Barrier–Free Travel Application for the Disabled in Guangxi

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Abstract

This research aimed 1) to develop a barrier–free travel application for the disabled in Guangxi, 2) to evaluate the quality of the barrier–free travel application for disabled people in Guangxi, and 3) to assess the satisfaction of disabled people in Guangxi with the barrier–free travel application. A quantitative approach is employed, with a sample of 500 participants determined using Taro Yamane's formula. Data collection is conducted online using the following tools: the Barrier–Free Travel Application, an application quality evaluation, and a satisfaction assessment survey. Descriptive statistics, including mean and standard deviation, are used to analyze the data. The study aims to develop a barrier–free travel application tailored to the needs of individuals with disabilities in Guangxi. The application includes eight essential components: 1) registration and login, 2) accessibility settings, 3) barrier–free travel route planning, 4) locating accessible services and facilities, 5) booking functionality, 6) real–time updates and notifications, 7) social sharing, and 8) feedback and support. Expert evaluations of the application's quality reveal high scores across five main dimensions, particularly in functionality, responsiveness, and compatibility with assistive technologies. The application provides a reliable and user–friendly experience for disabled travelers. Furthermore, a survey of 500 disabled users in Guangxi indicates high satisfaction, with users particularly valuing the content, data security, and availability of customer support. These factors significantly contribute to the positive overall user experience.

Keywords: barrier–free travel; travel app for disabled; accessibility in tourism; Guangxi

Introduction

According to the Report on the Cause for Persons with Disabilities in China in 2022, there are approximately 85 million disabled people in China, with 3.3 million residing in Guangxi. Among those in Guangxi, 1.34 million are officially registered by the government, including individuals with visual, hearing, speech, and motor impairments (Zheng & Yang, 2022). Despite these numbers, discussions around the rights of disabled people often emphasize employment, education, and marriage, while neglecting their rights to leisure and tourism. However, access to tourism is a fundamental human right for disabled individuals and is integral to their overall quality of life (Chen, 2023)

Research indicates that disabled people face significant barriers to travel, including inadequate transportation, insufficient facilities, and limited access to information. While Guangxi is rich in natural and cultural tourism resources, such as Yangshuo and Beihai, disabled people are often unable to fully enjoy these attractions due to the lack of accessible infrastructure (Xia et al., 2020). The challenges are compounded by incomplete barrier–free facilities, inadequate hotel accommodations, and a lack of accessible tourism information, such as barrier–free maps and Braille guides. These issues create significant obstacles, not only for disabled individuals but also for other travelers with mobility difficulties, such as the elderly, pregnant women, and families with strollers. In light of these challenges, mobile applications have become a crucial platform for providing travel services. However, current travel apps rarely address the specific needs of disabled people, such as information on accessible facilities or specialized services. This research aims to develop a barrier–free travel app for disabled individuals in Guangxi, providing accessible travel planning, accommodation booking, and real–time navigation services. The app is designed to meet the unique needs of disabled travelers, promote equitable access to tourism, and support the development of barrier–free services in Guangxi, thereby fostering greater social inclusion and economic growth in the region.

Additionally, this research provides significant benefits in promoting equality in tourism for people with disabilities by developing an application that caters to accessible travel needs. It not only improves the quality of life for disabled individuals but also boosts the local economy by expanding the group of tourists with special needs. Additionally, it serves as a guideline for developing technologies and services that enhance fairness and understanding within society.

Research objective

1. To develop a barrier–free travel application for the disabled in Guangxi.

2. To evaluate the quality of the barrier–free travel application for disabled people in Guangxi.

3. To assess the satisfaction of disabled people in Guangxi with the barrier–free travel application.

Scope of Research

Media content:

1) Barrier–free information: Provides geographic information data for Guangxi, including real–time detailed information on barrier–free facilities such as urban roads, public transport facilities, tourist attractions, and accommodation.

2) Personalized itinerary planning: Users can create customized itineraries according to their barrier–free needs, interests, and preferences.

3) Community participation: Provide online information, evaluation, and suggestion functions, facilitate disabled people's communication with each other, share tourism experiences, suggestions, and opinions, and form a supportive tourism community.

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

Population and Samples

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

Samples: The sample included mobility–impaired individuals in Guangxi Province who tested the application. A convenience sampling method was used, with 500 participants voluntarily joining the study. They participated in an online application test developed by the researchers.

Research variables

Independent variables: Application for barrier–free travel for disabled people in Guangxi

Dependent Variable:

1) Quality of application for barrier–free travel for disabled people in Guangxi.

2) Satisfaction of Guangxi disabled people with barrier–free travel applications.

Research Area: The research scope is limited to Guangxi Zhuang Autonomous Region, China. As a region rich in natural and cultural resources, Guangxi provides a variety of travel opportunities, making it an ideal focus for developing barrier–free travel applications.

Literature Reviews

Related theories

1. Accessibility Theory

Primarily focuses on ensuring that people with disabilities can fully access and utilize various environments, tools, and technologies without barriers. It is an integral part of inclusive design and development, addressing the need for equitable experiences for all users, particularly those with disabilities. There are 4 important principles and 3 best practices. (W3C Web Accessibility Initiative (WAI), n.d.; International Organization for Standardization (ISO), 2018)

1.1 Perceivability: Ensuring information and components are presented in ways that can be perceived by users through multiple sensory modalities, such as providing text alternatives for images or captions for videos.

1.2 Operability: Systems and interfaces should be navigable by all users, regardless of their ability to use traditional input devices like a mouse or keyboard. Voice commands, screen readers, and other assistive technologies are essential in this principle.

1.3 Understandability: The content and user interfaces should be easy to understand, making sure instructions, functions, and user paths are clearly communicated.

1.4 Robustness: The content must remain accessible across a wide variety of devices, platforms, and assistive technologies, ensuring longevity and adaptability.

2. Best Practices

2.1 Use of assistive technologies: Incorporating screen readers, voice recognition, and text–to–speech tools.

2.2 Design with contrast and simplicity: High contrast and readable fonts benefit both users with visual impairments and those in different lighting environments (e.g., bright sunlight or dark rooms).

2.3 Consistent structure: Uniformity in the design, such as navigation menus and buttons, ensures ease of use and reduces cognitive load.

3. Benefits

3.1 Inclusive participation: Accessibility promotes equal opportunities by allowing people with disabilities to participate fully in society.

3.2 Improved user experience: Designing with accessibility in mind often improves usability for all users, including those with temporary impairments or situational challenges.

3.3 Compliance and legal adherence: Many countries have legal frameworks mandating accessibility (e.g., the ADA in the U.S.), and adherence to these can prevent legal consequences.

Accessibility Theory is applied in Barrier-Free Travel Apps, accessibility ensures that users with disabilities can easily access information and navigate the city without barriers. Techniques such as adding voice guidance, wheelchair-friendly routes, and maps with accessible public services improve the user experience.

4 Application Design Theory

focuses on principles and methodologies for creating user-centric, efficient, and engaging applications. This theory integrates several subfields like user experience (UX) design, user interface (UI) design, and interaction design, while addressing factors such as usability, accessibility, functionality, and aesthetics. Below is a summary of key principles, best practices, and their usefulness.

4.1 User-Centered Design (UCD): UCD focuses on designing applications that take into account the needs, behaviors, and preferences of the end user. It focuses on user research, personas, and usability testing to create designs that are appropriate for the user's task and context, ensuring relevance to real-world use, and providing a more user-friendly and enjoyable experience by prioritizing usability (Norman, 2013).

4.2 Usability: Usability measures how effectively users can accomplish their goals using an application. Conducting usability testing with real users improves interface design, simplifies navigation, and minimizes errors. A well-designed, usable application reduces the learning curve, increases user satisfaction, and enhances productivity (Nielsen, 1993).

4.3 Accessibility: Accessibility ensures that an application is usable by individuals with disabilities. Adopting practices such as the Web Content Accessibility Guidelines (WCAG) and ISO 9241 helps to provide inclusive access for all users, regardless of their abilities. Enhancing

accessibility broadens the potential user base and promotes inclusivity (W3C Web Accessibility Initiative (WAI), n.d.).

4.4 Consistent Interface Design: Consistent design refers to maintaining uniformity in visual elements (such as icons and buttons) and interaction patterns (like navigation flow and feedback mechanisms). Using consistent design patterns across the app helps users quickly understand how to navigate, reducing cognitive load. Consistency fosters familiarity, improving ease of use and minimizing confusion (Shneiderman & Plaisant, 2010).

4.5 Mobile–First and Responsive Design: Mobile–first design prioritizes the user experience on small screens before expanding to larger devices. Techniques such as flexible grids, scalable images, and media queries ensure that the application performs well across different devices. This mobile–first approach offers a seamless experience on smartphones, tablets, and desktops (Marcotte, 2011).

When developing a Barrier–Free Travel Application for the Disabled in Guangxi, accessibility theory plays a critical role. By designing for inclusivity, leveraging assistive technologies, and following accessibility standards like WCAG, the app can provide a seamless experience for disabled users. Moreover, usability principles ensure that the interface is intuitive, regardless of users' physical abilities, improving both ease of use and satisfaction.

Researches Related

Research paper "Accessible Tourism: A Review of Recent Research Trends and Future Agenda" by M. da Silva Soares Costa et al. (2024) explores the significant barriers faced by over 15% of the global population living with disabilities, particularly regarding their access to tourism experiences. The authors highlight the architectural and communication obstacles that hinder these individuals from fully enjoying public and private spaces, stressing the importance of inclusive practices to enhance their autonomy in tourism. In light of the COVID–19 pandemic, which severely impacted the tourism sector, the study reviews various aspects of tourism accessibility for people with disabilities in the post–pandemic context. It identifies a gap in the literature concerning the new normal's impact on accessibility and emphasizes the need for comprehensive stakeholder perspectives. The authors synthesized findings from peer–reviewed articles published in the Scopus database between 2020 and 2022, providing insights into the challenges, benefits, and emerging trends in accessible tourism. The paper concludes by suggesting future research agendas focusing

on planning, development, and management strategies to improve tourism accessibility for individuals with disabilities.

The study "Assessing Accessible Travel Satisfaction in Old Communities: A SEM Study" by Fan et al. (2024) addresses the pressing issue of accessibility for individuals with disabilities, the elderly, and pregnant women in China, particularly within aging communities like Nanchang City. The research identifies critical factors that influence satisfaction with accessible travel in these areas, utilizing interviews, surveys, questionnaires, and literature reviews to construct a satisfaction model. The model includes five key dimensions of evaluation: pedestrian pathways, public spaces, signage guidance, social support, and software provision, comprising a total of twenty–seven influencing factors. Structural Equation Modeling (SEM) was employed to validate the model, revealing that social support, pedestrian pathways, and public spaces significantly impacted overall satisfaction. In contrast, software provision and signage guidance had lesser effects. The findings highlight that vulnerable community members prioritize operational maintenance and cultural advocacy within social support, alongside essential features of pedestrian pathways and public spaces, such as elevation treatment, pavement design, and rest facilities. The study concludes with optimization strategies and development proposals based on the weighted ranking of these factors, contributing to improved community accessibility for socially vulnerable groups. Ultimately, this research aims to enhance the quality of life for these groups and support the development of accessible environments in aging communities.

The study "Towards an Evaluation System of Disabled Individuals' Friendly Communities from the Perspective of Inclusive Development—A Case Study in Jinan" by Wen et al. (2023) focuses on the ongoing barriers faced by people with disabilities in urban environments, despite improvements in travel quality due to urban renewal in China. It emphasizes the importance of ensuring that all urban residents, including disadvantaged groups, have equal access to services and rights, aligning with the principles of inclusive development. The research investigates the travel needs and behavior patterns of disabled individuals to promote their equal participation in urban spaces. It assesses how various urban land uses and service facilities affect the availability of barrier–free amenities. The authors establish an evaluation system to gauge the accessibility of these facilities in specific areas, identifying shortcomings through data analysis and geographic weighting. Ultimately, the study aims to address the travel challenges faced by underprivileged groups,

proposing strategies to enhance their access to opportunities and resources. The findings contribute to the understanding of inclusive development and aim to foster improvements in community design for disabled individuals.

Research Methodology

1. Research Tools

1.1 Application for barrier-free travel for disabled people in Guangxi.

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

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

2. Quality Control of Research Tools

The quality of the three research instruments was assessed by evaluating their content validity and reliability to determine overall quality as follows:

2.1 Content Validity: Content validity involved assessing whether the research instruments covered the relevant topics intended to be measured. Five experts evaluated the appropriateness of each item on the assessment using a scale ranging from –1 (irrelevant) to 0 (uncertain) to +1 (relevant). The researcher used the evaluations to calculate the item-objective congruence (IOC) index, setting the quality criterion for the instruments at an IOC value of 0.70 or above.

2.2 Reliability: Reliability was measured to assess the accuracy of the research instruments through test-retest methods. The instruments were tested on a sample of 50 participants over two different weeks, and the results were compared using Cronbach's alpha coefficient. A value of 0.88 was obtained, indicating that the instruments had a high level of reliability.

3. Data Collection

3.1 Development of a Barrier-Free Travel Application for People with Disabilities in Guangxi. The study surveyed 500 individuals with mobility disabilities in Guangxi who volunteered and met the specified criteria. Data collection was conducted through an online survey to understand their travel needs and challenges. The collected data informed the application's design, which

focused on accessible tourist attractions, routes, and facilities. The application enabled people with disabilities to plan accessible trips and supported tourism agencies in promoting inclusive travel.

3.2 Evaluation of the Quality of the Barrier-Free Travel Application for People with Disabilities in Guangxi. Five experts in accessibility and technology, along with end-users and caregivers, evaluated the application. Their feedback improved its functionality, usability, and design, ensuring the application met accessibility standards and user needs.

3.3 Assessment of Satisfaction Among People with Disabilities in Guangxi Using the Barrier-Free Travel Application. A group of 500 participants from Guangxi, who volunteered and met the specified criteria, tested the application online and participated in a satisfaction survey. They provided feedback on its strengths and areas for improvement. Positive reviews validated its usability, encouraged its adoption, and raised awareness of accessible tourism. The application allowed users to travel independently while fostering inclusivity.

This systematic approach ensured that the development, evaluation, and practical application of the app effectively achieved its objectives.

4. Data Analysis

This quantitative research collected data using two instruments: 1) the application quality assessment, and 2) a satisfaction survey of the sample group regarding the use of the "Application of Barrier-Free Tourism for Disabled People in Guangxi." The researcher analyzed the data using descriptive statistics to determine the mean and standard deviation.

Research Results

The findings from this research are presented as follows:

1. The outcomes of developing barrier-free travel applications for disabled people in Guangxi. The development of the barrier-free travel application for disabled individuals in Guangxi was based on the needs and limitations of people with mobility impairments in the region. The application was designed with a set of functions to support users in planning and managing their accessible travels. The following are the functions developed in the application, along with the 8 steps involved in its usage:

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.

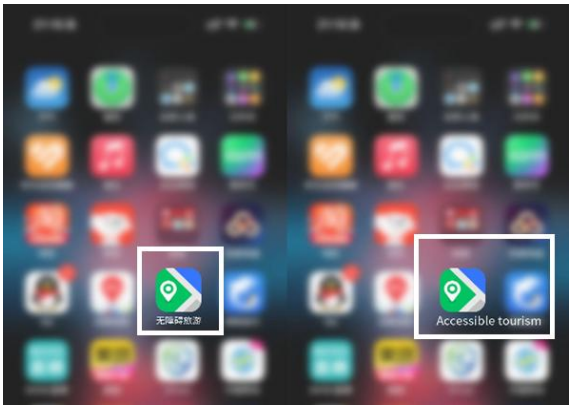

Figure 1 Guangxi Disabled Travel App Icon Displays Chinese and English

Figure 2 Guangxi Disabled Travel App Settings Interface Displays Chinese and English

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.

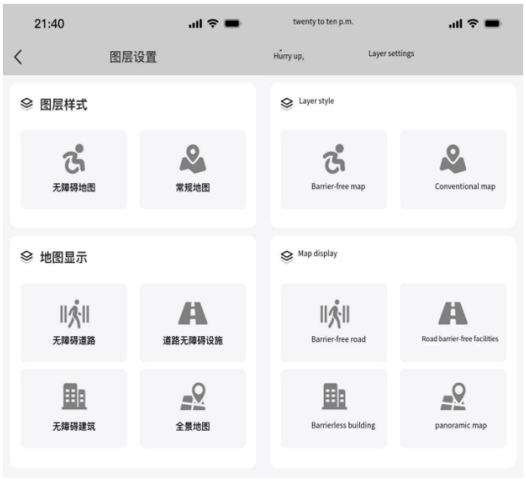

Figure 3 Accessible Travel APP Settings for Disabled People in Guangxi: Accessible Options

Figure 4 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.

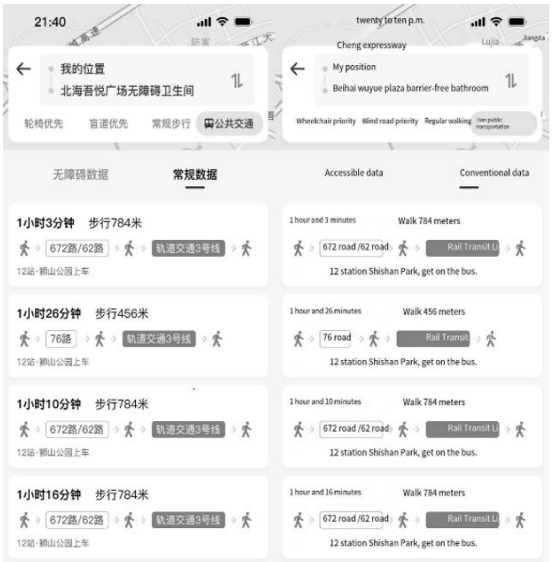

Figure 5 The best navigation interface for the disabled

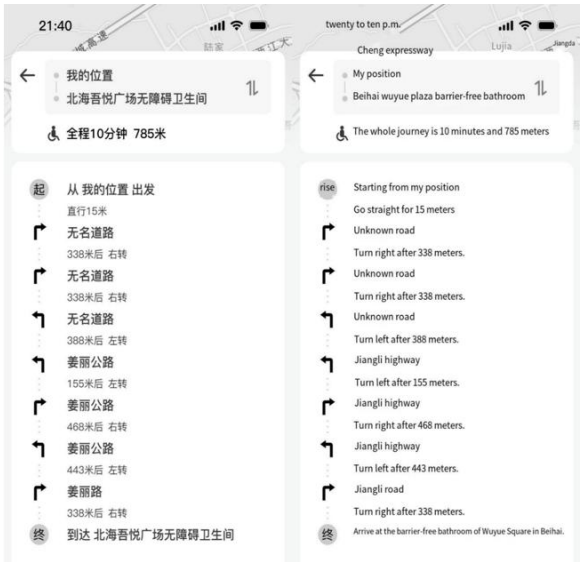

Figure 6 The navigation interface of a barrier-free travel planning application in Guangxi

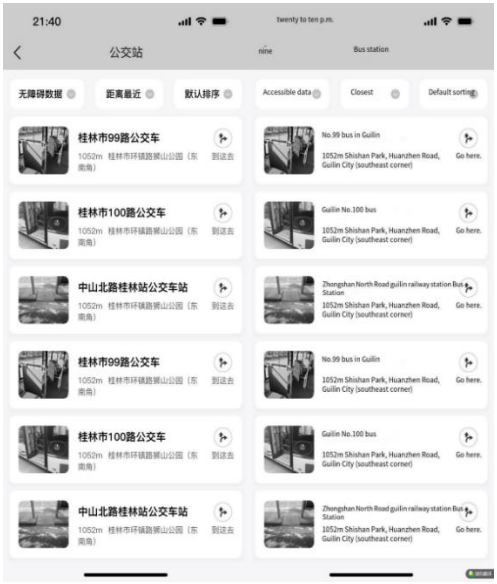

Figure 7. Inquiry into real–time traffic information via travel applications.

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.

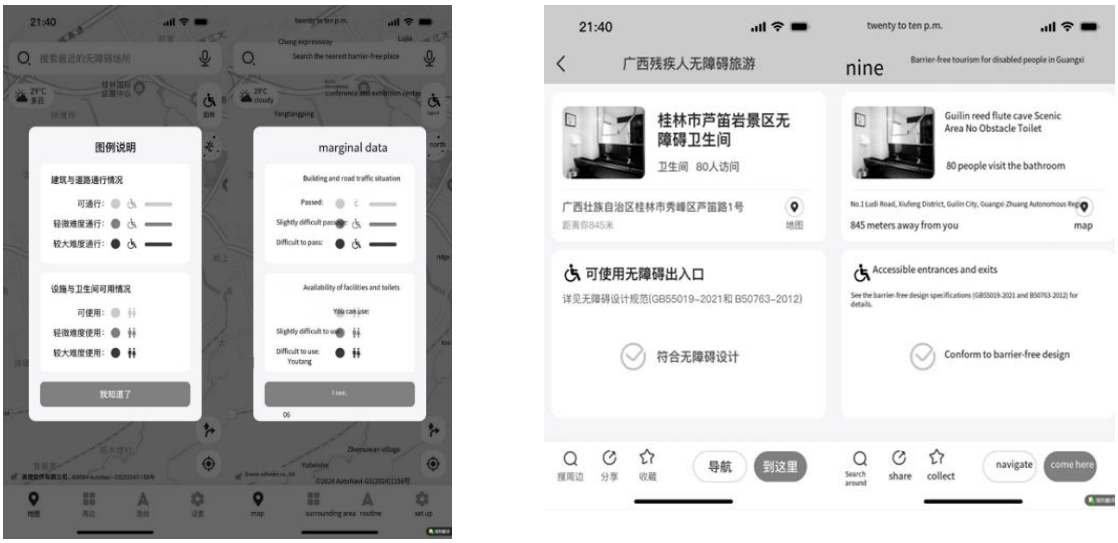

Figure 8. Inquiry into details and evaluation of facility users via application.

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

Figure 10 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 11 The travel application pushes the interface status of facilities for disabled users in real-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.

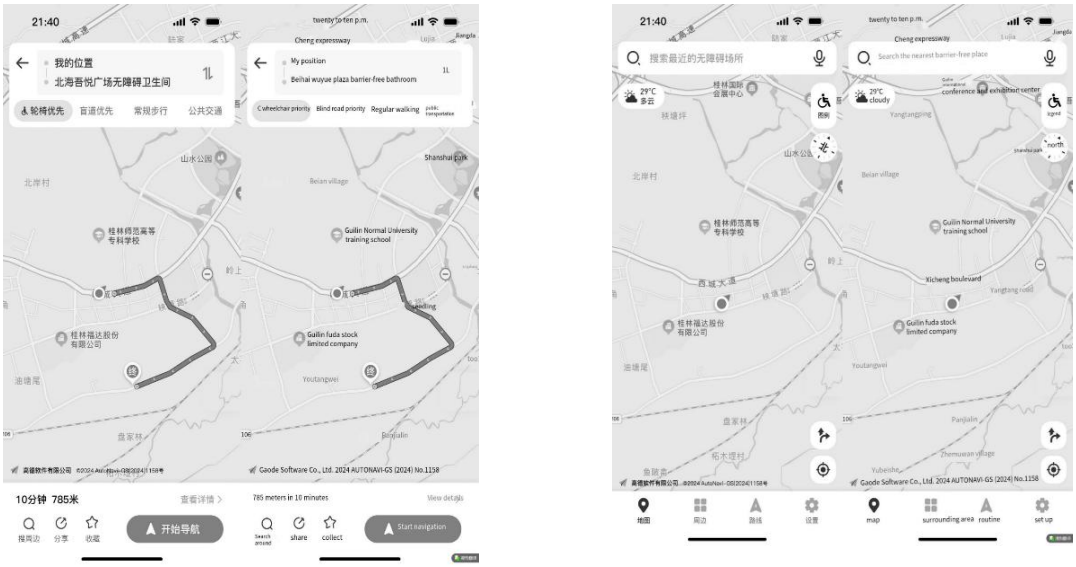

Figure 12. Share travel routes, disability accessibility assessments, and photos via travel applications.

8. Feedback and support

8.1 Steps: If users encounter problems during use, they can submit feedback or contact customer service through the Help and Support page. APP provides online customer service, FAQ and user guide.

8.2 Information: User feedback will be recorded and analyzed for continuous improvement and optimization of APP functions. The customer service team provides 7*24 hours online support to ensure that users get timely help.

Figure 12 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.

2. The results of evaluating the quality of barrier-free travel applications for disabled people in Guangxi.

Table 1 The application quality of disabled people's barrier-free travel in Guangxi evaluated by 5 experts.

Number	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
	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

Number	Quality evaluation list	Quality Level n=5		Meaning
		Mean	S.D.	
	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 1, 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, 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).

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.

3. The findings of evaluating the satisfaction of disabled people in Guangxi 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 2 Basic information 500 people

Number	Items	Basic information	Frequency	Percent
1	Age	Under 18 years old	49	10
		18-30	89	18
		31-45	169	34
		46-60	155	31
		Over 60 years old	38	8
	Total		**500**	**100**
2	Type of disability	Mobility impairment (e.g. wheelchair users)	425	85
		Visual impairment (e.g. poor eyesight, blindness)	6	1
		Hearing impairment (such as deafness and hard of hearing)	19	4
		Cognitive or learning disabilities	23	5
		Others (please specify)	27	5
	Total		**500**	**100**
3	Primary walker	Wheelchair	185	37
		A cane or a walker?	213	43
		Remedy	75	15
		Nobody	27	5
	Total		**500**	**100**
4	Living Environment	Urban	297	59
		Rural	96	19
		Both are equal.	74	15
		Not applicable	33	7
	Total		**500**	**100**

Number	Items	Basic information	Frequency	Percent
5	Travel frequency	Every day; Tiantiandi	85	17
		Hebdomadal	124	25
		Monthly	133	27
		Hard to come by	84	17
		Never	74	15
	Total		**500**	**100**

The study examined 500 participants with mobility impairments in Guangxi. Most were aged 31–60, residing primarily in urban areas. Mobility aids like canes, walkers, or wheelchairs were commonly used, and travel frequency varied, with many traveling monthly or weekly. A smaller proportion rarely or never traveled, highlighting barriers to mobility. This data underscored the diverse needs and travel behaviors of disabled individuals, providing a foundation for developing barrier-free travel solutions.

Table 3: Satisfaction of disabled tourists with the application of barrier-free tourism for disabled people in Guangxi

Number	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
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

Number	Satisfaction evaluation list	Satisfaction Level n=500		Meaning
		Mean	S.D.	
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 3 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.

Discussion

The findings of this study demonstrate that the development of the barrier-free travel application effectively addresses the needs and challenges faced by individuals with mobility impairments in Guangxi. By integrating features such as route planning, accessibility settings, and real-time updates, the application enhances the autonomy and convenience of disabled users in managing their travel. This aligns with previous research emphasizing the importance of user-centered design in accessibility-focused technology (Lewis & Sauro, 2021). Additionally, the integration of real-time notifications and social sharing reflects current trends in smart city initiatives, which prioritize inclusive and adaptive technologies (Makkonen & Tommi, 2024). The application's ability to provide personalized options, such as adjustable screen readers and font sizes, also adheres to the principles outlined by the World Wide Web Consortium (W3C) (2019) in their updated accessibility guidelines. This comprehensive approach not only facilitates mobility but also promotes social inclusion and independence, thereby underscoring the critical role of technology in mitigating accessibility barriers for disabled individuals.

The results of this study demonstrate the high quality of the barrier-free travel application for disabled tourists in Guangxi, particularly in terms of functionality and performance. The application's ability to operate both online and offline, provide accurate travel-related information, and respond quickly to user input aligns with the core principles of accessible tourism. Buhalis and Darcy (2011) highlight that the usability of travel applications is crucial for disabled tourists, particularly in ensuring seamless access to real-time information. The incorporation of assistive technologies such as screen readers and voice commands further strengthens the application's inclusivity. According to Petrie and Bevan (2009), integrating these technologies is essential for supporting users with disabilities, enabling them to navigate digital environments effectively. Additionally, the consistency and clarity of the user interface, praised by experts, reflect the principles of intuitive design outlined by Norman (2013), who emphasizes that good design fosters a positive user experience.

The evaluation of 500 disabled tourists revealed high levels of satisfaction, particularly with the content's relevance and the security measures in place. This finding aligns with Garcia-Romero and Buhalis (2021), who argue that providing relevant, up-to-date information is key to building trust among users of accessible tourism platforms. Furthermore, the availability of customer support

and the responsiveness of the application were significant factors in the positive feedback. This is consistent with research by Buhalis and Michopoulou (2011), who state that responsive service and timely assistance are critical in ensuring a satisfying user experience in accessible tourism applications. The overall reliability and user–friendliness of the application demonstrate its ability to meet the specific needs of disabled tourists, enhancing their ability to engage in barrier–free travel. In summary, the barrier–free travel application for disabled tourists in Guangxi successfully combines functionality, accessibility, and user satisfaction. Its ability to integrate assistive technologies, provide relevant information, and maintain security measures has resulted in high user satisfaction. The study highlights the importance of both technical performance and user–centered design in creating effective tools for accessible tourism, reflecting broader trends in the development of inclusive digital platforms.

Conclusion

Research on barrier–free travel application for the disabled in Guangxi. The researcher would like to present a summary of the research as follows:

The development of the barrier–free travel application for disabled individuals in Guangxi effectively addressed the specific needs and limitations of people with mobility impairments in the region. The application was designed with a comprehensive set of functions that supported users in planning and managing their accessible travels. By incorporating features such as personalized accessibility settings, real–time updates, and detailed route planning, the app allowed users to navigate and access essential services with ease. The step–by–step usage process, from registration and login to booking reservations and receiving notifications, ensured a smooth and user–friendly experience for individuals with disabilities. The app's core functions included customizable accessibility options like screen readers, font size adjustments, and color contrast settings. The route planning function generated the most suitable barrier–free paths, while the service and facility locator helped users find essential accessible venues such as hotels, restaurants, and parking areas. The real–time updates provided users with essential travel information, including changes in traffic conditions and facility statuses. Additionally, the app enabled users to share their travel experiences and receive immediate customer support when needed. It also facilitated easy reservations for

accessible transportation, accommodation, and dining services, ensuring that users could complete their travels without unnecessary barriers.

Overall, the application was a valuable tool for enhancing the travel experience of disabled individuals in Guangxi, offering a user–friendly and reliable solution for managing barrier–free travel. It successfully met the needs of its target audience and contributed to fostering an inclusive and accessible tourism environment in the region.

The results of assessed the quality of the application for barrier–free travel for disabled tourists in Guangxi, evaluated by five experts across five key areas. The results demonstrated that the application was of high quality, particularly in terms of functionality and performance. The application effectively operated both online and offline, provided accurate travel–related information, and responded quickly to user input, which significantly enhanced its usability. Experts also highlighted the application's strong responsiveness to users, emphasizing the usefulness of its help system and the ease with which users could search and contact support. In terms of auxiliary functions, the application performed exceptionally well with assistive technologies, offering features such as clear voice performance and compatibility with screen readers and voice commands. The content provided by the application was also well–rated, especially its relevance to the travel needs of disabled users and its up–to–date accessibility information. Finally, the user interface and design were praised for their consistency, clarity, and overall aesthetics, contributing to an intuitive and visually pleasing experience. In summary, the application demonstrated its ability to meet the unique needs of disabled tourists, offering a reliable, user–friendly, and accessible tool for barrier–free travel in Guangxi.

The outcome evaluated the satisfaction of 500 disabled tourists with the application for barrier–free tourism in Guangxi. The results indicated that the application was highly effective in meeting the needs of disabled users. Tourists were particularly satisfied with the relevance of the content provided, as well as the security measures in place to protect their personal data. The availability of customer support, the speed and responsiveness of the application, and the value of the information it offered were also important factors contributing to the positive feedback. Overall, the findings demonstrated that the application provided a reliable and user–friendly experience, addressing the specific needs of disabled travelers and enhancing their ability to enjoy barrier–free tourism in Guangxi.

Suggestion

1. Suggestions from the Research

1.1 Enhance Assistive Technologies: Ffuture applications should focus on improving features like screen readers and voice commands to increase accessibility for disabled users.

1.2 Personalize Content: Travel applications should offer customizable options based on user needs to provide a more tailored and user–friendly experience.

1.3 Update Information Regularly: Maintaining accurate, up–to–date accessibility information is crucial to ensure users can rely on the application for real–time travel planning.

2. Future Research Suggestions

2.1 Future research will investigate the long–term impact of using barrier–free travel applications on the overall travel satisfaction and independence of disabled tourists. This will provide deeper insights into how these tools influence travel behaviors.

2.2 Researchers will explore the potential of integrating augmented reality (AR) into barrier–free travel applications to improve navigation and access to real–time information in unfamiliar environments.

2.3 Comparative studies between different regions or countries will be conducted to analyze the effectiveness of barrier–free travel applications across diverse cultural and infrastructure contexts. This will help tailor these applications to a wider audience.

New Knowledge

1. A well–designed barrier–free travel application significantly enhances the travel experience of disabled tourists.

2. The application achieves this by offering accurate information, robust security features, and seamless integration with assistive technologies.

3. This research confirms a direct link between application functionality and user satisfaction in the context of accessible tourism applications.

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