Barrier-Free Travel Application for the Disabled in Guangxi

Chenli Xie

A Thesis Submitted in Partial Fulfillment of Requirements for
degree of Master of Science in Creative Media
December 2024

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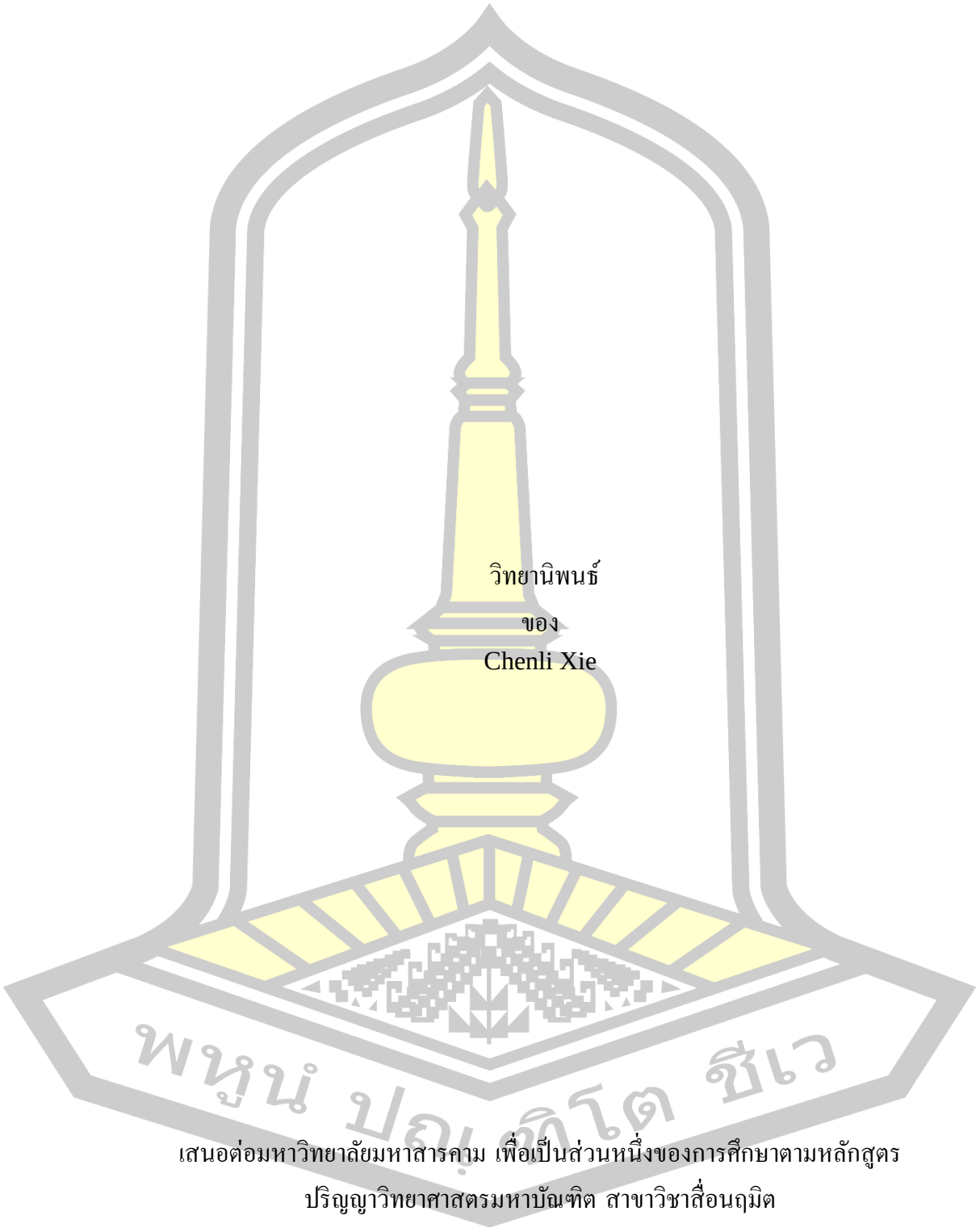

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ABSTRACT

This study aimed to: 1) Develop a barrier-free travel application for disabled individuals in Guangxi, 2) Evaluate the quality of the barrier-free travel application for disabled people in Guangxi, and 3) Assess the satisfaction of disabled people in Guangxi with the barrier-free travel application. A quantitative approach was employed, with an initial sample of 400 participants for the development of the application. After the application was completed, 500 individuals with mobility disabilities tested and evaluated their satisfaction. The sample size was determined using Taro Yamane's formula. Data were collected online using the following tools: 1) A survey on travel challenges, restrictions, and demand for tourist attractions for disabled individuals in Guangxi, 2) The barrier-free travel application, 3) An application quality assessment tool, and 4) A satisfaction evaluation survey. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used for data analysis.

The research on barrier-free travel applications for disabled people in Guangxi revealed three main findings. First, disabled travelers faced significant challenges, including physical barriers and inadequate infrastructure, with a strong demand for more accessible tourist attractions. Second, the barrier-free travel application was of high quality, excelling in performance, online and offline capabilities, user responsiveness, compatibility with assistive devices, and the relevance of its content. However, the user interface could be improved. Third, disabled users expressed high satisfaction with the app, particularly appreciating its relevant content, fast performance, data security, helpful customer support, and ease of use, which collectively enhanced their travel experience. These findings suggest that improving infrastructure and mobile app accessibility could greatly benefit disabled tourists in Guangxi.

Keyword : Barrier-Free Travel, Disabled People, Mobile Application, Accessibility, Inclusive Tourism, Assistive Technology

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Above all, I am profoundly grateful to my parents and all benefactors for their unwavering encouragement and support. I dedicate the value and benefits of this thesis to them. I hope that this research will be useful to researchers and interested individuals alike.

Chenli Xie

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CHAPTER I

Introduction

1.1 Research Background

According to the data of the official website of China Disabled Persons' Federation, there are 85 million disabled people in China (the Total number of disabled people in China and the number of people with different disabilities at the end of 2010 (China Disabled Persons' Federation, 2021). There are 3.3 million disabled people in Guangxi, of which 1.34 million are officially registered by the government. Among the people with mild disabilities registered by Guangxi government, there are 138,000 people with visual impairment, 99,000 people with hearing impairment, 25,000 people with speech impairment and 68,000 people with motor impairment. About 70 thousand of them have recovered and can go out independently with the help of boosters. (3-2 main data of the national population database of licensed disabled people (China Disabled Persons' Federation, 2022). When people talk about the rights of disabled people, they often mention the rights of employment, education and marriage, but they often ignore that disabled people also have the rights of entertainment and tourism. Disabled people have strong travel restrictions in their lives and are easily ignored in the development of tourism. However, disabled people also have the desire to go out for leisure and pleasant experience. The right of disabled people to travel is an indispensable part of the human rights of disabled people and an integral part of their complete human rights (Yinwei, 2018). How to reduce the travel obstacles of disabled people and make tourism no longer a "luxury" of this group has become an important content of the research on inclusive development of tourism.

Guangxi is located in the south of China, adjacent to Viet Nam, with an area of 236,000 square kilometers and a population of 48 million. Guangxi is rich in tourism resources and has a long history and culture. It not only has rich ethnic customs and complex geographical and geological landscapes, but also has a beautiful coastline, which has created world-famous tourist attractions and brands such as Yangshuo, Bama and Beihai in Guilin. In 2019, Guangxi received 876 million

domestic and foreign tourists (data bulletin of major tourism indicators in 2019. (Guangxi Tourism and Culture Department, 2020). As a tourist destination, Guangxi is one of the most desirable tourist destinations for the disabled. However, compared with non-disabled people, disabled people's right to travel is often deprived by imperfect barrier-free facilities, space and environment. Disabled people's travel is not only restricted by their own physical condition, but also by the obstacles existing everywhere in the city, which aggravates the impact of disability on their normal life (hsia ching, 2020). People with disabilities face great challenges in traveling.

First of all, the traffic problem is the primary problem that people with disabilities encounter when traveling. Although Guangxi has made remarkable achievements in the construction of transportation facilities in recent years, the transportation facilities in some areas are still not perfect, and it is still very difficult for people with disabilities to take public transportation. Secondly, the lack of facilities and services in scenic spots is also a major problem faced by disabled people in the process of tourism. Many scenic spots in Guangxi are deficient in barrier-free facilities, toilets for the disabled, wheelchair rental, etc., which makes it impossible for people with disabilities to fully experience the beautiful scenery of the scenic spots. Moreover, the problem of accommodation also plagues the disabled people in Guangxi. Many hotels around Guangxi scenic spots do not fully consider the needs of disabled people in hardware facilities and services. For example, the number of rooms dedicated to the disabled is insufficient, and the internal facilities of rooms lack barrier-free design, such as steps and thresholds, which bring a lot of inconvenience to the disabled. In addition, the difficulty in obtaining information for people with disabilities in the process of traveling is also a problem that cannot be ignored. At present, the dissemination of tourism information in various parts of Guangxi is not perfect enough, and there is a lack of special needs for the disabled. For example, only a few scenic spots provide barrier-free guide maps and braille introductions, which makes it difficult for people with disabilities to fully understand the relevant information of scenic spots during their travel. As the elderly, pregnant women and babies with mobility difficulties, they often need to carry wheelchairs and strollers when traveling, and they will use barrier-free facilities. They will also encounter the above difficulties and problems.

With the continuous progress of Internet technology, mobile application (APP) has become an important platform for providing various services, including tourism information inquiry, booking and navigation. However, most of the current travel apps on the market fail to fully consider the actual needs of the disabled, such as the guidance of barrier-free facilities and the provision of special services. Therefore, researching and developing a barrier-free travel APP for disabled people in Guangxi and those who travel to Guangxi can not only meet the needs of disabled people for a better life, but also increase the income of local tourism in Guangxi and promote the creation and improvement of barrier-free services in Guangxi

This accessible travel mobile app is specially developed for disabled people and people with reduced mobility in Guangxi. It can provide online booking of accommodation for accessible travel and vacation facilities, accessible travel and vacation guides, accessible travel route planning, accessible restaurant reviews, etc. Function. The attraction information on the App takes into account the travel needs of people with reduced mobility and disabled people. The development of barrier-free tourism mobile apps is of great practical significance, helping to solve the problem that their needs in tourism are not fully met, achieve fairness and justice in the tourism field, and promote social harmony and progress.

1.2 Research Question

1.2.1 How about the use and satisfaction of barrier-free tourism for the disabled in Guangxi?

1.2.2 When developing barrier-free travel app, which features and functions should be given priority to meet the needs of disabled people in Guangxi?

1.2.3 What are the characteristics and functions that people with disabilities in Guangxi are most satisfied with the barrier-free travel app?

1.3 Research Objectives

1.3.1 To survey the needs, travel restrictions, and problems faced by Guangxi tourist facilities and persons with disabilities.

1.3.2 To develop barrier-free travel applications for disabled people in Guangxi.

1.3.3 To evaluate the satisfaction with using these barrier-free travel apps among disabled people in Guangxi.

1.4 Definition of Terms

1.4.1 Barrier-free travel: Barrier-free travel refers to "the conditions and facilities needed for disabled people to enter and use any place in the environment, use vehicles and carry out activities". Barrier-free travel includes not only the barrier-free facilities such as buildings, public places and vehicles, but also the barrier-free information and communication. Information and communication: whether public places provide information and guidance needed by the disabled, such as signs and icons, and whether assistive tools such as hearing AIDS and visual AIDS can be used. Policies and regulations: whether the policies and regulations formulated by the government and enterprises are conducive to disabled people's barrier-free travel, such as prohibiting discrimination and encouraging the use of barrier-free transportation. Social support and cognition: whether the society's cognition and attitude towards disabled people are conducive to disabled people's barrier-free travel, such as tolerance and respect for disabled people, and help and support for disabled people.

1.4.2 Application: This term usually refers to a software program, which can help users complete a specific task or realize a certain function. Application is a kind of "tool" on mobile phone or computer, which makes people's life and work more convenient.

1.4.3 Disabled people and mobility difficulties: Disability is not a disease, but a state. Disabled people may be physically disabled (such as physical disability, hearing disability, visual disability, etc.), mentally disabled (such as autism, mental retardation, etc.) and temporarily disabled (such as injury or surgical rehabilitation). Of course, people with barrier-free needs also include some non-disabled people, such as the elderly, pregnant women, babies and children, and even tourists with heavy luggage.

1.4.4 Guangxi: Guangxi is a minority autonomous region in the southwest of China, which is called Guangxi Zhuang Autonomous Region. It is the main settlement of Zhuang, one of the 55 ethnic minorities in China, and also a multi-ethnic area, with

Zhuang, Han, Miao, Dong, Hui, Yao, Mulao, Maonan, Gelao and other ethnic groups. Guangxi is famous for its rich national culture, beautiful scenery and unique customs. Guilin landscape is one of the most famous tourist attractions in Guangxi. It is famous for its green mountains, beautiful water, strange caves and beautiful stones, attracting tourists from all over the world.

1.4.5 Satisfaction: refers to the degree of satisfaction that users feel when using products or services. Satisfaction can be measured by user's experience, satisfaction of functional requirements and interface design. Satisfaction is usually used to measure consumers' evaluation of products or services, and it is also an important basis for enterprises to improve products and services.

1.4.6 APP quality: APP quality usually refers to the comprehensive measurement of application performance, reliability, security, user experience and functionality. For developers, it is very important to ensure the quality of the APP, because it is directly related to the user's satisfaction with the APP and its market performance. APP quality mainly includes the following aspects.

Performance: refers to the running speed and efficiency of the APP. A high-quality APP should be able to respond to the user's operation quickly, and maintain a smooth running state, and there should be no obvious jam or delay.

Reliability: refers to the stability and error rate of the APP in long-term operation. A high-quality APP should be able to run stably in different devices and environments with low failure rate.

Security: It refers to the ability of APP to protect user data from unauthorized access, disclosure or damage. A secure APP should take appropriate security measures, such as data encryption and secure authentication mechanism.

User Experience, UX): refers to the feelings and experiences of users in the process of using the APP. An excellent user experience should include intuitive and easy-to-use interface design, reasonable operation process and timely feedback.

Functionality: refers to whether the functions provided by the APP are complete, correct and easy to understand. A high-quality APP should fully realize its expected functions, and these functions should be clear to users.

When measuring and improving the quality of APP, developers usually use various quality assurance methods and tools, such as automated testing, code review,

user feedback collection and continuous integration and deployment. Through these methods, developers can ensure that the APP meets certain quality standards before release and provide users with satisfactory services. interface design, etc.

1.4.7 Gestalt design: A design method based on the principles of Gestalt psychology, which emphasizes the importance of wholeness and wholeness perception in visual design. The basic idea of Gestalt Psychology is that "the whole is greater than the sum of the parts", that is, when people perceive visual information, they tend to understand and organize the information in a whole way, not just the simple accumulation of independent parts.

Proximity: elements close to each other will be regarded as a whole. By controlling the distance between elements, the combination and grouping of perception are influenced.

Similarity: Elements with similar characteristics (such as color, shape and size) are considered as a group, thus creating consistency and relevance in the design.

Continuity: People tend to perceive elements in the direction of straight lines or curves, forming a continuous visual path to help guide the user's line of sight.

Closure: The brain tends to fill in incomplete figures or shapes to form a complete whole. This can be used in design to create striking images or logos.

Symmetry: Symmetric elements are considered to be balanced, harmonious, easy to understand and attractive.

Graphics-background: The view is divided into graphics (foreground) and background (background). Graphics should be legible and contrasted with the background to highlight important information.

1.5 Research scope

1.5.1 Population: Nanning, Guilin and Beihai, Guangxi: Guangxi Zhuang Autonomous Region, China only. The region offers a variety of travel opportunities, making it an ideal focus for developing barrier-free travel applications.

1.5.2 Sample group:The main target audience is the disabled (not easy to exercise), pregnant women and families with old people and babies who travel in Guangxi. Consider including all kinds of disabled people, mainly physical disabilities and hearing disabilities.

1.5.3 Media content:

Barrier-free information: provides geographic information data of Guangxi, including real-time detailed information of barrier-free facilities such as urban roads, public transport facilities, tourist attractions and accommodation.

Personalized itinerary planning: Users can create customized itinerary according to their barrier-free needs, interests and preferences.

Community participation: provide online information, evaluation and suggestion functions, facilitate disabled people to communicate with each other, share tourism experiences, suggestions and opinions, and form a supportive tourism community.

Language support: The application will provide Chinese and English support to adapt to local and international users.

1.5.4 Media type:

Literature analysis: By consulting the relevant literature, we can understand the theoretical knowledge of the design principles, functional modules, user experience and other aspects of barrier-free travel APP, and provide theoretical guidance for the subsequent actual design and development of APP.

Questionnaire survey: Through online questionnaire survey, the needs, expectations and pain points of disabled tourists are collected in order to provide empirical basis for APP design.

Interview: Conduct in-depth interviews with disabled tourists, tourism practitioners and other related groups to understand their views and suggestions on barrier-free travel APP and further optimize the APP design.

Case analysis: Analyze the successful cases of barrier-free travel APP at home and abroad, sum up the experience and lessons, and provide reference for the development of barrier-free travel APP for the disabled in Guangxi.

User experience design: Based on the above research results, the user experience design method is used to design a simple, easy-to-use and friendly interface and function for the barrier-free travel APP for the disabled in Guangxi to ensure the practical APPlication effect of the app.

Prototype testing and optimization: make a prototype of APP, invite disabled tourists to test, collect feedback, constantly optimize the function and interface design of APP, and improve user satisfaction.

1.5.5 Research tools

1) Questionnaire survey on application components, behaviors and use requirements of barrier-free travel app for the disabled in Guangxi.

2) Quality evaluation of disabled people's barrier-free travel application in Guangxi.

3) Satisfaction evaluation of disabled people using barrier-free travel applications in Guangxi.

1.5.6 variable research

1) Independent variable:

Application for barrier-free travel for disabled people in Guangxi

2) Dependent variable:

2.1) Quality of application for barrier-free travel for disabled people in Guangxi

2.2) Satisfaction of Guangxi disabled people with barrier-free travel applications.

1.5.7 Research area: Guangxi

1.5.8 The research time is about one year

1.6 Research benefits

1.6.1 Travel needs, preferences, and limitations We know the facilities, attractions and challenges faced by people with disabilities in Guangxi.

1.6.2 Get a barrier-free travel app for people with disabilities in Guangxi

1.6.3 Quality barrier-free travel app applications for disabled people in Guangxi are available.

1.6.4 Satisfaction with the barrier-free travel app from Guangxi people with disabilities

CHAPTER II

Literature Review

The social inclusiveness of tourism is reflected in the participation of the whole people. The realization of tourism universality needs to attach importance to the participation of all groups in tourism. Disabled people have strong travel restrictions in their lives and are easily overlooked in tourism development.

However, disabled people also have the desire to go out for leisure and pleasant experience. How to reduce the travel obstacles of the disabled, so that tourism is no longer a "luxury" of this group, has become an important content of the study of inclusive development of tourism. The existing literature mainly focuses on disabled people (including visually impaired people and physically disabled people), so this literature review will deeply study the existing research, research and initiatives in barrier-free travel, barrier-free travel and application development of disabled people's travel, with special attention to barrier-free travel for disabled people in Guangxi.

2.1 Accessibility and tourism:

The so-called barrier-free tourism, early concern is how to remove obstacles for disabled people to participate in tourism activities from three aspects: hardware environment, software services and tourism products. In the past, tourism for the disabled had different names, such as inclusive tourism, adaptive tourism, barrier-free tourism and universal tourism.

In recent years, with the popularization of the principle of equal opportunity and universal design theory, all walks of life gradually realize that the goal of barrier-free tourism is not only to meet the needs of disabled tourists, but also to comprehensively cover and integrate the needs of disabled tourists in order to create a more suitable tourism environment, services and products for disabled tourists. This approach not only meets the needs of the disabled, but also allows the elderly and young people with children to share the fun of traveling. This broader and more

positive definition organically combines the concept of barrier-free tourism with the principles of shared tourism, quality tourism and inclusive development.

The Manila World Tourism Declaration adopted in 1980 clearly stipulates that citizens have the right to travel without discrimination. Article 4 of the Declaration stipulates: "The right to leisure, vacation and free travel is a natural extension of the right to work, which is recognized by the Universal Declaration of Human Rights and guaranteed by the legislation of many countries. Therefore, society has the responsibility to ensure that citizens fully enjoy these rights in the best, effective and non-discriminatory way. " The World Tourism Organization published the first international document on barrier-free tourism in 1992.

In 2005, the International Barrier-free Tourism Proposal changed the name of the disabled person from "physically disabled person" to "disabled person" for the first time. In 2007, the United Nations adopted the Convention on the Rights of Persons with Disabilities, which came into effect in May 2008.

This landmark international treaty has strengthened the international community's understanding and development of disability from the perspective of human rights. The convention clearly stipulates the policy environment, hardware environment, information environment and cultural environment, which lays a legal and ethical foundation for realizing the ideal that everyone can travel.

In 2016, under the call of the World Tourism Organization, world tourism day's annual publicity theme was "Tourism for all-promoting universal accessibility", that is, "Everyone shares tourism and promotes universal accessibility", and on September 27th, a large-scale celebration was held in Bangkok at the main venue of world tourism day.

Since the celebration in Bangkok in 2016, the international community has reached an unprecedented consensus on barrier-free tourism. The government and the industry generally believe that the development of barrier-free tourism embodies the spirit of equality in the human family advocated by the United Nations Convention on the Rights of Persons with Disabilities, and is an important part of the sustainable development strategy and tourism macro-policy. Barrier-free tourism is not only a public welfare and obligation, but also an opportunity for social, economic and cultural integration. The development of barrier-free tourism is a policy tool to realize

people's better life and a powerful pusher to promote leisure tourism, healthy tourism and pension tourism.

In recent years, the international community has made great progress in developing universal barrier-free tourism, but there are still many shortcomings.

Judging from the development level of each country, the degree of care for the disabled and vulnerable groups is related to the development stage of a society, and it is also the embodiment of the accessibility of local infrastructure, the universality of transportation system and the convenience of public services, as well as the embodiment of social civilization and cultural awareness. Relatively speaking, European and American countries are at the forefront, and Asia and other regions still need to be improved in the following aspects:

-Further incorporate barrier-free tourism into national legislation and macro-tourism policies.

-increase the seamless docking of hardware at all nodes of barrier-free tourism supply chain.

-further emphasize the importance of universal design.

-Strengthen the classification, compilation and provision of information, and strengthen the construction of information platforms.

-Strengthen special training for personnel and establish a cultural awareness of equal service.

An institution worthy of learning in other regions is the European Accessible Tourism Network (ENAT), a non-profit association established in 2006 and headquartered in Brussels, Belgium. The establishment of this organization was originally initiated by nine institutions from six EU member States, and the Ministry

of Employment and Social Affairs of the European Commission provided financial the development of barrier-free tourism in European countries and providing barrier- free tourism environment for the disabled and the elderly; Provide members with information, knowledge, skills and experience to improve their barrier-free travel service level and ability; Promote the formulation and implementation of European barrier-free tourism standards; Promote European governments' policy support and investment in barrier-free tourism. As a non-profit organization, ENAT's funds

mainly come from membership fees, project funds and donations. Members of ENAT include various types of tourism agencies, such as tour operators, hotels, scenic spots,

transportation companies, and related government departments, research and education institutions. Over the years, the organization has actively participated in the development of barrier-free tourism, devoted itself to the exchange of knowledge and practice, made positive contributions to its members in terms of information provision, transportation and infrastructure construction, design and accessibility of services, and became a leader in research, promotion and practice in this field.

2.2 Existing tourism applications for the disabled:

The international application of design for disabled people is mainly aimed at disabled people's travel. Parking Mobility in the United States is a parking navigation specially designed for the disabled, including various parking spaces around hotels, theaters, restaurants, clubs and tourist attractions. As long as you open the map and click on the destination, it will locate the open space that can be used by disabled people around you according to GPS, where to enter, and whether there are barrier-free facilities, so that you can walk unimpeded and won't go wrong.

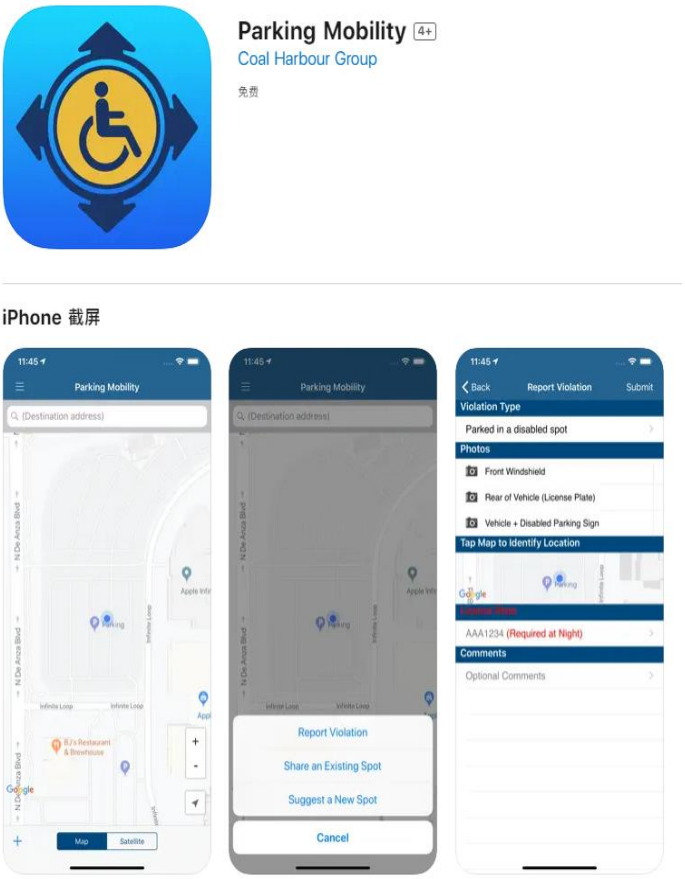


Figure 2. 1 Screenshot from the Apple App Store Parking Mobility APP

Users can add their own tags, and the more people use them, the more convenient it is. Occupation of disabled parking spaces can also be reported through this application, and soon these behaviors will be punished by the application. Similar disabled parking software includes intelligent parking and disabled parking. In Taiwan Province Province, there is a "Good Taipei Restaurant Friendly" mobile App for the disabled, which serves not only the disabled, but also all "citizens with disabilities", because everyone may need barrier-free services because of injury, heavy load, old age, pregnancy and child-rearing. This App is made up of a group of enthusiastic disabled people as "caring commissioners", who go to the restaurant to eat in person, use various facilities, experience various services and sort out information, including: the entrance and exit of the restaurant, barrier-free environment, ordering food, dining service, elevator, toilet, parking space, barrier-free transportation, wireless network and free charging (including on-site photos), so that people with disabilities can eat out without worry. In the design of the App, it is also

classified in detail according to the needs of different groups of people, and various dining places are described in detail. In addition to delicious food, there is another dimension to evaluate the dining environment.

Figure 2. 2 Screenshot of APP mobile phone interface from friendly Taipei good restaurant

In China, there is a disabled service map of China Disabled Persons' Federation, which serves all disabled people. This service map only provides POI information of disabled service organizations. Disabled people can easily learn about the geographical location, contact information and other information of nearly 30,000

service institutions in seven categories, including national rehabilitation institutions for the disabled, higher special education institutions, employment service institutions for the disabled, rehabilitation institutions for the disabled, poverty alleviation bases for the disabled in rural areas, care service institutions for the disabled and legal aid workstations for the disabled. And organizations for the disabled. This App provides a lot of reference information for people with disabilities, which is more comprehensive than searching on public electronic maps. The map was jointly developed by China Disabled Persons' Federation and Alibaba, which provided technical and data support. You can query by province, city, district and county at will, but at present, it only supports POI retrieval and does not provide navigation function.

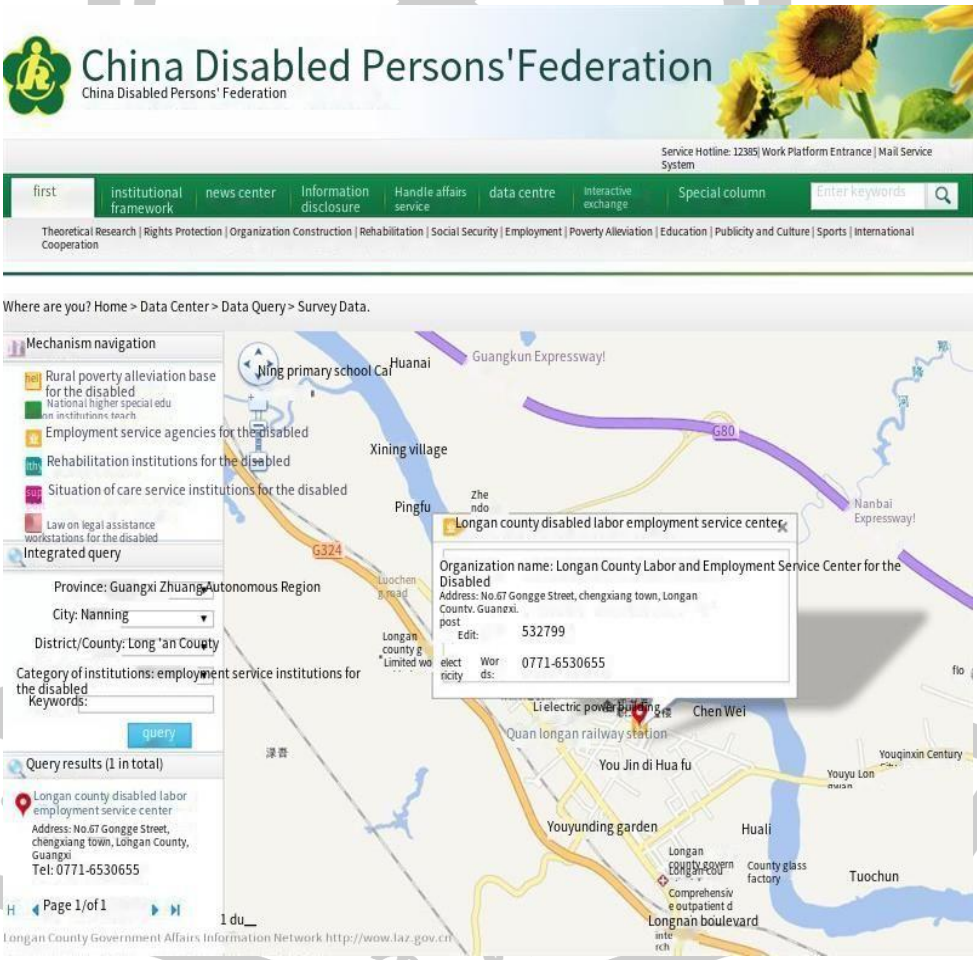


Figure 2. 3 From the website of China Disabled Persons' Federation

When people with disabilities travel to strange places in wheelchairs, they often have psychological barriers due to insufficient understanding of information. In

November 2022, Gaode Map launched the barrier-free "wheelchair navigation" function. After the user turns on the "barrier-free mode", when traveling by subway, Gaode Map App will combine barrier-free facilities such as barrier-free elevators and elevators in subway stations to plan barrier-free routes for users. During outdoor navigation, avoid underground passages, footbridges and other sections where wheelchairs cannot pass. If the subway can't reach the destination directly, call a taxi to plan the route. This function is used by people with disabilities, elderly people with mobility difficulties, parents pushing strollers, people traveling in temporary wheelchairs due to accidental injuries, and people traveling with heavy objects.

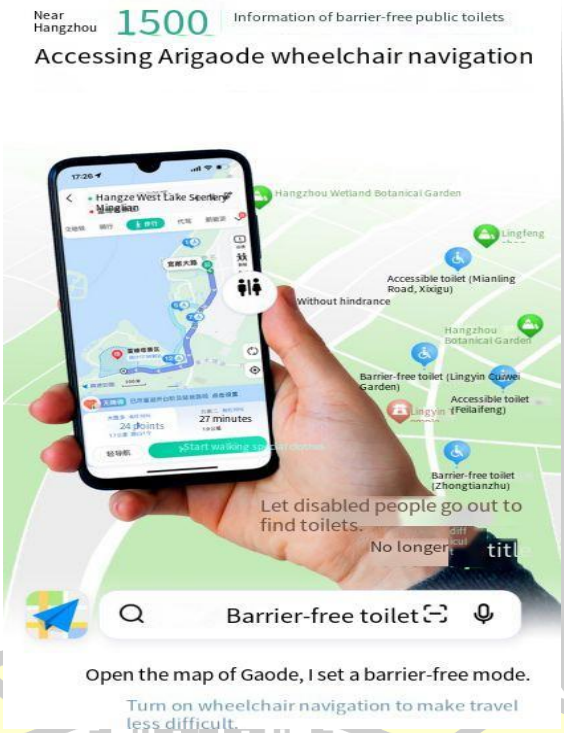


Figure 2. 4 From the Arigaode wheelchair navigation APP interface

China has an APP for disabled people's travel and vacation, which mainly publishes destinations, tourism research, routes, travel agencies, recruitment information and so on. At the same time, individuals can become members of the client and publish personal travel routes. The information of scenic spots on the App takes into account the travel needs of people with mobility difficulties and physical disabilities. The App classifies all kinds of popular tourist routes, and has a special "Travel Notes" column to regularly publish personal travel notes of people with

disabilities. However, this APP is mainly aimed at China, the first-tier city in China: Beijing, Shanghai, Guangzhou, Hangzhou and other cities, excluding ordinary urban tourist attractions.

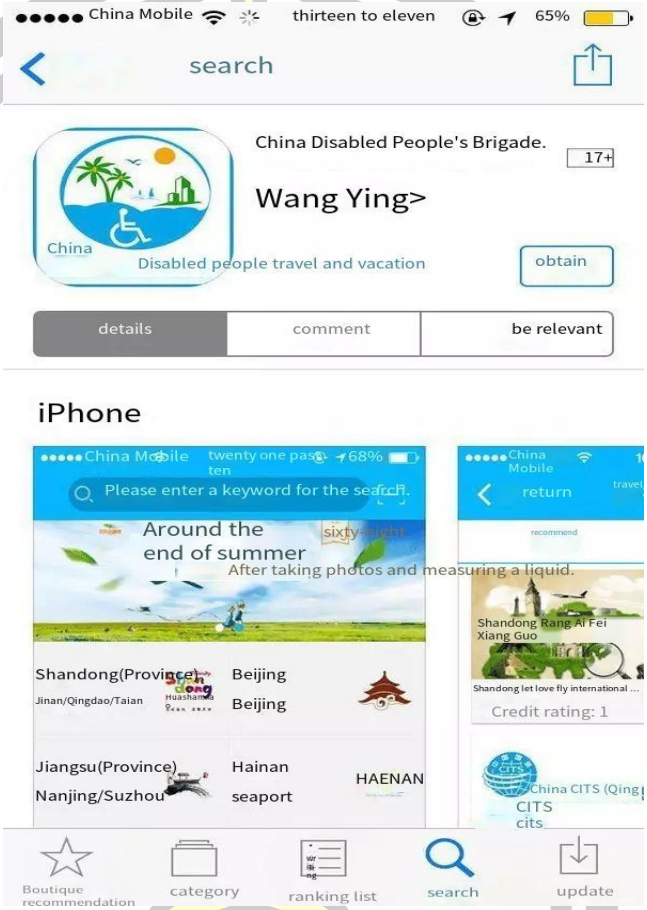


Figure 2. 5 From the APPle App Store, the mobile phone interface of China Disabled Travel and Vacation App.

2.3 Global barrier-free tourism application trends:

Wheel The World is a third-party travel platform in the United States that specializes in serving the disabled. The Wheel of the World (WTW) was co-founded by Alvaro Silberstein and Camilo Navarro in the United States in 2018. It is committed to enabling disabled people around the world to explore the world safely and confidently. The service of World Wheel mainly includes three aspects: accommodation, things to do and multi-day tours. Users can not only combine

subscribed services by themselves through these three options, but also choose services according to the determined destination. In Britain, there are professional barrier-free travel operators, such as Tourism for All, which provide all-round convenient services for travelers with travel difficulties.

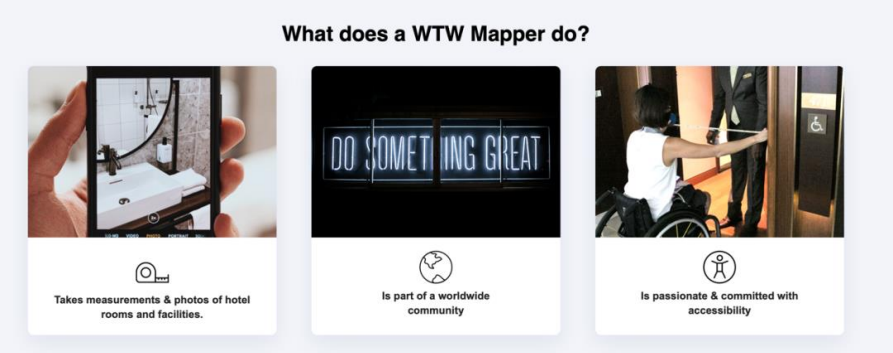


Figure 2. 6 from the website around the world

The Spanish government and disabled people's rights organizations have taken active actions to promote the transformation of "barrier-free tourism" routes, improve barrier-free facilities, increase barrier-free navigation and other special services, and strive to help disabled people better visit local attractions. The Madrid municipal government, in cooperation with the Spanish National Platform for Persons with Disabilities and relevant tourism agencies, has launched a Spanish and English version of the Madrid barrier-free travel guide, which provides eight barrier-free travel routes and related services according to the theme. The municipal government has also carried out hundreds of barrier-free tour guide activities, including sign language tour guides, and regularly organizes tour guides to guide disabled people to visit urban attractions.

Figure 2. 7 Arguence Wuyila Spiral Pedestrian Bridge in Madrid (from Cai Junyong Bridge Vision 2018-03-23)

In 2006, barrier-free facilities were built in 20 major tourist attractions in Beijing, including the Summer Palace, Temple of Heaven, Xiangshan, Beijing Aquarium, Lama Temple, Taoranting and Shijingshan Amusement Park. Renovation of ancient buildings is also a problem. In 2008, Beijing installed lifting platforms in the Great Wall and the Forbidden City, and transformed barrier-free facilities. On the premise of protecting cultural relics, Badaling Great Wall built a 180-meter-long uphill ramp, installed two lifting platforms, installed a wheelchair lifting platform at the noon gate of the Forbidden City, installed a stair climbing platform at the Third Hall of the Forbidden City, and reformed the ramp to better meet the needs of the disabled.

Figure 2. 8 Elevator in the Forbidden City (from Zhejiang Daily on July 18th, 2008)

Figure 2. 9 Love Channel of Beijing Forbidden City-From Beijing Forbidden City

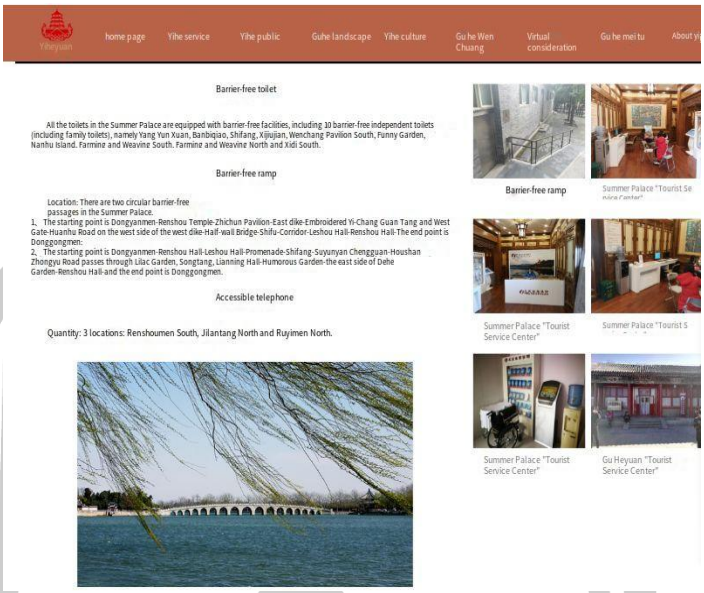


Figure 2. 10 Barrier-free toilets and ramps in Beijing Summer Palace From the website of Beijing Summer Palace

In 2018, China ByteDance Company launched "Blind Headlines" to help blind friends get more information before traveling; Both Baidu and Ali have launched map products suitable for people with disabilities; ROTH Gmb is a company specializing in the production of indoor handles. It has developed a mobile barrier-free handle for people with mobility difficulties. It is small and easy to carry, which can reduce the risk of traveling and going to the toilet. Intelligent stair lift chairs produced by several brands can be reused on the stairs of several scenic spots in China, which can reduce the construction cost of scenic spots to some extent. (From the article, why is it so difficult for 80 million disabled people to travel? "Li Ran People's Cultural Travel 2020-12-03)

Figure 2. 11 ROTH MOBELI series of mobile barrier-free handles
(from Sohu.com on September 10, 2017)

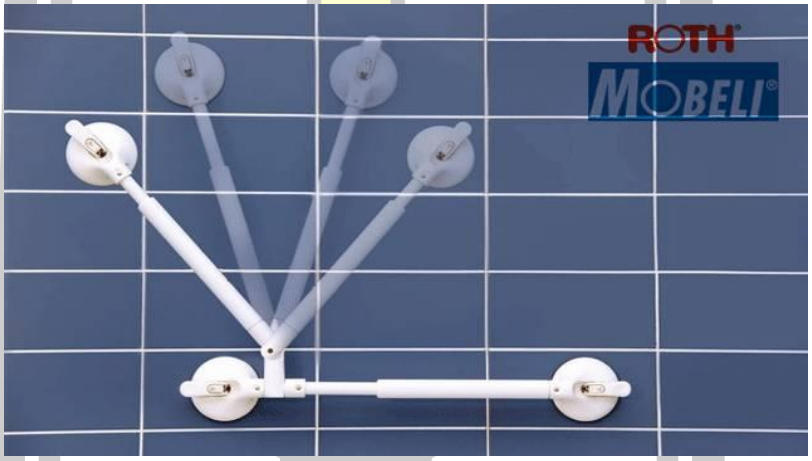


Figure 2. 12 ROTH MOBELI series of mobile barrier-free handles
(from Sohu.com on September 10, 2017)

2.4 Case study:

The concept of barrier-free travel in China was put forward in 2003. In 2008, during the Beijing Olympic and Paralympic Games, the China Municipal Government invested a lot of money and human resources to build and improve barrier-free facilities in the city to facilitate the Paralympic Games. Since then, the China Municipal Government has promulgated a series of policies and regulations, stipulating that public facilities and transportation must meet the barrier-free standards. At the same time, the government also invested funds to encourage and

guide all sectors of society to actively participate in barrier-free travel construction and promote the popularization and improvement of barrier-free travel services. At present, the barrier-free travel construction in China has made some achievements. The barrier-free transformation of urban transportation facilities has been continuously promoted, barrier-free passages and facilities in public places have been gradually improved, and some vehicles have also been barrier-free transformed. For example, great progress has been made in the barrier-free transformation and upgrading of subways, buses and taxis in China. In addition, some Internet companies have also actively participated in barrier-free travel construction and launched a series of barrier-free travel service applications, providing more convenient choices for special groups to travel. As typical representatives of the Yangtze River Delta, Jiangsu, Zhejiang and Shanghai put forward the idea of building barrier-free tourist areas, which includes not only eliminating regional obstacles in a broad sense and realizing inter-regional tourism economic cooperation, but also providing special facilities, special services and special products for the disadvantaged groups with functional obstacles in a narrow sense to meet or improve their convenience in tourism activities.

In 2004, the Yangtze River Delta region will take "launching humanized tourism service products to provide tourism convenience for vulnerable groups" as one of the main measures. This initiative focuses on three directions: sign language guide, Braille guide map and barrier-free access for people with disabilities. Jiangsu, Zhejiang and Shanghai jointly trained 30 dumb tour guides to serve deaf-mute tourists; At the same time, there is a Braille touchpad in the scenic spot, so that the blind can know the general situation of the scenic spot in time and design a Braille guide map. Secondly, all scenic spots and scenic spots in Jiangsu, Zhejiang and Shanghai will build ramps for the disabled, so as to facilitate disabled tourists to watch the scenery, thus preventing some scenic spots and scenic spots from being inaccessible to disabled tourists due to ravines, ridges and other reasons.

In 2018, China's first local standard "Standard for Disabled People's Travel Service" landed in Hangzhou, Zhejiang Province, and major travel agencies in Hangzhou began to provide special products and services for disabled people. In Nanjing, Jiangsu Province, the Nanjing Museum has set up a special "Boai Pavilion"

to provide barrier-free visit experience services for the disabled, including touch, voice translation, automatic guided vehicles and so on. For the visually impaired, although they can't see the contents of the museum, they can also feel it through touch and hearing.

Figure 2. 13 Nanjing Museum "Boai Pavilion
(from the World Wide Web on January 15th, 2020)

2.5 Specific conditions of barrier-free construction in Guangxi:

According to the Statistical Bulletin on the Development of Disabled Persons in China in 2018, China has issued 475 regulations, government orders and normative documents on the construction and management of barrier-free environment, and 1,702 cities and counties have systematically developed barrier-free environment, and barrier-free travel has received further attention. On June 28th, 2023, the China Municipal Government passed the Law on Barrier-free Environment Construction in People's Republic of China (PRC), which will come into force on September 1st, 2023. It pays close attention to the needs and expectations of the disabled and the elderly in terms of system design, standard formulation and construction requirements, adheres to the people-centered principle, respects and guarantees human rights, and will become a powerful guarantee for effectively promoting social integration and building a friendly society. Guangxi, China formulated and promulgated the Regulations on the Management of Barrier-free Facilities

Construction in Guangxi Zhuang Autonomous Region and the Notice on Accelerating the Aging Transformation of Families of the Elderly with Special Difficulties during the Tenth Five-Year Plan period, which included barrier-free environment construction as one of the main tasks of local governments in Guangxi. Incorporate barrier-free environment planning into national economic development planning, and carry out barrier-free environment construction and transformation in accordance with standards and norms.

Figure 2. 14 Barrier-free pedals for buses in Luzhai County, Guangxi Photo courtesy of Wang Lingyun, correspondent of Guangxi News Network.

Figure 2. 15 Barrier-free facilities built by a cinema in Hezhou City, Guangxi Photo courtesy of Wang Lingyun, correspondent of Guangxi News Network.

Currently, the biggest challenge in developing barrier-free travel apps for disabled people in Guangxi is the incomplete construction of barrier-free facilities in Guangxi. Barrier-free facilities are the basis for the realization of APP functions, and the perfection of facilities directly affects the practicality and effect of APP. In China, urban barrier-free facilities are fragmented. For example, in Nanning and Guilin, Guangxi, the barrier-free facilities and special services in cities and scenic spots are relatively complete, while many scenic spots and hotels in other parts of Guangxi basically have no barrier-free facilities, which leads to many disabled tourists not choosing hotels in these areas at all. Accommodation, thus narrowing the choice of travel routes. Therefore, when developing and setting up barrier-free tourist routes for people with disabilities in Guangxi, we can only choose major Chinese cities and popular scenic spots such as Nanning and Guilin in Guangxi, but cannot go to small cities in a short time to serve more people with disabilities.

Figure 2. 16 People with disabilities in Guangxi go to the bank to experience barrier-free banking (from WeChat official account of Guangxi Disabled Persons' Federation)

In the past, the disabled people in Guangxi faced great difficulties in obtaining tourism-related information. This is mainly due to their past difficult experience and the reality that their income can't support long-distance travel, which makes them not interested in traveling, or even lack the necessary confidence. However, nowadays, with the development of society and the change of ideas, more and more disabled people want to go out and explore and experience different customs. The barrier-free travel app for disabled people in Guangxi will be promoted and installed in Guangxi through official media and travel agencies, aiming to let more disabled people know and get in touch with tourism-related information, thus stimulating their desire to travel abroad and enhancing their confidence in travel.

The launch of this app can not only increase the economic income of local tourist attractions in Guangxi, but also promote the improvement of barrier-free services in Guangxi. By improving the barrier-free facilities for the disabled, we can provide better services for all disabled people, so that they can participate in tourism activities more conveniently and enjoy life.

At the same time, the promotion of this app is also a kind of maintenance and respect for the rights and interests of the disabled. It reflects Guangxi's care and attention to the disabled, so that they can better integrate into society and enjoy the same rights and opportunities as ordinary people.

2.6 Stakeholder participation:

Advocacy group for the rights and interests of the disabled: Through the platform of Guangxi Disabled Persons' Federation, we can accurately grasp the data of the number, employment situation, income level and travel demand of licensed disabled people in Guangxi, and design and develop various service functions of the barrier-free travel APP for disabled people in Guangxi to better meet the travel needs of local disabled people.

Local authorities: Through the introduction and formulation of more perfect laws on the rights and interests of the disabled by the Guangxi government, increase investment in public construction of barrier-free facilities in Guangxi, and improve the tourism rights and interests of all disabled people (people who are inconvenient to exercise) in Guangxi.

Tourism enterprises: Through cooperation with Guangxi Tourism Development Group and Guangxi local travel agencies, local tourism enterprises will assume the exemplary role of social responsibility, develop more experience products beyond scenic spots and transportation facilities, launch Guangxi disabled travel APP, and enrich the barrier-free service function of the APP. Strive for the Guangxi district government to give financial subsidies and tax incentives to tourism enterprises.

Local Tourism Bureau: By collecting and sorting out the barrier-free road maps of hotels, shopping malls and scenic spots in various cities in Guangxi, we will provide more complete information on barrier-free travel services on the barrier-free travel APP for the disabled in Guangxi.

2.7 User-centered design:

The barrier-free travel APP for disabled people in Guangxi follows a user-centered design, focusing on in-depth understanding of disabled users (inconvenient for movement) in Guangxi: what users need, what users value, their usage capabilities and limitations. During the design process, we always pay attention to the needs and experience of users, aiming to meet user needs and achieve product usability, ease of use and humanization. The core of designing and developing this app is to ensure that users can find value from the product. From the aspects of interaction design, visual design, functional design, etc., consider the user's usage scenarios, operating habits and other factors to improve the user experience.

Gestalt Design Principles: Gestalt principles relate to how humans perceive and understand visual information, including proximity, similarity, closure, and continuity. Apply Gestalt principles to create visually cohesive and intuitive application interfaces that make it easier for users to understand and interact with content.Available: The mobile phone application for disabled people in Guangxi is barrier-free and easy to use.

Ideal: Use Guangxi's unique image of ethnic minorities, local characteristics of border areas, Guangxi intangible cultural brands and other design elements to arouse emotion and appreciation.

Can be found: the contents of scenic spots in major cities in Guangxi can be navigated, located on site and located in different places.

Barrier-free: The main contents are accessible to disabled people (people with mobility difficulties) inside and outside Guangxi.

Integrity: All service information is true and reliable.

2.8 Technology and accessibility:

Information accessibility refers to making up the difference between body function and environment through information technology, so that anyone (whether healthy or disabled, whether young or old) can obtain, interact and use information equally, conveniently and safely. On the basis of the existing geographic positioning service, map navigation technology and augmented reality technology, the barrier-free travel APP for the disabled in Guangxi pays attention to how science and technology can better serve human well-being, and emphasizes that science and technology should meet the needs of the disabled in Guangxi (people who are inconvenient to exercise) and realize the fair and sustainable development of science and technology.

2.8.1 One of the best advocates of social inclusion.

The barrier-free travel APP for the disabled in Guangxi pays attention to the needs of special disabled groups (inconvenient sports) in Guangxi and the diversity and inclusiveness of society. This will help to improve the social care for the disabled through information technology and further strengthen the inclusiveness and diversity of society.

2.8.2 While creating social value, it can also create value for enterprises.

The design and development of barrier-free travel APP for the disabled in Guangxi will not directly bring significant commercial income, but in the long run, it will have a positive impact on Guangxi tourism brand image, local government public services, local tourism enterprises and residents' economic income, thus indirectly creating commercial value.

2.9 Researches Related

2.9.1 internationally, Smith(1987) is one of the pioneers in studying the types of obstacles to tourism participation. In his early article in 1987, he mentioned that experiencing obstacles made disabled people lose their sense of freedom and personal control in leisure participation. In order to reduce the travel obstacles of disabled

people more specifically, this paper summarizes the obstacles that have the greatest impact on disabled tourists, and divides them into internal obstacles (mainly caused by tourists' own cognitive, physiological and psychological functions), environmental obstacles (externally imposed restrictions) and interaction obstacles (caused by the interaction between tourists and their surrounding environment).

2.9.2 Mckercher(2003) and other scholars summarized the previous studies on the types of obstacles for disabled people to participate in tourism, and divided them into endogenous obstacles and exogenous obstacles. Among them, endogenous obstacles include internal obstacles such as lack of knowledge and low social skills, economic obstacles include economic obstacles such as affordability and income gap, exogenous obstacles include environmental obstacles such as barrier-free facilities and safety, and communication obstacles include communication challenges.

2.9.3 Mckercher and Darcy(2018) think that the previous research on the types of travel obstacles for disabled people is facing the challenge of the present situation, because the previous research often links all the obstacles faced by tourists with the unique obstacles of disabled people, which leads people to tend to regard all disabled people as homogeneous groups; There is no broad framework to consider the relationship between different types of disabilities and travel obstacles. On this basis, they put forward a four-level framework that can integrate all kinds of disabled people's participation in tourism obstacles.

2.9.4 In view of the positive impact of tourism on the disabled, Cook L.; (2014) discussed the role of leisure in the life of people with mobility disabilities. All the people with mobility disabilities who participated in the survey thought that leisure was a way of "recharging". Leisure is very important to their overall quality of life and happiness. In particular, leisure is beneficial to physical and mental health, and leisure participation can make disabled people feel more social support. Although disabled people can bring many benefits to themselves by participating in leisure activities, they are also faced with many concerns, such as the physical accessibility of leisure places, the lack of leisure choices and the lack of leisure companions.

2.9.5 pagans. R.(2015) Using the longitudinal data of social and economic groups in Germany, this paper studied the impact of holiday travel on the life satisfaction of non-disabled people and disabled people. Although disabled people are

less likely to participate in holiday tourism in real life than non-disabled people, the life satisfaction of disabled people through participating in holiday tourism is higher than that of non-disabled people. It can be seen that tourism enterprises and relevant government agencies should provide an inclusive leisure environment for the disabled, eliminate their travel obstacles, understand their different needs, and promote them to make full use of their holidays to participate in tourism activities, thus improving their life satisfaction.

2.9.6 According to the travel motivation and consumption preference of disabled people, Darcy. S.(2010) studied and tested the effectiveness of HAS in measuring the relative importance of accommodation standards for disabled people, and divided the original 55 standards into six dimensions: core mobility, hearing/vision (communication), ambulance equipment (safety), service and safety, facilities (comfort and entertainment) and auxiliary mobility. Through the analysis of the questionnaire data of 566 disabled people, it is found that factors such as gender, age, country of birth, employment status and highest education level, disability type, support demand and disability equipment demand have significant influence on the relative importance of travel and accommodation standards for disabled people. In addition, people and people with disabilities have different preferences for the presentation of accommodation information.

2.9.7 LEI S studied the push-pull model based on Crompton(1979), and through the analysis of focus group text data, summarized the specific dimensions of the push-pull of disabled people's tourism. Among them, the thrust includes escaping from the secular environment, exploring oneself, relaxing body and mind, strengthening the relationship with family and friends, promoting social interaction, pursuing independence, yearning for the natural environment, taking risks and doing today, and the pull includes novelty, education and accessibility. It is found that people with disabilities not only have the dimensions of the original tourism push-pull model, but also have unique elements such as pursuing independence, adventure and accessibility.

2.9.8 For the barrier-free solution of tourism, LAM K L studied the travel barriers of visually impaired people on the basis of Smith's (1987) classification of the barrier types of visually impaired tourists. It is found that companionship and

technology are the main means to help interviewees eliminate obstacles to leisure travel and achieve the goal of barrier-free travel for visually impaired people. In addition, mobile technology includes various smart phone functions and mobile applications, which can also help hearing-impaired people to remove obstacles when visiting scenic spots. For example, the mobile bus application can help the hearing impaired estimate the arrival time of the bus. It can be seen that the obstacle analysis of disabled people's participation in tourism is the main content of tourism research for disabled people.

2.9.9 Domestic research basically follows the above ideas. Tao Changjiang used "disability/handicap", "visual impairment" and "tourism" as keywords to query China HowNet. As of June 23, 2019, a Total of 54 papers have been published, including 44 journal papers and 10 master's degree papers, among which the representative research is as follows:

2.9.10 Gong Fei believes that the main factors that hinder disabled people's tourism are market demand obstacles, market supply obstacles and social system obstacles.

2.9.11 Fu Jieer believes that the psychological characteristics, physical conditions, economic conditions, barrier-free facilities and the importance attached by related tourism enterprises have an important influence on the participation of disabled people in tourism.

2.9.12 Scholars such as Yang Peiqun investigated the characteristics of tourism demand of people with physical disabilities who have difficulty in moving. The analysis shows that the factors that affect disabled people's tourism can be divided into two categories, namely intangible obstacles and tangible structural obstacles.

2.9.13 User-centered design method is widely used in various fields, especially in user experience design. Xu Wei (2019) proposed that UCD practice should enter the stage of focusing on the user experience and innovative design of intelligent systems. He summarized nine innovative design methods driven by UX, and suggested adopting new methods of human factors to improve UCD practice. Lin Yingli et al. (2019) discussed the user-centered method in product interface design,

and proposed to define the concept of product use through user analysis, and evaluate the design scheme through usability testing.

2.9.14 The concept of inclusive design originated from barrier-free design to ensure that products and services can be used by as many people as possible. Scholars have discussed the theoretical basis of inclusive design from different angles, emphasizing its important role in social equity and sustainable development (Liu Chenshu, Lv Li, 2024). The research points out that the core of inclusive design is the principle of "people-oriented", that is, to eliminate or reduce the barriers to use caused by differences in human abilities through design (Hu Jia, Ma Dan, 2024). For example, (Chen, 2024) believe that inclusive design should consider the diverse needs of the elderly when using smart community facilities for the aged, so as to improve their quality of life. These studies emphasize the wide application and importance of inclusive design in different fields.

2.9.15 The methodology of inclusive design involves many aspects, including user research, design process and evaluation criteria. Domestic scholars in China put forward a variety of specific design methods and tools through empirical research (Feng Benyun, 2024; Wang Lijun, Liu Tianyu, 2024). For example, Feng Bensou (2024) designed a water cup for the blind, which solved the problem that the blind could not judge the amount of water in the cup when pouring water by using the principle of water buoyancy. This kind of research not only shows the practical application of inclusive design, but also provides the support of design tools and technologies, which provides a useful reference for future design practice.

2.10 Conceptual framework for research

It is essential to provide a structured research method for the Application of barrier-free travel app for the disabled in Guangxi. Conceptual framework helps to define key variables, relationships and concepts that guide research. The following is a conceptual framework tailored for the study:

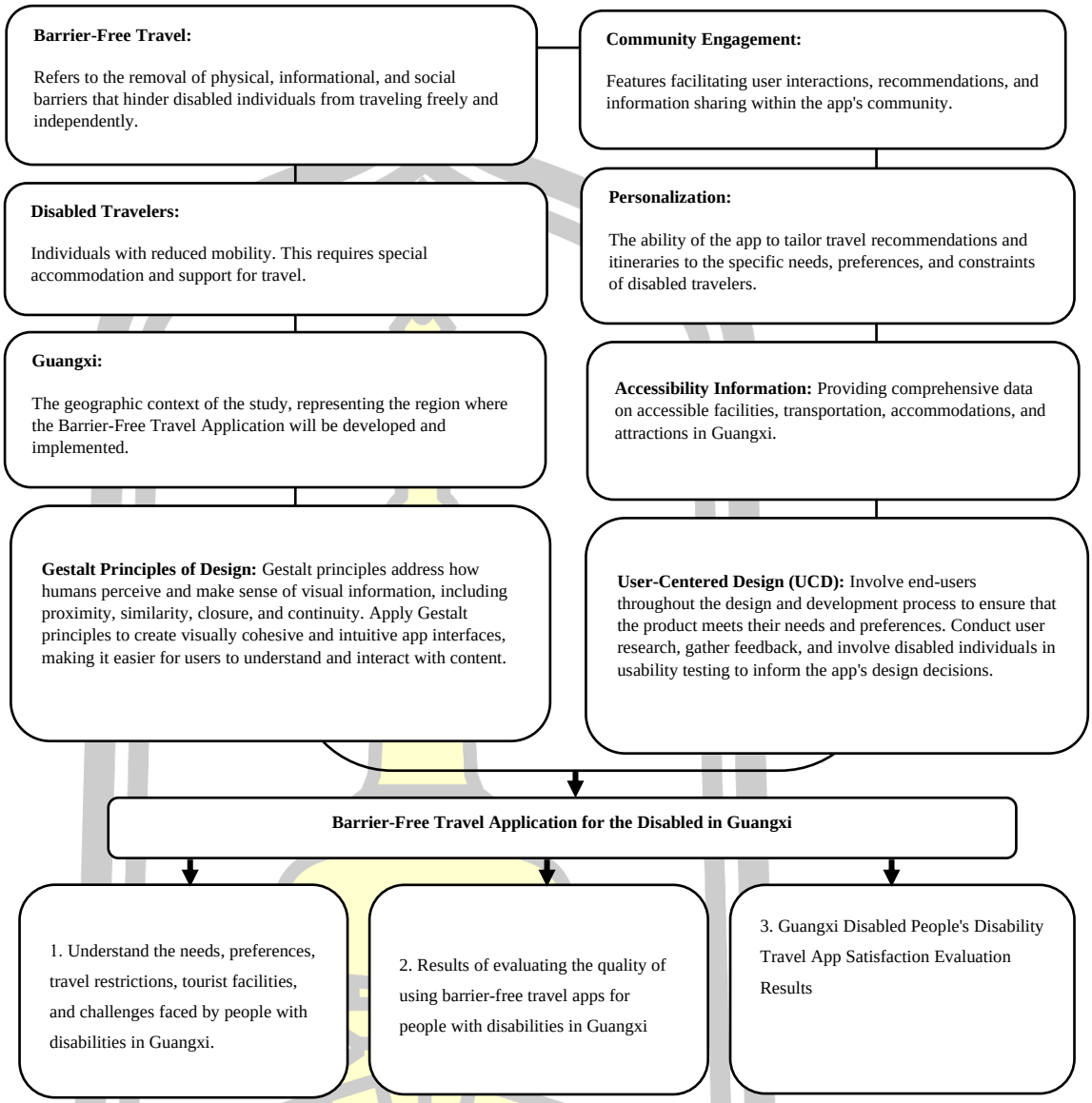


Figure 2. 17 Conceptual framework Flowchart

CHAPTER III

Research Methodology

The research process for the study titled “Barrier-Free Travel Application for the Disabled in Guangxi” was conducted through a research and development approach. This approach involved document analysis, a review of related studies, and surveys to assess the travel needs, limitations, and issues faced by individuals with disabilities in Guangxi. These steps were undertaken to develop an application addressing specific barriers and challenges in travel accessibility. Additionally, the research included evaluating the quality and satisfaction of disabled tourists regarding the usability of the application. The research process comprised the following steps:

3.1 Research Problem and Objective

3.2 Literature Review

3.3 Research Design

3.3.1 Population and Sample

3.3.2 Research Variables

3.3.3 Research Tools

3.3.4 Tools Development and Quality Assessment

3.3.5 Risk Mitigation for Volunteers

3.4 Data Collection

3.5 Data Analysis

3.6 Statistical Analysis

3.1 Research Problem and Objective

3.1.1 Research Problem

The research addressed a significant problem faced by individuals with mobility impairments who wished to travel within Guangxi. These individuals encountered various accessibility barriers when visiting tourist sites and using public transportation. Such limitations underscored the need for solutions that could facilitate barrier-free travel in this region, allowing disabled individuals to experience tourism with greater ease and inclusion.

3.1.2 Research Objective

1) To survey the needs, travel restrictions, and problems faced by Guangxi tourist facilities and persons with disabilities.

2) To develop barrier-free travel applications for disabled people in Guangxi.

3) To evaluate the satisfaction with using these barrier-free travel apps among disabled people in Guangxi.

3.2 Literature Review

A comprehensive review of existing literature on barrier-free tourism was conducted, examining studies and models from various regions that aimed to support tourism for people with disabilities. This review included research on accessible applications designed to aid users with disabilities. Specific examples included applications that assist wheelchair users in identifying suitable routes and apps providing information for individuals with visual impairments. Additionally, the review involved analyzing Chinese government policies, particularly those in Guangxi, that promote accessibility infrastructure. This foundational understanding informed the development of the travel application by integrating best practices and aligning with regional standards and policies on accessibility for individuals with disabilities.

3.3 Research Design

3.3.1 Population and Sample

The study on "Barrier-Free travel applications for people with disabilities in Guangxi" involved 2 main groups:

1) Population Disabled people in Guangxi: According to regional data, there are about 70,000 disabled people in Guangxi. This study especially includes people with mobility disabilities.

2) Sample group:

2.1) Population: Disabled people in Guangxi Province According to regional data, there are approximately 70,000 people with mobility disabilities.

2.2) Samples: The sample group consisted of individuals with mobility impairments in Guangxi province who tested the application. To ensure representativeness and accuracy of the results, Taro Yamane's formula (1967) was used to determine the sample size. The confidence level was set at 95%, with a margin of error of 5%, and the required sample size was approximately 400 participants or more. In this study, 500 disabled individuals voluntarily participated in testing the application online, which was developed by the researcher.

3.3.2 Research Variables

1) Independent Variable

Barrier-free travel applications for disabled people in Guangxi.

2) Dependent Variables

2.1) The quality of barrier-Free travel applications for people with disabilities in Guangxi

2.2) Results of the satisfaction evaluation on the use of barrier-free travel apps for disabled people in Guangxi

3.3.3 Research Tools

1) Survey the problem, travel restrictions, and demand for tourist attractions disabled people in Guangxi

2) Application for barrier-free travel for disabled people in Guangxi

3) The evaluation the quality of application for barrier-free travel for disabled people in Guangxi

4) The assessment the satisfaction of Guangxi disabled people with barrier-free travel applications.

3.3.4 Tools Development and Quality Assessment

1) Survey the problem, travel restrictions, and demand for tourist attractions disabled people in Guangxi

This study aimed to explore the travel-related issues, limitations, and tourism needs of individuals with disabilities in Guangxi. The survey targeted 400 individuals with mobility impairments. The development process of the survey tool followed the steps outlined below:

2.1 Concept Review

The researcher studied existing concepts and principles related to the design and development of barrier-free travel applications for individuals with disabilities in Guangxi. This review helped define the scope and structure of the survey instrument. The findings from the review provided insight into the key issues to be addressed in the survey, ensuring that the evaluation would cover the necessary aspects.

2.2 Questionnaire Design

Based on the results of the literature review, the questionnaire was structured into six sections to align with the content and objectives of the study. Sections 1 to 5 consisted of multiple-choice questions, allowing respondents to select more than one option where applicable. Section 6 provided space for additional suggestions.

Section 1: Basic Information

This section gathered demographic data and general information about the respondents.

Section 2: Application Component Requirements

This section explored the barriers individuals with disabilities face when traveling. It used a multiple-choice format, with respondents selecting the most relevant obstacles they encountered.

Section 3: Travel Application Requirements,

This section focused on understanding the specific needs and preferences of disabled travelers. It aimed to assess what features and services respondents desired in tourism-related applications and services.

Section 4: Usage Behavior of Tourism Applications

This section examined the availability of mobility aids and accessibility features at various tourist destinations in Guangxi, asking respondents to indicate which services they found essential.

Section 5: Smartphone Usage Ability

This section investigated the respondents' previous travel experiences, including challenges they faced and how well-existing travel services met their needs.

Section 6: Additional Suggestions

This open-ended section allowed respondents to provide any additional comments or suggestions they had regarding travel for people with disabilities in

Guangxi. This section was designed to capture insights beyond the predefined questions.

2.3 Preliminary Review and Revision

The draft evaluation form was submitted to academic advisors for quality review. The researcher made revisions based on the feedback from the advisors to ensure clarity and alignment with the research objectives. After the revisions, the form was sent to experts for further assessment.

2.4 Content Validity Assessment

The final version of the evaluation was sent to experts for content validation. They assessed whether the questions aligned with the evaluation objectives. The Content Validity Index (CVI) was calculated using scores ranging from -1 to 1, with items having an IOC value close to 1.00 considered valid. The researcher set the acceptable IOC range between 0.70 and 1.00 to ensure the responses were consistent.

2.5 Pilot Testing and Data Collection

Once validated, the evaluation tool was used in a pilot study with a sample group to collect preliminary data. This allowed the researcher to calculate the reliability of the evaluation tool using Cronbach's alpha. The reliability measurement ensured that the Likert scale questions (ranging from 1 = Strongly Disagree to 5 = Strongly Agree) consistently measured the quality of the application. After confirming the tool's reliability, the final version of the evaluation instrument, which met the reliability criteria, was used to collect data from the entire sample.

2) Develop an application for barrier-free travel for disabled people in Guangxi

The researchers introduced the development results of barrier-free travel application for the disabled in Guangxi from 3 main aspects including three stages: 1) before development, 2) after development, 3) after development. The researchers made the following findings.

2.1.1) Early development

Through the questionnaire survey on the needs, satisfaction, travel restrictions and challenges of tourist attractions and disabled people in Guangxi, according to the survey results, the main functions of barrier-free travel APP for

disabled people in Guangxi are set up, and the specific development process is as follows:

(1) Function Settings

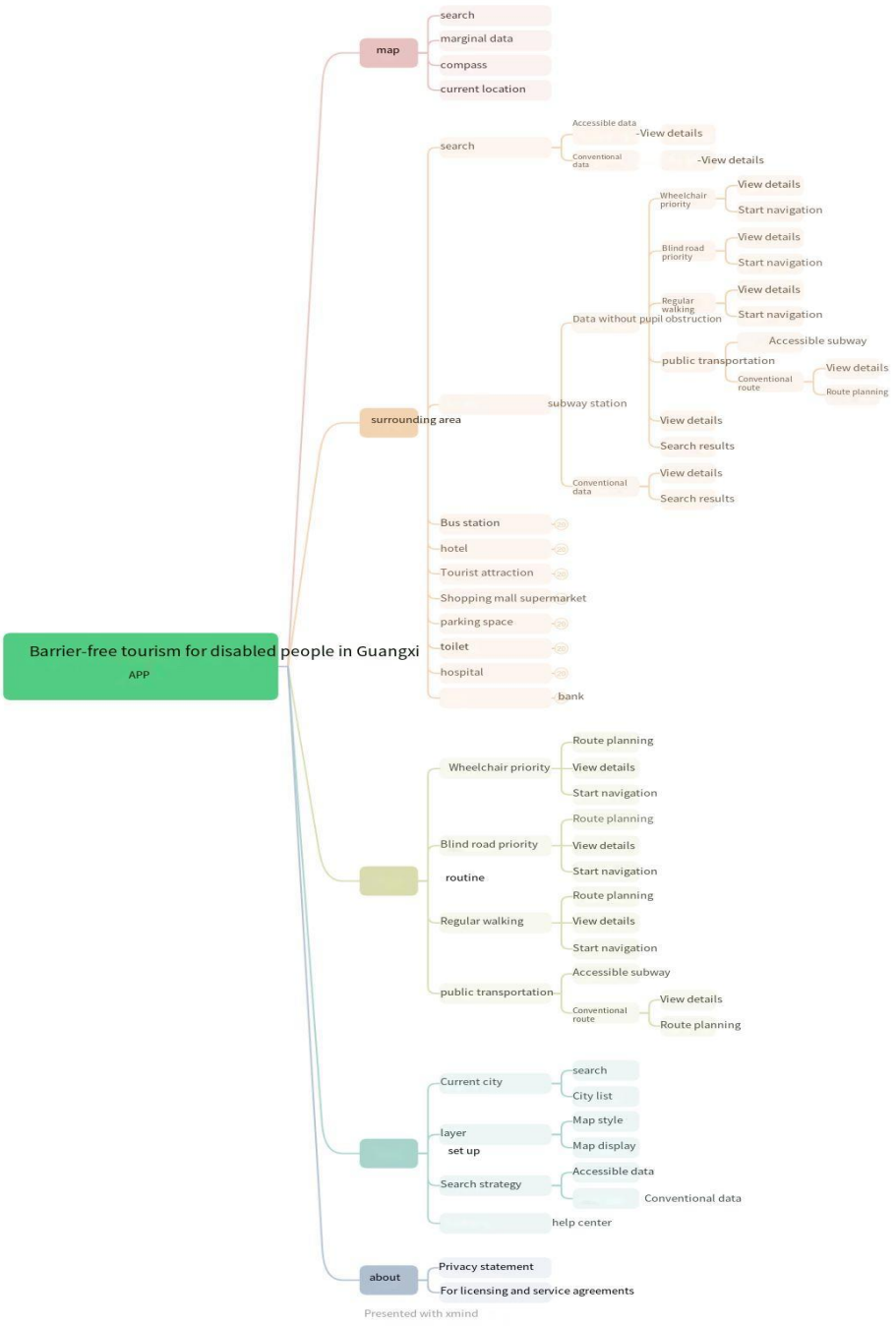


Figure 3. 1 Development model of barrier-free travel APP for disabled people in Guangxi

(2) Accessible information inquiry

(2.1) Scenic spot information: Provide detailed barrier-free information about scenic spots, including wheelchair accessibility, permission of guide dogs, etc.

(2.2) Transportation facilities: list the information of accessible transportation, such as buses and taxis.

(3) Route planning

(3.1) Customized route: Allow users to enter the starting point and ending point, and automatically plan the barrier-free route.

(3.2) Real-time navigation: integrated map service to provide real-time navigation of barrier-free paths.

(4) Booking service

(4.1) Accommodation reservation: support the reservation of barrier-free hotels or homestays.

(4.2) Ticket reservation: you can buy tickets for scenic spots directly and choose barrier-free visit service.

(5) Community interaction

(5.1) Experience sharing: users can share their own travel experiences and provide reference for others.

(5.2) Help-seeking and mutual assistance: Establish a help-seeking platform for users to help each other.

(6) Emergency support

(6.1) Emergency contact: built-in emergency contact information, such as police, hospital, etc.

(6.2) Medical Guide: Provides basic first aid knowledge and information about nearby medical institutions.

(7) Feedback and evaluation

(7.1) User feedback: allows users to submit feedback on the application.

(7.2) Scenic spot evaluation: users can evaluate the scenic spots and service quality they have visited.

2.1.2) Development

Development tools

(1) Front-end development

(1.1) (React Native or Flutter: These two frameworks can be used to quickly develop cross-platform mobile applications, with good community support and rich plug-in ecology.

(1.2) HTML/CSS/JavaScript: suitable for Web application development.

(2) back-end development

2.1) Node.js: a lightweight server-side solution, which can quickly build a RESTful API wit(h the Express framework.

(2.2) Django or Spring Boot: a mature enterprise-level back-end framework, suitable for applications that require complex business logic.

(3) Database

(3.1) MySQL/MariaDB: Relational database, suitable for storing structured data.

(3.2) MongoDB : NoSQL database, suitable for processing a large number of unstructured data.

(4) Cloud services: Alibaba Cloud, Tencent Cloud or AWS: Provide services such as server hosting, object storage and database.

(5) map API: Gaode map API or Baidu map API: provide map service and navigation function.

(6) Version control

Git: the most commonly used version control system, which is convenient for multi-person collaborative development.

(7) Project management: Jira or Trello: used to track project progress and task assignment.

(8) Test tools

(8.1) JUnit or Mocha: Used for unit testing.

(8.2) Selenium: used for automated testing.

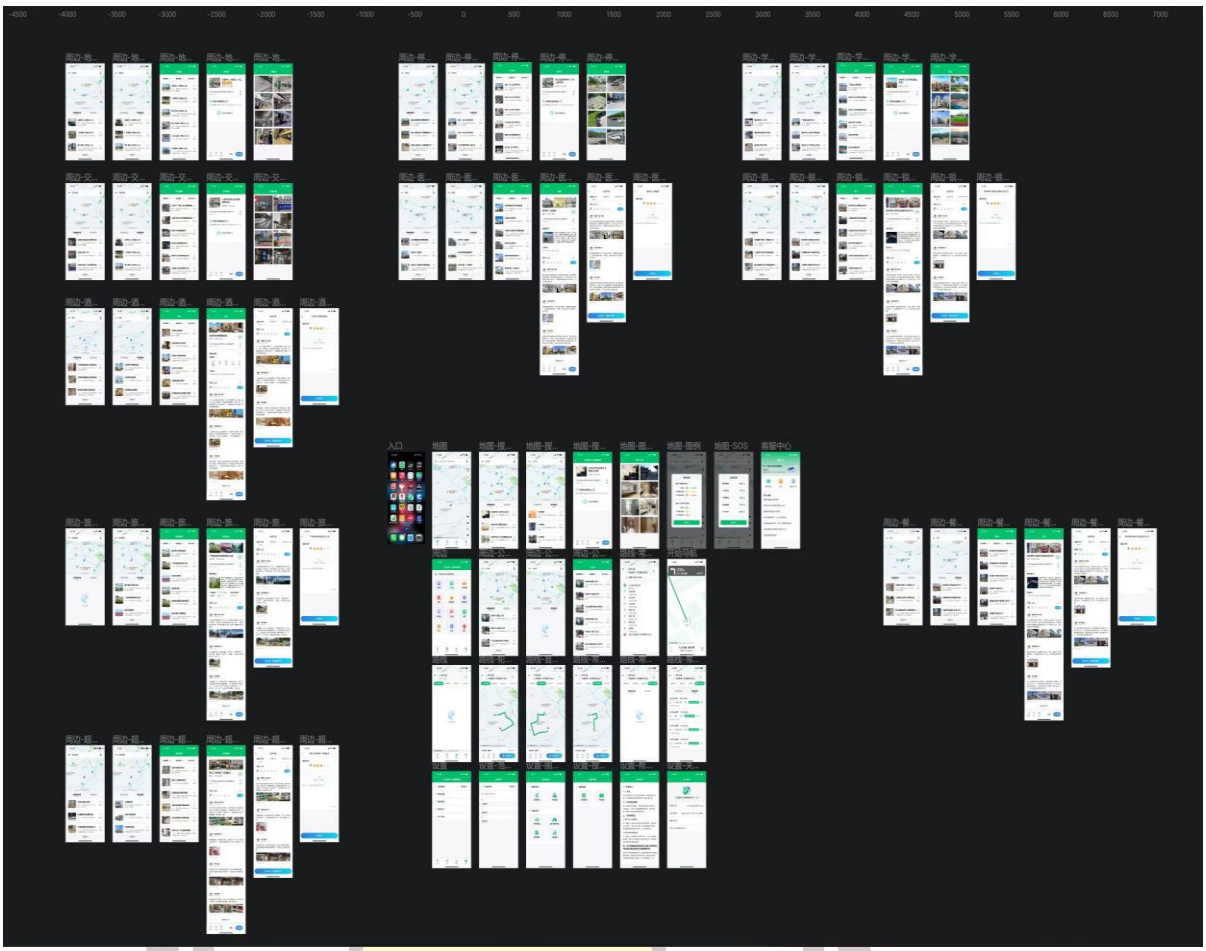


Figure 3. 2 Visual design of barrier-free travel APP for disabled people in Guangxi

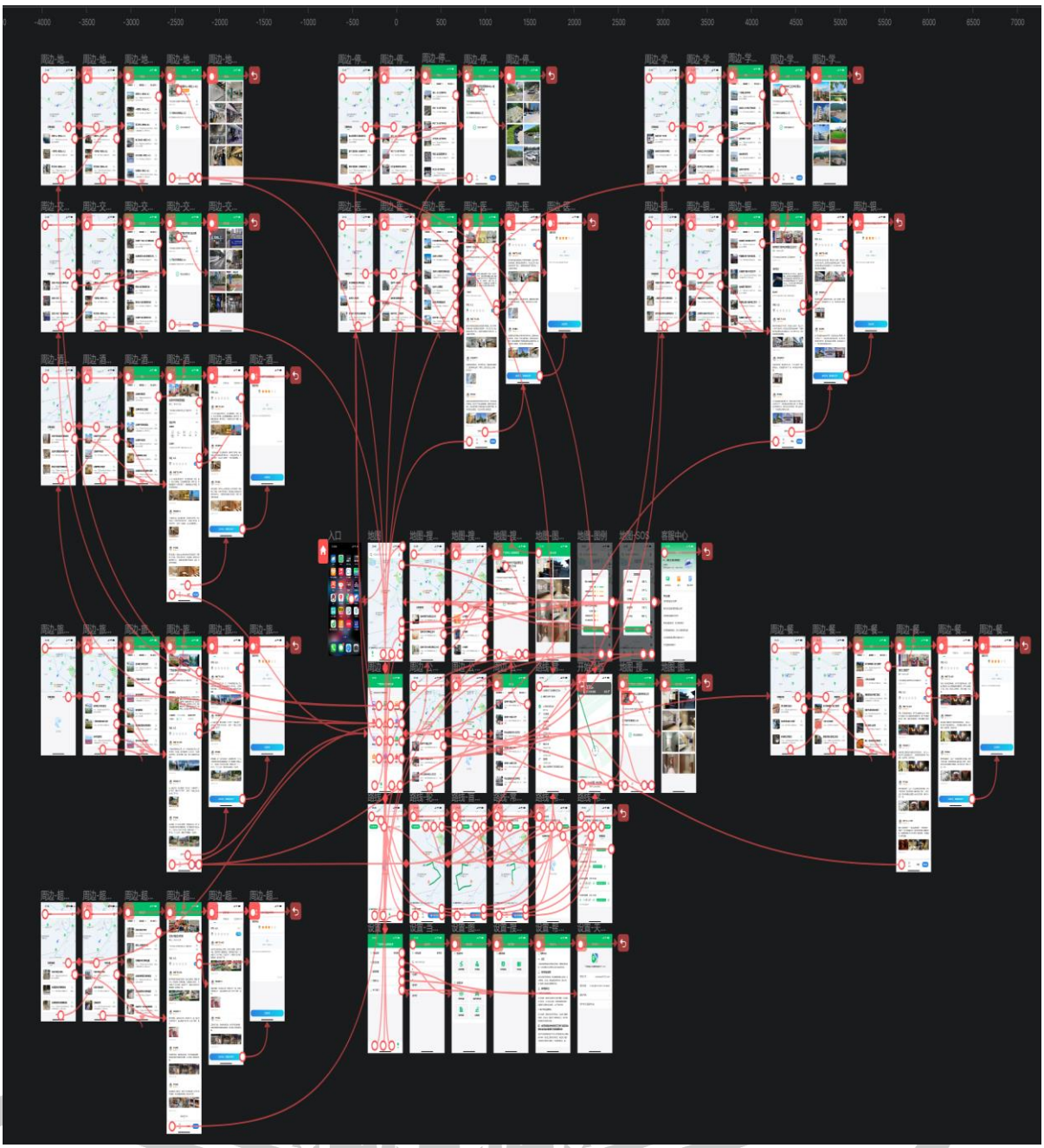


Figure 3. 3 Interactive design of barrier-free travel APP for disabled people in Guangxi

2.1.3) After development

According to the survey results, the barrier-free travel APP for the disabled in Guangxi should have a series of functions to support users to plan and manage

barrier-free travel. The following are the functions developed by the barrier-free travel APP for the disabled in Guangxi, and the use steps are as follows:

(1) Registration and login

(1.1) Step: After downloading the APP, users need to register when opening it for the first time. When registering, users can choose to enter personal information or log in through third-party accounts (such as WeChat and QQ).

(1.2) Information: users need to provide basic information, such as name, contact information, preferences, etc. After registration, users can further configure barrier-free functions and personalized settings through the settings interface.

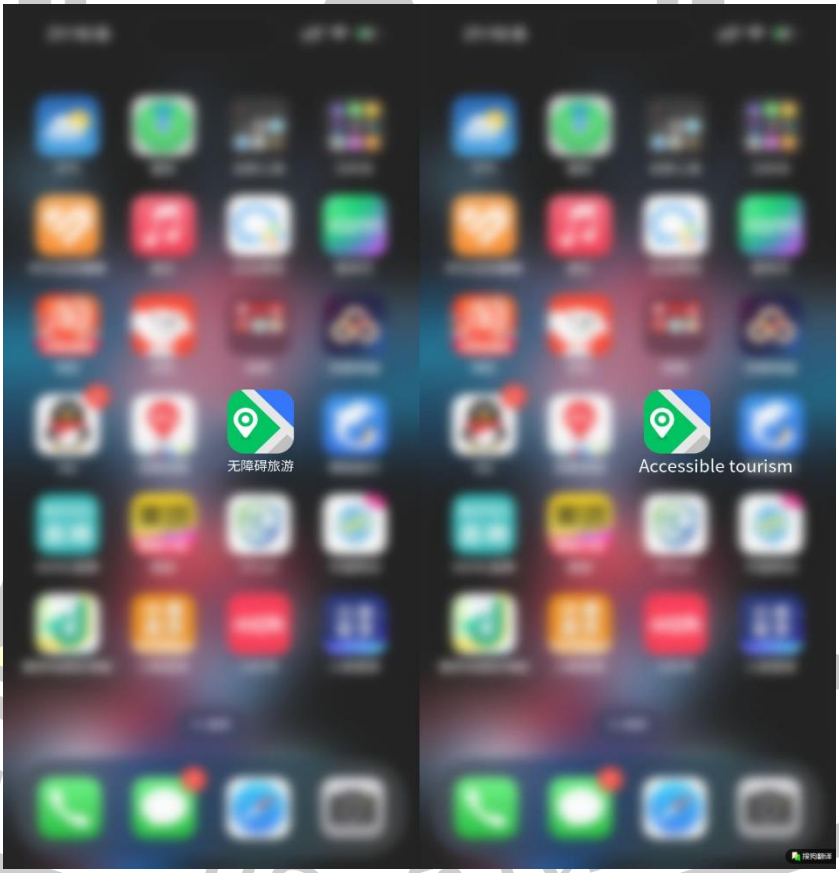


Figure 3. 4 Guangxi disabled barrier-free travel APP icon

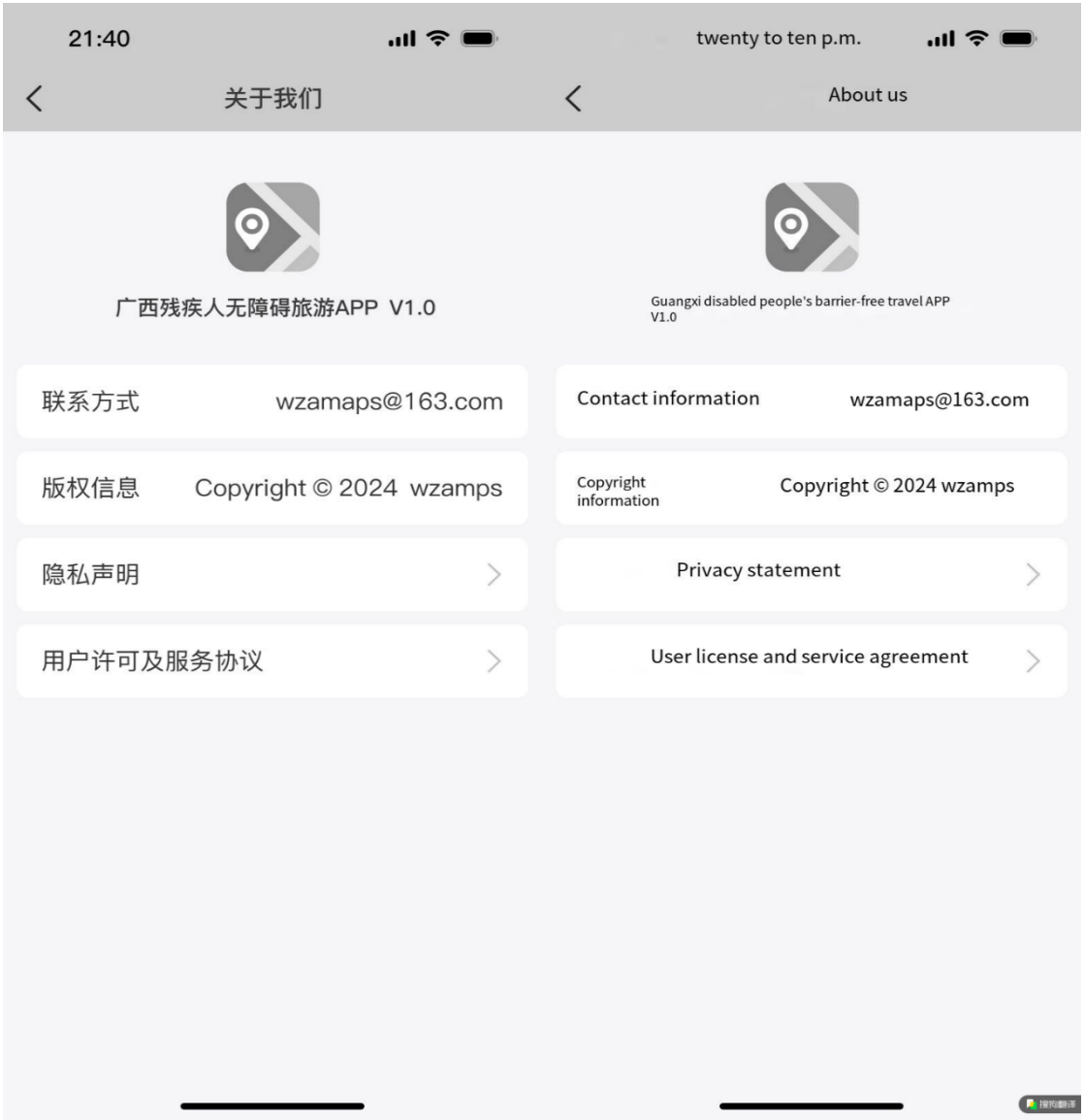


Figure 3. 5 Guangxi Disabled Accessible Travel APP Settings Interface

(2) Set accessibility options

(2.1) Steps: After logging in, users can configure barrier-free options on the Settings page, including screen reader, font size, color contrast, touch sensitivity and so on.

(2.2) Information: APP provides detailed barrier-free setting guidelines to help users adjust according to their personal needs. These settings can be modified at any time to adapt to different usage scenarios.

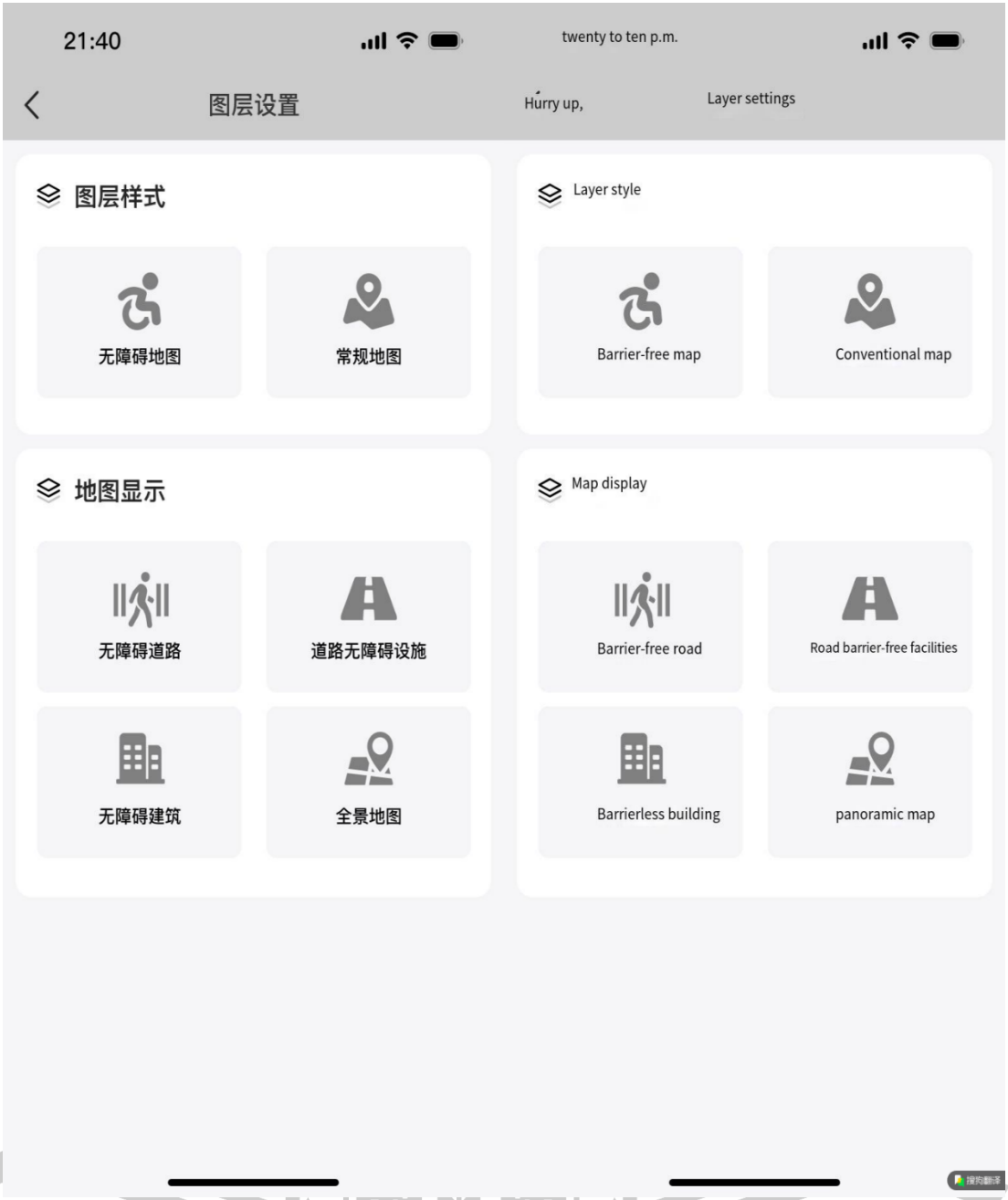


Figure 3. 6 Accessible Travel APP Settings for Disabled People in Guangxi: Accessible Options

Figure 3. 7 Guangxi Disabled Accessible Travel APP Accessible Facilities Search Interface

(3) Planning barrier-free travel routes

(3.1) Steps: Users can select the "Route Planning" function in the main interface, enter the starting point and ending point, and select the barrier-free

option. APP will automatically generate the best barrier-free route and provide detailed navigation information.

(3.2) Information: Route planning includes detailed information about barrier-free vehicles, barrier-free facilities and services (such as ramps and elevators). Users can also view real-time traffic conditions and road information.

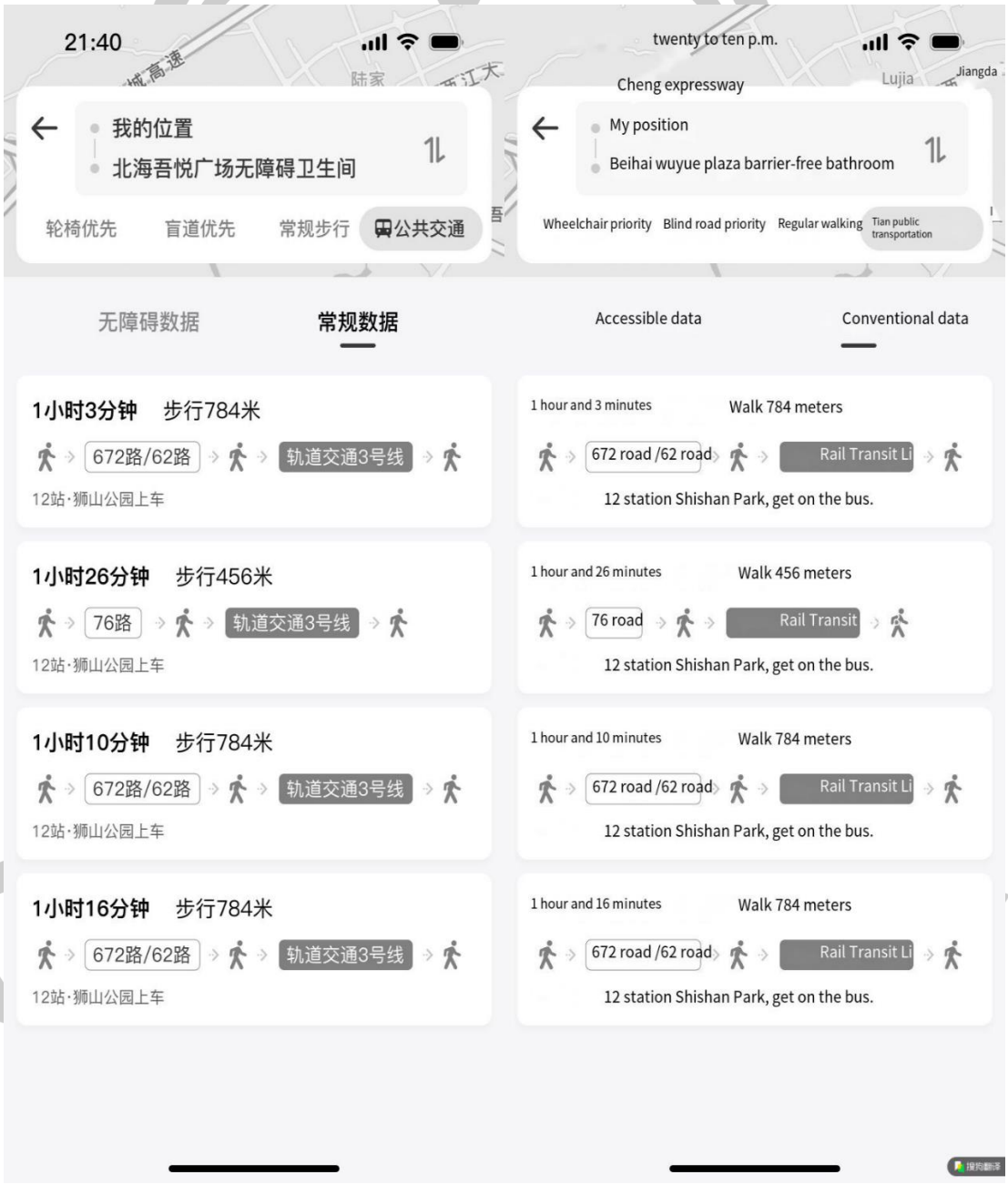


Figure 3. 8 Guangxi Disabled People's Barrier-free Travel APP Planning Barrier-free Best Route Interface

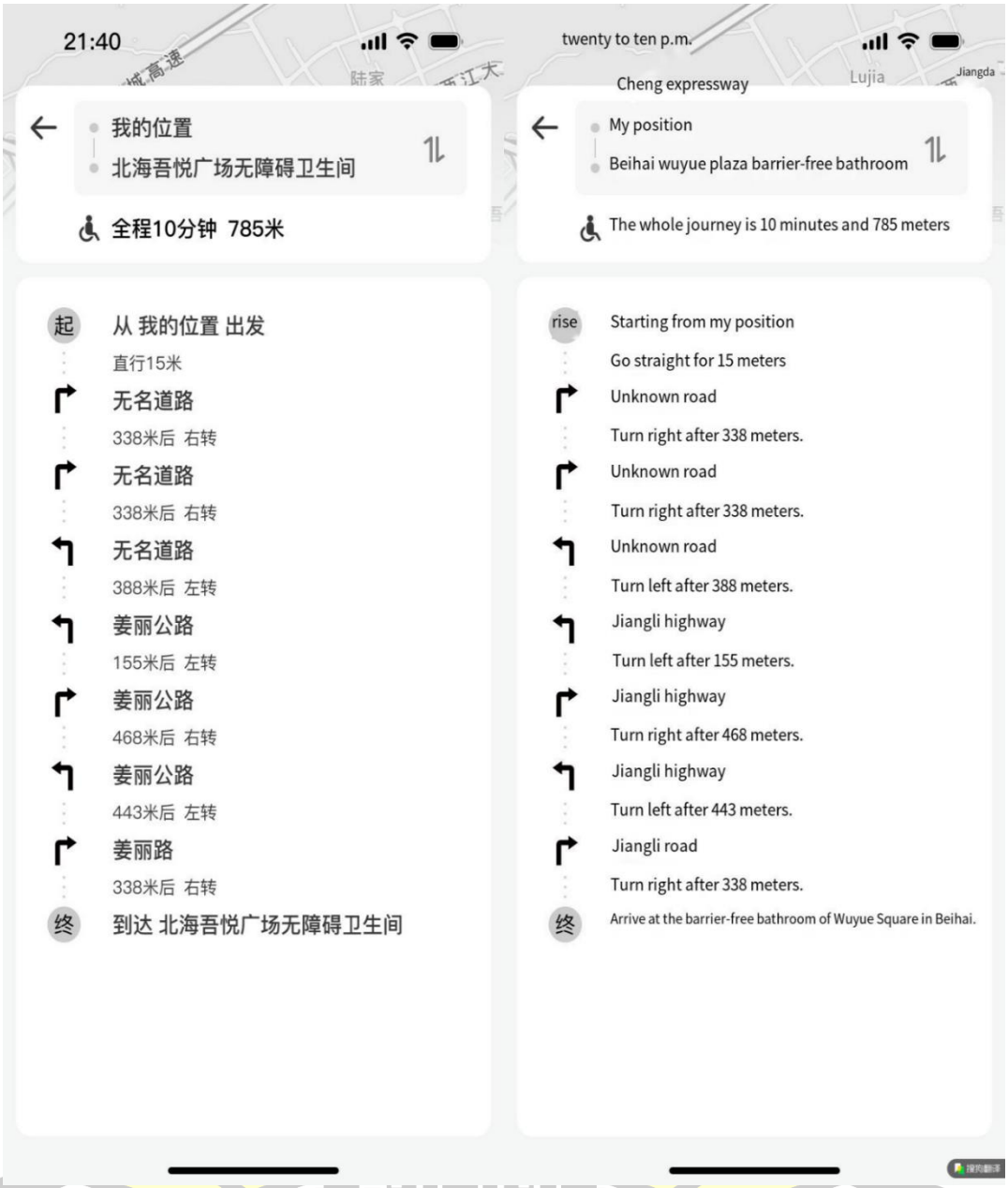


Figure 3. 9 Navigation interface of barrier-free travel APP planning for disabled people in Guangxi

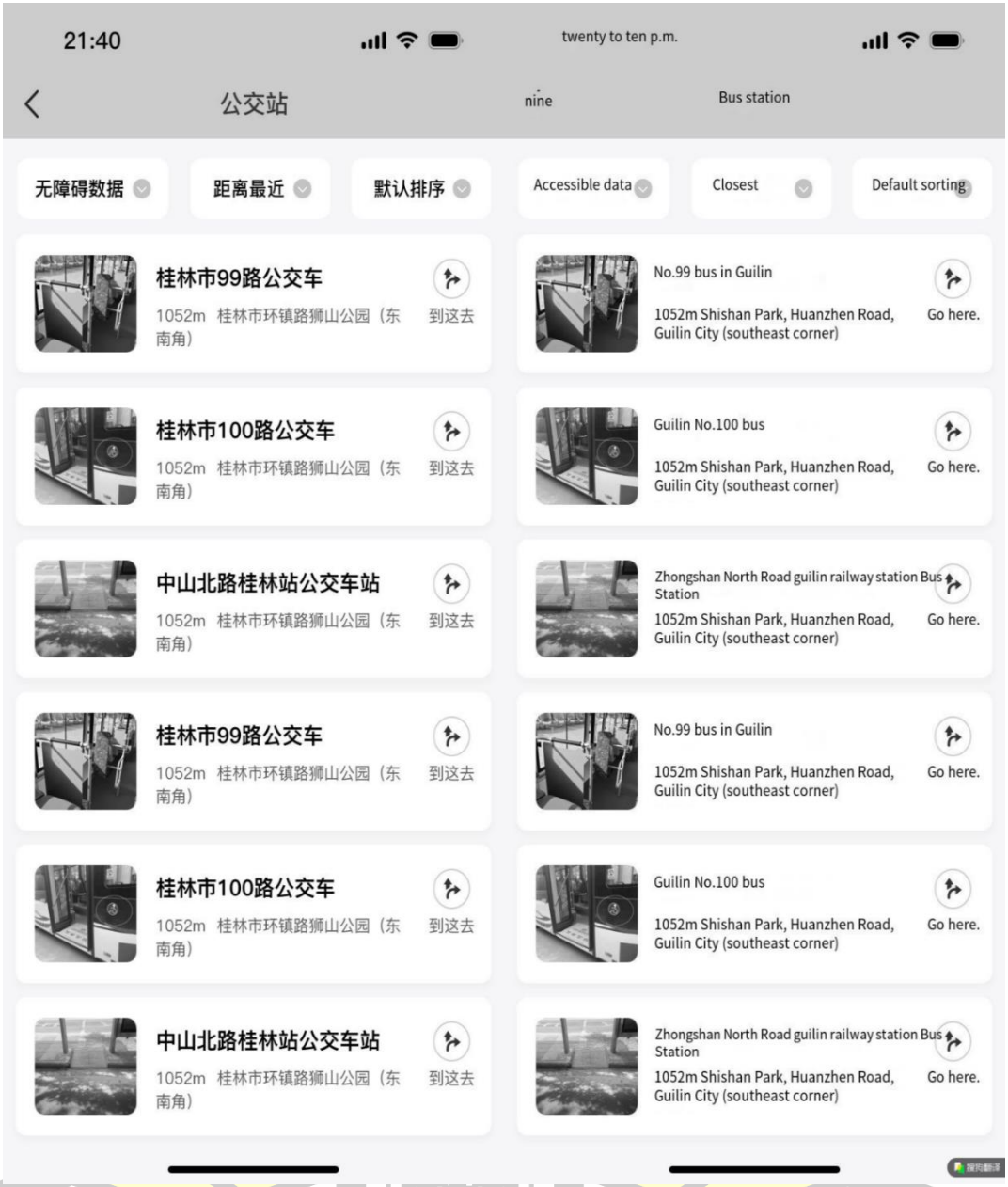


Figure 3. 10 Inquire about real-time traffic information through the barrier-free travel APP for the disabled in Guangxi

(4) Find barrier-free services and facilities

(4.1) Steps: Users can find accessible hotels, restaurants, parking lots and toilets nearby through the "Services and Facilities" page. Click on a facility to view detailed information and user reviews.

(4.2) Information: The information of barrier-free services and facilities provided by APP is updated in real time to ensure that users get the latest available information. Users can also share their experience through scoring and commenting functions.

Figure 3. 11 Inquire about the detailed information and user evaluation of a facility through the barrier-free travel APP for the disabled in Guangxi.

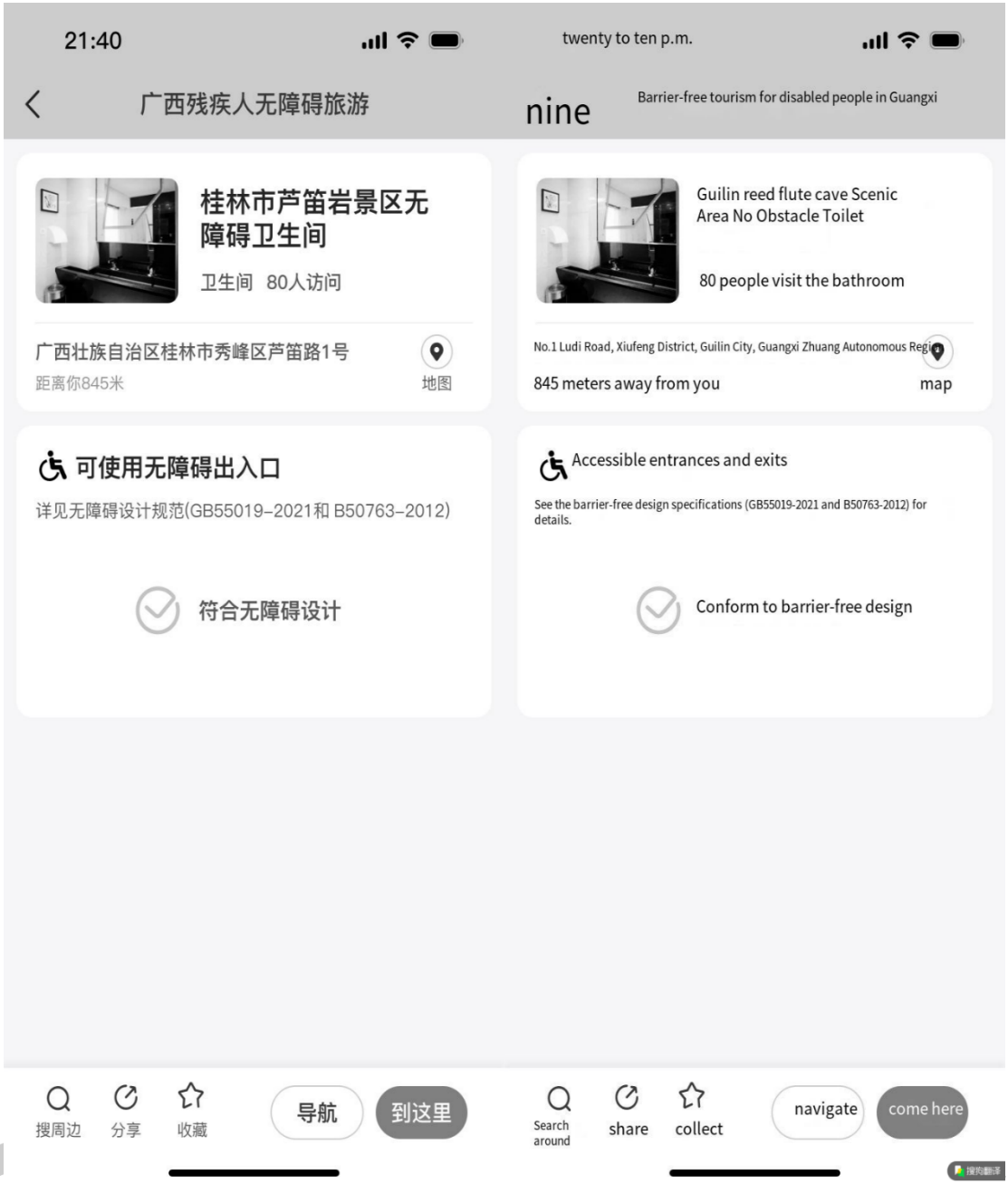


Figure 3. 12 Inquire about the detailed information and user evaluation of a facility through the barrier-free travel APP for the disabled in Guangxi.

(5) Reservation function

(5.1) Steps: On the "Booking" page, users can book barrier-free hotels, transportation and restaurants. After selecting the reservation item, the user can view the details and complete the online payment.

(5.2) Information: The reservation function supports multiple payment methods, and provides reservation confirmation and cancellation options. Users can view and manage all reservation records on the My Reservations page.

Figure 3. 13 Check the hotel's barrier-free room facilities and book the hotel through the Guangxi Disabled Accessible Travel APP.

Figure 3. 14 Inquire about transportation through Guangxi Disabled Accessible Travel APP.

(6) Real-time updates and notifications

(6.1) Steps: Users can set the ways to receive real-time updates and reminders on the "Notification" page, including push notifications, short messages,

emails, etc. APP will push barrier-free facilities status, traffic conditions and emergency alarms in time.

(6.2) Information: Notification settings can be customized according to user preferences to ensure that users can keep abreast of the latest travel information. The emergency notification function provides real-time information about nearby hospitals and emergency services.

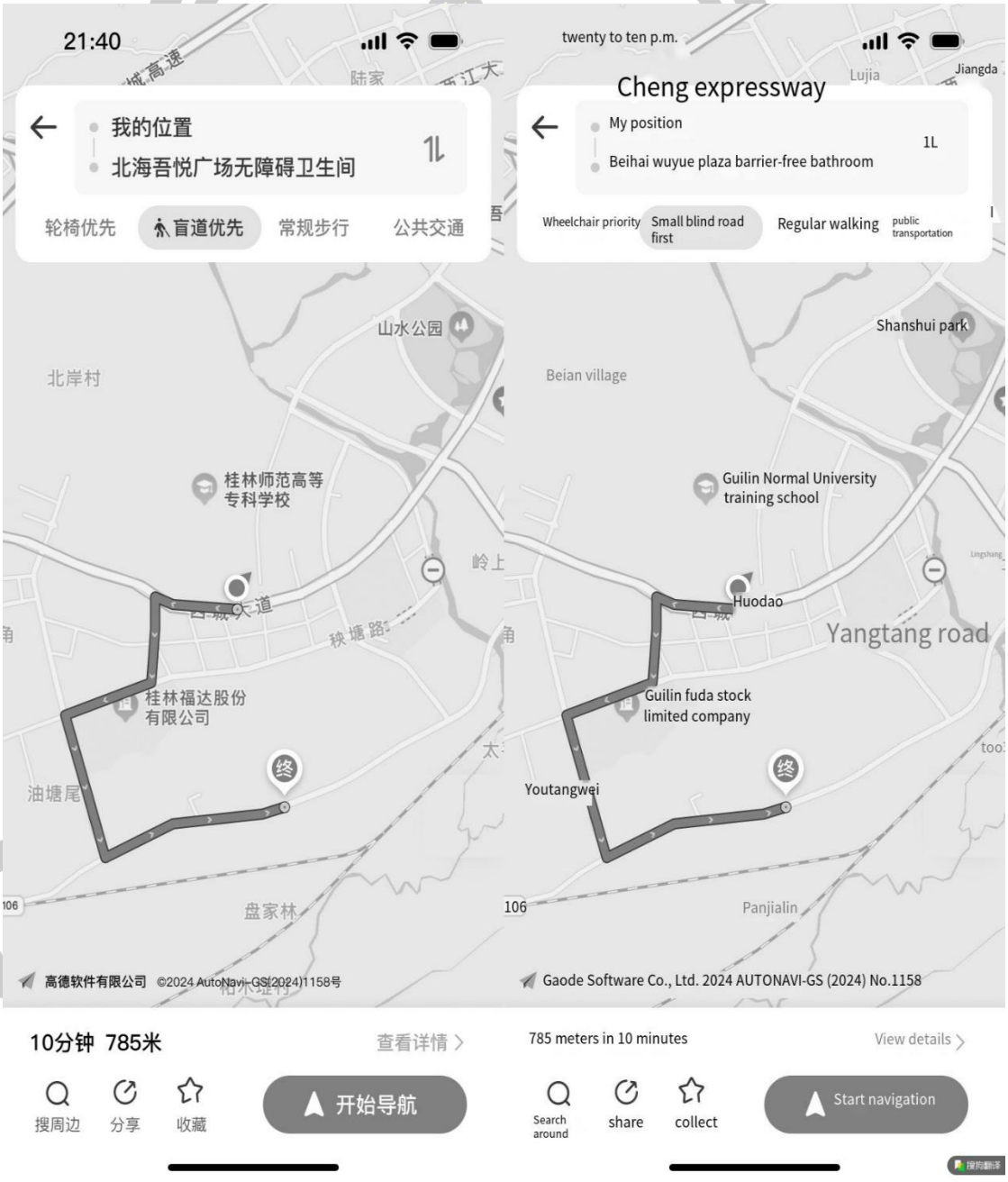


Figure 3. 15 The barrier-free travel APP for disabled people in Guangxi pushes the barrier-free facilities status interface in time.

(7) Social sharing

(7.1) Steps: Users can share their travel plans and experiences on the "Share" page. APP provides a variety of sharing methods, including social media, email and SMS.

(7.2) Information: users can share travel routes, barrier-free facilities evaluation and photos with family and friends. The APP also provides a travel log function to help users record and manage their travel experiences.

Figure 3. 16 Share travel routes, barrier-free facilities evaluation and photos through the barrier-free travel APP for the disabled in Guangxi.

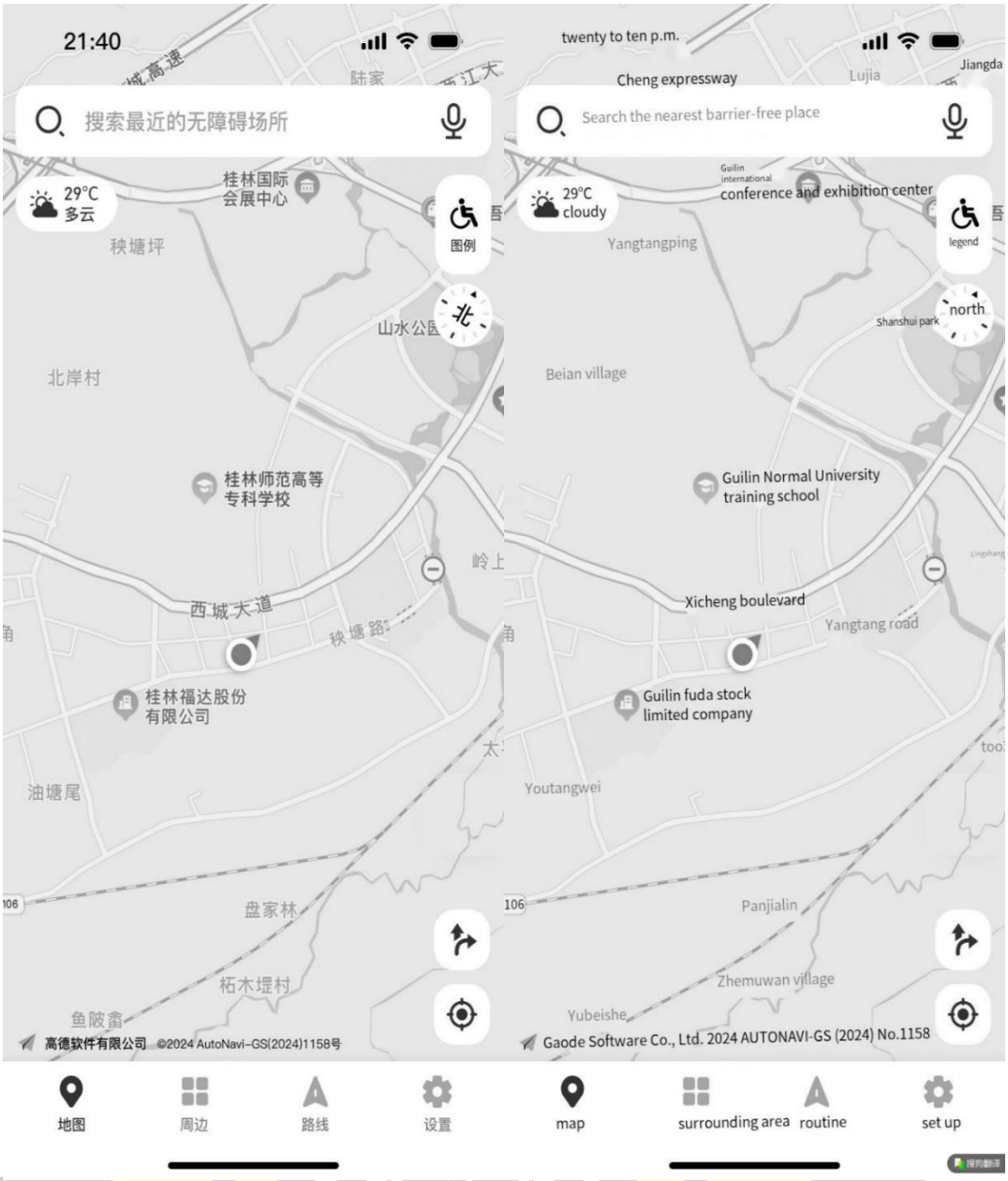


Figure 3. 17 Share travel routes, barrier-free facilities evaluation and photos through the barrier-free travel APP for the disabled in Guangxi.

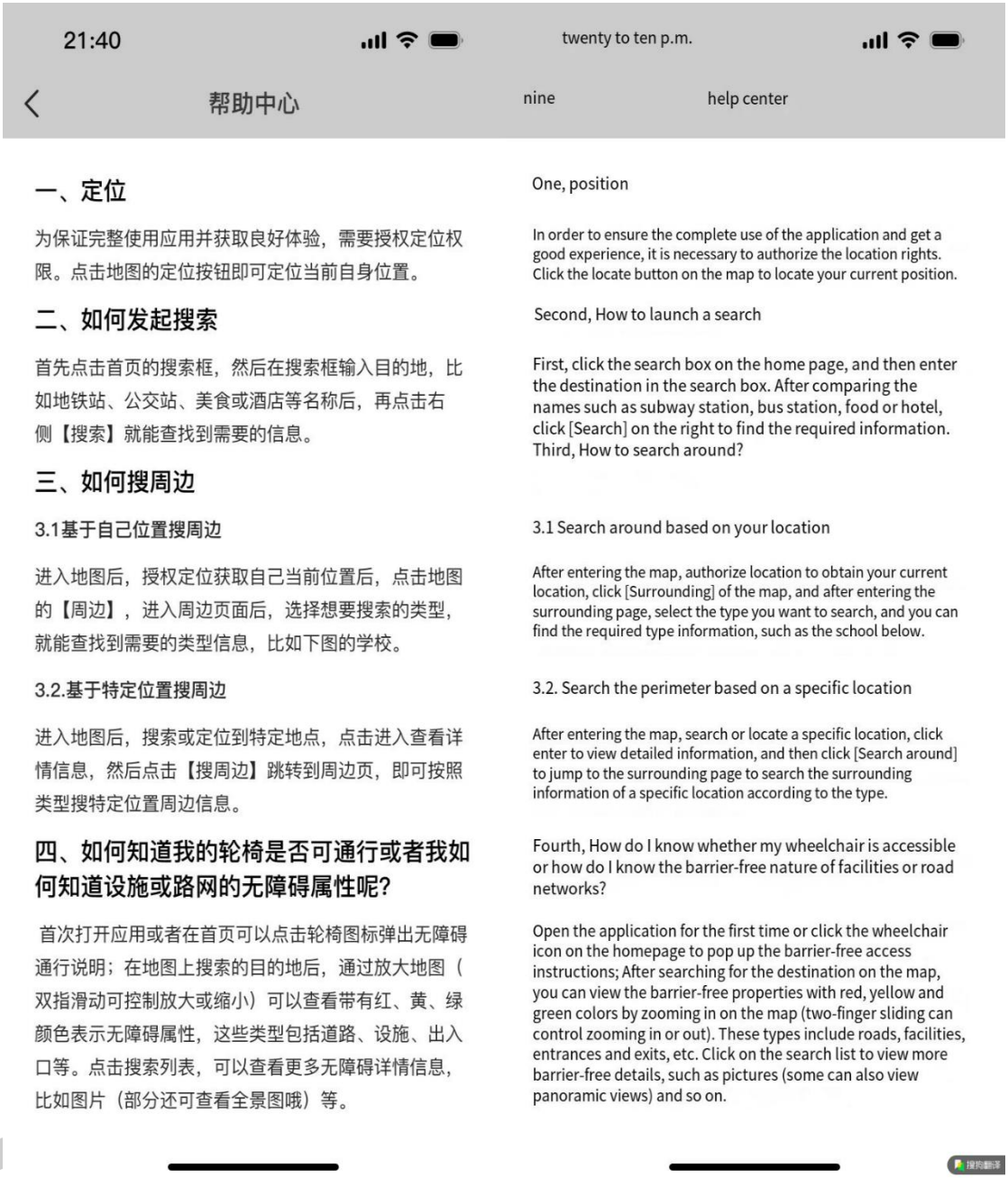


Figure 3. 18 Submit feedback or contact customer service through the "Help and Support" page of Guangxi Disabled Accessible Travel APP.

Through the above example steps, users can make full use of the functions of Guangxi Disabled Accessible Travel APP, and easily plan and manage barrier-free travel. The design of APP fully considers the needs of disabled users, and

provides comprehensive support and convenience through barrier-free settings, real-time updates and diversified services.

3) The evaluation the quality of application for barrier-free travel for disabled people in Guangxi

This study aimed to develop and evaluate the quality of the "Barrier-Free Travel Application for the Disabled in Guangxi." Data were collected from 5 experts to assess the quality of the application. The quality assessment development process consisted of several steps, as outlined below:

3.1) Concept Review

The researcher studied existing concepts and principles related to the design and development of barrier-free travel applications for individuals with disabilities in Guangxi. This step was crucial in defining the scope and structure of the quality assessment tool. The background research helped identify key issues that the evaluation would address.

3.2) Questionnaire Design

Based on the results of the literature review, the questionnaire was structured into six sections to align with the content and objectives of the evaluation.

Section 1: Basic Information

This section included a checklist to collect demographic data from the respondents.

Section 2: Application Component Requirements

This section used a 5-point Likert scale to assess key components of the application that disabled individuals considered essential for their travel needs. The evaluation applied predefined criteria to interpret the quality levels.

Criteria for Evaluating Quality	**Interpretation Criteria**
5 = Very High Quality	4.51-5.00 = Very High Quality
4 = High Quality	3.51-4.50 = High Quality
3 = Moderate Quality	2.51-3.50 = Moderate Quality
2 = Low Quality	1.51-2.50 = Low Quality
1 = Very Low Quality	1.00-1.50 = Very Low Quality

Section 3: Additional Comments

This open-ended section allowed respondents to provide suggestions beyond the predefined evaluation criteria.

3.3) Preliminary Review and Revision

The draft evaluation form was submitted to academic advisors for quality review. The researcher made revisions based on the feedback from the advisors to ensure clarity and alignment with the research objectives. After the revisions, the form was sent to experts for further assessment.

3.4) Content Validity Assessment

The final version of the evaluation was sent to experts for content validation. They assessed whether the questions aligned with the evaluation objectives. The Content Validity Index (CVI) was calculated using scores ranging from -1 to 1, with items having an IOC value close to 1.00 considered valid. The researcher set the acceptable IOC range between 0.70 and 1.00 to ensure the responses were consistent.

3.5) Pilot Testing and Data Collection

Once validated, the evaluation tool was used in a pilot study with a sample group to collect preliminary data. This allowed the researcher to calculate the reliability of the evaluation tool using Cronbach's alpha. The reliability measurement ensured that the Likert scale questions (ranging from 1 = Strongly Disagree to 5 = Strongly Agree) consistently measured the quality of the application. After confirming the tool's reliability, the final version of the evaluation instrument, which met the reliability criteria, was used to collect data from the entire sample.

4) The assessment the satisfaction of Guangxi disabled people with barrier-free travel applications.

This study aimed to develop a satisfaction survey to assess the satisfaction of individuals with mobility impairments regarding a barrier-free travel application for disabled travelers in Guangxi. Data were collected from a sample of at least 400 disabled travelers participants. The researcher developed the survey through the following steps:

4.1) Literature Review

The researcher reviewed theories and principles related to the satisfaction of individuals with mobility impairments concerning the content of a

barrier-free travel application. Special attention was given to the application developed in this study. This information helped define the scope and content of the satisfaction survey, ensuring that the survey would focus on the relevant aspects.

4.2) Questionnaire Design

The questionnaire was divided into three sections to align with the content and objectives of the study. It consisted of two main sections:

Section 1: Satisfaction Questions

This section included 10 questions about the satisfaction of disabled travelers with the barrier-free travel application in Guangxi. A 5-point Likert scale was used to measure satisfaction, with options ranging from "strongly agree" (5) to "strongly disagree" (1). This section also included criteria for interpreting satisfaction levels and guidelines for evaluating responses.

Criteria for Evaluating satisfaction	**Interpretation Criteria**
5 = Very High Satisfaction	4.51-5.00 = Very High Satisfaction
4 = High Satisfaction	3.51-4.50 = High Satisfaction
3 = Moderate Satisfaction	2.51-3.50 = Moderate Satisfaction
2 = Low Satisfaction	1.51-2.50 = Low Satisfaction
1 = Very Low Satisfaction	1.00-1.50 = Very Low Satisfaction

Section 2: Additional Comments

This section allowed respondents to provide additional suggestions or feedback that were not covered in the satisfaction questions. It gave participants an opportunity to share their opinions on aspects of the application that might not have been included in the predefined items.

4.3) Expert Review

Once the initial draft of the questionnaire was completed, the researcher sent it to a consultant for quality review. Feedback was received, and revisions were made to the questionnaire to improve clarity and alignment with the research objectives. The revised questionnaire was then sent to experts for further review.

4.4) Content Validity Evaluation

The experts assessed the questionnaire to ensure that it accurately measured the intended content. The correctness of each question was evaluated using the Item-Objective Congruence (IOC) index, which ranged from -1 to 1. Questions with an IOC value close to 1.00 were considered to be content-valid. Questions with an IOC value between 0.70 and 1.00 were retained for the final survey.

4.5) Pilot Testing and Reliability

The researcher revised the questionnaire based on expert feedback and conducted a pilot test with a sample group representing at least 10% of the target population (at least 40 participants). This group shared similar characteristics to the main sample. The results of the pilot test were used to calculate the reliability of the satisfaction survey using Cronbach's alpha. The reliability was measured on a 5-point Likert scale (Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1), with a target reliability coefficient ranging from 0.70 to 1.00.

4.6) Data Collection

The final version of the questionnaire, after ensuring quality and reliability, was distributed to the main sample group to collect data.

3.3.5 Risk Mitigation for Volunteers

The research aimed to collect data from volunteers with mobility impairments for an online-based study. The inclusion and exclusion criteria for selecting volunteers were as follows:

1) Inclusion Criteria

1.1) Age: Volunteers must be between the ages of 18 and 65 years.

1.2) Mobility Impairment: Volunteers must have a diagnosed mobility impairment, including but not limited to individuals using wheelchairs, crutches, prosthetics, or those with limited walking ability due to a physical condition.

1.3) Technology Access: Volunteers must have access to a smartphone, tablet, or computer, and an internet connection to participate in the online survey.

1.4) Language Proficiency: Volunteers must be able to read and understand the language in which the survey is conducted (i.e., Chinese or English).

1.5) Willingness to Participate: Volunteers must be willing to provide informed consent to participate in the study and complete the online questionnaire, including demographic and satisfaction-based questions.

1.6) Residence in Guangxi: Volunteers should be residents of Guangxi to ensure relevance to the study's focus on the region's tourism and accessibility.

2) Exclusion Criteria

2.1) Non-mobility Impairments: Volunteers without a diagnosed mobility impairment or with impairments unrelated to mobility (e.g., sensory or cognitive impairments) were excluded, as the study specifically focuses on those with mobility-related disabilities.

2.2) Inability to Access Technology: Volunteers who do not have the required technology (smartphone, tablet, or computer) or an internet connection to access and complete the online survey were excluded.

2.3) Non-consent: Volunteers who are unwilling to provide informed consent for participation in the study were excluded.

2.4) Incomplete Data: Volunteers who do not complete the entire questionnaire or provide insufficient or inconsistent data were excluded from the final analysis.

2.5) Underage or Over-Age Participants: Volunteers under the age of 18 or above 65 years were excluded, as the study targets young to middle-aged adults with mobility impairments.

3.4 Data Collection

The data collection process for this research is conducted in four phases as follows:

3.4.1 Survey the problem, travel restrictions, and demand for tourist attractions disabled people in Guangxi

To gather data from individuals with mobility impairments residing in Guangxi, the research team conducted an online survey targeting 400 participants. This survey focused on understanding the issues, travel limitations, and specific needs related to accessible tourism in the region. The following steps outline the data collection process:

1) Survey Design and Objectives

The survey instrument, "Survey on Travel Problems, Restrictions, and Demand for Accessible Tourism in Guangxi," was designed to capture the experiences, obstacles, and requirements of individuals with disabilities regarding travel in Guangxi. The questions were developed to assess participants' perspectives on current accessibility levels at tourist destinations and in transportation services, as well as their preferences for improvements.

2) Participant Recruitment via WeChat

The recruitment strategy involved using WeChat, a widely used social media platform in China. This platform was selected due to its accessibility and popularity among individuals with disabilities, allowing for efficient and direct engagement with the target group. Posts and invitations to participate in the survey were shared in various WeChat groups and forums related to disability advocacy and support within the Guangxi region.

3) Informed Consent

Before beginning the survey, participants received a detailed description of the study's purpose and procedures. An informed consent statement was provided, explaining that the survey responses would be used solely for research purposes and ensuring confidentiality. Participants were required to provide consent by selecting an option to proceed, which indicated their voluntary agreement to participate in the survey.

4) Survey Administration

The survey was administered entirely online through WeChat, allowing participants to complete the questionnaire at their convenience. The survey included a combination of closed-ended questions, using Likert scales to measure levels of agreement and satisfaction, and open-ended questions for qualitative insights. Participants were encouraged to share additional comments about their experiences with accessibility at tourist locations in Guangxi.

5) Data Monitoring and Collection Completion

The data collection process remained open for a set period, during which the research team monitored responses to ensure that the target number of 400 participants was reached. Reminders were periodically sent via WeChat to encourage

completion among partially responded surveys, helping to meet the data requirement efficiently.

This method facilitated an inclusive and convenient way for participants with mobility impairments to contribute their insights on accessible tourism, aligning with the study's objective to design an application tailored to their needs.

3.4.2 The evaluation the quality of application for barrier-free travel for disabled people in Guangxi

The research team collected data from five experts to evaluate the quality of a newly developed application designed to facilitate barrier-free travel for individuals with disabilities in Guangxi. The data collection process was carried out through the following steps:

1) Selection and Recruitment of Experts

Five experts with backgrounds in accessible tourism, application development, and disability services were selected based on their expertise. The research team reached out to these experts via email, providing a brief overview of the study's objectives and the importance of their role in evaluating the application's quality.

2) Scheduling and Consent Process

Each expert received an invitation via email that included a proposed schedule for completing the assessment, along with a consent form detailing the purpose of the study, the evaluation process, and the confidential handling of their feedback. Experts were required to review and sign the consent form electronically to confirm their willingness to participate and acknowledge their understanding of the study's aims.

3) Distribution of the Evaluation Tool

The evaluation tool, "The Evaluation of the Quality of Application for Barrier-Free Travel for Disabled People in Guangxi," was sent to each expert through email on the agreed-upon date. The tool included various assessment criteria covering the application's usability, accessibility, functionality, and relevance to the needs of individuals with mobility impairments.

4) Online Assessment and Data Collection

Experts were instructed to review the application independently and to complete the evaluation form according to the criteria provided. The experts' feedback was submitted via a secure email system, allowing them to share their assessments in a format that facilitated qualitative analysis.

5) Follow-Up and Completion Confirmation

Upon receiving the completed evaluation forms, the research team followed up with each expert to confirm receipt and clarify any responses as necessary. This final step ensured that all data were accurately captured and that the evaluation process aligned with the study's objectives.

Through these steps, the research team gathered in-depth insights from specialists, contributing to a comprehensive evaluation of the application's quality for supporting barrier-free travel for disabled individuals in Guangxi.

3.4.3 The assessment the satisfaction of Guangxi disabled people with barrier-free travel applications.

The research team conducted a data collection process involving more than 400 individuals with mobility disabilities in Guangxi to assess their satisfaction with a newly developed barrier-free travel navigation application. The data collection process through WeChat, a popular social media platform in China, followed these steps:

1) Recruitment and Informed Consent

Participants were recruited through disability support networks and relevant social media groups on WeChat. A recruitment message was shared, briefly describing the study and inviting eligible participants—individuals with mobility impairments residing in Guangxi—to participate in evaluating the new application. Each participant received a digital consent form that explained the study's purpose, their rights, and the confidentiality of their responses. Participants were required to electronically acknowledge and submit their consent before taking part in the survey.

2) Distribution of the Assessment Tool

After obtaining consent, the research team distributed the assessment tool titled The Assessment of Satisfaction of Guangxi Disabled People with Barrier-Free Travel Applications through WeChat. The assessment tool included questions on

various aspects of the application, such as ease of use, accessibility, navigation features, and overall satisfaction. The survey was designed to be user-friendly, allowing participants to complete it efficiently on mobile devices.

3) Data Collection via Online Survey

Participants completed the survey on their personal devices through WeChat, which facilitated ease of access and encouraged participation. The survey collected quantitative data on satisfaction levels, as well as qualitative feedback on participants' experiences and suggestions for improvement. The research team monitored incoming responses to ensure data completeness and quality.

4) Follow-Up for Clarification and Data Validation

Where needed, follow-up messages were sent to clarify incomplete or ambiguous responses, ensuring the data collected reflected accurate and comprehensive participant feedback. This final check allowed for consistency in the analysis.

5) Data Storage and Analysis Preparation

All data from the completed assessments were securely stored and prepared for analysis in line with the study’s objectives. The research team then proceeded with a quantitative analysis of the satisfaction levels and qualitative analysis of open-ended feedback to better understand the user experience and areas for potential enhancement in the application.

Through these steps, the research team successfully gathered data from a substantial sample of users, providing a detailed assessment of the application's effectiveness in supporting barrier-free travel for individuals with disabilities in Guangxi.

3.5 Data Analysis

The analysis of the data collected through online assessments was carried out using data from both individuals with mobility impairments and experts. Once the data were gathered, the researcher organized the data into two sections: quantitative data and qualitative data. These were analyzed according to the study objectives, and appropriate statistical methods were selected for analysis as follows:

3.5.1 Quantitative Data

The quantitative data consisted of the following assessment items:

1) Demographic Information of Respondents

The quantitative data in this section were analyzed to determine frequency and percentages. Numerical data were presented to support descriptive explanations and give an overview of the sample's characteristics.

2) Likert Scale Questions (5-point scale)

The researcher analyzed the responses to the Likert scale questions by calculating the mean and standard deviation. These calculations provided numerical data to support the descriptive analysis of participants' levels of satisfaction and their responses to the survey items.

3.5.2 Qualitative Data

The qualitative data consisted of the following assessment item:

Additional Comments this section included open-ended responses, which were analyzed through content analysis. The researcher summarized the key themes, identified patterns across different opinions, and presented descriptive data to explain the phenomena observed. The content analysis helped identify major trends and provided deeper insight into the respondents' experiences and suggestions.

By organizing and analyzing the data in this manner, the researcher was able to address the study's objectives and present both quantitative findings and qualitative insights that contributed to a comprehensive understanding of participants' satisfaction and opinions.

3.6 Statistical Analysis

For the analysis of the quantitative data, the researcher employed descriptive statistics as follows:

3.6.1 Content Validity: Content validity was assessed to ensure that the questionnaire accurately measured the intended objectives and reflected the relevance of each content area. This was achieved by calculating the Item-Objective Congruence Index (IOC), which evaluated the alignment between each question and the corresponding objective. The IOC was used to determine how well the items matched the intended focus of the study.

3.6.2 Reliability: Reliability of the assessment scores was established to confirm the consistency of the measurements across multiple cases. The Cronbach's alpha coefficient was used to measure internal consistency and to ensure that the tool provided stable results in repeated assessments. This was crucial for determining the reliability of the survey in capturing the participants' true responses.

3.6.3 Frequency: The frequency of responses was calculated to analyze data distribution across different categories. This helped identify the most common responses and provided insight into the general trends and preferences of the participants.

3.6.4 Percentage: Percentages were computed to express the proportion of responses about the Total number of respondents. This allowed for clear comparisons of the characteristics of the respondents and their levels of satisfaction, offering a more comprehensible representation of the data.

3.6.5 Mean: The arithmetic mean was calculated to determine the average score for various items. The mean score provided a general overview of the participants' satisfaction levels, helping to identify overall trends in the data.

3.6.6 Standard Deviation: Standard deviation was used to measure the dispersion of scores around the mean. This indicated the variability in the satisfaction levels of the respondents, showing how much individual responses deviated from the average score. A higher standard deviation suggested greater variability in the participants' satisfaction levels.

CHAPTER IV

Result

The research on the Barrier-free Travel Application for the Disabled in Guangxi presents the data analysis results in three main points, which are consistent with the framework of the research. These are as follows.

Result

4.1 Survey the problem, travel restrictions, and demand for tourist attractions disabled people in Guangxi

Table 4. 1 Basic information

Number	Items	Basic information	frequency	percent
1.	age	▪ Under 18 years old	49	12.25
		▪ 18-30	119	29.75
		▪ 31-45	112	28.00
		▪ 46-60	82	20.50
		▪ Over 60 years old	38	9.50
	Total		**400**	**100**
2.	Type of disability	▪ Mobility impairment (e.g. wheelchair users)	79	19.75
		▪ Visual impairment (e.g. poor eyesight, blindness)	76	19.00
		▪ Hearing impairment (such as deafness and hard of hearing)	79	19.75
		▪ Cognitive or learning disabilities	71	17.75
		▪ Others (please specify)	85	21.25
	Total		**400**	**100**
3.	Primary walker	▪ wheelchair	82	20.50
		▪ A cane or a walker?	78	19.50
		▪ Remedy	75	18.75
		▪ nobody	78	19.50
		▪ Others (please specify)	87	21.75
	Total		**400**	**100**

Number	Items	Basic information	frequency	percent
4.	living environment	▪ urban	107	26.75
		▪ rural	96	24.00
		▪ Both are equal.	105	26.25
		▪ not applicable	92	23.00
Total			**400**	**100**
5.	Travel frequency	▪ Every day; Tiantiandi	85	21.25
		▪ hebdomadal	72	18.00
		▪ monthly	78	19.50
		▪ hard to come by	91	22.75
		▪ never	74	18.50
Total			**400**	**100**

Table 4.1 : shows the needs, satisfaction, travel restrictions and challenges of tourist attractions and disabled people in Guangxi:

1. Age distribution: Most participants are between 18-30 years old and 31-45 years old, accounting for 29.75% and 28.00% respectively. This shows that the main participants are young to middle-aged adults. Few participants are over 60 years old, accounting for only 9.50%, indicating that the proportion of elderly disabled people participating in tourism activities is low.

2. Type of disability: Dyskinesia and hearing impairment account for 19.75% respectively, which is the most common type of disability. Participants with visual impairment accounted for 19.00%, which was close to the proportion of mobility impairment and hearing impairment. The proportion of cognitive or learning disabilities is relatively low, accounting for 17.75%. Other types of disabilities (such as other specific situations not listed) account for 21.25%, indicating that a considerable number of disabled people have diversified needs.

3. Primary walker: 20.50% of the participants used wheelchairs, and 19.50% used crutches or walkers, with similar frequency. Participants who did not use any walker also accounted for 19.50%. The number of participants who used prosthetic surgery was slightly less, accounting for 18.75%. The utilization rate of other types of walkers is 21.75%, which shows that the types of walkers are diversified.

4. Living environment: The proportion of participants living in cities is the highest, accounting for 26.75%, followed by those living in rural areas, accounting for

24.00%. 26.25% of the participants said that the environment is similar, indicating that this group of people may frequently migrate or live between urban and rural areas. The inapplicable options account for 23.00%, which may refer to those participants who cannot be classified in a specific living environment, such as people who frequently move between urban and rural areas.

5. Travel frequency: Travel frequency shows a certain dispersion, the proportion of daily travel accounts for 21.25%, and the proportion of rare travel is slightly higher, accounting for 22.75%. Participants who travel every month account for 19.50%, which shows that some people will travel regularly. The proportion of participants who travel every week is 18.00%, and the proportion of participants who never travel is 18.50%, which shows that some disabled groups may limit their travel frequency for various reasons.

These data reveal the diversified needs of the disabled in Guangxi in terms of age, disability type, walker use, living environment and travel frequency. Further analysis of these data will help to better understand and meet the special needs of disabled people's tourism services.

Table 4. 2 Application component requirements

Number	Items	Application component requirements	frequency	percent
1.	Do you think the following functions are very important in barrier-free tourism applications?	▪ Route planning and navigation tools	75	18.75
		▪ Real-time barrier-free information	82	20.50
		▪ Customization options (for example, text size, color contrast)	61	15.25
		▪ Integration with assistive technologies	65	16.25
		▪ Audio description and text-to-speech conversion	57	14.25
		▪ Visual aids (e.g., high contrast mode, text magnification)	60	15.00
	Total		**400**	**100**
2.	In tourism applications, the most important auxiliary function for	▪ Speech control and speech recognition	81	20.25
		▪ Large buttons and readable text	86	21.50
		▪ Adjustable text size and color contrast	68	17.00
		▪ Screen reader compatibility		

Number	Items	Application component requirements	frequency	percent
	you is	▪ Vibration or tactile feedback of notification	93 72	23.25 18.00
	Total		**400**	**100**
3.	You will find that the travel application requires the following customization options.	▪ Adjustable font size and type ▪ Color theme options (for example, dark mode, high contrast) ▪ Customizable notification settings ▪ User profile settings for saved preferences. ▪ Language Options and Translation	91 74 87 60 88	22.75 18.50 21.75 15.00 22.00
	Total		**400**	**100**
4.	The application should provide the following information for barrier-free travel	▪ Barrier-free routes and public transport options ▪ Availability of ramps and elevators ▪ Accessible parking space ▪ There is a barrier-free toilet nearby. ▪ Accessible accommodation and hotels	78 88 85 67 82	19.50 22.00 21.25 16.75 20.50
	Total		**400**	**100**
5.	The application should support different types of disabilities in the following ways.	▪ Visual impairment (for example, screen reader support, large text) ▪ Hearing impairment (such as subtitles, visual alarms) ▪ Obstacles to movement, eg wheelchair-friendly routes. ▪ Cognitive impairment (for example, simplified navigation) ▪ Multiple disabilities (combination of the above characteristics)	86 78 78 77 81	21.50 19.50 19.50 19.25 20.25
	Total		**400**	**100**

Table 4.2 shows the specific needs of disabled people for barrier-free travel applications and the priority functions:

1. Importance of application function: Real-time barrier-free information (20.50%) and route planning and navigation tools (18.75%) are considered as the most important functions. This shows that users with disabilities attach great

importance to the function of obtaining real-time information and effectively planning routes in order to better arrange their trips. Customization options (such as text size and color contrast) and integration with assistive technologies have also received high attention, accounting for 15.25% and 16.25% respectively, showing users' demand for personalization and assistive technologies.

2. The most important auxiliary function: Screen reader compatibility (23.25%) is the most important auxiliary function in tourism application, which may be because it can help visually impaired people to use the application better. Large buttons and easy-to-read text (21.50%) and voice control and voice recognition (20.25%) are also considered as key functions, indicating that ease of use and voice interaction are very important to users.

3. Customization options for travel applications: Adjustable font size and type (22.75%) and language options and translation (22.00%) are the customization options that users most want to see in the application, indicating that users have high requirements for readability and language adaptability. The high demand for color theme options (21.75%) also shows that users pay attention to visual experience.

4. barrier-free travel information: The availability of ramps and elevators (22.00%) and barrier-free parking spaces (21.25%) are the most important barrier-free information that participants think the application should provide. This shows that users with disabilities attach importance to being able to easily enter and use facilities. Barrier-free routes and public transportation choices (19.50%) and barrier-free accommodation and hotels (20.50%) are also considered as key travel information.

5. Functions to support different types of disabilities: Visual impairment support (21.50%) and multiple disability support (20.25%) are the most concerned aspects of participants, indicating that users hope that the application can support multiple types of disabilities and provide special functional support for specific disabilities. The support needs of hearing impairment (19.50%) and mobility impairment (19.50%) also show users' expectations for comprehensive barrier-free functions.

The data in Table 4.2 shows the expectations of disabled users for barrier-free travel applications, especially for personalized, easy-to-use and extensive barrier-free information. These requirements reflect the unique challenges faced by disabled

people when traveling, and the priority of these functions indicates the key areas that developers should pay attention to when designing and optimizing applications.

Table 4. 3 Travel application requirements

Number	Items	Travel application usage requirements	frequency	percent
1.	You need a travel application to integrate the following services	▪ Public transport timetable	86	21.50
		▪ Carpooling services (such as Uber and Raffles)	65	16.25
		▪ Hotel and accommodation reservation	90	22.50
		▪ Restaurant reservation	94	23.50
		▪ Emergency services (for example, the nearest hospital)	65	16.25
	Total		**400**	**100**
2.	The most important types of accessibility information for you include	▪ Real-time update of barrier-free functions (for example, elevator availability)	80	21.50
		▪ Detailed description of accessible routes	76	16.25
		▪ Availability of barrier-free seats in public transportation	83	22.50
		▪ Accessible entrance and exit information	79	23.0
		▪ Review and rating of barrier-free facilities	82	16.25
	Total		**400**	**100**
3.	You want your application to provide the following offline features.	▪ Offline map and navigation	78	19.50
		▪ Saved accessibility information	79	19.75
		▪ Downloadable guides and resources	85	21.25
		▪ Offline emergency contact information	69	17.25
		▪ Pre-saved routes and travel plans	89	22.25
	Total		**400**	**100**
4.	You want the application to send the following types	▪ push notification	68	17.00
		▪ In-app message	92	23.00
		▪ SMS reminder	85	21.25
		▪ Email update	88	22.90

Number	Items	Travel application usage requirements	frequency	percent
	of notifications	▪ nobody	67	16.75
	Total		**400**	**100**
5.	The application should handle your personal data in the following ways.	▪ Encrypted secure storage	76	19.00
		▪ Do not share data with third parties.	84	21.00
		▪ Option to delete data at any time	81	20.25
		▪ Clear privacy policy and terms	78	19.50
		▪ Update data protection measures regularly.	81	20.25
	Total		**400**	**100**

Table 4.3 shows the user's requirements for the use of travel applications, especially in terms of service integration, auxiliary functions, offline functions, notification preferences and data processing methods:

1. service integration: Hotel and accommodation reservation (22.50%) and restaurant reservation (23.50%) are the services that users most want to integrate with travel applications, indicating that they have a high demand for convenient travel details. Public transport schedules (21.50%) and emergency services (16.25%) have also been valued by users, indicating the importance of these functions to travel convenience and safety.

2. Information types of auxiliary functions: The real-time update of barrier-free functions (22.50%) and the availability of barrier-free seats in public transportation (23.50%) are the most desirable information for users, reflecting their dependence on real-time barrier-free information. The review and rating of barrier-free facilities (21.50%) also shows that users attach importance to the evaluation and feedback of other users, which can help them make more informed choices.

3. Offline function: Offline map and navigation (19.50%) and saved auxiliary function information (19.75%) are functions that users hope to be able to use even when there is no network, which shows users' demand for travel stability and information reliability. The high demand for downloadable guides and resources (21.25%) and pre-saved routes and travel plans (22.25%) indicates that users want to

be fully prepared before traveling and can continue to use the application even without network connection.

4. Notification preferences: In-app messages (23.00%) and email updates (22.90%) are the most popular notification methods for users, which may be because they do not disturb daily activities and can provide useful information at the same time. SMS reminder (21.25%) has also been recognized by users, which shows the effectiveness and immediacy of this method.

5. Personal data processing: The options of not sharing data with third parties (21.00%) and deleting data at any time (20.25%) are the most concerned issues for users in data processing, reflecting their strong demand for data privacy and control. The high attention paid to regularly updating data protection measures (20.25%) and encrypted secure storage (19.00%) shows that users attach importance to data security.

The data in Table 4.3 shows that when using travel applications, users not only want comprehensive service integration, but also have high expectations for real-time and offline barrier-free information, personalized notification settings and strict data privacy protection. These requirements show that users want to improve their travel experience through a highly integrated, secure and user-friendly application, and ensure that they can get the required support in various scenarios.

Table 4. 4 Usage behavior of tourism applications

Number	Items	Tourism application use behavior	Frequency	Percent
1.	You use the travel application for the following purposes:	▪ Planning barrier-free routes	68	17.00
		▪ Find barrier-free services and facilities	90	22.50
		▪ Check for real-time updates and alerts	87	21.75
		▪ Book travel accommodation	69	17.25
		▪ Share travel plans with others	86	21.50
Total			**400**	**100**

Number	Items	Tourism application use behavior	Frequency	Percent
2.	You have encountered the following challenges when using the travel application.	▪ Technical problems (e.g. crash, poor performance)	92	23.00
		▪ It is difficult to find accessibility information.	90	22.50
		▪ Complex navigation or user interface	76	19.00
		▪ Lack of integration with assistive technologies	73	18.25
		▪ Insufficient customer support	69	17.25
	Total		**400**	**100**
3.	When planning a trip, you usually use the application in the following ways.	▪ Search for accessible routes	80	20.00
		▪ Book transportation or accommodation.	86	21.50
		▪ Save your favorite routes and locations	67	16.75
		▪ Check accessibility before traveling.	90	22.50
		▪ Check the weather and traffic conditions	77	19.25
	Total		**400**	**100**
4.	How often do you use the travel app for barrier-free travel?	▪ every day	64	16.00
		▪ Several times a week	81	20.25
		▪ Several times a month	83	20.75
		▪ hard to come by	87	21.75
		▪ Only when necessary	85	21.25
	Total		**400**	**100**
5.	The following improvements will encourage you to use travel apps more frequently.	▪ Better auxiliary function	87	21.75
		▪ More accurate and up-to-date information	67	16.75
		▪ Enhanced user interface and design	97	24.25
		▪ Integration with more services	75	18.75
		▪ Improve reliability and stability	74	18.50
	Total		**400**	**100**

Table 4.4 shows users' behavior habits, challenges and expected improvements when using travel applications:

1. Purpose of use: The main purpose of most users using travel applications is to find barrier-free services and facilities (22.50%) and check real-time updates and alerts (21.75%), which shows that they attach great importance to the acquisition of real-time barrier-free information and services. Sharing travel plans with others (21.50%) also occupies a considerable part, indicating that users hope that the application can provide convenient social sharing functions.

2. Use challenge: Technical problems (23.00%) are the biggest challenges faced by users, which may include application crash and low performance, indicating that the stability and technical reliability of applications need to be improved. Difficulty in finding accessibility information (22.50%) and complicated navigation or user interface (19.00%) are also considered as the main obstacles, which emphasize the user's demand for ease of use and information availability.

3. Usage: When users plan their trips, the most common ways to use applications are to check the barrier-free function (22.50%) and book transportation or accommodation (21.50%), which shows that users attach importance to the preparation work before travel, especially in barrier-free related services. Searching accessible routes (20.00%) and checking weather and traffic conditions (19.25%) are also frequently used, reflecting users' concern about travel routes and environment.

4. Frequency of use: The frequency of using travel applications for barrier-free travel is scattered, with the highest proportion being rare (21.75%) and only when necessary (21.25%), indicating that many users will only use the application under certain circumstances.

However, some users use the application several times a week (20.25%) or several times a month (20.75%), which shows the daily use potential of the application in a specific population.

5. Expected improvement: The improvement that users most want to see is the enhanced user interface and design (24.25%), which shows that the visual and operational experience of the application is the key issue in the current user experience. Better auxiliary functions (21.75%) and more accurate and up-to-date information (16.75%) are also considered as important improvement directions. Users

hope that the application can meet the barrier-free needs more comprehensively and provide reliable and up-to-date information.

The data in Table 4.4 shows that although users have a high demand for barrier-free information and services when using travel applications, they face challenges in technical issues, difficulty in obtaining information and complexity of the interface. These problems affect the user's usage frequency and overall experience. By improving the stability of the application, improving the user interface design, strengthening the auxiliary functions and ensuring the accuracy and timeliness of information, the application can better meet the needs of users and encourage more frequent use.

Table 4. 5 Smartphone usage ability

Number	Items	Ability to use smart phones	Frequency	Percent
1.	You use the following assistive technologies on your smartphone.	▪ Screen readers (e.g., voiceover, reply)	89	22.25
		▪ Enlarge or zoom function	102	25.50
		▪ Speech to text software	69	17.25
		▪ Customizable keyboard settings	69	17.25
		▪ nobody	71	17.75
	Total		**400**	**100**
2.	You prefer to customize the accessibility settings of your smartphone in the following ways.	▪ Adjust text size and font style	85	21.25
		▪ Enable high contrast or dark mode	75	18.75
		▪ Custom touch gesture	75	18.75
		▪ Configure voice commands	77	19.25
		▪ Set accessibility shortcuts	88	20.00
	Total		**400**	**100**
3.	When using a smartphone, you face the following challenges.	▪ Difficulties in reading small texts	75	18.75
		▪ The problem of touch sensitivity	88	22.00
		▪ Navigate complex menus		

Number	Items	Ability to use smart phones	Frequency	Percent
		or applications.	83	20.75
		▪ Difficulties in setting up or using assistive technologies	86	21.50
		▪ nobody	68	17.00
	Total		**400**	**100**
4.	What do you think is the most challenging application to use on smart phones?	▪ Navigation and map applications	72	18.00
		▪ Social media application	82	20.50
		▪ Banking and financial applications	82	20.50
		▪ Shopping application	103	25.75
		▪ nobody	61	15.25
	Total		**400**	**100**
5.	Resources to help you learn to use new applications on your smartphone include	▪ Online tutorials or guides	84	21.00
		▪ Help from friends or family.	78	19.50
		▪ Customer support from application developers	90	22.50
		▪ Barrier-free training program	81	20.25
		▪ Trial and error learning	67	16.75
	Total		**400**	**100**

Table 4.5 shows users' abilities, preferences and challenges in using assistive technologies on smart phones:

1. Using assistive technology: Most users use zoom-in or zoom-out functions (25.50%) and screen readers (22.25%) on their smartphones, which shows that these functions are important tools they rely on in their daily lives. However, does anyone (17.75%) say that they don't use any assistive technology, which may reflect their low demand for assistive technology or strong ability to use technology.

2. User-defined auxiliary function settings: Users prefer to customize their smartphones by adjusting text size and font style (21.25%) and setting accessibility shortcuts (20.00%), which shows that text clarity and quick access are their focus. The

demand for enabling high contrast or dark mode (18.75%) and custom touch gestures (18.75%) is also high, reflecting that users hope to improve their experience through visual and interactive adjustment.

3. Challenges when using smart phones: The difficulty of reading small text (22.00%) and the problem of touch sensitivity (20.75%) are the main challenges faced by users, which shows that special attention should be paid to the readability of text and the responsiveness of touch interface when designing applications.

Navigation of complicated menus or applications (21.50%) is also considered as a major problem, and the importance of simplifying user interface design is emphasized.

4. The most challenging application: Shopping applications (25.75%) are considered to be the most challenging applications when users use smart phones, which may be because these applications involve multiple steps and input content, which increases the complexity. Navigation and map applications (18.00%) and banking and financial applications (20.50%) are also considered challenging. These applications usually require accurate input and complicated operations, which may not be friendly enough for some users.

5. Resources for learning new applications: Customer support from application developers (22.50%) and online tutorials or guides (21.00%) are the main resources for users to learn to use new applications, which shows that users expect to master new technologies through detailed guidance and support. The help of friends or family (19.50%) and barrier-free training plan (20.25%) also played a key role, showing the importance of social support and professional training to users.

The data in Table 4.5 reflects the diverse needs and challenges of users when using assistive technologies on smart phones. They rely on specific functions, such as zoom-in or zoom-out functions and screen readers, but they also face problems such as text readability, touch sensitivity and complex navigation. In order to help users make better use of smart phones, application developers should consider providing detailed user guides, optimizing user interfaces, and ensuring that applications can meet barrier-free requirements. In addition, users depend on a variety of resources when learning to use new applications, so providing multi-channel support and training will help improve users' experience and satisfaction.

4.2 The evaluation the quality of application for barrier-free travel for disabled people in Guangxi

Table 4. 6 The application quality of disabled people's barrier-free travel in Guangxi evaluated by 5 experts.

No.	Quality evaluation list	Quality Level n=5		Meaning
		Mean	S.D.	
1.	**Function and performance**			
	1.1 App function covers basic travel needs.	4.40	0.55	High
	1.2 Apps is stable to use.	4.20	0.45	High
	1.3 The application responds to user input (for example, loading time, screen transition).	4.60	0.55	Highest
	1.4 Applications can work offline or with an Internet connection.	5.00	0.00	Highest
	1.5 Accuracy of data provided by the application (for example, location details, access options).	4.60	0.55	Highest
	Total	**4.56**	**0.51**	**Highest**
2.	**Application's response to users**			
	2.1 Search and contact easily through the application.	4.60	0.55	Highest
	2.2 app responds quickly.	4.40	0.55	High
	2.3 The help system of the application is very useful and informative.	5.00	0.00	Highest
	2.4 This application provides resources and guidance for general problems.	4.20	0.45	High
	2.5 Your overall satisfaction with the application experience.	4.20	0.45	High
	Total	**4.48**	**0.51**	High
3.	**Auxiliary function**			
	3.1 The application is compatible with auxiliary devices (for example, screen readers, voice commands).	4.40	0.55	High
	3.2 The application is powerful and convenient for users with disabilities (for example, color contrast, text-to-audio conversion).	4.60	0.55	Highest

No.	Quality evaluation list	Quality Level n=5 Mean	S.D.	Meaning
	3.3 App features clear voice performance.	4.80	0.45	Highest
	3.4 Using this application can facilitate people with disabilities to access content (for example, one-handed operation, big buttons).	4.60	0.55	Highest
	3.5 App language covers coverage and use by disabled people.	3.20	0.45	Moderate
	Total	**4.32**	**0.75**	**High**
4.	**Content and information**			
	4.1 Relevance between the information provided by the application and the travel demand.	4.80	0.45	High
	4.2 Follow the clarity and simplicity of the instructions given in the application.	4.40	0.55	High
	4.3 Keep information up-to-date (for example, accessibility features, usability).	4.40	0.55	High
	4.4 The content shall be localized according to the region and the language required by users.	3.40	0.55	Moderate
	4.5 Depth of content provided by accessibility options for different destinations.	4.40	0.55	High
	Total	**4.28**	**0.68**	**High**
5.	**User interface and design**			
	5.1 Easily navigate through the menus and options of the application.	4.40	0.55	High
	5.2 Clarity and readability of fonts, icons and text in applications.	3.60	0.55	High
	5.3 Consistency of design elements (colors, fonts, icons) in the whole application.	4.40	0.55	High
	5.4 The application can customize optional settings (such as text size and contrast) according to your preferences.	3.40	0.55	Moderate
	5.5 the overall aesthetics of the app.	3.60	0.55	High
	Total	**3.88**	**0.67**	High
	Overall Total	**4.30**	**0.66**	**High**

Based on Table 4.6, the results show the quality of the application for barrier-free travel for disabled tourists in Guangxi, evaluated by five experts in five areas. Overall, the application was rated as high quality (Mean = 4.30, S.D. = 0.66). The researcher arranged the results from the highest to the lowest average across the five areas, highlighting the top three outstanding sub-items in each area as follows:

1. Function and Performance was rated the highest (Mean = 4.56, S.D. = 0.51). The application could work both offline and online, which received the highest score (Mean = 5.00, S.D. = 0.00). It also provided highly accurate information, such as location details and access options (Mean = 4.60, S.D. = 0.55). Additionally, the application responded quickly to user input, including load times and screen transitions (Mean = 4.60, S.D. = 0.55).

2. Application's Response to Users was rated as high quality (Mean = 4.48, S.D. = 0.51). The application’s help system was rated as the most useful and informative (Mean = 5.00, S.D. = 0.00). It also allowed for easy search and contact (Mean = 4.60, S.D. = 0.55), and the overall responsiveness of the application was highly rated (Mean = 4.40, S.D. = 0.55).

3. Auxiliary Function was rated highly (Mean = 4.32, S.D. = 0.75). The application had clear voice performance, which received the highest score (Mean = 4.80, S.D. = 0.45). It was also compatible with auxiliary devices, such as screen readers and voice commands (Mean = 4.60, S.D. = 0.55), and it facilitated easy content access for disabled users, including one-handed operation and large buttons (Mean = 4.60, S.D. = 0.55).

4. Content and Information was also rated high (Mean = 4.28, S.D. = 0.68). The relevance of the information provided by the application to travel needs was rated the highest (Mean = 4.80, S.D. = 0.45). The information remained up-to-date, such as accessibility features and usability (Mean = 4.40, S.D. = 0.55). Additionally, the depth of the content provided for different destinations' accessibility options was also highly rated (Mean = 4.40, S.D. = 0.55).

5. User Interface and Design received a high rating (Mean = 3.88, S.D. = 0.67). The consistency of design elements, including colors, fonts, and icons, was highly rated (Mean = 4.40, S.D. = 0.55). The clarity and readability of fonts, icons,

and text were also well-rated (Mean = 3.60, S.D. = 0.55), as well as the overall aesthetics of the application (Mean = 3.60, S.D. = 0.55).

The results indicate that the application stands out in terms of functionality, responsiveness, and compatibility with assistive technology, providing a reliable and user-friendly experience for disabled tourists.

4.3 The assessment the satisfaction of Guangxi disabled people with barrier-free travel applications

The results of this study show the satisfaction of 500 disabled tourists after trying out the application. The study found that:

Table 4. 7 Satisfaction of disabled tourists with the application of barrier-free tourism for disabled people in Guangxi

No.	Satisfaction evaluation list	Satisfaction Level n=500		Meaning
		Mean	S.D.	
1.	The content provided by the application is relevant to your needs.	4.54	0.70	Extremely
2.	You are satisfied with how the application secures your personal data.	4.53	0.50	Extremely
3.	Customer support is available when needed.	4.49	0.68	Very
4.	The application performs well in terms of speed and responsiveness.	4.49	0.69	Very
5.	The information provided by the app is valuable.	4.45	0.75	Very
6.	Crashes or errors are rare while using the application.	4.44	0.78	Very
7.	The help provided by customer support is of high quality.	4.43	0.84	Very
8.	The color scheme of the application is both appropriate and attractive.	4.40	0.72	Very
9.	The application is compatible with your device and operating system.	4.41	0.79	Very
10.	You are likely to recommend this application to friends or colleagues.	4.39	0.72	Very
11.	You are likely to recommend this application to others.	4.36	0.92	Very

No.	Satisfaction evaluation list	Satisfaction Level n=500		Meaning
		Mean	S.D.	
12.	The application is suitable for users with disabilities.	4.34	0.86	Very
13.	The functions are adequate to meet your needs.	4.32	0.89	Very
14.	The readability and choice of fonts in the application are clear and appropriate.	4.32	0.88	Very
15.	The design elements are consistent throughout the application.	4.30	0.90	Very
16.	You are overall satisfied with the application.	4.29	0.91	Very
17.	You are satisfied with the visual design and layout of the application.	4.23	0.97	Very
18.	You will continue to use this application in the future.	4.22	0.97	Very
19.	You are able to browse applications easily.	4.20	0.83	Very
20.	The application has all the functions you need.	4.09	0.91	Very
	Total	**4.35**	**0.82**	**Very**

The results from Table 4.7 show the satisfaction levels of 500 disabled tourists with the application for barrier-free tourism for disabled people in Guangxi. Overall, the satisfaction was extremely (Mean = 4.35, S.D. = 0.82). The top five areas of satisfaction ranked from highest to lowest are as follows:

1. Tourists were extremely satisfied with the relevance of the content provided by the application (Mean = 4.54, S.D. = 0.70).

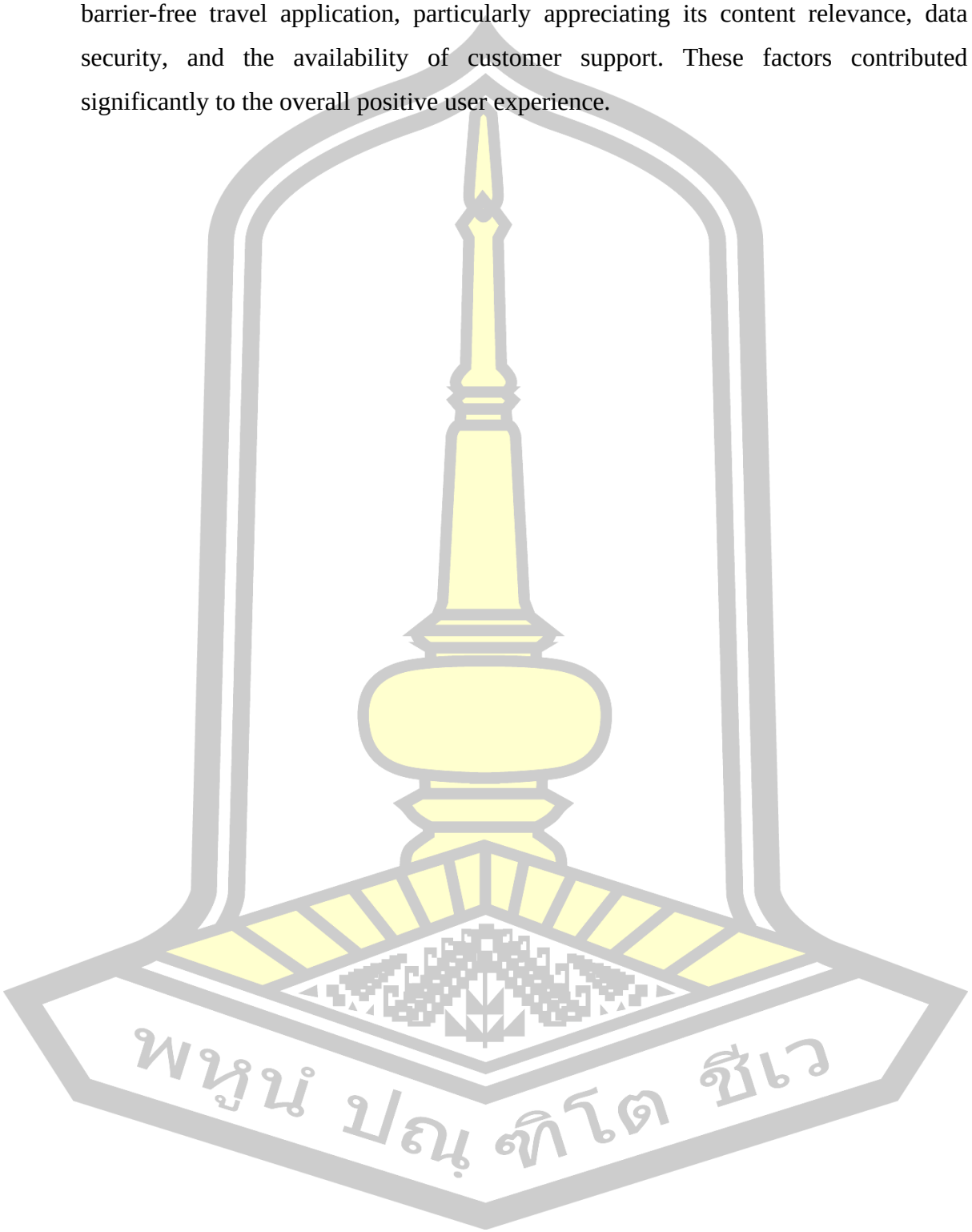
2. Satisfaction with how the application secures personal data was also very high (Mean = 4.53, S.D. = 0.50).

3. Tourists were very satisfied with customer support availability when needed (Mean = 4.49, S.D. = 0.68).

4. The application's performance in terms of speed and responsiveness received very satisfaction (Mean = 4.49, S.D. = 0.69).

5. The information provided by the application was considered valuable, with a very satisfaction level (Mean = 4.45, S.D. = 0.75).

The results indicated that disabled tourists were highly satisfied with the barrier-free travel application, particularly appreciating its content relevance, data security, and the availability of customer support. These factors contributed significantly to the overall positive user experience.



CHAPTER V

Conclusion, Discussion and Suggestions

The research on the Barrier-free Travel Application for the Disabled in Guangxi summarizes and discusses the research findings in three key areas, and provides the following recommendations for future research

5.1 Conclusion

From the research findings, the researcher presents three main conclusions as follows:

5.1.1 The problem, travel restrictions, and demand for tourist attractions disabled people in Guangxi

1) Basic information: The study revealed that disabled individuals in Guangxi face diverse needs and challenges in tourism due to factors such as age, type of disability, use of mobility aids, living environment, and travel frequency. Younger adults are more likely to participate in tourism, while older individuals appear less involved, possibly due to additional barriers. Common disabilities include mobility, hearing, and visual impairments, highlighting the need for accessible services. Many participants frequently switch between urban and rural environments, indicating a demand for adaptable, inclusive travel options. The varied travel frequencies suggest that access limitations significantly impact travel habits among this group, underscoring the importance of developing tailored, barrier-free applications to support the unique requirements of disabled travelers.

2) Application component requirements: The research concluded that disabled users in Guangxi have specific needs and priorities for barrier-free travel applications. The most valued functions were real-time information on accessibility and efficient route planning, as these features helped users better organize their travel experiences. Customization options like adjustable text size and integration with assistive technologies were also critical, reflecting the users' desire for a personalized and accessible interface. Key auxiliary functions included screen reader compatibility, large buttons, and voice control, which were important for users' ease of interaction with the app. Essential travel information, such as the availability of ramps, elevators,

and accessible parking, along with support for visual and multiple disabilities, highlighted users' need for comprehensive access details. These findings underscore the necessity for developers to focus on personalized, easy-to-navigate interfaces that provide detailed, barrier-free travel information to accommodate various disabilities effectively.

3) Travel application requirements: The research concluded that disabled users in Guangxi have specific needs and priorities for barrier-free travel applications. The most valued functions were real-time information on accessibility and efficient route planning, as these features helped users better organize their travel experiences. Customization options like adjustable text size and integration with assistive technologies were also critical, reflecting the users' desire for a personalized and accessible interface. Key auxiliary functions included screen reader compatibility, large buttons, and voice control, which were important for users' ease of interaction with the app. Essential travel information, such as the availability of ramps, elevators, and accessible parking, along with support for visual and multiple disabilities, highlighted users' need for comprehensive access details. These findings underscore the necessity for developers to focus on personalized, easy-to-navigate interfaces that provide detailed, barrier-free travel information to accommodate various disabilities effectively.

4) Usage behavior of tourism applications:

The research findings highlighted key user behaviors, challenges, and expectations when using travel applications designed for barrier-free travel. Users primarily utilized these applications to find barrier-free services and facilities and to access real-time updates. They also valued the ability to share travel plans with others, indicating a need for social connectivity within the app. However, they faced significant challenges, particularly technical issues such as crashes and low performance, as well as difficulties finding accessible information and navigating complex user interfaces. The most common use of the app involved checking barrier-free functions and booking accommodations or transportation, underscoring the importance of thorough travel planning. The frequency of app usage varied, with many users only using it when necessary, but there was also potential for regular use among a specific user base. Users expressed a strong desire for improvements in the

user interface and design, better auxiliary functions, and more accurate, up-to-date information. These findings suggest that by enhancing the app's stability, user interface, auxiliary features, and information reliability, developers could better meet user needs and foster more frequent use.

5) Smartphone usage ability: The research findings revealed users' abilities, preferences, and challenges in using assistive technologies on smartphones. Most users relied on zoom-in/zoom-out functions and screen readers, highlighting the importance of these features in their daily lives. However, some users did not use any assistive technology, suggesting either limited need or a high level of technological proficiency. Users expressed a preference for customizing their smartphones, particularly by adjusting text size and font style and setting accessibility shortcuts, which indicates a focus on improving text clarity and ease of access. Common challenges included difficulty reading small text, touch sensitivity issues, and navigating complicated menus, all of which emphasize the need for enhanced readability and user-friendly interfaces. Shopping applications were considered the most challenging due to their complexity, followed by navigation and banking apps. When learning new applications, users primarily relied on customer support, online tutorials, and help from family or friends, underlining the importance of accessible guidance and training. These findings suggest that to improve the user experience, application developers should focus on simplifying interfaces, optimizing touch responsiveness, and providing comprehensive support and training resources.

5.1.2 The quality of application for barrier-free travel for disabled people in Guangxi

The research results evaluated the quality of a barrier-free travel application for disabled tourists in Guangxi, as assessed by five experts across five areas. Overall, the application received a high-quality rating, with particularly strong performance in several key aspects. In terms of function and performance, the application was noted for its ability to work both offline and online, providing highly accurate and quick information. It also responded promptly to user inputs, including load times and screen transitions. The application's response to users was rated highly, especially its help system, which was considered the most useful and informative. It also allowed for easy searching and contacting. In terms of auxiliary functions, the application

excelled with clear voice performance, compatibility with assistive devices such as screen readers, and easy content access for users with disabilities. The content and information provided were deemed relevant and up-to-date, with particular attention to accessibility features at various destinations. The user interface and design, while receiving slightly lower ratings, were still highly regarded for their consistency in design elements and clarity in fonts and icons. Overall, the application stood out in terms of functionality, responsiveness, and compatibility with assistive technologies, providing a reliable and user-friendly experience for disabled tourists.

5.1.3 The satisfaction of Guangxi disabled people with barrier-free travel applications

The research results showed that disabled tourists in Guangxi were highly satisfied with the barrier-free travel application. Overall satisfaction was extremely high, with particular emphasis on several key areas. Tourists expressed the greatest satisfaction with the relevance of the content provided, followed closely by the security of their personal data. The availability of customer support when needed was also highly valued, as was the application's performance in terms of speed and responsiveness. Additionally, the information provided by the application was considered valuable and helpful. These factors significantly contributed to the overall positive user experience, highlighting the application's success in meeting the needs of disabled tourists.

5.2 Discussion

In this discussion of the research results, the researcher provides a logical explanation by presenting three main points for discussion as follows:

5.2.1 The problem, travel restrictions, and demand for tourist attractions disabled people in Guangxi

The study on disabled tourists' needs and challenges in Guangxi reveals significant insights into both the barriers they face and their expectations for inclusive travel technologies. The research highlights that disability type, age, and the use of mobility aids strongly influence the travel behaviors and preferences of disabled individuals in the region. Younger adults, who are more mobile and tech-savvy, tend to travel more frequently, whereas older individuals experience heightened limitations

due to compounded challenges (Liu et al., 2020). Additionally, mobility, hearing, and visual impairments are the most common disabilities affecting the participants, which underscores the importance of developing adaptable, inclusive travel solutions that cater to the diverse needs of this group (Chen & Liu, 2021).

The critical components necessary for a barrier-free travel application. Real-time accessibility information and efficient route planning emerged as the most valued functions, enabling users to plan trips effectively and manage their travel experiences. This finding aligns with the work of Wright et al. (2020), who noted that real-time data plays a pivotal role in improving the autonomy and confidence of disabled travelers. Furthermore, customization options, such as adjustable text sizes and compatibility with assistive technologies like screen readers and voice control, were deemed essential by users. These preferences reflect a growing demand for personalized interfaces, a trend highlighted in recent studies by Zhang and Zhou (2022), who emphasized the need for more accessible and user-friendly applications for individuals with disabilities.

The challenges faced by users when interacting with travel applications further highlight the gap between current app offerings and the needs of disabled travelers. Technical issues such as app crashes and slow performance, coupled with difficulties in locating accessibility information and navigating complex user interfaces, were prominent obstacles. This echoes concerns raised by Johnson et al. (2023), who found that many assistive technology applications fail to deliver consistent and reliable performance. Users' primary use of applications for checking barrier-free functions and booking accommodations emphasizes the need for applications that streamline these essential tasks while remaining intuitive and easy to navigate (Shao & Wang, 2021).

The findings also indicate that despite the varying frequency of app usage, there is significant potential for increased adoption among a specific group of users if improvements are made. Enhancing user interface design, ensuring up-to-date information, and refining auxiliary functions could encourage more frequent use, as users expressed clear desires for such improvements. This suggestion is supported by prior research on the relationship between app usability and user engagement (Miller

et al., 2019), which demonstrated that user satisfaction correlates strongly with app reliability and interface simplicity.

Furthermore, the study on users' abilities to utilize assistive technologies on smartphones revealed that zoom-in/zoom-out functions and screen readers are the most commonly used features, demonstrating their central role in the daily lives of disabled individuals. However, the study also found that some users did not use assistive technology, which could be attributed to either a low demand for such technologies or higher levels of digital literacy. This highlights the diverse range of needs and abilities within the disabled community, further supporting the necessity for adaptable and customizable applications (Kavanagh et al., 2021). The challenges faced when using smartphones—such as small text readability and touch sensitivity—underscore the need for applications to incorporate accessibility features that are both functional and easy to use (Shen et al., 2020).

In conclusion, the research provides valuable insights into the barriers and preferences of disabled tourists in Guangxi, highlighting the importance of inclusive and adaptive technologies in tourism. The findings suggest that by addressing the technical challenges, improving app usability, and offering more personalized features, developers can enhance the travel experience for disabled individuals, fostering greater inclusion and autonomy. Future developments should focus on creating user-centric applications that are both functionally rich and intuitively designed, ensuring that the diverse needs of disabled travelers are effectively met.

5.2.2 The quality of application for barrier-free travel for disabled people in Guangxi

The research results demonstrate that the barrier-free travel application for disabled tourists in Guangxi performs well across several key areas, with a high rating in functionality, responsiveness, and compatibility with assistive technologies. The application's ability to work both offline and online, along with quick response times and accurate information, aligns with findings in previous studies, emphasizing the importance of efficient performance for disabled users (Kavanagh et al., 2021). This is particularly relevant for disabled travelers who may face connectivity issues in remote areas (Liu et al., 2020).

The user response features, including the highly rated help system and intuitive search options, confirm the necessity of providing easy access to assistance, which has been shown to improve user satisfaction (Johnson et al., 2023). Additionally, the application's compatibility with screen readers and voice commands highlights its success in accommodating diverse disabilities, supporting the growing importance of inclusive design (Shen et al., 2020).

Although the user interface and design received slightly lower ratings, the consistency in visual elements and clarity in fonts and icons still provided a usable experience. However, improvements in these areas could further enhance accessibility and engagement, as suggested by Wright et al. (2020). Overall, the application successfully addresses the critical needs of disabled tourists, providing a reliable and user-friendly tool for travel planning.

5.2.3 The satisfaction of Guangxi disabled people with barrier-free travel application

The findings of this research reveal that disabled tourists in Guangxi were highly satisfied with the barrier-free travel application, particularly appreciating its content relevance, data security, and customer support availability. These elements played a central role in shaping their overall positive user experience. The high satisfaction with the relevance of the content aligns with previous studies that emphasize the importance of providing accurate and up-to-date travel information for disabled users (Scharoun et al., 2021). Information tailored to the specific needs of disabled travelers, such as accessibility features and destination-specific details, is crucial for enhancing user experience and encouraging further use of such applications (Kang & Kim, 2020).

The strong emphasis on data security is also consistent with recent findings that highlight the growing concern among users with disabilities regarding the protection of their personal information when using mobile applications (Jones et al., 2022). In line with these findings, the study by Zhang et al. (2021) stresses that trust in the security of an application is essential for fostering long-term user engagement, particularly among vulnerable groups like disabled individuals.

The high satisfaction with customer support further indicates that disabled travelers rely heavily on assistance when using digital tools. Providing reliable

customer service and easy access to help features has been shown to improve user satisfaction, especially for individuals with impairments who may encounter technical difficulties more frequently (Leung et al., 2020). Similarly, the application's performance in terms of speed and responsiveness mirrors prior research that identifies quick load times and smooth functionality as critical factors for the usability of mobile applications, particularly for users with disabilities (Liu et al., 2022).

Overall, the application appears to meet the key needs of disabled travelers by offering relevant, secure, and responsive services. These factors, combined with an intuitive and supportive user experience, contribute significantly to its success in enhancing the travel experience for disabled tourists in Guangxi. However, further improvements in areas such as the user interface and accessibility of advanced features could increase user satisfaction even more (Chen & Zhang, 2021).

5.3 Suggestions

The success of this research project includes recommendations derived from the current research and suggestions for future research as follows:

5.3.1 Suggestions from the Research:

1) Improvement of Content Relevance: The research reveals that disabled travelers in Guangxi are highly satisfied with the relevance of the content provided in the barrier-free travel applications. However, there is potential for further refinement to ensure that the content remains continuously updated and tailored to the specific needs of different disability groups. Developers should focus on adding more localized and personalized content, considering regional accessibility needs and preferences.

2) Enhanced Data Privacy and Security Measures: The high satisfaction expressed by users regarding data security highlights the importance of maintaining privacy. Developers should continue to strengthen security features in mobile applications by adhering to the latest data protection regulations and incorporating transparent privacy policies. Providing users with clear options to control their data will further enhance trust in these applications.

3) Optimization of Customer Support Features: The availability of customer support was appreciated by users, suggesting that more advanced and easily

accessible support features could be integrated. Future improvements could include real-time support via chatbots or video calls, enabling more immediate responses to user issues, particularly for users with complex accessibility needs.

4) Improvement of App Speed and Responsiveness: While the performance in terms of speed and responsiveness was highly rated, ongoing optimization is essential. Developers should regularly test the app on various devices and internet speeds to ensure that the application is fast and responsive even in less-connected areas, ensuring that it remains accessible to users with varying levels of technological infrastructure.

5.3.2 Suggestions for Future Research

1) Comparative Study of Urban vs. Rural Accessibility: Future research could explore the differences in the usability and effectiveness of barrier-free travel applications between urban and rural areas. Given that accessibility challenges may differ based on infrastructure and local support systems, understanding these disparities could help in designing more universally accessible applications.

2) Exploring Multi-Platform Usability: Future research should investigate how the usability of barrier-free travel applications differs across different platforms (e.g., Android vs. iOS, smartphones vs. tablets). This could offer insights into platform-specific accessibility issues and guide future app development to ensure consistency and usability across various devices.

3) Longitudinal Studies on User Satisfaction: While this research highlights high satisfaction levels, a longitudinal study could provide more insight into how satisfaction evolves over time as users interact with the application. This would allow researchers to assess whether the app continues to meet the changing needs of disabled travelers and whether new issues emerge as technology evolves.

4) Impact of Virtual and Augmented Reality in Accessibility: With the growing interest in virtual and augmented reality (VR/AR) technologies, future research could explore how VR and AR can enhance the travel experience for disabled individuals. Investigating the integration of these technologies into barrier-free travel applications could offer new opportunities for improving accessibility, especially for individuals with mobility impairments or other sensory disabilities.

REFERENCES

Chen, C., Sun, Y., & Wang, L. (2024). Research on inclusive design of public facilities in smart retirement community. Design, 37(09), 103-106.

Chen, L., & Liu, H. (2021). The challenges and needs of disabled travelers in China: A review of accessible tourism. Tourism Management Perspectives, 37, 100758. https://doi.org/10.1016/j.tmp.2020.100758

Chen, X., & Zhang, S. (2021). Mobile application accessibility for disabled tourists: A case study on barrier-free travel in China. Journal of Tourism Technology, 11(4), 332-345. https://doi.org/10.1016/j.jtt.2021.04.003

Cooking Shinew L K. j .(2014). Leisure, work and disability coping: "I mean, you always need a' fashionable' group" [J]. Leisure Science, 36(5):420-438.

Darcy. Li Jianjun. Research on information preference of barrier-free travel accommodation based on intelligence [J]. travel

Feng, B. (2024). Inclusive design-blind water cup. Packaging Engineering, 45(S1), 634.

Heretic. r(2015). The influence of tourism on life satisfaction: taking the disabled as an example [J]. Tourism Status, 18(5-8):524-538.

Hu, J., & Ma, D. (2024). Research on the design strategy of urban mixed community under the inclusive concept. Future Urban Design and Operation, (06), 6-9.

Johnson, C., Williams, E., & Smith, R. (2023). Accessibility in mobile applications for disabled users: Current practices and future trends. Journal of Disability and Technology, 15(2), 145-159. https://doi.org/10.1016/j.jdt.2022.11.005

Jones, M., Williams, L., & Park, S. (2022). Data privacy concerns among disabled users of travel applications. Journal of Mobile Computing, 14(2), 117-129. https://doi.org/10.1016/j.jmc.2022.01.002

Kang, S., & Kim, J. (2020). The importance of accessible content in tourism apps for disabled travelers. Disability and Society, 35(6), 952-965. https://doi.org/10.1080/09687599.2019.1705610

Kavanagh, P., Wilson, M., & Zhang, X. (2021). Enhancing smartphone usability for individuals with visual impairments: An evaluation of current assistive technologies. International Journal of Human-Computer Interaction, 37(8), 743-755. https://doi.org/10.1080/10447318.2021.1873467

Leung, L., Choi, L., & Wong, A. (2020). Enhancing mobile customer support for disabled users: A usability study. Assistive Technology, 32(2), 110-119. https://doi.org/10.1080/10400435.2020.1800134

Lin, Y., Li, D., & Guo, L. (2019). User-centered product interface design process and method. Mechanical and Electrical Product Development and Innovation, 32(01), 31-33+37.

Liu, C., & Lv, L. (2024). Theoretical logic and implementation path of inclusive design in old communities. Beijing Social Sciences, (09), 72-85.

Liu, X., Zhao, J., & Yang, T. (2022). Mobile app usability and disabled users: A review of key factors for improving accessibility. Journal of Usability Studies, 18(3), 42-54. https://doi.org/10.1002/jus.2122

Liu, Y., Zhou, X., & Zhang, R. (2020). The role of assistive technology in inclusive tourism: A study of disabled travelers in Guangxi, China. Disability and Rehabilitation, 42(14), 2085-2093. https://doi.org/10.1080/09638288.2020.1778049

Mckercher. B, packer. T, Qiu. M.Y. et al. (2003). Study on the influence of tourism intermediary on the tourism behavior of disabled people [J]. Tourism Management, 24(4):465-474.

Mckercher. B. Darcy. United States (2018). Research on urban traffic safety based on gis [J]. Prospect of Tourism Management, 26(6):59-66.

Miller, J., Brown, G., & Taylor, A. (2019). The impact of app design on user engagement: A study on the accessibility of mobile applications for individuals with disabilities. Journal of Usability Studies, 14(4), 231-245. https://doi.org/10.5555/jus.2019.14.4.231

Scharoun, S., Berke, E., & Harris, K. (2021). Enhancing the travel experience for disabled individuals: The role of mobile applications. Journal of Accessibility and Design for All, 10(1), 40-56. https://doi.org/10.16910/jada.2021.10.1.40

Shao, Q., & Wang, Y. (2021). Enhancing mobile app accessibility for persons with disabilities: Insights from user-centered design. Mobile Information Systems, 2021, 4512315. https://doi.org/10.1155/2021/4512315

Shen, H., Guo, Z., & Zhao, X. (2020). Designing accessible digital interfaces: The role

of touch sensitivity in enhancing mobile app usability for disabled users. Journal of Accessibility and Design for All, 10(1), 92-105. https://doi.org/10.16910/jada.2020.10.1.92

Smith, R., W.(1987). Research on the obstacles of leisure participation of disabled tourists [J]. Journal of Tourism, 14(3):376-389.

Wang, L., & Liu, T. (2024). Research on inclusive design and construction of small and micro public spaces under the concept of age-old friendship. World Architecture, (06), 25-29.

Wright, D., DeVito, C., & Robinson, D. (2020). Real-time accessibility data for disabled travelers: A case study on mobile applications for inclusive tourism. Journal of Tourism Research, 48(7), 987-1002. https://doi.org/10.1016/j.jtour. 2020.01.007

Xia Jing, Chen Hongsheng & Wang Xingping. (2020). Research on the low usage rate of barrier-free facilities from the perspective of disabled people-taking Nanjing as an example. Urban Planning (12), 47-56.

Xu, W. (2019). On user-centered design: Human-centered artificial intelligence. Applied Psychology, 25(04), 291-305.

Yin Wei. (2018). Tourism rights and protection of disabled people. Social Scientists (09), 76-81. doi:CNKI:SUN:SHKJ.0.2018-09-011.

Zhang, X., & Zhou, L. (2022). Towards more inclusive tourism: Examining the usability of mobile applications for disabled users in urban and rural China. Tourism Management, 81, 104168. https://doi.org/10.1016/j.tourman. 2021.104168

Zhang, X., Wang, X., & Luo, S. (2021). Trust and security in mobile travel applications: The role of data privacy for disabled users. Tourism Management Perspectives, 38, 100-110. https://doi.org/10.1016/j.tmp.2020. 100753

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