Construction of Rural Revitalization Tourism Planning and Design and Management Information System Based on WebGIS Technology

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Abstract. Under the active promotion of the concept of rural revitalization, facing the unique rural tourism resources, how to fully tap and release the advantages of characteristic resources and realize accurate development and comprehensive planning and design is the main problem faced in the development of rural tourism at this stage. In this regard, based on the existing shortcomings of rural tourism planning and design model, combined with the technical advantages of WebGIS, data analysis and processing, Web application, this paper puts forward a set of rural revitalization tourism planning and design and management information system, which sets a new paradigm for the development and planning of rural tourism. The whole system is B/S architecture, the front end supports users to obtain corresponding functions and services, and the back end server ensures the control of the system operation logic. The results of system simulation test show that all functions are running normally from spatial data collection to comprehensive analysis of environment and resources, and finally comprehensive evaluation is completed. Diversified information management can provide necessary technical support for tourism planning and design to meet the practical application needs of users.

Keywords: WebGIS · Rural tourism planning and design · Information management and application · Computer software

1 Introduction

The rural revitalization strategy is an important strategy for China's social and economic development and modernization in the new period, and it is also an important task for building a modern country in Socialism with Chinese characteristics in an all-round way [1]. Rural tourism, as a new engine to accelerate rural revitalization, can not only build rural tourism projects with regional characteristics by relying on the rich natural landscape of the countryside, but also condense traditional excellent culture to achieve the goal of coordinated development of cultural inheritance and village protection. However, there are still some problems in the current rural tourism planning and design process,

such as backward concept, lack of innovation, low resource utilization rate and unreasonable layout, which seriously restrict the development of rural tourism [2]. In view of this, this paper holds that rural tourism planning and design should adhere to the global development thinking, introduce a new generation of digital information technology into the original model, digitize and virtualize rural tourism resources, and give full play to the use value behind the data information, so as to provide necessary decision-making assistance for rural tourism planning and design, truly revitalize rural global tourism resources, and realize accurate development and unified planning [3]. The system integrates data analysis, processing and application services, and can realize the collection, storage, processing and application of spatial data of tourism resources with the help of WebGIS technology, and provide relevant technical support for tourism resources query, evaluation and analysis, planning and design, map editing and information management, so as to make rural tourism planning and design more scientific, convenient and predictable.

2   Development Process

Firstly, a new geographic information database is built in ArcMap software to provide necessary storage space for spatial data and attribute data of rural tourism resources [4]. On the one hand, the acquisition of spatial data can carry out vector scanning on paper maps to complete digital conversion, on the other hand, it can be directly imported into electronic maps from other platforms. For attribute data, it needs to be investigated and counted manually to complete the initial processing of data information. After the spatial data and attribute data are input, the points, lines and areas in the spatial data are vectorized and edited, and they correspond to the attribute data one by one, forming multiple data layers such as terrain, roads, scenic spots and facilities, which provides convenience for subsequent planning and design [5]. Secondly, the development of WebGIS frontend pages mainly depends on Openlayers framework. Windows 10.0 is selected as the basic operating system, MyEclipse 2014 as the integrated development tool and Java as the development language. Openlayers framework selects version v6.10.0. Under MyEclipse, Openlayers can be directly introduced into the project to complete the definition and deployment of subsequent API interfaces, and the function of Openlayers calling ArcGis Server map service interface in WMS mode is realized [6]. Finally, for the construction of Web Server, the system will complete the integration and encapsulation of each functional module based on Tomcat 8.0 and Spring framework to meet the call and control of Web Server to ArcGis Server, and use MySQL5.7 database to complete the storage of user information data, system running logs and other materials [7]. Through the introduction of the above key technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of rural revitalization tourism planning, design and management information system is also clarified.

3   Functional Implementation

3.1   Data Query

Relying on the application advantages of geographic information database, the system collects a large number of scattered data information and completes digital construction, which greatly improves the comprehensiveness and integrity of planning and design. At the same time, it supports users to quickly complete information retrieval by means of location query, attribute query, selection query, etc., and complete fixed-point display of content and results that meet users' needs in the electronic map. In addition, some characters and pictures are displayed as detailed information in the electronic map, which is convenient for users to refer to and apply.

3.2   Environmental and Resources Superposition Analysis

The spatial analysis function of WebGIS will play an important role in rural tourism planning and design. Under this function module, the topological superposition function of WebGIS can divide the development areas by overlapping the environmental layers such as topography, address, climate, hydrology, transportation and tourism resources, and determine the priority order between the areas [8]. In addition, WebGIS also has the function of buffer analysis, that is, to draw a certain width of regional zone around a certain point, line, surface and other elements, which helps scenic spot protection and road planning and design.

3.3   Measure and Estimate

In the system, users can automatically calculate and estimate the environmental capacity and tourist capacity by relying on the preset algorithm model to measure the coordination and rationality of rural tourism planning and design [9]. As shown in Formula 1, it is a daily environmental capacity calculation formula based on area method, where C stands for daily environmental capacity, S is the total area of sightseeing, S' is the average occupied area of tourists, t is the overall opening time, and T' is the average sightseeing time of tourists. The calculation of daily tourist capacity is related to the daily environmental capacity, as shown in Formula 2, where G stands for daily tourist capacity, T1 is the shortest time for tourists to visit continuously, and T2 is the most

Table 1. Estimated results of environmental capacity and tourist capacity

Regional area	Area unit capacity	Opening time	Minimum duration	The most suitable time	Daily environmental capacity	Daily visitor capacity
7940 m^2	4 m^2/person	12 h	5.5 h	8.5 h	11934 person	7721 person

Table 2. Details of indicators in the comprehensive evaluation system

Item	Evaluation indicator	Evaluation standards
Ecological characteristics	Typicality, rarity, diversity, naturality, etc.	Grade score
Landscape aesthetics	Geomorphology, vegetation, animals, water system, meteorology, etc.	Level A: 5 points Level B: 4 points
Develop adaptability	Temperature, humidity, altitude, air pressure, etc.	Level C: 3 points Level D: 2 points Level E: 1 point
Hygiene and health	Air quality, water environment quality, etc.	
Humanistic connotation	History, folk customs, religion, art, etc.	
Location conditions	Location, transportation, facilities, etc.	

suitable time for tourists to visit. Taking a scenic spot as an example, the estimated results are shown in Table 1.

$$C = \left(\frac{S}{S'}\right) \times \left(\frac{T}{T'}\right) \qquad (1)$$

$$G = \left(\frac{T_1}{T_2}\right) \times C \qquad (2)$$

3.4 Comprehensive Evaluation

The establishment of comprehensive evaluation system can evaluate rural tourism resources from multiple dimensions, so as to highlight the characteristics of resources and grasp the core of planning and design. Under the system, users can score from the aspects of ecological characteristics, landscape aesthetics, development suitability, health, humanistic connotation and location conditions, and determine the scoring standard according to the expert scoring method to complete the final objective and scientific evaluation, as shown in Table 2, which shows the details of various indicators in the comprehensive evaluation system [10].

After simulation test, the comprehensive evaluation results of a rural tourism resource are shown in Table 3. The test results show that the comprehensive score of a rural tourism project is 76, and the score of health and location conditions is high. In the core of planning and design, the elements of recreation and family and group travel can be highlighted, and the design and development of landscape and humanistic connotation can be strengthened to form an integrated rural tourism project.

Table 3. Comprehensive evaluation results of a rural tourism resources

	Ecological characteristics	Landscape aesthetics	Develop adaptability	Hygiene and health	Humanistic connotation	Location conditions
Score	18	14	8	12	11	13
Scoring average	67.3%	72.5%	74.9%	90.8%	63.2%	88.4%

4 Conclusions

Aiming at the reform of rural tourism planning and design mode, this paper puts forward a rural revitalization tourism planning and design and management information system with WebGIS as the core and data analysis and processing as the auxiliary. The system can provide relevant technical support from multiple dimensions, and make rural tourism planning and design more scientific, convenient and predictable. In the follow-up research, the system will further enhance the richness of user interaction means, and introduce the 3D visualization model into the system display, providing reference for the informatization and intelligent development of rural tourism planning and design.

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