039_18137840_Dissertation_1064857_1965258878.pdf (35.46M)
Word count: 16364
Character count: 91280

UNIVERSITY COLLEGE LONDON
FACULTY OF THE BUILT ENVIRONMENT
BARTLETT SCHOOL OF PLANNING

Where are we now? What should we do?

A Research on the Travel Experience of the Visually Impaired People on Public Transport and Accessibility Facilities in Nanjing

Ziqi Dong

Being a dissertation submitted to the faculty of The Built Environment as part of the requirements for the award of the MSc Transport and City Planning at University College London:

I declare that this dissertation is entirely my own work and that ideas, data and images, as well as direct quotations, drawn from elsewhere are identified and referenced.

Signature:

Date: 2 September 2019

Word Counts:

Main body: 9940

Appendices: 5529

Acknowledgements

I would like to express my gratitude to Bonvino Gualtiero, my supervisor, for the guidance and encouragement throughout this dissertation. I would like to give thanks to Dr. Robin Hickman for his support, guidance and suggestions throughout the Master's study. I am so grateful to finish the interviews successfully under the participants' permission, and to achieve sufficient information of this research from their own journey experiences and valuable suggestions. Finally, I would like to express my deepest gratitude to my family and friends, who always support and accompany me to overcome all the difficulties.

Table of Contents

List of Figures

List of Tables

Abstract

Visually impaired people (VIP) constitute a large population in China and the number of this group continues growing. A barrier-free travel environment is crucial for VIP to travel independently and participate in various activities. However, in China, there are still numerous problems in barrier-free construction, causing difficulties for VIP to travel. Therefore, taking Nanjing as a case study, this dissertation aims to explore the deficiency of Nanjing public transport construction and existing barrier-free facilities based on the independent travel experience of VIP. Furthermore, this research also puts forward feasible suggestions to improve the barrier-free travel environment of Nanjing and provide more opportunities for VIP to travel on their own. Face-to-face interviews have been conducted for this study with 20 VIP who have sufficient independent travel experiences. Since travel experience can influence people's choices of taking public transport and their enthusiasm to travel, it is significant to allocate more attention and resources for VIP to provide them with a safe and convenient travel environment. By satisfying the special demands of this vulnerable group, society will become more inclusive and equitable for everyone in the future.

1. Introduction

1.1 Background

Although well-developed communication devices and network systems can help people fulfill various needs without leaving home, physical travel is still a basic necessity in many cases of social activities (Urry, 2003). Transport is a crucial factor in promoting the mobility of people (Rodrigue, Comtois and Slack, 2013). With the ability of mobility, people can select the destination and the time to travel, as well as the activities to take part in (Nordbakke, 2013). Visually impaired people (VIP) constitute a large population in China. According to the second national sample survey of the handicapped in 2006 (National Bureau of Statistics of China, 2008), the number of VIP in China has reached 12.33 million people. Due to the lack of visual help, they may face more obstacles in their travels. For example, as they are unable to drive, the only option for their individual travel is to take public transport (American Foundation for the Blind, 2015). Moreover, various dangers also manifest when they walk on the street due to their inability to see or recognise barriers, traffic lights, and road conditions. Therefore, the construction of barrier-free public transport and facilities can provide a more convenient and safer experience for VIP to reach the destination on their own. Furthermore, accessible travel can encourage VIP to participate in social activities more easily, paving the road towards a more equitable and sustainable development of the whole society.

Hall (2014) said that the availability of public transport is a major feature of a good city. As a developing country, China started late with the development of barrier-free transport and facilities. The construction of accessible facilities was first proposed in the 1980s and has made certain achievements through the last few decades (Zhu, 2010). However, compared

with other developed countries, China still lacks the construction and evaluation standard system of accessible public transport systems. The design specifications for such systems are not well implemented, at present (Xiong, 2009). Additionally, numerous reports have also indicated that the existing facilities are not well used due to the non-standard construction and inadequate management and maintenance. These negative factors lead to dangers for travelling VIP, to some extent (Xiong, 2009). Therefore, it is necessary to understand the perspective and demands of VIP in depth in order to improve the current accessibility environment and build more available facilities for them.

1.2 Research Aim and Objectives

This research aims to explore the deficiency of public transport construction and existing barrier-free facilities in Nanjing based on the independent travel experience of VIP, and to present the feasible solution that can provide a better environment for their barrier-free travel. In this paper, public transport will only focus on rail transit and bus systems. The accessibility facilities will be defined as tactile paving and traffic signals.

In order to achieve this aim, this paper has the following objectives:

1. To explore what problems VIP suffer from when travelling by public transport;
2. To explore the obstacles facing VIP when using accessibility facilities;
3. To discuss the improvements for a more barrier-free travel environment supporting from VIP perspective.

1.3 Structure of the Dissertation

The content of this dissertation includes 7 chapters. Chapter 1 contains the background, research aim and objectives, and the integral structure. Chapter 2 states the existing literature

about VIP and public transport, as well as barrier-free facilities. Moreover, it also states the knowledge about their travel experience and the related transport policies, and indicates the research blank for this study. Chapter 3 introduces the methodology being used for collecting the data. Chapter 4 explains the situation of the public transport and barrier-free facilities in Nanjing. Chapter 5 describes and analyses the research findings from the observation and interviews. Chapter 6 provides feasible recommendations for VIP to reduce the barriers and improve their journey experience. Finally, Chapter 7 sums up the content of this dissertation, presenting the limitation and suggestions of the research.

2. Literature review

2.1 Significance of Public Transport to VIP

2.1.1 Accessibility

Accessible transport provides the opportunities for disabled people to engage in the work and to live more independent lives (Ministry of Women, Family and Community Development, 2010). Initially, a research analysed the significance of public transport to the handicapped especially when they were unable to use private cars and it summarised that disabled people depended entirely on public transport to reach their destinations generally (Jolly et al., 2006). Secondly, easy access to travel information is also important for VIP to travel independently and do other activities (Marston and Golledge, 2003). Finally, it is worth noting that accessibility to public transport is also considered as a challenge for VIP. Marston and Golledge (1998) indicated that insufficient access to public transport restricted the job opportunities for people with visual impairment when they were of working age. As a result, public transport plays a crucial role in offering accessible travels for VIP.

2.1.2 Mobility, Quality of Life and Well-being

Khorrami-Nejad et al (2016) reflected that for VIP, physical defects influenced their quality of life due to the restrictions of independence and social interactions. Mobility of VIP is considered as a significant factor to evaluate their quality of life. It is indicated that the mobility domain decreases in visually impaired individuals in comparison with able-bodied people (Khorrami-Nejad et al, 2016; Montarzino et al., 2007). Physical mobility can be directly affected by transport (Delbosc, 2012). Active transport is a beneficial factor to facilitate the mobility of VIP and improve their quality of life.

In addition, transport policies may facilitate social well-being by reducing travel barriers and promoting health, employment and relationships (Delbosc, 2012). Furthermore, Delbosc (2012) also presented that transport systems could increase subjective well-being through easy access to events and physical infrastructure. Due to the sight loss, VIP have higher demands on taking public transport than the people with other disabilities (Clery et al., 2017). Therefore, providing more effective public transport services for VIP can encourage more life participation and hence enhance their social well-being.

2.1.3 Transport Disadvantages and Social Exclusions

According to Lucas (2012), the disadvantaged situation on using the transport system may evolve into social exclusion. VIP are considered as mobility disadvantaged because of their limited options on transport modes when making independent travel. Therefore, as Pal (2011) mentioned, restricted access to transport was identified as one of the principal factors for social exclusion for VIP. Furthermore, VIP may suffer from unemployment, poverty and restricted access to efficient housing and health care facilities because of social exclusions

(Bates and Davis, 2004; Tobias and Mukhopadhyay, 2017). Therefore, VIP should overcome the difficulties when using transport so that they can participate in various social activities and mitigate social exclusions.

2.2 Public Transport Experiences of VIP

2.2.1 Pre-trip Planning

Planning before travel is a necessary procedure for individuals who want to take public transport. Preparing a trip involves seeking information, as well as selecting routes and transport modes (Andre et al., 2007). Information validity and dependability can affect the route options (Andre et al., 2007). With the development of technology and the extensive use of Global Positioning Systems (GPS) in recent years, VIP can search the route options through various navigation applications (Zhang, 2017). Moreover, most applications support speech recognition systems which provide convenience for VIP to input their target location by voice (Zhang, 2017). In addition, comfort, convenience and safety of the journey are also significant factors for choosing a suitable route (Andre et al., 2007). For example, VIP are inclined to choose the route with the minimum number of transfers or minimum walking distance in order to reduce the risk of accidents (Zhang, 2017). When considering the selection of transport modes, VIP have different preferences according to the situation of public transport construction in different regions. As a result, it is necessary to analyse the factors affecting their selection of travel modes in the background of Nanjing.

2.2.2 The Way to Station/Stop

Generally speaking, people need to walk for a short distance to the station before taking public transport. Casey et al. (2013) indicated that VIP might encounter various difficulties and

risks when they got to unfamiliar stations/stops independently, as they were short of visual cues of the surrounding area and environment. This condition can affect their flexibility during travelling. Therefore, VIP require assistance from their family or friends when they plan to unfamiliar stations/stops (Quinones et al., 2011).

In addition, reaching the accurate position of a public transport station is considered to be another difficulty for VIP (Azenkot et al., 2011). The navigation applications on smartphones are now widely used and are frequently used to help VIP reach their destinations. However, the positioning system still generates short distance errors frequently (Wang, 2018). Hence, it is important to provide more effective and accurate traffic information for people with visual impairment.

2.2.3 Finding the Correct Service and Getting on/off the Vehicle

In many cases, although VIP can find the exact location of the bus stop, it is still difficult for them to board the correct bus. The reason of this adverse situation is that the majority of bus stops have more than one bus route, they will feel particularly nervous when multiple buses arrive at the station (Hara et al., 2015). Moreover, the boarding point and arrival time of a bus is also uncertain for VIP, so they may still miss the bus after reaching the stop (Markiewicz and Skomorowski, 2010). In addition, negative behaviours of some bus drivers such as failing to park the buses in designated points or treating VIP badly also increase the difficulties for VIP to get on or off the vehicles and cause social exclusion (Xiong, 2009). Therefore, most VIP tend to choose alternative travel modes rather than buses due to the inconvenience and stress of finding the right service and getting on or off a bus.

Real Time Information (RTI) is considered as an appropriate solution for seeking the correct service. For example, navigation applications can show the schedule of the target bus and RTI display panels have been installed in most bus stops. RTI can provide timetables or actual waiting times of each bus, which benefits passengers by reducing waiting time at bus stops and providing a sense of security (Watkins et al., 2011; Zhang, Shen and Clifton, 2008). For people with sight impairment, the timetable can help them estimate if the approaching bus is the target one (Hara et al., 2015).

Research on usage of railway transportation by VIP is limited. It is presumed that they face fewer obstacles when using the trains, and favor them over bus transportation. However, VIP still face some challenges when getting on or off the train in certain cases. Construction of the infrastructure in some stations such as stairs, uneven floors and handrails might lead to difficulties to VIP (Jones and Jain, 2006). Moreover, a metro station covers a relatively large area; VIP have to go through ticket gate and elevator (or stairs) before reaching the platform, stations may fail to provide guides or markers for the location of the train doors (Huang and Sun, 2017). Furthermore, the internal structure becomes more complicated in a transfer station, which results in more challenges for VIP to find the right platform. Inadequate access to service or to travel information may also happen in some stations with large volumes of people or during peak hours, as there is no available staff. Audio announcements may also be drowned out the noisy environments of such stations (Wang, 2018). Additionally, VIP may suffer from various risks when they are getting on or off a train which contain the gap between the train and platform, as well as the automatic doors (Gallagher et al., 2011). According to the analysis by Cheng (2010), the gap could lead to greater anxiety even among the

able-bodied passengers. Therefore, it can be speculated that visually impaired individuals, who are unable to stride the gap by sight, may feel more anxious and face greater dangers. The experiences of the VIP on seeking assistance from the staff and getting on or off the vehicles in Nanjing will be discussed later.

2.2.4 Heading for Destination

Initially, due to their vision impairment, VIP lack timely and effective reaction during vehicular accidents (Xiong, 2009). Therefore, Xiong (2009) revealed that safety on board was the most important indicator for VIP to take public transport. Potential risks may occur because of the non-standard driving behaviours by bus drivers. For instance, drivers may take sudden turns or brake abruptly, creating hazardous situations. As a result, Xiong (2009) suggested that drivers should remind passengers about turning, stopping, opening and closing the door in advance. Besides, driving smoothly can also improve the sense of security of VIP.

In addition, lack of information on board results in greater stress and anxiety of VIP, as it is difficult for them to estimate their position during an independent trip (Golledge, Marston and Costanzo, 1997; Sammer et al., 2012). VIP have limited access to information about the time to their destinations, so they have to rely on people with normal vision to remind them when they are approaching the target station (Gallagher et al., 2011; Casey et al., 2013). However, research by Casey et al. (2013) also showed that some bus drivers and passengers failed to help VIP with the destination, as they were unfamiliar with the routes. Therefore, the installation of an efficient, reliable, and intelligible audio announcement system on the buses and metros is significant to help passengers disembark at the correct location. Audio

announcements are considered as a major information source for VIP when taking public transport independently (Smith, 2014).

2.3 Importance of Accessibility Facilities to VIP

2.3.1 Tactile Paving

Tactile paving is considered as a crucial infrastructure to support the mobility of VIP. Tactile paving surfaces can provide essential information for VIP to identify the surrounding environment such as directional guidance, the existence of facilities, and hazard warnings (DETR, 1998). Through the sensory warning from soles of their feet or long canes, VIP can navigate through pavements and stairways more safely, thereby reducing the hazards of falls, slips or other kinds of accident (DETR, 1998).

In China, the construction of tactile paving has begun since 2000 with numerous cities making great progress in the development of such barrier-free facilities over the years (Zhao et al., 2014). However, a number of studies have shown that tactile paving caused various difficulties and risks for VIP rather than promoting their journey. Zhang (2017) indicated that despite the high coverage of tactile paved sidewalk in urban area, few people with sight impairment actually used them. The deficient construction of tactile paving reduces its availability and restricts the opportunities for VIP to participate in social, economic and political activities, thus resulting in greater social exclusion (Zhang, 2016).

2.3.2 Crossing the Road

Crossing the road is also identified as a major obstacle for the independent travel of VIP. Because of sight loss, VIP cannot distinguish the colour of the signal light and cannot determine whether they can cross the road, which results in a great threat to their safety

(Wang and Li, 2010). Lack of crossing facilities is frequently mentioned as a restriction of the walking environment (Montarzino et al., 2007). In Japan, traffic lights are built together with beeping signals to provide guidance for VIP to cross the road (Zhang, 2017). Similar facilities with voice signals have been built in some cities of China, but the relative construction is still seriously inadequate and most signal lights still lack the supporting facility of sound warning devices (Zhang, 2017). Wang and Li (2010) stated that the deficiency of voice prompt on the road led to more pressure and anxiety, which could affect the entire journey experience of VIP. Furthermore, they also indicated that the shortage of sound warning devices also reduced the availability of the accessible sidewalk. However, a contrasting argument regarding to audible crossings facilities shows that the sound signalling to stop the traffic can be confusing (Montarzino et al., 2007). This study looks into the experience of VIP on crossing the road in Nanjing.

2.4 Transport policy

The disabled involve various groups of people with different transport demands. Relative policies in People with Disabilities Act of the Peoples Republic of China are generally set for all the disabled persons as some of the regulations are inapplicable for VIP. Therefore, it is important to provide more particular policies for VIP in order to support their use of public transport. In China, the preferential policies for VIP are still insufficient. A policy which can be beneficial to VIP directly is the Article 50 of People with Disabilities Act of the Peoples Republic of China (2008), which stipulates that VIP can take all urban public transport free of charge with a valid Disability Certificate. This preferential treatment can provide more accessible environments for VIP to take public transport and to some extent relieve their

economic pressure.

2.5 Research Gap

Similar investigations about exploring the travel experience of VIP have been conducted in the USA (Marston, Golledge and Costanzo, 1997), Scotland (Hine and Scott, 2001; Montarzino et al., 2007), Ireland (Casey, Brady and Guerin, 2013; Gallagher et al., 2011) and Hong Kong (HKSWGU, 2016). However, because of the different legislative situation, demographic structures, urban forms and degree of social equality, the research of the above-mentioned countries and regions cannot represent the travel experience of VIP in Nanjing. Furthermore, assistive technologies have been improved continuously and more available smart technology has emerged to support the mobility of VIP, while there is a lack of research mentioned about the development.

In addition, in China, there are still a lack of studies on travel experience of VIP and the feedback of the obstacles they encounter when taking public transport and using barrier-free facilities. Although there are numerous investigations about the barrier-free travel of the disabled, the respondents of these studies generally contain all kinds of disabled people and only limited content focuses mainly on VIP. Furthermore, most of the conclusions or the improvement suggestions about these studies are presented also for all disabled groups so the recommendations may be less helpful to VIP. Research became more limited when the scope was narrowed down to Nanjing. As a result, this study focuses on the journey experience of VIP under the current background of Nanjing in order to enrich the knowledge on this topic. Meanwhile, with the same context of barrier-free construction in China, most obstacles encountered by VIP in Nanjing are also typical cases in other cities (Wang and Li,

2010). Therefore, the latest findings of accessible travel in Nanjing and suggestions for the improvement on existing barriers can also be instructive for other cities.

3. Methodology

3.1Semi-structured Interview

Compared to a questionnaire, a semi-structured interview allows an interviewer to adjust the forms, numbers, orders and degrees of adaptation of questions more flexibly (Rowley, 2012). Furthermore, participants are given more freedom to present their experiences, behaviours, attitudes and comments through the interview, which can be more beneficial to obtain in-depth understanding on the study (Rowley, 2012). As the major objectives of this study include exploring the negative factors of using public transport and barrier-free facilities in Nanjing from the perspective of VIP, a semi-structured interview as a qualitative approach is applied to this survey.

3.2 Sampling Survey

HKSWGU has done a similar research in Hong Kong and presented that a sample size of about 20 VIP who had sufficient travel experiences could stand for the varied composition of the visually impaired group (HKSWGU, 2016).

Aiming to achieve more representative results on exploring the travel experience of people with sight loss in Nanjing, the age of selected VIP in this survey are between 18 and 60 years old. It is appropriate that the interviewees are adults with sufficient experiences of travelling independently and that their situations of sight loss or travel difficulties are not age-related. There are a large number of blind massage centers in China and “massage technician” has become a major career choice for the people with visual impairment due to their limited career

options (Guo, 2017) Eight blind massage centers were visited with the purpose of finding the samples that met the criteria. After being informed of the purpose of this study and making requests, 20 workers with visual impairment agreed to participate in the survey. With different genders, ages, degrees of sight loss and mobility tools (summarised in table 1), the interviewees can represent various VIP in Nanjing.

Table 1. Profiles of respondents (Author, 2019)

Serial number	Gender	Age group	Degree of sight loss	Mobility tool
A	Female	31-45	Completely Blind	Long cane
B	Male	31-45	Partially Sighted	No
C	Female	46-60	Severely Sight Impaired	Long cane
D	Male	18-30	Completely Blind	Long cane
E	Female	31-45	Partially Sighted	No
F	Male	18-30	Severely Sight Impaired	Long cane
G	Male	46-60	Completely Blind	Long cane
H	Male	31-45	Completely Blind	Long cane
I	Female	31-45	Severely Sight Impaired	Long cane
J	Female	46-60	Completely Blind	Long cane
K	Male	31-45	Severely Sight Impaired	Long cane
L	Male	31-45	Completely Blind	Long cane
M	Female	31-45	Partially Sighted	Long cane
N	Male	18-30	Completely Blind	Long cane
O	Female	46-60	Severely Sight Impaired	Long cane
P	Male	18-30	Completely Blind	Long cane
Q	Male	18-30	Partially Sighted	Long cane
R	Female	31-45	Severely Sight Impaired	No
S	Male	31-45	Partially Sighted	No
T	Male	31-45	Completely Blind	No

3.3 Design of the Questions

The purpose of the interview is to address the aim of the research through three objectives. It reflects a systematic method for exploring the situation of accessible public transport and barrier-free facilities in Nanjing, according to the summary in literature review (Appendix 1). The first two objectives pay attention to the travel obstacles, and the last objective focuses on the improvements. Design of the questions will follow the order illustrated in Chapter 2.2 which is reasonable for the interviewees to describe their own travel experiences chronologically. The interview can provide an opportunity for the participants to look back at the difficulties they suffered from and present more recommendations from their perspective, which can satisfy their actual demands and improve their journey experience. Meanwhile, the question about free riding is also mentioned in the interview in order to discuss the effect of the preferential policies on VIP.

3.4 Face-to-face Interview and Research Ethnic

Face-to-face interviews were conducted in this research. As the respondents are vulnerable groups with visual impairment, the places for one-to-one interviews were chosen in the blind massage centers where they work. Appointments were made after consulting with blind technicians about their free time at work. In order to ensure that interviewees understood the detailed objectives of this survey, as well as their relevant rights and interests, a Participant Information Leaflet and a Consent Form for VIP had been provided and read to the participants before their interview (as shown in Appendices 2 and 3). They were required to give verbal permission instead of written consent according to their physical condition. According to Saleh (2004), recorded audio consent could be regarded as an alternative option

for VIP due to the equivalent legal validity compared with written consent. In addition, National Disability Council (1999) also indicated that interviewers have an obligation to change procedures or behaviors in order to avoid difficulties for the disabled people to take the interview.

4. Case Study - Nanjing

As the capital city of Jiangsu province and an important central city in eastern region, Nanjing has a population of 8.43 million and is one of the 13 megacities in China (Nanjing Government, 2018). Meanwhile, Nanjing is also known as a national comprehensive transportation hub and has made remarkable achievements in both external and internal transport planning. In regards to the public railway system, Nanjing is the sixth city to build metros in Mainland China. By the end of 2018, Nanjing metro constructed 10 lines and the entire length of the lines ranked fourth in China (Nanjing Metro, 2019). Additionally, Nanjing has also built an integrated bus network. The connection of dedicated bus lanes has been accelerated, and bus capacity has also been expanded and updated in order to satisfy the increasing number of users (Nanjing Government, 2016). The extensive public transport network encourages more people to change modes of travel. In 2018, public transport of the city carried about 5.3 million passengers per day, accounting for 63 percent of the motorized travel (Nanjing Government, 2019).

In addition, the construction of barrier-free facilities has also been rapidly and comprehensively developed in Nanjing, and the city has been appointed by the State Council as one of the 12 demonstration cities for nationwide barrier-free facilities construction since

2005 (Zhu, 2010). Zhu (2010) also stated that the construction of tactile paving has already covered 100 percent of the main roads and commercial areas in Nanjing.

In summary, the well-established public transportation network and integrated accessibility facilities in Nanjing provides more opportunities for VIP to travel independently without relying on private transport. However, in fact, the current barrier-free construction has led to various obstacles for the travel of VIP and even decreased their travel frequency (Zhu, 2010). Due to the lack of specific research on the travel experience of VIP, it is significant to choose Nanjing as the research target in order to discuss the barriers encountered by VIP during their independent travel and to analyse the factors that cause the obstacles. In addition to the common issues mentioned in literature review, this study reflects the specific obstacles emerging in Nanjing based on the field visit and the personal experiences from the interviewees.

5. Findings and Analysis from the Observation and Interviews

5.1 Pre-trip Planning

According to the interviews, it is not difficult for most respondents to prepare for a journey, with the main source of information deriving from mobile phone navigation. The multifunctional navigation applications can provide comprehensive information for VIP to find the way to the destination. Moreover, most smartphones support the function of voice inputting the instructions and voice-reading screen. This allows VIP to search the destination and choose their preferential travel modes by voice, which provide more opportunities for them to travel independently. However, two respondents aged between 46 and 60 said that they were not good at using mobile phones, so they tended to choose familiar routes when

travelling alone. If they had to travel to an unfamiliar destination, they would ask family members ahead of time and keep asking strangers for directions.

5.2 Finding the Station/Stop

When travelling independently on public transport, VIP find the stations mainly by asking pedestrians or using mobile navigation. With regard to the experience of seeking for help, most respondents gave positive responses.

'I am not familiar with the mobile phone so I rely on the pedestrians when I go to the station on my own. Luckily, most strangers are active to tell me the way when they realise I am blind and some of them even take me for a while or send me directly to the station if we are heading for the same direction.'

(Interviewee G, male, 22/07/2019)

In addition, navigation applications on the mobile phone can be used as an auxiliary tool and the function of audio guide can help them to find the destination. However, several respondents indicated that the navigation positioning might produce deviation, and even just a few meters could cause non-ignorable effect to them, as they were unable to see the exact location of the station.

'I have had the experiences that the mobile navigation reminded that I have arrived, but I cannot touch the pavilion of the station/stop board. After asking other people, I realised that I still had to walk a few meters.'

(Interviewee N, male, 24/07/2019)

In addition, a particular obstacle for taking a bus is that a portion of bus stops and sidewalks are separated by broad non-motor vehicle lanes without guidance of tactile paving (figure 1),

which pose a greater danger for VIP to access the bus stop independently.

Figure 1. The adverse location of a bus stop for VIP (Author, 2109).

5.3 Finding the Correct Vehicle

A considerable problem for VIP when waiting for a bus is that they cannot identify which bus is correct to take if the stop is operating more than one bus lines. Hence, they may miss the bus or get on a wrong vehicle. Although numerous bus stops in Nanjing have installed RTI display panels, voice prompts were not equipped simultaneously, which keep VIP from fully benefiting from these systems.

However, the navigation applications on mobile phone have also added RTI about the timetable of the buses at present, so VIP can determine whether the approaching bus is the target vehicle based on the voice prompts on their phone. However, a potential risk of boarding the wrong vehicle still exists if multiple buses arrive at the station at the same time, which will affect the following itinerary and the entire travel experience of VIP.

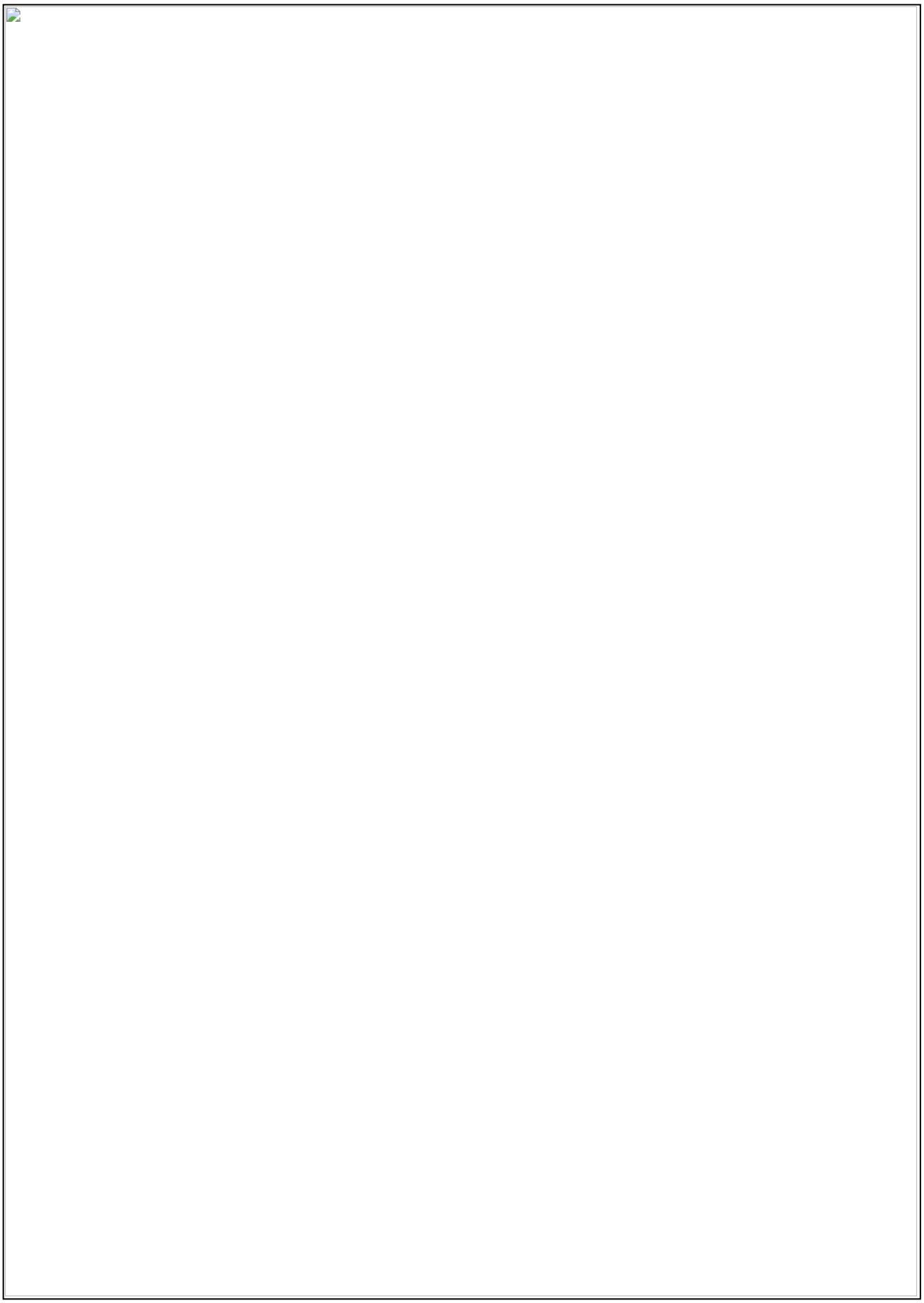
'I refresh the voice reminds constantly when I am waiting for a bus in order to estimate the

arrival time of the vehicle. If I hear a hint that the bus is approaching, I will pay particular attention to the sound of the coming bus. However, I still boarded the wrong bus several times and I realised the issue until I heard the internal voice prompt, whereas the bus has already left the station. Therefore, I will ask other passengers or the bus driver before boarding in order to confirm the bus line.'

(Interviewee P, male, 25/07/2019)

Compared with the experience of taking a bus, metro is considered as an easier travel mode. Firstly, each platform only operates specific line in general, with the time interval between the two trains being relatively short. Hence, VIP feel less stressed from missing the train or taking a wrong one if they find the right platform. Secondly, all the stations have RTI display panels along with automatic audio announcement on the platforms which declare the destination and waiting time of the next train (figure 2). The voice prompt allows VIP to prepare for boarding which can increase their sense of security while waiting.

Figure 2. RTI display panel at Tianyuanxilu Station (Author, 2019).



only ask for help from other unfamiliar passengers if they travel alone. This can become a problem if no one else is waiting for the bus simultaneously or they are too embarrassed to talk to the strangers. In addition, it may happen occasionally that a few bus drivers do not respect VIP and refuse to take them. Two participants reflected their frustrating experiences of being neglected and rejected by the bus drivers.

'A few years ago, I asked a bus driver whether the vehicle was heading for my destination, but his attitude was extremely bad probably because he thought I had influenced the passengers behind me to boarding the vehicle. He called me the blind which was the last word I wanted to hear. Fortunately, I never met other drivers who treated me bad again. The majority of them were patient to tell me the way.'

(Interviewee A, female, 21/07/2019)

'*I met the situation for several times when I was waiting for a bus that the driver parked the vehicle far away deliberately when he (she) saw me waiting. I still have partial light sense so I could vaguely see the bus passed by without stopping. I guessed they might feel inconvenient to take me as they saw me holding the long cane.'*

(Interviewee Q, male, 25/07/2019)

Additionally, it is considered that seeking for help when taking rail transit is more convenient for VIP. Due to the artificial security check in every metro station in Nanjing, the most beneficial factor is that VIP can find the staff at the beginning. Moreover, the green channel is also offered in each station, allowing VIP to avoid the narrow ticket gates (figure 3). The respondents stated that the staff could lead them to the platform and helped them board the train directly. Meanwhile, they also mentioned that the staff would asked them about the

destination in order to inform their colleagues to wait for their arrival at the same gate. After arriving at the target station, the prepared staff led them to the nearby transfer point or took them out of the station, which was significantly helpful for them and increased their sense of safety. However, four of the respondents who used the metro frequently still concerned about the assistance during peak hours.

'I tried to avoid rush hour travel because no one was available to help me at that time and I had to wait until the stream of people became smaller.'

(Interviewee H, male, 23/07/2019)

'Sometimes, the staff forgot to tell his (her) colleagues to help me at the destination and I felt panic when I had to exit the station by myself.'

(Interviewee I, female, 23/07/2019)

Figure 3. The green channel (Author, 2019).

5.5 Getting on/off the Vehicle

It is important for VIP to board all the vehicles at a specific location of the bus stop because

they cannot see where the bus parks exactly. Through the observation, it is surprising to discover that the various parking behaviours of most bus drivers are far from the standard. This includes stopping before reaching the platform or parking on the road away from the platform as shown in the following three figures, which leads to great dangers for even normal passengers to get on or off the bus. The participants who were used to travelling by bus also reflected the problems.

'I often saw the bus stopping with a distance so I had to walk fast to catch it and be more careful to watch if there was anyone cycling around. Dropping off the vehicle was a similar condition. It was necessary to observe at the door before getting off and quickly walk to the sidewalk in order to avoid the non-motor vehicles.'

(Interviewee S, male, 26/07/2019)

Figure 4. Stopping without reaching the platform (Author, 2019).

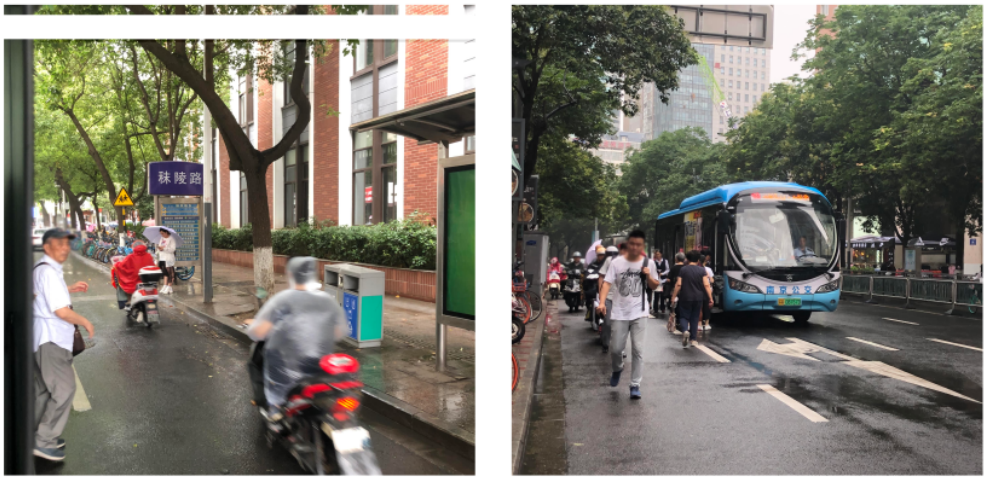


Figure 5 and 6. Parking on the road away from the platform (Author, 2019).

It is more accessible to get on or off a metro for VIP, as every train has numerous doors and the positions of the doors are strictly fixed. During the interview, no one reported problems getting on or off a metro.

5.6 On Board

Driving safety is a crucial factor for VIP travelling independently (Xiong, 2009). In general, VIP can take a seat after getting on board with the barrier-free seats on buses or metros, which prevent them from falling. However, due to the irregular driving behaviour of some bus drivers, VIP should still pay more attention. Moreover, since the metros run smoothly, it is not a serious problem for VIP in this aspect.

'I really appreciate it if the bus driver see me getting on the bus, he (she) ask other passengers to provide a seat and the passengers also help me to the seat initiatively. However, I still hold the armrest tightly when I am in the seat because sometimes the bus may swerve or brake.'

(Interviewee C, female, 21/07/2019)

In addition, another significant barrier is access to the information. Almost all the buses and metros in Nanjing have been installed with voice announcement at present, which offer prominent convenience to VIP. However, it is worth mentioning that the voice prompts of the buses are controlled by the drivers manually, which may result in failure to announce stops. The situation is not serious for normal people because they can determine the route by other approaches, whereas it can cause severe problem for VIP as they may miss the destination. Similarly, it is not a barrier on taking metros because they are all equipped with automatic voice prompts.

5.7 Tactile Paving

As mentioned above, tactile paving is a significant infrastructure for VIP to gain the essential information of the surrounding environment. The tactile paved sidewalk built in Nanjing have covered the major streets and commercial sites (Zhu, 2010). However, the insufficient construction, supervision and maintenance of accessible pavement, as well as the lack of attention from both the government and citizens, result in a large proportion of handicap-friendly sidewalk not being applicable to use, making the tactile paving more like a 'image project' rather than a practical infrastructure (Dai, 2018; Zhu, 2010).

The first problem is the substandard construction of the tactile paving. During the initial street construction, there is a lack of unified planning and overall arrangement for barrier-free facilities, which lead to different developers acting independently. Moreover, due to the insufficient constraints of the barrier-free construction on law and system levels, numerous developers take little account of tactile paving and even reject to build it in order to save costs

(Zhu, 2010). Hence, due to the lack of strict supervision during construction process and the insufficient knowledge popularisation to the labourers, the completed handicap-friendly sidewalks cannot meet the standard and the issues involve discontinuity or impeded by other municipal facilities (like flower bed or bollard) (Wang and Li, 2010; Zhang, 2016). The following figures show several types of substandard construction, which increase the injury risks of VIP and their difficulties of travel.

'What worries me most is the bollards. They are always short and made of stone, sometimes I cannot touch them through the long cane, and it is quite painful if I hit them.'

(Interviewee D, male, 21/07/2019)

'I have experienced the problem that I was walking on the tactile paving but it suddenly broke off. I felt panic at that time because I lost the direction and was not sure where was the following accessible sidewalks, got confused about where I should go either.'

(Interviewee I, female, 23/07/2019)

Figure 7 and 8. Discontinuity (Author, 2019).

Figure 9, 10 and 11. Tactile paving impeded by other municipal facilities (Author, 2019).

Figure 12. Surrounding pavement built similar to the tactile paving (Author, 2019).

The second problem is the occupation of tactile paving by various obstacles. The causes of this can be summarised as lack of knowledge dissemination and supervision of the facilities (Zhu, 2010). Nanjing Municipal Government and the relevant Non-Governmental Organisation, such as ‘Home of the Disabled’, rarely popularise the knowledge of how important is the barrier-free facilities to the public, leading numerous citizens to ignore the

existence of tactile paved sidewalks and to occupy of accessible pavements frequently (Cheng and Liu, 2019). The majority of obstacles are the vehicles such as cars, electric motorcycles and bicycles (figure 13 and 14). It is worth mentioning that Nanjing has a large number of shared bicycles. They encourage more people to travel environmentally friendly, whereas they also increase the risks for the travel of VIP. There is no fixed parking for shared bicycles so the users often park the bicycles on tactile paving. Meanwhile, other movable obstructions such as temporary retails (figure 15 and 16) also bring VIP more pressure on using tactile paving (Zhang, 2016). In addition, there is a lack of legal provisions prohibiting the citizens from occupying the tactile paving and government has not set up a department to inspect and supervise the conditions of barrier-free facilities termly, which results in a more serious encroachment gradually. For the independent travel of VIP, dangers from the obstacles reduce their dependence on tactile paving and affect their entire journey experience. Furthermore, the phenomena also reflect the exclusion of VIP in the society (Hong, 2018). During the interviews, all the participants mentioned the difficulties of using tactile paving. Some of them even got hurt while walking on it.

'I prefer to walk on non-motorised vehicle lanes rather than tactile paving, because at least roads are smooth and expedite, the cyclers can see me and avoid hitting me. Inversely, I cannot see the obstacles on the tactile paving so it is difficult to avoid them. Hence, I think walk on the cycle lanes is safer actually.'

(Interviewee H, male, 23/07/2019)

'I'm afraid of getting hurt on tactile paving, and I'm also worried about breaking other people's belongings, such as the goods on the wayside stalls, thus I would like to avoid walking on

tactile paving during the journey.'

(Interviewee A, female, 21/07/2019)

'I have travelled by myself a lot and I find out that tactile paving in city centre is much difficult to use than other areas. Bicycles stop everywhere so although I try to walk on the pavement I may still hit them. I know the downtown area has larger flows of visitors so there are more non-motor vehicles, but I have to say, parking for these vehicles should be restricted in fixed zones and everyone should know sidewalks are not the appropriate place for stopping their vehicles!'

(Interviewee O, female, 25/07/2019)

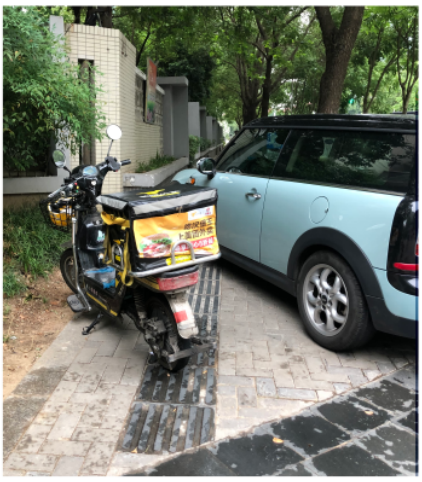


Figure 13 and 14. Vehicles occupying on the tactile paving (Author, 2019).

Figure 15 and 16. Wayside stalls on the tactile paving (Author, 2019).

The final problem is the insufficient maintenance and renewal of the existing tactile paving. Similarly, there is no department dedicated to maintain accessibility facilities. Although the handicap-friendly sidewalks are already uneven or cracked, no one takes the responsibility to repair them. VIP may fall if they passing the broken paving (figure 17 and 18).

'It really requires courage to walk on a accessible sidewalk. Sometimes, my long cane does not detect any obstacles in front of me, but I still stumble over a depression on the pavement.'

(Interviewee L, male, 24/07/2019)

Figure 17 and 18. Cracked tactile paving (Author, 2019).

5.8 Crossing the Road

Although crossing the road is considered as a particular concern for VIP, research about this topic in Nanjing is still insufficient. As a result, the barriers for VIP on crossing the roads will be discussed through the observation from the author and the journey experiences from the respondents. Initially, as mentioned above, the main problem for VIP is the inadequate voice signal facilities in Nanjing. The majority of traffic lights with voice signals are only clustered in the downtown area. Furthermore, another common phenomenon is that the time for pedestrians to go across some wide roads is very short. It is extremely adverse for the people who have difficulty in walking and VIP. In addition, because there are no tactile paving on the roads, VIP may sometimes go awry without guidance, which extends the time to cross the road and increases the risks of accidents.

'Sometimes when I was walking on the road, the traffic signal changed. I was afraid to go any further when I heard the car began to move so I could only stand at the same place until I

heard the car stop again.'

(Interviewee M, female, de 24/07/2019)

'I can only hear the voice prompt at some of the crossroads when I go to Xinjinkou (city centre), maybe because that area has large pedestrian volumes and busy traffic all the time. However, I am still worried about crossing the road although it has the voice prompt as it is not clear and I get confused about which direction it is reminding. '

(Interviewee K, male, 23/07/2019)

6. Recommendations

In order to reduce the barriers mentioned above and provide more accessible travel experience for the VIP, recommendations are presented based on the suggestions from other research and the expectation from the respondents.

First, the fundamental cause of the travel barriers of VIP is the insufficient awareness, attitude and behaviour of the public towards VIP and barrier-free construction. It is suggested that the municipal government should introduce more policies and regulations to facilitate accessible travel (Zhu, 2010). Relevant departments serving the people with disability should also be founded to drive a comprehensive improvement of barrier-free construction and provide a safer, more convenient travel environment for VIP. The department needs to emphasise the importance of the accessible facilities to the developers and related construction workers, as well as supervise their building process to meet standards (Zhu, 2010). Subsequent management on the accessible facilities is also necessary to ensure the availability of the construction. Moreover, staff of the service industry such as bus drivers and the employees in the metro stations needs to be more responsible when VIP are seeking for assistance.

According to the various obstacles when taking a bus in Nanjing, the drivers need more training in regards to parking and driving behaviour. They should stop the vehicles at the proper markers of the bus stop in order to avoid non-motor vehicles passing by when passengers are boarding and help VIP to find the boarding gate. Drivers should also drive smoothly and remind the passengers about the approaching stop or other emergencies in advance to enhance their sense of security. Meanwhile, it is similar for metro staff to provide a more integrated help for VIP throughout their use of the metros. Additionally, the active awareness and behaviour of the citizens on treating the disabled groups is a significant factor to encourage their travels. Knowledge and education about the importance of barrier-free environment for the disabled needs to be popularised to the public widely, which can be achieved trough the media or holding related activities (Cheng and Liu, 2019). In order to encourage more citizens to consciously maintain the availability of barrier-free construction, and even actively participate in the improvement of barrier-free environment, the relevant departments can use a 'Carrot and Stick' method. Reward should be given to the people who facilitate accessible-friendly developments, such as reporting when an existing tactile paving needs repairs or when a staff member displays negligent behaviour. On the contrary, punishment should also be levied the behaviour leading to travel barriers of VIP, such as occupying tactile paving or other barrier-free facilities. Therefore, with the improving awareness of the public shifting to normalise the respect and recognition of VIP, the development of the barrier-free environment can be more efficient and promote VIP to participate in activities, reducing social exclusion.

Secondly, the availability of public transport is identified as a significant impact on the journey

experience of VIP. The barrier-free construction of public transport in Nanjing still requires an extensive improvement. In regards to bus travel, the design of bus stops should offer more aids for VIP to access the RTI and get on the vehicle. For example, the boarding point at each station should be fixed and equipped with voice prompts or handrails with braille guidance. Moreover, RTI display panels with voice announcement should be set up in every stop to declare the waiting time and the impending approach of each bus. Meanwhile, every bus should install the external voice prompts and announce its number when pulling in the station. With the voice announcement from both the platform and the approaching bus, it will be easier for VIP to determine if the bus is the target one and avoid boarding the wrong vehicle. Nanjing Public Transportation Group has installed this equipment on buses in succession since 2014 (China Disabled Persons' Federation, 2014). However, the facility is still far from being widely implemented at present. Hence, the developers should improve efficiency on the construction in order to encourage more VIP travel by bus.

Moreover, improving the barrier-free infrastructure in metro stations can also offer guidance for VIP to find the platform without seeking assistance. A portion of metro stations in Nanjing has built tactile paving, but the construction is still insufficient for VIP to find the platform. As a result, more integrated and continuous tactile paving should be built in the stations aiming to guide VIP from the entrance via the elevator (or stairs) to the platform and the door directly. The tactile paving should be designed in straight and the symbols should be simple (Zeng, 1998). Additionally, when focusing on the transfer stations with more complex layout, specific sound prompts can be provided for different lines in order to identify the direction of the target route. Furthermore, at the pavement node, the route selection can be determined by tactile

signals combining with different auditory instructions (Huang and sun, 2017). Easy access to public transport can promote the mobility of VIP, prevent them from transport exclusion, and improve their quality of life.

Thirdly, the barrier-free facilities on the roads in Nanjing also requires further development in order to offer a safer and more accessible walking environment for VIP to take part in more activities. It is worth noting that the construction of tactile paving should be improved from the beginning. The design should be considered based on the road conditions in Nanjing and the actual demands of local VIP, rather than copying the standards from other areas. The construction should avoid overlapping with or being too close to other municipal facilities (Zhang, 2016). Moreover, it is necessary to distinguish between the ordinary pavement and accessible sidewalk through tactile sense aiming to avoid confusion. Meanwhile, using vivid colours such as yellow to separate from the colours of sidewalks can help VIP with colour weakness to recognise the heading direction (Wu et al., 2017). Furthermore, ensuring the continuity of the tactile paving and using different tactile signs to highlight the turns, activity sites and changing terrain should also be considered (Hong, 2008). Additionally, the supervision and maintenance of tactile paving should be conducted constantly in order to remove obstacles and repair damaged parts (Yin, 2009). Tactile paving should be clear and smooth to guide and promote the independent travel of VIP.

Aiming at providing a safer environment for VIP to cross the road, it is necessary to install voice prompts on every traffic signal with accurate indication of the passable time (Yin, 2009). Moreover, in order to avoid confusion about the direction of passage, volume control of the voice prompts can be helpful for VIP to determine whether their forward direction is passable

or not. In addition, passable duration of pedestrian should be set according to the walking speed of people and the width of the road. It is reasonable to measure walking speed of VIP or physically handicapped individuals rather than able-bodied people, so that the designed passable duration can be adequate for everyone. Furthermore, It would be easier to get across if tactile paving could be constructed on the zebra crossing of the roads, and that it can also help VIP with the speed and direction (Zou, et al., 2017).

7. Conclusion

In conclusion, this research has explored the independent journey experiences of VIP on using public transport and accessibility facilities in Nanjing and presented the feasible suggestions for improving their accessible travel environment.

7.1 Key Findings

Response to Objective 1:

According to the interviews, there are three considerable issues for VIP on using public transport independently. At first, a common barrier is to find the location of a bus stop or metro station. Inaccurate navigation information and insufficient guidance of the tactile paving may cause confusion for VIP to reach the correct location. Moreover, when travelling by bus, the main problem for VIP is to get on the correct vehicle and keep secure on board. The RTI display panel is not popularised in every bus stop and the existing RTI display panels are not equipped with voice prompts, which are less helpful for VIP to access the information and determine whether the approaching bus is the target one. Meanwhile, the parking and driving behaviour of numerous drivers still cannot achieve the standard. This includes stopping without closing to the platform and taking sharp turns or brakes on the road, which leads to

great dangers for VIP. In addition, the most difficult process to travel by metro is to get to the platform. VIP have to pass the security check, ticket gate and elevator (stairs) before reaching the platform and this situation will be more complex for a transfer station. Most VIP can get support from the staff who can lead them directly to the platform, but it is almost impossible for them to find the right boarding location on their own.

Response to Objective 2:

Based on the observation from the author and the experiences shared by the interviewees, two significant barriers of the existing barrier-free facilities are the insufficient construction of tactile paving on the road and the lack of guidance when crossing the road. Initially, the design and supervision of tactile paving in Nanjing are far from the standard so walking on it is considered as a great challenge for VIP. Common negative phenomena with tactile paving can be summerised as discontinuity, occupied with municipal facilities or various vehicles and neglect of maintenance. In addition, the lack of voice prompts on traffic signals lead to the difficulties for VIP to determine whether they can go forward. Insufficient passing time for VIP on wider roads and lack of guiding facilities about the direction such as tactile paving also increase the risks of accidents and reduce their sense of security.

Response to Objective 3:

After the discussion about the above obstacles, chapter 6 presented feasible recommendations to improve the travel experience of VIP which responsed to the last objective. First, the awareness, attitude and behaviour of the public on treating VIP should be improved. The government needs to improve the design standards of accessibility facilities and enhance the supervision and maintenance of barrier-free construction. Related service

personnel should regulate or improve their own behaviour in order to offer a safer and more convenient public transport experience for VIP. Citizens need to realise the importance of barrier-free facilities to the VIP and avoid the occupation and destruction of those facilities. With the joint efforts of all walks of life, the travel environment will be more accessible for VIP which can encourage them to participate in more activities and reduce social exclusion. Additionally, the construction of barrier-free public transport and accessibility facilities should also be improved in order to provide a more accessible travel environment for VIP.

7.2 Contributions of this Study

This dissertation fills up the information blank in the travel experience of VIP on taking public transport and using accessibility facilities in the context of Nanjing. Different from the majority of previous research which considers about all groups of the disabled, this investigation focuses on the demands of VIP based on their previous travel experiences and present specific suggestions for them. It also investigates their travel experience more in-depth and discusses the issues that have not been mentioned before, such as the availability and satisfaction of staff assistance and the barriers when crossing the roads. In addition, with the same context of barrier-free construction in China, most obstacles encountered by VIP in Nanjing are also typical cases in other cities (Wang and Li, 2010). Therefore, the latest findings of accessible travel in Nanjing and suggestions for the improvement on existing barriers can also be instructive for other cities.

7.3 Policy Implication

As mentioned in the recommendation, Nanjing Government should introduce more policies and regulations to facilitate accessible travel. It should also set up relevant departments

serving the people with disabilities in order to drive a comprehensive improvement of barrier-free construction and provide a safer and more convenient travel environment for VIP. Moreover, it is important for the government to popularise knowledge and education about the importance of a barrier-free environment for disabled people to the public extensively (Cheng and Liu, 2019). A 'Carrot and Stick' method is also introduced to supervise the nonstandard behaviour of various groups and encourage more people to participant in building a more accessible travel environment.

7.4 Limitations and Future Research

Due to the time limit, this research only recruited 20 respondents. Although interviewees are diversely chosen, they may not adequately stand for the entire VIP community in Nanjing. For example, the participants need to have sufficient independent travel experiences, so the challenges of individuals who have less experience are not included. However, these respondents can still represent numerous VIP in Nanjing and offer valuable recommendations.

Additionally, because of the word limit, a few obstacles reflected from the interviews cannot be further discussed in this dissertation. For example, some respondents are worried about carrying a valid Disability Certificate along the journeys. Other difficulties of taking a bus were also mentioned by several interviewees due to the step at the gate or other inner designs of some buses. Moreover, problems with exiting the bus still need further discussion.

Therefore, future research is needed for improving the barrier-free travel environment for VIP. It is important to understand the demands of the users before construction. Periodic supervision and maintenance during and after the development are also necessary.

Development on smart technology can also promote the convenience and safety of the journey. With more attention and joint efforts of all walks of life, it is expected to see Nanjing and other cities in China become more accessible and inclusive for everyone.

! '$

Fangbian Mangren Chengche (Nanjing public bus provide external voice prompts for visual imparied people to ride) [Online]. Available from: http://www.cdpf.org.cn/mryk/2014n/20145/201406/t20140603_419018.shtml (Accessed: 20 August 2019)

Clery, E., Kiss, Z., Taylor, E. & Gill, V. (2017) *Disabled people's travel behaviour and attitudes to travel*. London: Department for Transport.

Dai, X. (2018) 'Mangdao Sheji Que Guifan, Gonggong Fuwu Cun Duanban(Lacks specifications on tactile paving design; Weaknesses in public services)', *China business newspaper,* October, P02.

Delbosc, A. (2012) 'The role of well-being in transport policy', *Transport Policy,* 23, pp.25-33.

DETR (1998) *Guidance on the Use of Tactile Paving Surfaces.* Rotherham: Goldthorpe Industrial Estate.

Gallagher, B. et al. (2011) 'Mobility and access to transport issues as experienced by people with vision impairment living in urban and rural Ireland', *Disability and Rehabilitation,* 33(12), pp.979-988.

Golledge, R., Marston, J. & Costanzo, C. (1997) 'Attitudes of Visually Impaired Persons Towards the Use of Public Transportation', *Journal of Visual Impairment & Blindness,* 91(5), pp.446-459.

Guo, T. (2017) *A case study on the problems, reasons and possible solutions of the employment of people with visual impairment.* Shandong: Shandong University.

Hall, P. (2014) *Good Cities, Better Lives.* Abingdon, Routledge.

Hara, K. et al. (2015) ‘Improving Public Transit Accessibility for Blind Riders by Crowdsourcing Bus Stop Landmark Locations with Google Street View: An Extended Analysis’, *ACM Transactions on Accessible Computing*, 6(2), pp.1-23.

HKSWGU (2016) *The Experience of People with Visual Impairment Using Public Transportation Systems in Hong Kong*. Hong Kong: HKSWGU.

Hine, J. & Scott, J. (2000) ‘Seamless, accessible travel: Users' views of the public transport journey and interchange’, *Transport Policy,* 7, pp.217-226.

Hong, X. (2008) *Study on Upgrading TGSI in Pedestrian Area on the Road of Nanjing Gulou District.* Nanjing: Nanjing Tech University.

Huang, D. & Sun, Y. (2017) ‘Blind Guides the Design Suitable for Underground Space’, *Packaging Engineering,* 38(24), pp.56-60.

Jolly, D., Priestley, M. & Matthews, B. (2006) *Secondary analysis of existing data on disabled people’s use and experiences of public transport in Great Britain.* Leeds: University of Leeds.

Jones, T. & Jain, J. (2006) ‘Examining the experiences of sight-impaired travellers: The next station stop?’, *The British Journal of Visual Impairment,* 24(3), pp 141-144.

Khorrami-Nejad, M., Sarabandi, A., Mohammad-Reza, A. & Askarizadeh, F. (2016) ‘The Impact of Visual Impairment on Quality of Life’, *Medical Hypothesis, Discovery & Innovation Ophthalmology Journal*, 5(3), pp.96-103.

Lucas, K. (2012) ‘Transport and social exclusion: Where are we now?’, *Transport Policy,* 20, pp.105-113.

Markiewicz, M. & Skomorowski, M. (2010) ‘Public Transport Information System for Visually Impaired and Blind People’, *Transport System Telematics*, pp.271-277.

Marston, J., Golledge, R. & Costanzo, M. (1997) 'Investigating Travel Behavior of Non-driving Blind and Vision Impaired People: The Role of Public Transit', *The Professional Geographer*, 49(2), pp.236-245.

Marston, J. & Golledge, R. (1998) Improving Transit Access for the Blind and Vision Impaired. *Intellimotion,* 7(2), pp.4-5&11.

Marston, J. & Golledge, R. (2003) The hidden demand for participation in activities and travel by persons who are visually impaired. *Journal of Visual Impairment and Blindness,* 97(8), pp.475-484.

Ministry of Women, Family and Community Development (2010) *A Review of International Best Practice in Accessible Public Transportation for Persons with Disabilities.* Malaysia: United Nations Development Programme.

Montarzino, A. et al. (2007) 'The Impact of Mobility and Public Transport on the Independence of Visually Impaired People,' *Visual Impairment Research,* 9, pp.67-82.

Nanjing Government (2016) *2016 Nianban Nanjing Jiaotong Fazhan Baipishu (Nanjing transport development white paper 2016)* [Online]. Available from: https://wenku.baidu.com/view/574b3d1b856a561253d36f5b.html (Accessed: 18 May 2019).

Nanjing Government (2018) *Chengshi Gaikuang (Profile of Nanjing)* [Online]. Available from: http://www.nanjing.gov.cn/zjnj/csgk/201809/t20180903_378114.html (Accessed: 18 May 2019).

Nanjing Government (2019) *Ditan Nanjing, Rijun 531wanren Chenggongjiaochuxing, Gongjiao Jidonghua Chuxing Fendanlv Da Baifenzhi 63 (Low-carbon nanjing, with an average of 5.31 million trips by public transport per day, public transport travel sharing rate of*

63%) [Online]. Available from: http://www.nanjing.gov.cn/njxx/201906/t20190620_1570916.html (Accessed: 18 May 2019).

Nanjing Metro (2019) *Xianlu Jianjie (Metro line profile)* [Online]. Available from: http://www.njmetro.com.cn/njdtweb/home/go-line-intro.do?columnId=8a8080076512510d0165130727520004&rowId=8a80800765a29a780165a8538b6f0018 (Accessed: 18 May 2019).

National Bureau of Statistics of China (2008) *2006 Nian Dierci Quanguo Canjiren Chouyangdiaocha Zhuyaoshuju Gongbao (Major data bulletin of the second national sample survey of the handicapped in 2006)* [Online]. Available from: http://www.cdpf.org.cn/sjzx/cjrgk/200804/t20080407_387580.shtml (Accessed: 15 May 2019).

National Disability Council (Great Britain) (1999) *Disability Discrimination Act 1995: code of practice, rights of access, goods, facilities, services and premises / NDC.* London: Stationery Office.

Nordbakke, S. (2013) 'Capabilities for mobility among urban older women: Barriers, strategies and options', *Journal of Transport Geography*, 26, pp.166-174.

Pal, G.C. (2011) 'Disability, intersectionality and deprivation: An excluded agenda', *Psychology and Developing Societies*, 23(2), pp.159-176.

Peoples Republic of China (2008) *People with disabilities act of the Peoples Republic of China.* Beijing: The National People's Congress of the People's Republic of China.

Quinones, P., Greene, T., Yang, R. & Newman, M. (2011) Supporting Visually Impaired Navigation: A Needs-finding Study, Proceeding of the ACM CHI Conference on Human Factors in Computing Systems: *CHI 2011,* pp.1645-1650.

Rodrigue, J., Comtois, C. & Slack, B. (2013) *The Geography of Transport Systems*. 3rd ed. London: Routledge.

Rowley, J. (2012) 'Conducting research interviews', *Management Research Review*, 35, pp.260-271.

Sammer, G.et al. (2012) 'Identification of Mobility-Impaired Persons and Analysis of Their Travel Behavior and Needs', *Journal of Transportation Research Board,* 2320, pp.46-54.

Saleh, G. (2004) 'Consent of the blind and visually impaired: A time to change practice', *British Journal of Ophthalmology*, 88, pp.310-311.

Smith, R. (2014) *Destination Unknown: An investigation into bus passenger experiences.* Reading: Guide Dogs.

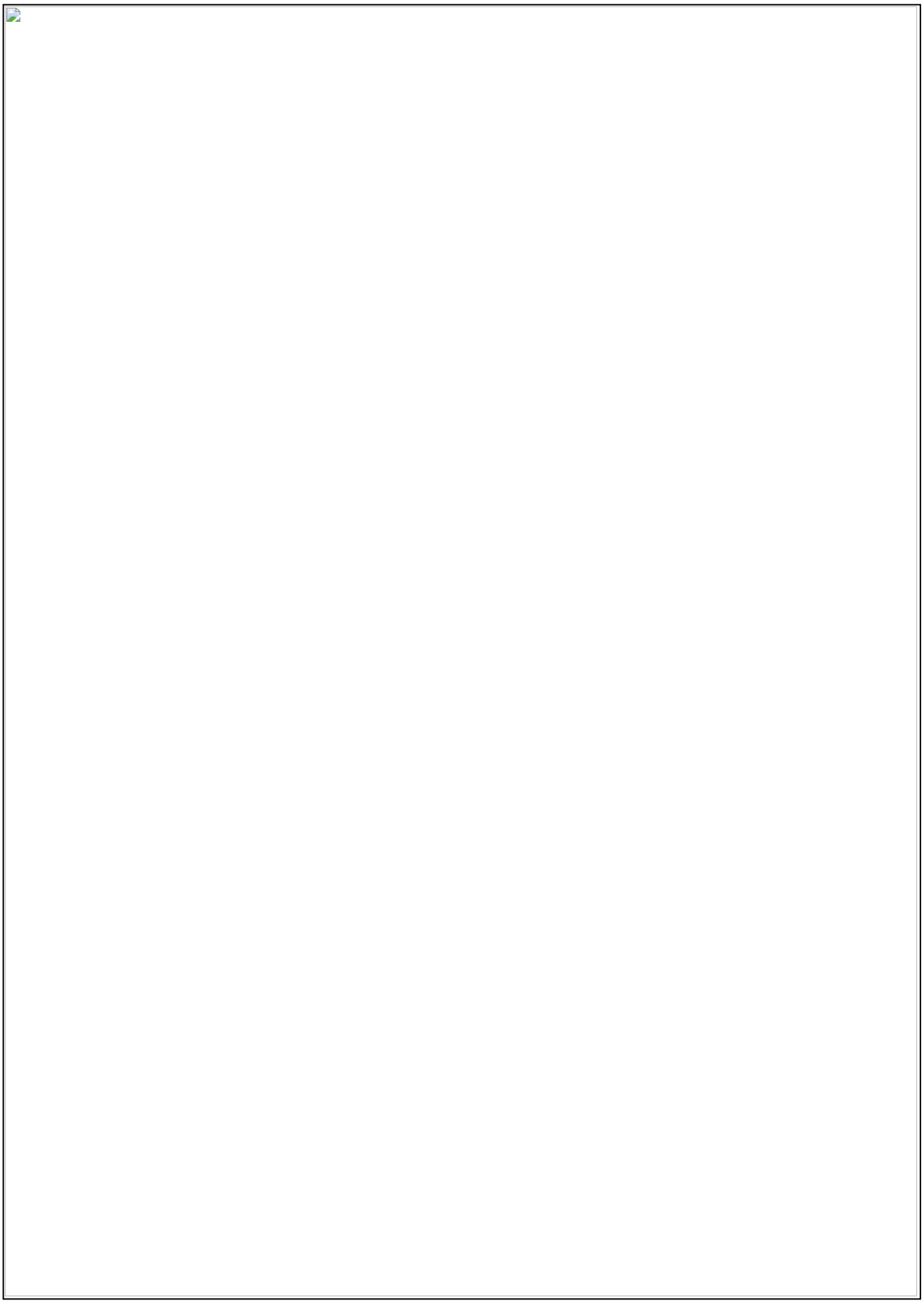
Tobias, E.I. & Mukhopadhyay, S. (2017) 'Disability and Social Exclusion: Experiences of Individuals with Visual Impairments in the Oshikoto and Oshana Regions of Namibia', *Psychology and Developing Societies*, 29(1), pp.22-43.

Urry, J. (2003) 'Social networks, travel and talk', *British Journal of Sociology,* 54(2), pp.155-175.

Wang, M. & Li, X. (2010) 'Nanjingshi Wuzhangai Sheshi Diaocha Yanjiu (Research on the Barrier-Free Design of Nanjing)', *Landscape Construction,* 3, pp.55-57.

Wang, Y. (2018) 'The Accessible Design of Railway Station Building based on the Traveling Demands of Transportation Disadvantaged Group', *China Transportation Review*, 40(3), pp.57-60&105.

Watkins, K., Ferris, B., Borning, A., Rutherford, G. & Layton, D. (2011) 'Where is My Bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders',



Overpass Accessible Facilities at Home and Abroad', *Urban roads and Bridges and flood control*, 5(5), pp.47-51&59.

Zhu, J. (2010) 'Woguo Chengshi Wuzhangaisheshi Jianshe de Fansi-Yi Nanjingshi Weili (Reflections on the construction of barrier-free facilities in Chinese cities - taking Nanjing as an example)', *Social Scientist*, 11, pp.40-43.

9. Appendix

Appendix 1. Face-to-face Interview Question List

For Objective 1

Q1. How and where do you get information when planning your travel route? Is there any barriers in accessing information? (Literature support: Andre et al., 2007; Zhang, 2017)

Q2. How do you get to the station/stop? (Literature support: Azenkot et al., 2011; Casey et al., 2013; Quinones et al., 2011; Wang, 2018).

Q3. Are there any problems on finding the correct location of the bus or metro platform? (Literature support: Huang and Sun, 2017; Jones and Jain, 2006)

Q4. How do you buy the ticket? (Literature support: Peoples Republic of China, 2008)

Q5. To what extent do you think is important to know real time information about public transport services? (Literature support: Hara et al., 2015; Watkins et al., 2011; Zhang, Shen and Clifton, 2008)

Q6. How important is it to seek staff assistance when you arrive at the station/stop? Are you satisfied with other people's behaviour (staff or other passengers) when seeking assistance? (Literature support: Gallagher et al., 2011; Hine and Scott, 2000; Jones and Jain, 2006)

Q7. How important is the voice prompts on the platform? Is there any barriers to access information from the voice promps? (Literature support: Wang, 2018).

Q8. Is there any difficulty when boarding or alighting a bus or metro? (Literature support: Gallagher et al., 2011; Hara et al., 2015; Markiewicz and Skomorowski, 2010).

Q9. How important is the voice prompts on board? Is there any barriers to access information from the voice promps? (Literature support: Casey et al., 2013; Golledge, Marston and

Costanzo, 1997; Gallagher et al., 2011; Sammer et al., 2012 Casey et al., 2013; Smith, 2014)

Q10. Do you feel convenient on board？ Are there any barriers when heading for the destination? (Literature support: Xiong, 2009)

For Objective 2

Q11. How helpful do you think is the tactile paving? How often do you use tactile paving? Did you suffer from any problems when walking on tactile paving? (Literature support: DETR, 1998; Zhang, 2016; Zhang, 2017)

Q12. Is it difficult for you to crossing the road? Why this happens? Literature support: Wang and Li, 2010; Zhang, 2017)

For Objective 3

Q13. Is there any specific experience you want to supplement? Do you have any expectations and suggestions on creating a more barrier-free travel environment in Nanjing?

Appendix 2. Information Sheet for Participants

Participant Information Sheet For Visually Impaired People

UCL Research Ethics Committee Approval ID Number: 16015/001

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Title of Study: The travel experiences of VIP when using public transport and accessibility facilities in Nanjing

Department: The Bartlett School of Planning

Name and Contact Details of the Researcher(s): Name: Ziqi Dong

Email address: ziqi.dong.18@ucl.ac.uk

Name and Contact Details of the Principal Researcher: Name: Bonvino Gualtiero

Email address: gualtiero.bonvino.09@ucl.ac.uk

1. Invitation Paragraph

You are being invited to take part in a research project for a master research study. Before you decided it is important for you to understand why we do the research and what kind of participation we will invite. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. You can take time to decide whether or not you wish to take part. Thank you for reading this.

2. What is the project's purpose?

Nowadays, there are a large number of visually impaired people in China. But I found out that it was really hard to see this group of people walking on the street or taking public transport compared with UK. Therefore, I choose Nanjing as the target city and try to explore the barriers they faced during the journey especially in using public transport and accessibility facilities. This study will also present the feasible solution in order to improve the accessible travel supporting from their perspective.

3. Why have I been chosen?

We want to choose 20 visually impaired people aged between 18 and 60. The reason is that it is appropriate for this topic that the interviewees are adults, have the experience of travel alone and their visual impairment is not because of aging.

4. Do I have to take part?

You can make your own decision on whether to participate. There is no penalty if you decide not to take part. If you decide to participate, I will give you this information sheet to keep and I will ask for your verbal agreement at the beginning of the interview. Although you have decided to attend it is still free for you to cancel the meeting at any time without any reason and without it affecting any benefits that you are entitled to. If you decide to withdraw you will be asked what you wish to happen to the data you have provided up that point.

5. What will happen to me if I take part?

If you agree to join, we will hold a semi-structured interview with you (face-to-face or by a telephone interview). We will ask you about your travel experiences and expectations on public transport infrastructure and services and other accessibility facilities in Nanjing. Our interview will last about 20 to 30 minutes. We will book a time when you are free and we will come to your work place so you do not need to pay any travelling expenses. You only need to provide your family name, age and the degree of sight loss.

6. Will I be recorded and how will the recorded media be used?

The interview will be recorded and the audio recordings of your activities made during this research will be used only for analysis and for illustration in conference presentations and lectures. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings.

7. What are the possible disadvantages and risks of taking part?

This study may let you recall your travel experiences on public transport in Nanjing, which may be positive or negative memory. As a result, you can withdraw from the study immediately if you feel uncomfortable when sharing your experience.

8. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will help shape future research.

9. What if something goes wrong?

If anything goes wrong or you wish to raise a complain, you can contact the supervisor who is called Bonvino Gualtiero – gualtiero.bonvino.09@ucl.ac.uk. If you feel your complaint has not been handled to your satisfaction by the supervisor, you can contact the Chair of the UCL Research Ethics Committee – ethics@ucl.ac.uk

10. Will my taking part in this project be kept confidential?

We promise that all the information we collect will be confidential – all the study materials will be collected and stored according to General Data Protection Regulation (GDPR) and the new UK Data Protection Act 2018.

11. Limits to confidentiality

Please note that assurances on confidentiality will be strictly adhered to unless evidence of wrongdoing or potential harm is uncovered. In such cases the University may be obliged to contact relevant statutory bodies/agencies.

12. What will happen to the results of the research project?

The data will be presented within a master dissertation. It will be saved as electronic data and be stored on laptops. The data will be securely deleted after finishing the dissertation.

13. Local Data Protection Privacy Notice

The controller for this project will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities involving the processing of personal data, and can be contacted at data-protection@ucl.ac.uk

Your personal data will be processed so long as it is required for the research project. If we are able to anonymise the personal data you provide we will undertake this, and will endeavour to minimise the processing of personal data wherever possible.

Your personal information will be sent to the UK. If you are concerned about how your

personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at data-protection@ucl.ac.uk.

14. Contact for further information

If you need to contact for further information, the following details are provided for you.

Name and Contact Details of the Researcher(s):

Name: Ziqi Dong

Email address: ziqi.dong.18@ucl.ac.uk

Name and Contact Details of the Principal Researcher:

Name: Bonvino Gualtiero

Email address: gualtiero.bonvino.09@ucl.ac.uk

Finally, you will be given a copy of the information sheet and a signed consent form to keep. Thank you for reading this information sheet and thanks for your interest in participating in this study.

Appendix 3. Informed Consent Form

CONSENT FORM FOR VISUALLY IMPAIRED PEOPLE IN RESEARCH STUDIES

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: The travel experiences of VIP when using public transport and accessibility facilities in Nanjing
Department: The Bartlett School of Planning
Name and Contact Details of the Researcher(s): Name: Ziqi Dong
Email address: ziqi.dong.18@ucl.ac.uk
Name and Contact Details of the Principal Researcher: Name: Bonvino Gualtiero
Email address: gualtiero.bonvino.09@ucl.ac.uk
Name and Contact Details of the UCL Data Protection Officer: Name: Spenser Crouch
Email address: s.crouch@ucl.ac.uk
This study has been approved by the UCL Research Ethics Committee: Project ID number: 16015/001

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

I confirm that I understand that by ticking/initialling each box below I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element that I may be deemed ineligible for the study.

		Tick Box
1.	I confirm that I have read and understood the Information Sheet for the above study. I have had an opportunity to consider the information and what will be expected of me. I have also had the opportunity to ask questions which have been answered to my satisfaction. I agree to take part in an individual interview.	
2.	I understand that I will be able to withdraw my data up to 6 weeks after interview	
3.	I consent to participate in the study. I understand that my personal information (provide information on what personal information specifically will be collected) will be used for the purposes explained to me. I understand that according to data protection legislation, 'public task' will be the lawful basis for processing.	
4.	I understand that all personal information will remain confidential and that all efforts will be made to ensure I cannot be identified. I understand that my data gathered in this study will be stored anonymously and securely. It will not be possible to identify me in any publications.	
5.	I understand that my information may be subject to review by responsible individuals from the University for monitoring and audit purposes.	
6.	I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. I understand that if I decide to withdraw, any personal data I have provided up to that point will be deleted unless I agree otherwise.	
7.	I understand the potential risks of participating and the support that will be available to me should I become distressed during the course of the research.	
8.	I understand no promise or guarantee of benefits have been made to encourage me to participate.	
9.	I understand that the data will not be made available to any commercial organisations but is solely the responsibility of the researcher(s)	

	undertaking this study.	
10.	I understand that I will not benefit financially from this study or from any possible outcome it may result in in the future.	
11.	I consent to my interview being audio recorded and understand that the recordings will be stored anonymously, using password-protected software and will be deleted after the research finished.	
12.	I hereby confirm that: (a) I understand the exclusion criteria as detailed in the Information Sheet and explained to me by the researcher; and (b) I do not fall under the exclusion criteria.	
13.	I am aware of who I should contact if I wish to lodge a complaint.	
14.	I voluntarily agree to take part in this study.	
15.	I have informed that the information I have submitted will be sent to the UK.	

If you would like your contact details to be retained so that you can be contacted in the future by UCL researchers who would like to invite you to participate in follow up studies to this project, or in future studies of a similar nature, please tick the appropriate box below.

	Yes, I would be happy to be contacted in this way	
	No, I would not like to be contacted	

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Researcher	Date	Signature

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

☐	work abroad incorporates Foreign Office advice
☒	participants have been trained and given all necessary information
☐	only accredited centres are used for rural field work
☐	participants will wear appropriate clothing and footwear for the specified environment
☐	trained leaders accompany the trip
☐	refuge is available
☐	work in outside organisations is subject to their having satisfactory H&S procedures in place
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

EMERGENCIES	Where emergencies may arise use space below to identify and assess any risks
e.g. fire, accidents	Examples of risk: loss of property, loss of life

The risk is low.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

☐	participants have registered with LOCATE at http://www.fco.gov.uk/en/travel-and-living-abroad/
☐	fire fighting equipment is carried on the trip and participants know how to use it
☒	contact numbers for emergency services are known to all participants
☒	participants have means of contacting emergency services
☒	participants have been trained and given all necessary information
☐	a plan for rescue has been formulated, all parties understand the procedure
☐	the plan for rescue /emergency has a reciprocal element
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

FIELDWORK	1	May 2010

EQUIPMENT	Is equipment used?	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. clothing, outboard motors.	Examples of risk: inappropriate, failure, insufficient training to use or repair, injury. Is the risk high / medium / low?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	the departmental written Arrangement for equipment is followed
☐	participants have been provided with any necessary equipment appropriate for the work
☐	all equipment has been inspected, before issue, by a competent person
☐	all users have been advised of correct use
☐	special equipment is only issued to persons trained in its use by a competent person
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

LONE WORKING	Is lone working a possibility?	Yes	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. alone or in isolation lone interviews.	Examples of risk: difficult to summon help. Is the risk high / medium / low?		

Lone interviews

Difficult to summon help. The risk is medium.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	the departmental written Arrangement for lone/out of hours working for field work is followed
☐	lone or isolated working is not allowed
☒	location, route and expected time of return of lone workers is logged daily before work commences
☒	all workers have the means of raising an alarm in the event of an emergency, e.g. phone, flare, whistle
☒	all workers are fully familiar with emergency procedures
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

ILL HEALTH	The possibility of ill health always represents a safety hazard. Use space below to identify and assess any risks associated with this Hazard.
e.g.accident, illness, personal attack, special personal considerations or vulnerabilities.	Examples of risk: injury, asthma, allergies. Is the risk high / medium / low? The risk is low

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	an appropriate number of trained first-aiders and first aid kits are present on the field trip

☐	all participants have had the necessary inoculations/ carry appropriate prophylactics
☒	participants have been advised of the physical demands of the trip and are deemed to be physically suited
☐	participants have been adequate advice on harmful plants, animals and substances they may encounter
☐	participants who require medication have advised the leader of this and carry sufficient medication for their needs
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

TRANSPORT	**Will transport be required**	**NO**		**Move to next hazard**
		YES		**Use space below to identify and assess any risks**

e.g. hired vehicles

Examples of risk: accidents arising from lack of maintenance, suitability or training

Is the risk high / medium / low?

Yes. The risk is low.

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

☒	only public transport will be used
☐	the vehicle will be hired from a reputable supplier
☐	transport must be properly maintained in compliance with relevant national regulations
☐	drivers comply with UCL Policy on Drivers http://www.ucl.ac.uk/hr/docs/college_drivers.php
☐	drivers have been trained and hold the appropriate licence

☐	there will be more than one driver to prevent driver/operator fatigue, and there will be adequate rest periods
☐	sufficient spare parts carried to meet foreseeable emergencies
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

DEALING WITH THE PUBLIC	**Will people be dealing with public**	**Yes**	**If 'No' move to next hazard** **If 'Yes' use space below to identify and assess any risks**
e.g. interviews, observing	Examples of risk: personal attack, causing offence, being misinterpreted. Is the risk high / medium / low? The risk is medium		

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

☒	all participants are trained in interviewing techniques
☐	interviews are contracted out to a third party
☒	advice and support from local groups has been sought
☒	participants do not wear clothes that might cause offence or attract unwanted attention
☐	interviews are conducted at neutral locations or where neither party could be at risk
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

FIELDWORK	3	May 2010

WORKING ON OR NEAR WATER	Will people work on or near water?	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. rivers, marshland, sea.	Examples of risk: drowning, malaria, hepatitis A, parasites. Is the risk high / medium / low?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	lone working on or near water will not be allowed
☐	coastguard information is understood; all work takes place outside those times when tides could prove a threat
☐	all participants are competent swimmers
☐	participants always wear adequate protective equipment, e.g. buoyancy aids, wellingtons
☐	boat is operated by a competent person
☐	all boats are equipped with an alternative means of propulsion e.g. oars
☐	participants have received any appropriate inoculations
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

MANUAL HANDLING	Do MH activities	No	If 'No' move to next hazard

(MH)	take place?		If 'Yes' use space below to identify and assess any risks
e.g. lifting, carrying, moving large or heavy equipment, physical unsuitability for the task.	Examples of risk: strain, cuts, broken bones. Is the risk high / medium / low?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

☐	the departmental written Arrangement for MH is followed
☐	the supervisor has attended a MH risk assessment course
☐	all tasks are within reasonable limits, persons physically unsuited to the MH task are prohibited from such activities
☐	all persons performing MH tasks are adequately trained
☐	equipment components will be assembled on site
☐	any MH task outside the competence of staff will be done by contractors
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

SUBSTANCES	Will participants work with substances	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. plants, chemical, biohazard, waste	Examples of risk: ill health - poisoning, infection, illness, burns, cuts. Is the risk high / medium / low?		

The risk is low

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

☐	the departmental written Arrangements for dealing with hazardous substances and waste are followed
☐	all participants are given information, training and protective equipment for hazardous substances they may encounter
☐	participants who have allergies have advised the leader of this and carry sufficient medication for their needs
☐	waste is disposed of in a responsible manner
☐	suitable containers are provided for hazardous waste
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

OTHER HAZARDS	Have you identified any other hazards?	No	If 'No' move to next section If 'Yes' use space below to identify and assess any risks
i.e. any other hazards must be noted and assessed here.	Hazard: Risk: is the risk		

CONTROL MEASURES	Give details of control measures in place to control the identified risks

Have you identified any risks that are not adequately controlled?			
	NO	☒	Move to Declaration
	YES	☐	Use space below to identify the risk and what action was taken

Is this project subject to the UCL requirements on the ethics of Non-NHS Human Research?	Yes
If yes, please state your Project ID Number	**16015/001**

For more information, please refer to: http://ethics.grad.ucl.ac.uk/

DECLARATION

The work will be reassessed whenever there is a significant change and at least annually. Those participating in the work have read the assessment.

Select the appropriate statement:

☒ I the undersigned have assessed the activity and associated risks and declare that there is no significant residual risk

☒ I the undersigned have assessed the activity and associated risks and declare that the risk will be controlled by the method(s) listed above

NAME OF SUPERVISOR

SIGNATURE OF SUPERVISOR DATE 1 September 2019

FIELDWORK 5 May 2010