Language Services and Smart Scenic Spot Emergency Management under the Background of the Belt and Road Initiative

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Abstract ： Under the promotion of the Belt and Road Initiative, cultural and tourism exchanges between China and partner countries have become increasingly close, and the inbound tourism market continues to expand. As a window for external display, the importance of emergency management capabilities in smart scenic spots has become prominent, with language services serving as a key supporting element therein. This paper discusses the current situation, problems, and optimization paths of language services in the emergency management of smart scenic spots in the Belt and Road context. The research finds that current emergency language services in scenic spots exhibit problems such as insufficient multilingual coverage (e.g., lagging behind for minority languages and dialects), incomplete implementation of technical tools (e.g., lack of offline functionality and weak linkage with emergency platforms), a gap in personnel emergency language capabilities (e.g., insufficient reserve of professional medical and safety terminology), and absence of policy standards. These issues cause foreign tourists to face information access barriers during scenarios like sudden health incidents and safety evacuations, affecting emergency response efficiency and tourist safety assurance. On this basis, this paper proposes a three-dimensional improvement system of "Technology Empowerment-Process Optimization-Policy Support" by deploying dual-mode "online+offline" translation equipment, constructing a tripartite "Scenic Spot-Hospital-Public Security" multilingual linkage mechanism, and incorporating multilingual emergency services into the 5A scenic spot assessment indicators, to improve the emergency language service system of smart scenic spots. The research aims to provide theoretical reference and practical paths for enhancing the internationalization and humanized level of emergency management in smart scenic spots in the Belt and Road context, aiding the high-quality development of China's cultural and tourism services.

Keywords: language services, smart scenic spot, emergency management

1. Introduction

Against the backdrop of the Belt and Road Initiative continuously releasing cooperation dividends, cultural and tourism exchanges between China and participating countries are shifting from "one-way attraction" to "two-way interaction," and the inbound tourism market is experiencing explosive growth. Data from the National Immigration Administration shows that from January to August 2025, 15.89 million foreign nationals entered China visa-free, accounting for 62.1% of inbound foreign nationals, a year-on-year increase of 52.1%.[1] During the same period, 10.739 million visitors from ASEAN countries entered mainland China, a year-on-year increase of 27.5%, among which 9.054 million

entered visa-free, a year-on-year increase of 28.4%. The purposes of entry were mainly for tourism sightseeing, business activities, etc., indicating sustained active personnel exchanges and interactions between China and ASEAN countries.[2] However, the sharp increase in the number of foreign tourists has also gradually highlighted shortcomings in scenic spot services. At the level of daily services, most scenic spots still have significant deficiencies, apart from a few core scenic spots such as the Beijing Palace Museum, the Emperor Qinshihuang's Mausoleum Site Museum (Terracotta Army), the Mogao Caves in Dunhuang, and Jiuzhaigou Valley in Sichuan, which can provide multilingual signage and guided services in languages such as English, Japanese, Korean, and Russian. More crucially, the gap in language services at the emergency management level is even more prominent. In emergency scenarios, scenic spot staff have a severe lack of professional vocabulary reserve, and emergency guidance and first aid signs are mostly in Chinese. Tourists have difficulty obtaining effective help in a timely manner during sudden health conditions or safety incidents. Research shows that situations where overseas tourists cannot understand scenic spot safety instructions due to language barriers also occur frequently. This problem not only affects the travel experience but also concerns life safety, urgently requiring scenic spot management to pay attention and make systematic improvements.

2. Current Situation and Problems of Language Services in Emergency Management at smart scenic spots

The Encyclopedia of China defines a smart scenic spot as one that utilizes modern technological means such as the Internet of Things, mobile internet, cloud computing, big data, and spatial information technology to conduct comprehensive, systematic, real-time, and accurate active perception, intelligent analysis, interactive sharing, prediction, and decision-making regarding the resource environment, infrastructure, tourists, business activities, and disaster risks of scenic spots. It is an intelligent scenic spot possessing advanced comprehensive "wisdom" capabilities.[3]

The Smart Scenic Spot Construction Guide considers a smart scenic spot as one that uses information technologies such as space-air-ground remote sensing, sensor networks, and the Internet of Things to conduct comprehensive, thorough, and timely perception of natural and cultural resources, various environmental conditions, tourist behavior status, scenic spot staff activities, and scenic spot infrastructure and service facilities. It achieves visualizable management of tourists and scenic spot staff, assists in optimizing and re-engineering scenic spot business processes and intelligent operation management, forms strategic alliances with upstream and downstream enterprises in the tourism industry, realizes effective protection of natural resources and cultural heritage, improves service quality, and achieves comprehensive, coordinated, and sustainable development of the scenic spot's environment, society, and economy.[4]

The Ministry of Culture and Tourism (formerly the National Tourism Administration before March 2018) designated 2014 as the "Smart Tourism Year" and issued the Notice on Printing and Distributing the 2014 China Tourism Theme Year Promotion Theme and Promotion Slogans. The notice pointed out that all regions should combine the development direction of the tourism industry, take smart tourism as the theme, guide the construction of smart tourism cities, scenic spots, and other tourism destinations, and especially strengthen the development and integration of tourism resources and products in three aspects: smart services, smart management, and smart marketing. This aims to promote the transformation of tourism into a modern service industry through informatization, strive to enhance the modern technological management level and service level of tourism enterprises such as travel agencies, tourist attractions (sites), and tourist hotels, innovate development models, and promote the sound and rapid development of China's tourism industry.[5]

Obviously, we can understand smart scenic spots from these three dimensions. First, smart services refer to providing multilingual intelligent customer service, emergency rescue positioning, and personalized recommendations, such as recommending routes or attractions based on tourist preferences, to meet diverse tourist needs. Second, smart management refers to using intelligent monitoring, environmental monitoring (e.g., temperature, humidity, PM2.5), and facility inspection systems, such as intelligent manhole covers, streetlights, etc., to achieve real-time supervision and efficient dispatch of the scenic spot environment, equipment, and personnel. Third, smart marketing involves analyzing tourist profiles based on big data, carrying out precise advertising, operating membership points systems, and planning online activities (e.g., live-streamed cloud tours) to enhance the scenic spot's visibility and secondary consumption conversion. Among the three aspects of operations in smart scenic spots, "smart services" are an important element for enhancing the tourist experience and ensuring the safe operation of the scenic spot. In the Belt and Road context, how to provide smart services for tourists from countries along the Silk Road and from all over the world is a huge challenge faced by scenic spots nationwide. From the perspective of emergency management, a smart scenic spot should be "a management system supported by smart technology, covering the entire emergency process of the scenic spot (Prevention-Preparation-Response-Recovery)," with its core goal focused on "tourist safety assurance."

In the emergency management of smart scenic spots, language services face specific problems such as incomplete implementation of technology, insufficient scenario adaptation, and a gap in personnel language capabilities. These problems are reflected in practical cases from multiple scenic spots in China:

2.1 Insufficient Coverage of Technical Tools and "Dead Spots" of Multilingual Intelligent Devices

2.1.1.Single-function equipment, unable to cope with complex scenarios.

Although the IP network broadcast system of Huangshan scenic spot can achieve real-time emergency information broadcasting, it only supports Chinese and English. The "Zhiyou Huangshan" mini-program provides an intelligent customer service and translation function interface, but its functions are limited. The translation function is only based on WeChat's translation function, so the use of this function is limited by the tourist's WeChat version. The intelligent customer service, namely the Huangshan Official AI Travel Assistant, can communicate with tourists, but its ability to answer questions intelligently is very limited. When asked "*Can this scenic spot offer multi-language service*?", "*Can this scenic spot help tourists from Russia, Japan, Korea and other countries*?" and "I come from Russia, do you have staff speaking Russian to help me in case of emergency", the travel assistant's replies were: 1). *Sorry, the content you proposed involves relevant sensitive words, please correct the question content and ask again.* 2). *Sorry, I don't seem to fully understand what you mean. You can ask me travel-related questions, or describe the question more clearly.* Based on these situations, this scenic spot's ability to deal with complex scenarios must be very limited. It is suggested to optimize the mini-program's translation function to get rid of the restriction on tourists' WeChat versions.

2.1.2 Lagging adaptation for dialects and minority languages.

Some surveys indicate that as a 5A scenic spot, the Qingxiu Mountain scenic spot in Guangxi has not paid sufficient attention to local languages like Zhuang in its multilingual signage, showing a deviation in the targeting of language services.[6] The Mosuo people, an ethnic minority living in the area of Lugu Lake scenic spot, have their own ethnic language but no writing system. There is a lack of this ethnic language in emergency broadcasts. It is suggested to prefabricate Mosuo emergency short sentences (e.g., 'Please don't panic')".

2.2 Rigid Service Processes and "Time Gap" in Emergency Response

2.2.1 Systems idle, tools available but not effectively used.

According to the Notice of the Beijing Municipal Tourism Development Commission on Further Strengthening the Use of the Beijing Tourism Safety and Emergency Management System, multiple travel agencies and scenic spots in Beijing were criticized for problems with the use of the tourism safety and emergency management system. Among them, during the system use process, omissions and misreporting of basic information and safety monthly reports, and failure to submit documents as required were relatively prominent. Some units had never used the system at all. Among the list of those criticized for not using the system were several 4A-level scenic spots including Wendu Water City and Jingdong Grand Canyon, as well as the only 5A-level scenic spot, the Olympic Forest Park, which was named and criticized.[7]

2.2.2 Cumbersome information release process, leading to missing the golden opportunity.

The release of emergency information requires multiple layers of manual approval. In time-critical emergency situations, this process directly causes delays. The management measures of Huangshan scenic spot stipulate that urgent voice information release requires the principal responsible person of the applying unit to request approval from the responsible leader of the Management Committee before it can be broadcast, and approval procedures must be completed afterwards.[8]

2.3 Personnel Capability Gap Leading to a "Communication Divide" in Front-line Services

2.3.1 Insufficient foreign language ability and reliance on tools to replace human labor.

According to information released by the Office of the Ningxia Hui Autonomous Regional Committee of the Chinese People's Political Consultative Conference in February 2025, Ningxia, as an important node of the "Belt and Road," has seen continuous growth in inbound tourists. However, scenic spots lack multilingual guided tour resources, and human translation is costly with limited coverage, leading to some international tourists having difficulty deeply experiencing the local culture due to language barriers. This reflects the scenic spots' own insufficient foreign language service capability, especially in dealing with non-English-speaking tourists.[9] A portable translation device is suggested to be used to assist temporary tour guide services in a scenic spot in Ningxia.

2.3.2 Low standardization of emergency communication scripts.

In the tourism safety emergency response requirements issued by Xinzhou District, Jiangxi Province, although processes such as information reporting time limits were specified, standardized communication scripts or translation plans for tourists from different language backgrounds were not mentioned. This indirectly reflects that at the operational level of emergency response, the standardization of cross-language communication may not yet have been detailed down to the grassroots level.[10]

2.4 Ambiguous Policies and Standards and Lack of "Hard Constraints"

2.4.1 Emergency language services are not included as mandatory indicators for 5A-level scenic spots.

The local standard Specifications for Smart scenic spot Construction issued by Gansu Province, although detailing content such as infrastructure and smart management, does not explicitly list multilingual emergency broadcasting or translation services as mandatory or detailed guiding indicators in its publicly available scope summary.[11]

2.4.2 Lack of policy support for the safeguarding of dialects and minority languages.

When constructing its smart tourism system, the Ningxia Hui Autonomous Region proposed establishing a characteristic cultural content translation system including dialects through AI technology. This initiative precisely reflects the gap in public services for dialects and minority

languages under conventional policy safeguards, requiring reliance on specific projects for supplementation.

3. The Role and Specific Applications of Language Services in Emergency Management at Smart Scenic Spots

In the emergency management of smart scenic spots, the specific role of language services can be summarized as breaking down information barriers, improving response efficiency, and ensuring tourist safety. It is mainly reflected in the following five key scenarios:1) Emergency Early Warning "Without Omission": For multilingual tourist groups, transmit warning information such as heavy rain, landslides, and overcrowding through multilingual broadcasts, electronic screens, etc., to prevent some tourists from missing risk prompts due to language barriers, reducing the hidden danger of casualties from the source. 2) Evacuation Guidance "Without Deviation": In emergency evacuation scenarios, use languages familiar to tourists (including dialects and minority languages) to clearly guide evacuation routes, assembly point locations, and safety precautions, preventing secondary problems such as crowding and getting lost caused by misunderstanding instructions. 3) Rescue Communication "Without Barriers": When tourists are injured, trapped, or have special needs, such as allergy history or underlying diseases, language service measures like on-site translation and multilingual first aid communication cards can help rescue personnel quickly and accurately grasp key information, shorten rescue decision-making time, and improve rescue effectiveness. 4) Emotional Reassurance "With Warmth": Tourists are prone to emotions such as panic in emergency states. Using their native language to convey reassuring information, such as "Rescue personnel have arrived, please stay calm," can effectively alleviate anxiety, reduce chaotic behavior, and cooperate with the scenic spot to complete emergency handling. 5) Risk Disputes "With Early Prevention": If tourists miss emergency guidance or suffer impaired rights due to language barriers, it may lead to complaints or public opinion risks. Comprehensive language services can not only reflect the professionalism and humanization of the scenic spot's emergency management but also reduce potential disputes and ensure tourist safety and experience.

The emergency rescue scenarios for foreign tourists in scenic spots are concentrated in three categories: "Safety Threats, Access Barriers, Unexpected Situations." Language services in different scenarios need to accurately match needs. The specific scenarios and service solutions are as follows:

3.1 Scenario 1: Getting Lost or Separated from Companions (High-Frequency Basic Scenario)

Scenario Characteristics are that tourists are often in an anxious state and their core need is to quickly locate and contact companions language communication needs focus on location description and information transmission. Staff should immediately activate the emergency translation terminal, call up " Emergency Corpus of Getting Lost", and select questions: "Where was the last place you separated from your companion?" or "Do you have your companion's contact information?". The terminal translates in real-time into the tourist's native language and supports the tourist's voice or text reply translation. If the tourist cannot clearly describe the specific location, use the terminal to display a bilingual map of the scenic spot and let the tourist point out the general area; when he or she needs to contact a companion, help the tourist edit a text message in their native language to avoid contact failure due to language errors.

3.2 Scenario 2: Accidental Injury (e.g., Fall Injury, Scrape, Burn)

Scenario Characteristics are that priority is to confirm the degree of tourist injury and underlying medical history, avoiding delayed first aid due to language barriers. Language Service needs to be concise, accurate, and visual. Service Solutions are as follows: For minor injuries like scrapes, use an

offline bilingual illustrated first aid card. Point to the wound location on the card, such as head, arm, or leg, and illustrations for whether disinfection or bandaging is needed. The tourist confirms by nodding or shaking their head. Simultaneously, use the translation terminal to inform the tourist that the treatment process is painless and takes about 5 minutes, to alleviate resistance. For serious injuries like fractures or the condition after regaining consciousness from coma: Immediately initiate remote multilingual medical translation, allowing first aid personnel to communicate directly with the tourist. Use the system to translate in real-time questions like "Where does it hurt now?" and "Have you had heart disease or high blood pressure before?", while accurately conveying the tourist's answers to medical staff to assist in determining the treatment plan.

3.3 Scenario 3: Sudden Illness (e.g., Heart Disease, Allergic Reaction, Heatstroke)

Scenario Characteristics are that key information such as medical history and medication usage is involved Language service needs quickly obtain core data, avoid missing risk points. Staff can use a multilingual sudden illness questionnaire for the tourist to check if they have a history of asthma or diabetes, the names of medications they are taking, or let the tourist show the medicine box, with the terminal scanning and translating the medicine name, and whether they have allergy history, such as pollen, penicillin, etc. If the tourist is unable to check themselves due to situations like regaining consciousness after heatstroke coma, staff can use the translation terminal to ask each question slowly sentence by sentence, waiting for the tourist to clearly reply before asking the next, ensuring information accuracy; simultaneously, synchronize the questionnaire and reply content to the 120 emergency personnel to reduce communication time after arriving at the hospital.

3.4 Scenario 4: Lost Items (e.g., Passport, Phone, Luggage)

Scenario Characteristics are that tourists need to clearly describe item characteristics and verify the recovered lost property. Language service needs assist in information verification and avoid mistaken claims. When registering lost information, staff should use the translation terminal to let the tourist describe the item's appearance or special marks, such as passport type, name, date of birth, phone color, and other key identification points. The terminal synchronously translates into Chinese, and staff accurately record it in the system; if the tourist has a photo of the item, they can show it to the staff to avoid description deviation. When verifying a found item, use the terminal to translate the item's characteristics into the tourist's native language, wait for the tourist to reply with information, and confirm a match before returning it to prevent mistaken claims.

3.5 Scenario 5: Getting Trapped due to Natural Disaster or Sudden Safety Incident (e.g., Trapped by Heavy Rain, Temporary Area Closure)

Scenario Characteristics are that tourists are extremely prone to panic and the core need is to understand the risk and obtain evacuation and safety instructions. Language Service needs to be timely, effective, and clear. Through the scenic spot's multilingual broadcast (repeatedly broadcast) the current specific situation, safety requirements, rescue progress, etc. Slow down the speech rate to avoid tourists being unable to receive too much information at once. Simultaneously, provide one-on-one reassurance to emotionally agitated tourists. For nervous tourists, staff can use the translation terminal to say "Please be assured, we will ensure your safety, you can find me anytime if you have any needs," while using gestures such as nodding and smiling to convey reassuring signals; if tourists have special needs, such as needing to inform their family of their safety, assist in making phone calls or sending messages in their native language.

4.Optimization Recommendations and Countermeasures Proposed for Language Services in Smart Scenic Spots

Combining the actual sore points of language services in emergency scenarios of domestic 5A-level scenic spots, we can develop specific plans from four dimensions: equipment selection, process design, content implementation, and policy details, ensuring executability and verifiability.

4.1 Technical Level: Promote "Online+Offline" Dual-Mode Translation Equipment and Deeply Connect with Emergency Platforms.

Core solutions focus on single-function equipment, offline failure, and linkage lag problems. The specific plan is as follows: First, prioritize the procurement of technologically mature voice translation equipment to ensure stability, such as domestic iFlytek offline translation machines and Hikvision multilingual intelligent sound pillars. Specifically plan configuration standards and equipment density according to tourist capacity. Second, achieve deep connection with emergency platforms by pre-setting linkage trigger conditions and offline emergency backup mechanisms. Connect translation equipment and multilingual broadcast systems with the scenic spot's fire alarm system and meteorological warning system, setting automatic trigger rules.[12] Simultaneously, to address network instability in mountainous areas and underground areas like the Terracotta Army pits, pre-stored emergency language packs in the equipment, containing sufficient high-frequency emergency sentences, which can be directly called even when disconnected from the network. Also, regularly synchronize and update the corpus on each handheld translator through the scenic spot's internal network to ensure content timeliness.

4.2 Process Level: Establish a Tripartite "Scenic Spot-Hospital-Public Security" Multilingual Collaboration Mechanism

To solve the problems of slow departmental linkage and broken medical communication, first, it is necessary to clarify the mechanism structure and responsibility division. (See Table 1-1 below)

Participants	Core Responsibilities	Language Service Tools
scenic spot (Front-end)	1. Use translation equipment to obtain tourist information (injury, medical history, location) at the first moment. 2. Synchronously push information to the tripartite platform.	Handheld translators AR smart glasses
Hospital (Back-end)	1. Communicate in real-time through the remote translation system to guide on-site first aid. 2. Prepare adapted medical solution libraries in advance.	Tripartite video translation system Multilingual first aid knowledge
Public Security (Coordination)	1. Assist in contacting tourist's family (multilingual communication). 2. Handle foreign-related emergency disputes.	Public security foreign-related translation terminal, scenic spot shared corpus

Table 1-1

Second, familiarize with the real-time linkage operation process, taking "fall injury of foreign tourists " as an example.

Step 1: Scenic Spot Front-end Response. After a patrol officer discovers a fallen foreign tourist, they immediately use AR smart glasses to say to the tourist, "Can you tell me where it hurts?". The glasses

automatically translate into Chinese and display it, while simultaneously translating the tourist's English response into Chinese. Then, they shoot the tourist's wound (image/video) and synchronously transmit it to the scenic spot emergency center and the cooperating hospital's emergency department.

Step 2: Tripartite Remote Linkage. The scenic spot emergency center, through the tripartite video translation system, connects the hospital doctor and public security police into the call. The doctor, through the video feed and real-time translation, asks "Have you ever had a fracture before?", guiding the patrol officer to perform temporary immobilization. Then, the police officer simultaneously confirms the tourist's identity and contacts their relatives/friends in China.

Step 3: On-site and Hospital Handover. Before the ambulance arrives, the hospital prepares an informed consent form in English based on the communication results. After the ambulance arrives, medical staff use the illustrated multilingual first aid card to quickly confirm the tourist's allergy history, avoiding repeated communication.

4.3 Personnel Level: Formulate the Scenic Spot Emergency Language Service Manual and Conduct Scenario-Based Drills

To solve the problems of non-standard staff communication scripts and weak minority language abilities, we can formulate the following specific plan. First, design the content of the Emergency Language Service Manual based on the dual dimensions of "Language + Scenario". Language coverage should be wide. A dual version of "Pocket Print Version+Mobile Electronic Version" can be adopted. The print version is convenient for patrol staff to carry with them, and the electronic version supports voice playback to avoid inaccurate pronunciation by staff. Second, implement training and drills. It is suggested to carry out a simple multilingual emergency dialogue drill of about 10 minutes every quarter. Adopt a model combining "online learning+offline learning" scenario simulations, and regularly conduct practical assessments of the emergency language capabilities of scenic spot employees. The Xi'an Beilin Museum (Forest of Stone Steles) has conducted a series of specialized service skill training programs for its front-line staff by actively learning from and introducing the "Golden Key service" experience and management model from the Xi'an City Wall Scenic Area.

4.4 Policy Level: Incorporate Multilingual Emergency Services into 5A Scenic Spot Re-evaluation Indicators and Strengthen Support for Dialects and Minority Languages

As of 2024, there were 16,541 A-level tourist scenic spots nationwide, among which 19 new 5A-level scenic spots were added, bringing the total to 358. The county coverage rate of national A-level scenic spots increased to 97%. Given the reality of China's rich tourism resources and the increasing travel demands of domestic and foreign tourists, the improvement of emergency language service capability is even more urgent. Solving the problem through top-down policy formulation is a wise approach. During the review and re-evaluation stage of 5A-level scenic spots, the implementation of multilingual or even dialect emergency language services can be incorporated into the assessment content. Simultaneously, promote the construction of smart scenic spot corpus through policy support means such as financial subsidies. It is suggested that 5A scenic spots also need to be equipped with basic multilingual emergency signs.

5. Conclusion

In conclusion, the sustained prosperity of cross-border tourism under the Belt and Road Initiative has not only driven the increase in the frequency of personnel exchanges with countries along the route but also significantly increased the demand for internationalized services in scenic spots. This trend highlights the key value of language services in the emergency management of smart scenic spots—it is an important link ensuring that Chinese and foreign tourists obtain emergency information in a

timely manner and cooperate efficiently in avoiding danger. At the same time, it also exposes practical problems such as poor multilingual communication and delayed transmission of emergency information. Research shows that deeply integrating intelligent translation technology, multilingual emergency databases, and the scenic spot's smart management system can effectively break down language barriers and is an effective path to improve emergency response efficiency and effectively ensure the safety of Chinese and foreign tourists. In the future, it is necessary to further optimize the precision of language services and the adaptability of smart systems, so that language services truly become a bridge for tourism safety assurance under the "Belt and Road," providing more solid support for the standardized and internationalized development of emergency management in smart scenic spots.

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