Planning Strategy and Construction Research on Integrated Transport and Travel Service Areas

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Abstract: Expressway service areas are key nodes in the integration of transportation and travel. In China, their construction often precedes the development of underlying principles. In response to issues such as unclear planning concepts, indeterminate principles, and uncertain requirements that arose during the process of practice, we conducted a survey of domestic and foreign research status, carried out a study on service area development concepts, and summarized the basic requirements and principles of planning and design for integrated transport and travel service areas. These principles include optimal scale, reasonable layout, complete functionality, superior products, and high-quality service. The research findings have been applied in the planning and construction of the Longteng Service Area on the Qimen–Wuyuan Expressway in Jiangxi Province, establishing a new paradigm for planning tourist-themed open service areas in the new era. This study provides a reference for the planning of integrated transport and travel in open service areas in other regions nationwide.

Keywords: highways, integration of transportation and tourism, service areas, planning strategies, engineering practices

1 Introduction

Expressway service areas, situated along expressways, are designed to provide essential services such as parking, restrooms, and rest areas for drivers and passengers. Beyond their basic functions, they also serve as significant showcases of regional cultural characteristics and economic levels. With the advent of the era of "comprehensive tourism" and "integration of transportation and tourism," open service areas have come into public view due to their deep integration capabilities and their inclusive nature with regional economic culture. As a result, they are gradually replacing the traditional "closed" service areas and becoming the mainstream of development.

Currently, some provinces and cities in China have begun to pilot open service areas. However, due to a lack of clear planning concepts and principles, some service areas have encountered issues that hinder sustainable development, such as overly high positioning, complex functions, and inappropriate site selection. This study, through reviewing domestic and international research achievements and engineering practices in the development of service areas under the concept of transportation-tourism integration, analyzes the concept of tourism-themed open service areas. It summarizes the basic requirements and planning principles for their design.

PMBDA 2023, December 15-17, Nanjing, People's Republic of China

DOI 10.4108/eai.15-12-2023.2345315

Taking the planning of the Longteng Service Area in Qimen–Wuyuan Expressway, Jiangxi Province as an example, this research aims to create a new paradigm of planning for tourism-themed open service areas in the new era. This is achieved through multi-dimensional integration of space, function, service, and supply, thereby providing a reference for the planning of open service areas in other regions across the country.

Currently, foreign research on the integration of transportation and tourism started earlier, and the overall planning concept for supporting facilities is more human-centered and closer to nature, with high service functionality. European expressway service areas, represented by Germany, the UK, and France, pay more attention to the experience of drivers and passengers. They aim to create a comfortable resting environment for users. The construction of leisure facilities is more meticulous, and the service area is relatively large, offering greater adaptability [1]. From 2000 to present, foreign service area infrastructure construction has moved from perfection to pursuing higher service quality, with more in-depth research on the landscape, environment, business model, layout, and human-friendly support of service areas. Su Xingju et al. [2] have conducted the most in-depth research so far on roadside catering and reception facilities. Jennings [3] conducted a systematic and in-depth thematic study on the architectural style, history, and culture of American highway service areas. In terms of highway-tourism integration, Brown [4] pointed out that highways are not only paths connecting two points but also channels for humans to experience natural and cultural values. Based on this, he proposed the Highway Experience Opportunity Spectrum (HEOS) theory. The principle of the Highway Experience Opportunity Spectrum is to replace land use types with highway division standards, replace the recreational value of land with the inherent quality of the highway, and concretize recreational activity expectations into the feelings and experiences of highway users. Ettema [5] used a tourist satisfaction scale to survey tourists traveling by car in the Netherlands, proposing the "Tourist Satisfaction Index."

As for open service areas in our country, practice precedes research, and the practice is still in its early stages. The majority of research focuses on functional business models, cultural tourism enhancement, landscape design, product development, etc., with fewer detailed studies on the planning concepts and principles of tourism-themed open service areas. Gao Jiawei et al. [6] proposed the concept of "Service Area + Tourism" based on the open concept, summarized the characteristics of the new business model of "Service Area + Tourism", and proposed five types of "Service Area + Tourism" business models. Lin Zhangzhang [7] suggested that the construction of open service areas can refer to the TOD development model of cities and explore the establishment of a "Community + Service Area" model centered on expressway service areas, integrating work, business, cultural education, and living. Gao Jianping et al. [8] aimed to enable expressway users to receive high-quality special services, expressway managers to gain benefits, and local economies to develop, and studied the functional positioning methods of open service areas.

Currently, the construction of service areas under the concept of transportation-tourism integration in China is thriving. However, some service areas have encountered problems due to functional homogeneity and overly high development positioning. These issues lead to insufficient attraction of passenger flow and industry, narrow subsequent development paths, and an unstable foundation for sustained and healthy development. Research is fervent, with some scholars gradually conducting research on the design, function, and products of service areas from the perspective of transport-tourism integration. However, there are many types of

service areas under the concept of transport-tourism integration, and the research is not specific enough. This study analyzes the concept and summarizes the planning design principles and requirements for tourism-themed open service areas on expressways. Taking the planning and design of the Longteng Service Area on the Qimen–Wuyuan Expressway in Jiangxi Province as an example, the study aims to provide reference and insights for the transformation and upgrading of the transportation industry and the improvement of service quality.

2. Analysis of the Concept of Transport-Tourism Integration Service Areas

With the arrival of the mass tourism era and people's continuous aspiration for a better life, the development of transport-tourism integration is in high demand. This development is a requirement for implementing national strategies and is also an endogenous need for social development. For the planning and design of transportation infrastructure, it represents a conceptual change and breakthrough.

The concept of transport-tourism integration emphasizes the completeness of tourism functions of transportation infrastructure, including the scenic quality of the infrastructure itself, the coordination of tourism resources in the entire area, the synergy of business models and industry chains, and the intelligence of infrastructure [9]. Service areas on expressways, being places where drivers and passengers stay for long periods and consume, are key nodes in tourism transportation. Service areas under the concept of transport-tourism integration can be divided into tourist-themed, commercial service, medical wellness, and conference and exhibition types according to their functional layout. Tourist-themed service areas target tourists as their main customer base, and provide entertainment, dining, accommodation, leisure, shopping, and other functional forms specifically for this group. They especially need to set up tourism expansion area functional forms based on the surrounding tourism resources, such as luxury camping sites, forest walks, tea mountain recreation, etc.

Open service areas break the traditional enclosed layout and form a linkage with surrounding scenic spots or villages. Drivers and passengers on expressways and residents outside the service area can freely enter and exit the service area, but vehicles cannot leave and enter the layout of the service areas [10]. This approach allows the facilities in the service area to be shared with local residents, while the nearby tourism resources and village resources can also be shared with the drivers and passengers on the expressway. On the one hand, this allows drivers and passengers who were originally just "passing by" on the highway to get off the expressway and enter the local area, providing a new way of relaxation and understanding of local cultural characteristics. On the other hand, for the local economy, it transforms the originally "mobile" consumption into "staying," promoting local economic development.

3. Basic Requirements and Principles for Planning Transport-Tourism Integration Service Areas

3.1 Basic Requirements for Planning Transport-Tourism Integration Service Areas

As a "hub" combining expressways with the local economy, the basic planning requirements for tourist-themed open service areas can be summarized in the following three aspects:

(1) Service Terminal, Functional Composite

Tourist-themed open service areas are important places for expressway drivers and passengers to rest and recreate, and to explore local characteristic attractions. They are also the locations for the surrounding residents' daily leisure and entertainment, with a stronger emphasis on "service". Therefore, the proportion of tourism-related business in such service areas should be significantly increased, highlighting the service quality and experience, and improving service reception capacity and emergency response capabilities. These service areas should be equipped with functions such as a basic service center, a tourist passenger transport center, tourist ticket services, a commercial complex center, local characteristic product sales, a homestay reception center, and an entertainment experience center.

(2) Coordinated Planning, Convenient Travel

The fundamental purpose and essential requirement of setting up tourist-themed service areas is to promote regional economic and social development. Therefore, from a regional perspective, the planning and design should coordinate the layout of the regional transportation network, the distribution of tourism resources and attractions, and the demand for local characteristic agricultural products. It should pay particular attention to tourism resources outside the road area, characteristic towns, beautiful villages, etc., to establish a balanced sharing and system-connected open service area system, improving the rationality of the layout of open service areas and service quality. For tourists, scenic spots with high reliability and accessibility are the primary considerations for travel. Therefore, tourist-themed open service areas should be set up in places with a wide distribution of attractions and convenient transportation routes. The selected area should have at least one connection to a secondary tourist road.

(3) Intelligent Travel, Brand Attraction

Because of its inherent tourism attributes, tourist-themed service areas have a strong demand for intelligent services in aspects such as scenic spot collection and distribution, precise tourism information services, and integrated travel services [11]. They should integrate passenger flow monitoring, operation management, and intelligent service information systems to create an intelligent travel information service platform. The healthy and sustainable development of tourist-themed service areas cannot be separated from the support of passenger flow. Therefore, the planning and design should leverage local tourist attractions to attract tourist groups; dig deep into the local characteristics of the service area to create a beautiful local card; attract tourists, use superior product characteristic services to retain consumption, and enhance the image of the service area's transport-tourism integration.

3.2 Principles for Planning Transport-Tourism Integration Service Areas:

Appropriate Scale: Based on factors such as the level of expressway traffic, construction conditions, and landscape appearance, in line with the distribution of towns along the line and travel demand, the total scale and spatial layout of open service areas should be reasonably determined. Open service areas should adhere to the principles of land conservation and intensive use. While ensuring a comprehensive "transportation + tourism" service function and traffic safety, they should co-build and share with other surrounding facilities, pay attention to integration with the surrounding natural landscape, and reduce the occupation of land resources.

Rational Layout: The arrangement within the open service area should be tailored to local conditions, strive to be compact, scientifically allocate the positions and building areas of various functional areas, and design flexibly. Traffic flow lines need to be divided into external traffic flow lines and internal traffic flow lines, achieving simple traffic flow lines, clear route boundaries, and avoiding pedestrian and vehicle flow intersections. The local residents' parking lot and the expressway passenger parking lot are separated from each other, vehicles cannot park interchangeably, and passengers can enter and exit freely.

Complete Functionality: In addition to equipping basic service functions such as vehicle services, personnel services, and ancillary services, leisure, catering, entertainment, tourism, and other service facilities need to be configured. The service facilities strive for intelligent and humanized design; the sign lines should be simple, clear, coordinated, and unified, with continuous information; sewage treatment facilities, garbage temporary transfer and disposal and other ancillary facilities should comprehensively consider factors such as wind direction, topography, and natural environment protection.

Excellent Products: Extract the local characteristic theme culture to create a comprehensive service area with a distinct theme, set up local characteristic theme pavilions, homestays, camping sites set up according to its own tourism resources, hot spring hotels and tourist distribution centers, etc., to meet the tourism needs of people traveling through the expressway. Set up a "life leisure square" to meet the daily leisure and entertainment of local residents.

High-Quality Service: Introduce well-known domestic and foreign chain supermarkets, characteristic catering, vehicle maintenance suppliers; set up a tourist distribution center or tourist transfer station, which can meet the one-stop travel services such as transfer, ticket purchase, and reception for the traveling crowd; provide service desks, free tea supply places, exclusive parent-child areas and other humanized facilities and equipment; provide toilets to meet different needs, and meet the purchasing power of different groups.

4. Project Overview

4.1. Project Overview

The Dezhou to Shangrao Expressway is a parallel line of the Beijing-Taipei Expressway in the national expressway network and an important part of the "Four Verticals" in Jiangxi Province's "Four Verticals, Six Horizontals, Eight Radiations, Seventeen Connections" expressway network. The entire Qimen–Wuyuan Expressway is located within the national 3A

scenic area of Wuyuan County. The tourist routes in Wuyuan County are mainly divided into three routes: east, west, and north. The Qimen–Wuyuan Expressway mainly connects the resources of the northern tourist route, including Congxi Drifting, Sixiyan Village, Likeng Village, etc.

There is a lack of basic tourism transportation facilities in the area where the Qimen–Wuyuan Expressway is located, and the satisfaction of travel experience urgently needs to be improved. Therefore, with the Longteng Service Area as the engine, the Qimen–Wuyuan Expressway aims to create a tourism-themed open expressway service area. From a strategic level, it plans for the integration of space, function, service, and supply, integrates transportation and tourism resources, and builds a tourist distribution center and integrated platform. While serving expressway drivers and passengers, it also promotes the economic development and rural revitalization of the surrounding areas.

4.2 Site Selection Feature Analysis of Qimen–Wuyuan Expressway Integrated Tourism Service Area

When selecting the site for this project, we fully considered the principles of overall coordination and convenient travel stated in the planning requirements, mainly considering three aspects: spatial location, natural environment, and development value.

(1) Spatial Location Advantage: The Longteng Service Area is located between Wuyuan county town and the main scenic spots on the northern tourist route of Wuyuan. At present, tourists use the county town as the main center for food and accommodation, and carry out short-term tourist activities such as day trips and short trips to the surrounding tourist routes. The expressway, as a fast transport channel to the main scenic areas, will play a role in receiving tourists and opening up to the outside world by setting up a tourist service center in the service area.

(2) Natural Environment Advantage: The Longteng Service Area is located in the peninsula area to the northwest of Longteng village in Sikou Town, adjacent to Qinghua Water, and surrounded by paddy fields, tea gardens, and mountain river landscapes. It is suitable to combine the features of the terrain and natural environmental conditions to develop this node as a potential tourist spot and integrate it with the expressway service area.

(3) Development Value Advantage: Longteng Village, a "Northern Song Dynasty Heritage Village", with more than 30 ancient Hui-style houses from the Qing Dynasty built along the water, currently does not have high visibility among Wuyuan's tourist resources and has potential development value. It is possible to use the transformation of the mechanized path to upgrade it to the entrance channel connecting the Longteng Village and the service area, and in the future, it can be built into a group with the service area featuring characteristic homestays.

4.3 Customer Analysis of Qimen–Wuyuan Expressway Integrated Tourism Service Area

The current trend in tourism is leaning towards self-drive, self-service, and campsite types of tourism, requiring more experiential elements. An online survey was conducted for this project on tourists' consumption choices, and the main conclusions are as follows:

In terms of travel time, highway tourism is considered short- to medium-distance travel. Tourists tend to choose self-driving, with the travel time typically ranging from 1 to 3 days.

48.2% of camping consumers choose to self-drive once every 1-2 months, 25.1% of self-driving consumers choose to self-drive once every 3-6 months, and 15% of consumers choose to do so once a year. 62.8% of consumers travel with family, 55.0% of consumers travel with friends, and 42.4% of consumers travel with a partner. From the perspective of the demographic, tourists who choose to self-drive are becoming younger. In terms of consumption, both the willingness to consume and the level of consumption are increasing year by year.

The service target audience of this project exhibits characteristics of "younger age, family-oriented, and short-distance travel time." From the perspective of the tourist population, the tourism group mainly tends towards family-oriented and younger demographics, characterized by leisure vacation type travel with the whole family and experiential travel by post-90s and post-00s generation. In terms of travel mode and travel time, it is inclined to weekend and holiday type short-distance leisure travel mainly by self-driving.

5 Planning Ideas and Content

In the planning of the tourism-themed expressway service area - Longteng Service Area, the aforementioned planning principles and requirements are fully considered. Its planning philosophy emphasizes compound functions, integrated spaces, and diversified services. Relying on the characteristic Hui-style architecture of Longteng Village and integrating the peninsula-like topography of the site and the surrounding natural environment, it is proposed to build the Longteng Service Area into a brand of "Hui Culture Immersive Natural Show Garden in Wuyuan Landscape", with the theme of "Colorful Wuyuan, Dream Back to Longteng". This service area is a garden-style characteristic tourism service area that combines a comprehensive highway service area, a tourist distribution center, and Hui-style cultural displays. The Longteng Service Area integrates natural landscapes, folk customs, historical and cultural elements, and advanced concepts of transportation-tourism integration, forming a diverse recreational experience that is feasible, enjoyable, hopeful, livable, and edible.

(1) Comprehensive Coordination and Convenient Travel Practice Analysis - Layout Emphasizes Spatial Integration

To fully leverage the systematic nature of transportation facilities, break the "red line" thinking, create a "break" project on the expressway, integrate the planning of highway land use with surrounding rural land use, create a waterside recreational space on the Longteng Peninsula, expand the tourism and accommodation functions of Longteng Ancient Village, and solve the "point" problem by planning a "surface" space.

Creating an expressway tourism service distribution center. Achieving the conversion of expressway tourist passenger dedicated lines, self-driving tourists and scenic spot dedicated vehicles, as well as the implementation of tourist diversion and distribution;

(2) Service Terminal, Functional Compound Practice Analysis - Development Highlights Multifunctionality

The Longteng Service Area emphasizes three major roles and eight major functions. The three

major roles are: service terminal, overall coordination; resource integration, gathering popularity; fully equipped, convenient travel. The eight major functions are: highway and public shared space, tourist passenger center, commercial comprehensive center, tourist information coordination center, tourist ticket center, homestay reception center, network information management center, and emergency center. It achieves the interactive development of basic expressway service functions and tourism expansion functions, planning inter-function boosting, forming a vibrant regional center along the expressway, and transforming the single-purpose "people flow" into the multi-purpose "value flow".

In combination with the above functions and overall principles, in the service area, combined with its landscape pattern, cultural resources, agricultural resources, etc., key tourist service functions such as ecological wetlands, waterfront plank roads, science popularization, forest cycling, forest creek flower sea, forest camping, cycling post stations, riverfront plank roads, three-dimensional tea fields, agricultural mazes, farming experiences, Eye of Longteng, colorful terraces, etc. are implanted.

In addition to the basic service function area, the entire service area has added six major tourist service function areas. These include the "Qinghua Waterfront" function area mainly for ecological wetlands, science education, and fishing functions; the "Wenxiu Huizhou" function area mainly for tourist post stations, themed services, shopping and food, and leisure vacations; the "Slow Mountain Shallow Forest" function area mainly for forest trails, aerobic cycling, camping leisure, and children's playground; the "Tea Fragrance Dongli" function area mainly for tea picking, tea tasting, and viewing; the "Shuipan Qiu Field" function area mainly for earth art, plant maze, and farming experience; the "Smoky Rain Longteng" function area mainly for homestays, academies, handicrafts, and cultural displays.

(3) Smart Travel, Brand Attraction Practice Analysis - Demand Planning for Diverse Services

The theme IP of the Longteng Service Area is the "Immersive Natural Scenic Park of Huizhou Culture in Wuyuan's Landscape". The service area product settings emphasize cultural experience products, such as setting up tea product making, handicraft production, and cultural revival activities, allowing tourists to fully relax and rest here. The comprehensive display of Huizhou culture scenes through the construction of the Huizhou Museum enables visitors to feel the evolution process of celebrities, architecture, and history. The service area will not only undertake the functions of internal and external traffic conversion and regional contact, but also undertake the window function of cultural publicity and folklore display. In Longteng Service Area, a tourist traffic intelligence system is established. In addition to providing basic online services for food, accommodation, travel, shopping, and entertainment, it cooperates with the cultural and tourism department to complete the statistical analysis of passenger flow, and through the adjustment of scenic dedicated vehicle routes and ticket sales, it achieves real-time diversion and allocation of tourists.

6. Conclusion

Transportation and tourism integrated service area is one of the means to promote the sustainable development of highway traffic. This study, through reviewing domestic and

international research achievements and engineering practices in the development of service areas under the concept of transportation-tourism integration, analyzes the concept of tourism-themed open service areas. It summarizes the basic requirements and planning principles for their design. Taking the planning of the Longteng Service Area in Qimen–Wuyuan Expressway, Jiangxi Province as an example, this research aims to create a new paradigm of planning for tourism-themed open service areas in the new era. This is achieved through multi-dimensional integration of space, function, service, and supply, thereby providing a reference for the planning of open service areas in other regions across the country. However, limited by the depth of the research, the current research on the business layout, product system and follow-up policy support of the service area still needs to be carried out complete research and deepening.

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