

# Realistic Dilemmas and Response Strategies of Digital Culture and Tourism Enabling Rural Revitalisation

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## ABSTRACT

This paper explores the extent and direction of the impact of digital technology-enabled rural cultural tourism development by constructing fixed-effects models, GMM models, spatial Durbin models, Moran indexes, mediation effects and other models. Using the hierarchical analysis method to construct measurement indexes from two aspects of scale and benefit, and then using the coupling coordination degree model to measure the level of digital rural tourism development, to summarize the level of development and coordination of cultural tourism industry in rural areas. The results show that the difference between the minimum value and the maximum value of the rural digitalization level is about 8, and the large gap also reflects to some extent the uneven development of digital rural tourism in different regions. Digital rural tourism has a significant impact on rural economic development and non-rural non-farm employment level, and its impact coefficient is 0.138 and 0.784 respectively. In the data measurement of 2017 and 2022, the more significant the degree of aggregation is, the faster the level of development of digital rural tourism becomes. The comprehensive evaluation index of digital rural tourism in the sample area in 2021 is 0.82, which is at a high level, and the sample region's service quality satisfaction is also at a high level. Therefore, this paper analyzes from various aspects that the development of digital tourism can promote the sustainable development of rural economy and realize rural revitalization.

**Keywords:** fixed effects model, Moran index, digital rural tourism, mediating effect, hierarchical analysis method, rural revitalization

## 1. Introduction

The construction of the new socialist countryside has brought about an improvement in the appearance of some of the villages, with farmers becoming the masters of their own house and their lives being further improved. Especially this year is the key moment of poverty alleviation, the construction of the countryside has been given an unprecedented opportunity to enhance the taste of

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Received 15 January 2024; Revised 20 February 2024; Accepted 30 November 2024; Published Online 15 April 2025.

DOI: [10.61091/jcmcc127a-201](https://doi.org/10.61091/jcmcc127a-201)

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the countryside and drive the rural economy is a good opportunity. With the beautiful countryside construction and rural revitalization promotion, the rural transportation facilities and village appearance have undergone fundamental changes, all of which provide the environment and elements for the development of rural tourism [1]. However, some of the countryside construction of the pursuit of big development and construction, there are many similar villages, construction style uniformity, the formation of a thousand villages one-sided situation, the countryside has lost its original appearance, and even brought a certain degree of environmental pollution, some of the rich characteristics of the architectural and cultural heritage is not well protected, and some of the culture and history of the countryside is not well tapped into the development. What is even more worrying is that due to the lack of education, medical and other resources, backward infrastructure, the countryside can not keep people, resulting in the emergence of a number of hollow villages, hollow houses.

Digital technology is the pioneering force of the new round of industrial revolution and technological revolution, digital technology empowered rural cultural revitalization is the fusion point where the two strategies of digital economy and rural revitalization intersect with each other [2], which provides new opportunities for rural cultural revitalization, and becomes an important means of rural cultural production, dissemination as well as inheritance and protection of rural cultural resources and development and innovation [3]. Digital technology in the process of empowering rural cultural revitalization, for the digital facilities in the countryside, the villagers' digital literacy capacity, digital talents and digital policies and other aspects of the problem [4-5], can be strengthened from the construction of digital facilities in rural areas, enhance the level of farmers' digital literacy, increase the introduction of rural digital talents, promote the improvement of rural digital policies and other aspects of the solution to the reality of the difficult problem, so as to more fully release digital technology's Enabling space, stimulate the internal momentum of rural revitalization, and better help rural cultural revitalization.

With the development and improvement of digital technology, digital technology to promote rural revitalization has achieved fruitful results, promoting the inheritance and protection of rural culture, and also promoting the development of rural culture-related industries [6-7]. However, in China's vast rural society, digital technology-enabled rural cultural revitalization still faces many practical difficulties [8].

Digital cultural tourism is mainly to take the digital cultural tourism industry as a relying carrier to realize the deepening development of rural revitalization integration industry [9]. Its development needs to consider the utility of two aspects. On the one hand, increase the industrialization scale of digital cultural tourism to expand the volume of rural cultural tourism industry. Digital technology can play its high-end and efficient value role by technical means throughout the whole process of the cultural tourism industry, and catalyze the generation of new rural cultural tourism business forms with the expansion of the industrial scale [10-11]. On the other hand, the digital application of the cultural tourism industry is broadened to realize the incremental efficiency of the rural cultural tourism industry. The traditional cultural tourism industry in the digital technology means of intervention and integration of the role of its production volume and production efficiency advantages for the high-quality development of the rural economy to provide new kinetic energy [12]. The integration of digital technology into the culture and tourism industry has promoted the deep integration of rural culture and tourism with characteristic products, characteristic resources and characteristic industries, promoted the transformation of information technology for the integrated development of rural culture and tourism, and given rise to new forms of rural industrial revitalization and development.

Digital technology has given new kinetic energy to the traditional industry, how to explore out of a path of digital revitalization of rural culture and tourism industry with local characteristics is of great significance, and provide a replicable model for promoting the digital revitalization of rural culture

and tourism industry [13-14]. The internal mechanism of digital cultural tourism to promote the development of rural revitalization is as follows:

- 1) The endogenous power to promote the revitalization and development of rural culture and tourism industry. Digital empowerment of rural culture and tourism industry, in line with the specific rules of rural culture and tourism industry development, is conducive to enhancing the vitality of the culture and tourism industry itself, so that the rural culture and tourism is closely integrated into people's production and life, so that the culture and tourism industry has the endogenous power of sustainable development.
- 2) The objective need to realize common prosperity. To realize common prosperity, the most arduous and burdensome task in the countryside. The realization of rural industrial revitalization is the premise of solving all problems in rural areas. The rural culture and tourism industry is an important hand in the integration of rural one, two and three industries, but also one of the important ways to realize the farmers' income, not only for the people on one side of the well-being of the people, but also to vigorously promote the common wealth of the local community.
- 3) An important way to enhance cultural soft power. Cultural soft power is a kind of cultural power that can be realized only after widespread dissemination. Empowering the rural cultural tourism industry through digital, driving the in-depth development of rural cultural tourism resources, and developing the non-heritage industry and traditional craft industry is an inherent need for the revitalization of the rural cultural tourism industry.
- 4) Important means to realize industrial transformation and upgrading. Through digital empowerment to achieve value co-creation, constantly extend the cultural tourism industry chain, can promote the flexible integration of cultural tourism consumption node innovation ability, and then realize the rural cultural tourism industry revitalization transformation and upgrading.

The cultural tourism industry is affected by environmental carrying capacity, transportation conditions and other factors in the process of development, while digital cultural tourism can show tourists the local natural landscape and humanistic landscape by simply using digital technology, and the economic level of the region has thus been greatly improved [15]. In addition, in the process of developing the digital cultural tourism industry, agriculture, logistics, e-commerce and other industries in the countryside have also been developed rapidly, especially the e-commerce industry, due to the increase of online sales channels, the sales of cultural tourism products and agricultural products in the countryside have increased dramatically, which has led to a steady increase in the economic level of the countryside [16-17].

Digital cultural tourism has a positive role in promoting the development of rural economy. On the one hand, the quality and brand influence of rural products are improved through digital means [18-19]. For example, the use of Internet technology and big data technology for branding, quality monitoring and marketing of rural products to improve the competitiveness and market share of products. Digital cultural tourism can also further promote rural e-commerce, enrich online sales channels, expand the sales range and channels of rural products, and increase the sales of rural products. On the other hand, the visibility and reputation of rural products are improved through digital means [20-21]. For example, the use of Internet technology and social media platforms to promote the special products of rural tourism and increase consumer awareness and interest. Digital cultural tourism can also provide intelligent tourism services and experiences, such as guided tours, virtual tours and other programs to attract more tourists to rural tourism.

As an emerging industry, digital cultural tourism can not only promote rural economic development, but also contribute to the protection and inheritance of rural culture. Rural culture is an important part of traditional Chinese culture and an important resource and foundation for rural revitalization, and digital cultural tourism can enhance the cultural heritage and popularity of the countryside by excavating rural cultural resources and developing cultural tourism products [22-23]. On the one hand, digital cultural tourism can integrate rural culture and rural tourism through the development of

cultural tourism products to improve the dissemination and influence of rural culture. For example, digital technology can be used to develop a virtual tour system, so that tourists can feel the charm of rural culture through VR digital equipment and so on, or carry out cultural theme activities, such as cultural festivals and folklore displays, so that tourists can personally feel the connotation and characteristics of rural culture. These initiatives can not only promote the development of rural tourism, but also allow more people to understand and love rural culture, and thus improve the protection and inheritance of rural culture. On the other hand, digital cultural tourism can inherit and protect rural cultural heritage through digital means [24-26]. Rural cultural heritage is an important part of rural culture and an important resource for rural revitalization. Through digital means, rural cultural heritage can be digitally protected, such as digital photography, storage and display. Digital means can also help rural cultural heritage to realize digital inheritance, such as through digital display and virtual reality to let more people understand the history, connotation and characteristics of rural cultural heritage, and then improve the inheritance of rural culture [27].

Rural governance is an important part of the rural revitalization strategy. Through the use of big data, artificial intelligence, and the Internet of Things, digital cultural tourism can effectively improve rural governance capabilities, bridge the "data divide" between urban and rural areas, solve the problems of "urgency, hardship and longing" of the masses, and make positive contributions to improving the level of rural governance [28-29]. First, digital cultural tourism can improve the level of informationization and strengthen the construction of information infrastructure. Digital cultural tourism can help accelerate the digitalization and upgrading of various rural infrastructures, such as smart street lights and intelligent logistics. In addition, Internet technology and big data technology can also be used to provide data support technology and analysis for rural governance, such as real-time monitoring of environmental pollution, understanding of the quality of life of residents, etc. These initiatives help to improve the science, precision and efficiency of rural governance. Secondly, digital cultural tourism can promote the construction of intelligent villages and improve the level of rural governance. Digital cultural tourism can realize the sharing of rural information resources through digital means and promote the construction of rural informatization and intelligence. For example, a digital agricultural intelligence platform can be built to realize the information management and intelligent control of agricultural production, or a digital community service center can be built to provide social services and public services. These initiatives can provide more efficient and convenient services for rural governance and improve the level of rural governance [30-31].

This paper analyzes the empirical process of digital rural tourism affecting rural economic development and realizing rural revitalization. Firstly, we need to select suitable indicators for verification, and choose the spatial Durbin model to carry out the spillover effect test to test the direct impact of digital rural tourism on rural economic development, and secondly, we choose the intermediary model to test the intermediary mechanism of rural tourism affecting the sustainability of the rural economy. Hierarchical analysis was then used to measure the development potential of digital rural tourism and its subsystem index in the sample area, so as to find out the level of digital technology development. Finally, the regression analysis of service quality and tourists' satisfaction in the sample area was conducted.

## **2. Digital design for rural cultural tourism**

### *2.1. Impact of digital technology on the high quality development of rural tourism*

Digital technology empowers the high-quality development of rural tourism, which refers to the fact that while digital technology is fully integrated with the rural tourism industry, the digitization of the rural tourism industry has been continuously improved, which promotes the digitization of the governance, experience, production and service of rural tourism, etc., and the digital technology has transformed the rural tourism industry in an all-round, multi-angle and full-chain way, thus Improved

the development efficiency of rural tourism. The use of intelligent products, personalized consumer demand, and the onlineization of enterprise services and other new forms and modes of new business, to improve the quality and efficiency of rural tourism products and services, so that the rural tourism industry has a new vitality.

1) Digital technology promotes rural tourism product innovation. When it comes to the high-quality development of rural tourism, the first problem is the problems in the planning and development of rural tourism in terms of products, management and operation. Specifically embodied in some rural tourism destinations because of the integration of modernization and urban elements into rural tourism products, resulting in a large number of tourists seeking rural characteristics and culture of the experience of rural tourism products and satisfaction has been greatly affected, which led to a decline in the overall quality of rural tourism products. In addition, some rural tourism destinations ignore the requirements of high-quality development and only consider the form of rural tourism products, while ignoring the connotation of rural tourism products. Digital technology provides technical support for the high-quality development of rural tourism, and through the application of new technologies, it brings about new business models of rural tourism and forms competitive and attractive cultural tourism projects to meet the increasingly rich consumption needs of people in the new period, and to adapt to the changes in consumer demand to create rural tourism products that are more satisfying to personalization and customization. Secondly, the traditional handicraft technology in rural areas can be digitally developed, designed and produced under digital technology, utilizing the advantages of rural areas themselves to develop digital forms and carriers of handicrafts, and to enhance the added value of rural digital culture industry. On the basis of protecting traditional cultural ecology, digital cultural branding strategies are carried out for national traditional culture in specific regions, cultivating cultural villages, and innovating product forms to meet the changing needs in the digital economy.

2) Digital technology to improve the operational efficiency of rural tourism. The high-quality development of rural tourism does not negate the idea of sustainable development, but to emphasize the "quality" and "efficiency" of the field on the basis of sustainable development. Digital technology can realize the whole process of rural governance open, transparent, dynamic and traceable, reduce the cost of real-time monitoring of rural tourism, strengthen the effectiveness of supervision and disciplinary mechanism of rural tourism governance, enhance the efficiency of conflict and contradiction resolution in the rural society, promote the effective implementation of rural governance system, and promote the democratization of rural governance. Rural tourism management is an important aspect of realizing the high-quality development of rural tourism, and the magnitude of its implementation effect depends crucially on the supervision system and punishment system as well as the problem-solving ability, which can be significantly enhanced by digital technology. First of all, the supervision and punishment of rural tourism can be realized more effectively through digital technology, and the supervision of rural tourism activities can be strengthened to ensure the safe, standardized and orderly development of rural tourism. The extensive use of digital technology can promote the communication and connection between administrative organizations in different regions and at different levels, and broaden the interaction between administrative organizations and the grassroots public, providing experience support for the management of rural tourism in various regions, as well as enhancing the autonomy and activeness of villagers in rural management. Secondly, digital technology helps to improve the efficiency of conflict resolution. The use of digital technology can collect in real time, accurately record and track the specific behavior of multiple subjects involved in rural tourism, which helps to scientifically and reasonably divide the responsibility for the behavior of conflicts or contradictions between multiple subjects, provides a reasonable basis for the implementation of progressive sanctions, enriches the means of sanctioning, and makes it easier to reach a solution to the conflict that is satisfactory to all parties, so as to promote the orderly development of rural tourism.

3) Digital technology to enhance rural tourism public services. In terms of rural tourism services, on the one hand, due to the lack of necessary service facilities, resulting in tourists in the process of tourism is difficult to get effective support, on the other hand, operators mostly lack of systematic professional knowledge training, unable to fully meet the personalized needs of tourists. In addition, due to the lack of necessary service facilities and professional knowledge training, the quality of rural tourism services can not be effectively improved, and it is difficult to meet the requirements of tourists for the quality of rural tourism services. Therefore, upgrading the level of rural public services is another important element in realizing the high-quality development of rural tourism. The development of digital technology provides a new opportunity to improve the level of rural tourism services. The high-quality development of rural public services, of course, can not be separated from the successful grafting of digital technology, and only in this way can we promote the accurate docking of resources between urban and rural areas, smooth flow, narrowing the differences in the livelihood of urban and rural areas, and ultimately achieve equality between urban and rural areas. In the context of digital village construction, the integration of digital technology into rural public services has become an important element in the construction of digital villages. Therefore, increasing the popularization of digitization of rural public services and increasing the integration and application of rural public services such as education, medical care, social security and pension have been the first task in promoting the construction of digital villages.

## *2.2. Digital rural cultural tourism for economic development*

There are many villages in China, most of which are located in economically underdeveloped areas, with weak infrastructure construction, low level of scientific and technological development, poor transportation access, and local industries dominated by agriculture, handicrafts, and other industries, with low value-added products. The development of tourism industry in rural areas and the concentration of efforts on the development of tourism areas can not only drive the development of local catering, accommodation and other typical industries, but also promote the construction of local transportation, tourism toilets and other infrastructure through the creation of various types of tourism scenic spots, resorts and other indicators, and promote the rapid improvement of the level of public services and the revitalization of the countryside.

As in the informationization of rural tourism and the development of regional tourism today, rural tourism should not only have characteristic tourism projects, but also reflect the original local folklore, but also plan in general, so that the tourism process is smooth, to enhance the tourism experience, and to promote the sustainable development of tourism. Service design needs to concentrate the wisdom and resources of all parties, and the success of rural cultural tourism depends on the support and cooperation of all parties. Therefore, service design can help rural cultural tourism attract more partners and resources, realize joint innovation and improve service quality. Digital technology has become an important means of modern service design, which can improve service efficiency and experience by means of intelligence, informationization and VR. In rural cultural tourism, digital technology can be used to design more intelligent guide services, online booking and so on.

## *2.3. Digitalization Trends and Challenges of Rural Cultural Tourism*

Digital countryside is accompanied by the application of agricultural and rural grids, information technology and digitalization in economic and social development, as well as the farmers' modern information technology level continues to improve, and from the inside out to promote the modernization of agricultural and rural development and transformation of the process, not only to achieve the strategic orientation of rural revitalization, but also a key link in the digital China.

Tourists' demand for a better life is gradually increasing, and the focus of their consumption is shifting to experience, quality and personalization. Under the growing demand for creative rural experiences, the "rural culture and tourism industry", as a typical example of "green mountains are

golden mountains", is an important industry for rural revitalization. As a typical industry of "green hills and green mountains are the silver mountain", "rural cultural tourism industry" is not only an important hand for rural revitalization, but also a key force for releasing the vitality of rural development, and is gradually becoming a new highlight of rural economic development. Digital technology, as a brand new production factor, can effectively integrate with the cultural tourism industry, and to a large extent empower the whole process of rural agricultural production, management, sales and distribution, tourism services, etc., effectively reconstructing the production factors of the countryside, local resources, and expanding the scope of digitalization of the rural cultural tourism, so as to improve the countryside's industrial system and service processes, and promote the transformation and upgrading of the rural cultural tourism. To facilitate the two-way combination of rural resources and modern technology, to create a multi-network interconnection, intelligent, digital rural cultural tourism, so as to realize the economic and social benefits of "double harvest", and thus the rural cultural tourism digitalization presents its significant features.

(1) Green and livable features. Digitalization can largely drive the transformation and upgrading of the rural cultural tourism industry, greatly changing the production and life style of the countryside, which is conducive to the creation of ecology, production and life community. In addition, cultural tourism consumers in the rural ecological cultural tourism at the same time, may be subconsciously by the green, low-carbon, environmentally friendly concept of influence, the harmonious development of man and nature resonate. Therefore, vigorously promote the informatization of the rural industry effectively avoided in the process of building digital countryside produced by the countryside travel consumers can only participate in the sales of products and tourism services, and the preparation, production and other aspects of the corresponding information access to the problem of the lack of. It realizes the networkization and intelligentization of rural production and life, and highlights the characteristics of green livability.

(2) Characteristics of sustainable dynamic development. Relying on the innovative model of rural cultural tourism empowered by digital technology, the rural cultural tourism industry is prone to produce many value-added values, such as productive value, service value, personalized value, and traffic value, in the process of developing content. For the digital countryside, with the continuous development of modern technology and the popularization and application of emerging digital technology, the concept of digital management has gradually penetrated into all aspects of production, service, marketing and operation of rural cultural tourism products. The digital production makes the infrastructure construction of rural tourism more bright, the digital service prompts the rural cultural tourism experience more in-depth, the digital marketing makes the development of cultural tourism products more diversified, and the digital operation makes the planning of cultural tourism activities more efficient. Applying digitalization and intelligence to all aspects can realize real-time interactive participation of multiple subjects and get timely and comprehensive feedback. Especially with the rapid development of digital technology, the development and design of virtual rural cultural tourism products in the context of "cloud tourism" will be more feasible, for example, through the combination of AR, VR, AI and other technologies, it can realize the tourists' time booking, no-touch service in the process of tourism and virtual reality and other functions. The progress of science and technology will never stop, and as science explores the laws of nature, more and more new technologies, new equipment and new ideas will appear. The popularization and application of digital technology in the integrated development of rural culture and tourism also brings more open channels and broader development space for the development of rural culture and tourism industry, so the digital countryside presents the characteristics of dynamic development and sustainability.

(3) Characteristics of promoting economic development. Digital empowerment of rural culture and tourism industry, with information dissemination technology as the medium, to achieve the rapid dissemination of information, based on digital technology, the regional culture of the countryside, advantageous resources for the depth of excavation, in order to enhance the connection and

interaction between the rural culture and tourism industry and tourists, to promote the development of the rural culture and tourism industry, so as to achieve the purpose of the upgrading of the experience scene from the excavation of the regional culture to the rural cultural and tourism experience, and then to achieve for the rural The effective feedback of the management body of the rural culture and tourism industry promotes the closed-loop upgrading of the new rural culture and tourism industry, so as to achieve a win-win situation in terms of economic benefits. On the one hand, the traditional life of the rural cultural tourism industry is mostly dependent on a large number of human and material resources, while the digital village is different from the traditional village, digitalization provides strong support for the development of the rural cultural tourism industry. Rural cultural tourism products, in addition to providing agricultural products, hospitality services, natural landscapes, tourist attractions, etc., also contains the value of production, emotion, ecology and other aspects. It should start from multiple aspects such as design, production, sales and management, and with the help of digital technology, improve the participation of rural tourism consumers, so as to realize the optimal configuration of the whole industry chain.

There are still obvious deficiencies in the digital transformation of rural cultural tourism, and it still faces many challenges.

(1) Lack of digital professionals. Rural revitalization requires talent revitalization, and the promotion of the digital development of the cultural and tourism industry also requires the support of talent. The development of digital countryside can not be separated from high-quality, specialized digital technology talents, and the weaker support for digital talents still restricts the development process of rural digitalization. Part of the training of rural digital talents is still in a blank state, the lack of a variety of forms of training system, it is difficult to cultivate composite talents with high skills. Therefore, accelerating the introduction, cultivation and training of digital talents in the cultural tourism industry is an urgent task for the digital transformation of the cultural tourism industry, and how to grasp the balance and synergy between digital empowerment and villagers' digital adaptation is also a problem to be faced by digital village construction and cultural tourism service design.

(2) Backward digital infrastructure. For the time being, the infrastructure construction of China's rural tourism is still relatively weak, as well as the problem of uneven development between rural digital economy regions is still very prominent. The digital development of the cultural and tourism industry cannot be separated from the support of emerging technologies such as 5G, big data, artificial intelligence, industrial Internet, cloud computing, intelligent terminals, and the Internet of Things. Today, the slow construction of informatization infrastructure in China's cultural and tourism industry has greatly limited the process of digital transformation of the cultural and tourism industry. Due to many constraints such as technology, capital, human and material resources, it makes it difficult for the rural cultural and tourism industry to realize the digital transformation, and the only way to achieve the digital transformation is through the digital platform. At the same time, the lack of information technology support makes it difficult for the rural cultural tourism industry to effectively integrate and form a benign industrial ecology. Therefore, it is imperative to accelerate the digital infrastructure construction of rural cultural tourism industry.

(3) Difficulty in transforming traditional concepts and models. Rural cultural tourism practitioners lack sufficient understanding of the importance of digital transformation of the cultural tourism industry, and the digital transformation of the rural cultural tourism industry is not strong enough. Due to the constraints of traditional concepts and modes of thinking, some rural tourism enterprises do not have a deep enough understanding of digital transformation, and there are some problems of no planning and no target transformation. The goal of digital transformation is to transform the business process of rural cultural tourism through the use of new technologies, cultivate new forms of business, new products, new services, new business models, and provide quality products and services for rural cultural tourism consumers, not just simple online sales.

In summary, digital empowerment of rural cultural tourism is still facing more practical challenges,

and it is necessary for rural areas and tourism practitioners to strengthen the digital infrastructure and talent training, promote the digital transformation of the rural cultural tourism industry, and pay attention to the precise adaptation of the application of digital technology and local cultural characteristics and resources.

#### *2.4. Digital Rural Tourism Service Design*

2.4.1. "Living" service model. Based on the current problems of rural smart tourism, such as the weak expression of local culture, industrial synergies, and rough homogeneity of service construction, combined with the ecological transformation of service design in the digital information era, we propose a "living" service model of rural smart tourism to practice the people-oriented service concept and improve the quality of tourism services. The "living" service mode always takes "sustainable development" as the design guide, connects the integration and development of smart tourism and rural tourism, and integrates various living service modes, such as protection, inheritance, participation and perception, from the four sustainable dimensions of environment, culture, service and experience, in order to build rural smart tourism. Service mode, in order to build a benign and sustainable service ecology of rural smart tourism, and realize the value of multi-directionality and continuity of service. First of all, the development of rural smart tourism relies on its unique natural landscape, village architecture and other environmental resources, and adopting a living protection approach to design services for the rural environment can realize the sustainable development of the rural environment. In the design process, it is necessary to follow the internal symbiosis law of the natural and humanistic environment, and combine the local environmental resources to create a modern rural tourism environment that is integrated with the local culture. Secondly, as the cohesive expression of regional farming culture and traditional folk culture, the local culture is the main cultural expression of rural intelligent tourism, and in the service design, it is necessary to pay attention to the expression of the living heritage of the local culture, pay attention to the interaction between the local villagers and the tourists, and effectively stimulate the conscious initiative of the main body of the villagers. Again, in the service expression of rural wisdom tourism, according to the content of different services will be divided into tangible sensory services and intangible spiritual services, through the study of tourists for the service of the utility of the expectations of the design of the best combination of the two forms of tourists and the appropriate inclusion of tourists and services of the contact and interaction process, to stimulate intangible service needs externalized into tangible service needs, to complete the living participation in the service process, and to achieve the sustainability of the service system. Sustainability of the service system. Finally, based on the online big data analysis of the rural smart tourism platform and the offline Internet of Things follow-up, we study the tourists' contact preferences in the tourism service scene, iteratively optimize and innovate the service touchpoints in the system, complete the precise transmission of the rural tourism content and the value of the smart services, and enhance the tourists' living perceptions of the service experience.

2.4.2. Service design elements. Based on the "living" service mode of rural smart tourism, we study the sustainable service system of rural smart tourism, analyze the four dimensions of environment, culture, service and experience from the perspective of the system, study the entry point of service and summarize the corresponding design elements.

1) Environmental elements. Rural smart tourism is mainly carried out in the established rural areas, and its environmental elements mainly include the rural ecological environment as the main body of natural and humanistic landscape tourism, the infrastructure environment related to technology and services, and the supporting industrial synergy environment, etc. Among them, the rural ecological environment is mainly categorized into the land, culture, and experience, and the service entry point. Among them, the rural ecological environment is mainly divided into the natural environment composed of landforms, water systems, etc. and the humanistic environment composed of farmland

and village buildings; the infrastructure environment refers to the technological facilities such as network support and navigation equipment, and the service facilities such as public transportation and sanitation; and the supporting facilities related to industrial synergies mainly refer to specific outlets and base stations.

2) Cultural elements. As a rural intelligent tourism service system with the dual connotation of rural tourism and intelligent tourism, the cultural elements can be subdivided into three parts: local culture, tourism culture and intelligent technology culture. The elements of local culture generally include local folkways and customs, traditional crafts and special products such as special costumes and jewelry. Tourism culture is mainly based on the cultural atmosphere derived from the flow of tourists, industrial integration and technological influence under the conditions of smart rural tourism. Intelligent technology culture mainly refers to the re-creation and packaging of digitalized local culture and tourism culture, mostly in the form of graphics, audio, VR/AR and other new media for display.

3) Service elements. In the rural intelligent tourism service system, the service elements mainly refer to the tangible or intangible service forms that satisfy the multiple needs of tourists, such as sensory-physiological and spiritual-psychological services, which can be divided into basic life services, entertainment and leisure services, and scientific and educational or commercial exhibition services according to the content of the services. Basic living services mainly refer to the daily accommodation and food services for tourists in the process of tourism. Recreation and leisure services can be divided into trekking and sightseeing, agricultural products picking, folk entertainment and so on. Science and education or business exhibition services are mainly designed for school or company group tours, providing them with services such as popularization of science and education, academic exchanges, business visits and training activities.

4) Experience elements. Integrate the environmental, cultural and service elements and combine them with the specific characteristics of the countryside to improve and upgrade the rural intelligent tourism service system. In terms of environmental experience, redesigning the tourists' experience map to plan the tour route, organizing the stakeholders' map based on the industrial synergy environment, and coordinating the interests of all parties to achieve win-win situation. In terms of cultural experience, smart tourism thinking is used to extract and express local cultural elements, and redefine the presentation and inheritance of cultural services. In terms of service experience, a sustainable service blueprint is established based on the principle of "living state", mobilizing the enthusiasm of villagers, tourists and relevant participants to enhance the service experience.

### **3. Study on the development of rural cultural tourism industry**

#### *3.1. Explanatory variables*

This paper adopts the hierarchical analysis method to measure the level of digital technology development. The level of digital cultural and tourism exhibition is closely related to the level of related infrastructure construction and industrial development, and at the same time, it can drive the innovation and development of related industries.

Principal Component Analysis (PCA) takes dimensionality reduction as the main idea, and under the principle of striving to ensure the least loss of data information, it transforms multiple indicators into a few comprehensive indicators of a multivariate statistical method that optimally synthesizes and simplifies multivariate data. Its advantage is that the determination of weights is based on the structural relationship between the indicators derived from data analysis, the results are more objective, and the resulting principal components are independent of each other, with less information crossover.

The main steps of principal component analysis:

- 1) Select the original data, standardize the original data and establish the data matrix.
- 2) Calculate the correlation coefficient matrix to determine the correlation of indicators:

$$R = \begin{bmatrix} r_{11} & r_{12} & \Lambda & r_{1p} \\ r_{21} & r_{22} & \Lambda & r_{2p} \\ M & M & & M \\ r_{p1} & r_{p2} & \Lambda & r_{pp} \end{bmatrix} \quad (1)$$

$r_{ij} (i, j = 1, 2, \dots, p)$  is the correlation coefficient between the original variables  $x_i$  and  $x_j$ ,  $r_{ij} = r_{ji}$ , which is calculated as:

$$r_{ij} = \frac{\sum_{k=1}^n (x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j)}{\sqrt{\sum_{k=1}^n (x_{ki} - \bar{x}_i)^2 (x_{kj} - \bar{x}_j)^2}} \quad (2)$$

3) Calculate the eigenvalues and eigenvectors. Solve the eigenroot equation  $|\lambda I - R| = 0$ , the eigenvalues are commonly found by Jacobi's method and are listed in order of magnitude:

$$\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_p \geq 0 \quad (3)$$

Find the eigenvector  $e_i (i = 1, 2, \dots, p)$  corresponding to eigenvalue  $\lambda_i$ , respectively, and require  $\|e_i\| = 1$ , i.e.,  $\sum_{j=1}^p e_{ij}^2 = 1$ ,  $e_{ij}$  denote the  $j$ th component of vector  $e_i$ .

4) Calculate the principal component contribution and its cumulative contribution:

$$\text{Contribution} : \frac{\lambda_i}{\sum_{k=1}^p \lambda_k} (i = 1, 2, \dots, p) \quad (4)$$

$$\text{Cumulative contribution} : \frac{\sum_{k=1}^i \lambda_k}{\sum_{k=1}^p \lambda_k} (i = 1, 2, \dots, p) \quad (5)$$

Generally take the eigenvalues with a cumulative contribution rate of 70% or more, the  $\lambda_1, \lambda_2, \dots, \lambda_m$  st, 2nd, ...,  $m (m \leq p)$ nd principal component corresponding to 1.

5) Calculate the principal component loadings:

$$I_{ij} = p(z_i, z_j) = \sqrt{\lambda_i} e_{ij} (i, j = 1, 2, \dots, p) \quad (6)$$

6) Calculate each principal component score  $F_i$ :

$$R = \begin{bmatrix} r_{11} & r_{12} & \Lambda & r_{1p} \\ r_{21} & r_{22} & \Lambda & r_{2p} \\ M & M & & M \\ r_{p1} & r_{p2} & \Lambda & r_{pp} \end{bmatrix} \quad (7)$$

Principal component analysis is often used in conjunction with comprehensive evaluation methods to solve problems, using the eigenvalues of the principal components as weights, and using a weighted arithmetic mean to obtain a comprehensive evaluation value  $F$ , which is used to characterize the target layer in the evaluation system, so as to carry out a comprehensive evaluation and analytical ranking.

The calculation method of the comprehensive evaluation of principal components is expressed by

the formula:

$$F = \frac{\lambda_1}{\lambda_1 + \lambda_2} F_1 + \frac{\lambda_2}{\lambda_1 + \lambda_2} F_2 \quad (8)$$

### 3.2. Explained Variables

To measure the development level of digital culture and tourism industry using the coupled coordination model, this paper measures the development level of culture and tourism industry by constructing a total of fifteen secondary indicators, including eight secondary indicators of culture industry and seven secondary indicators of tourism industry, based on the indicators of tourism and culture industry, i.e., business industries engaged in the production of cultural products and the provision of cultural services.

The calculation process is as follows:

$$\text{For positive indicator } X_{ij} = \frac{X_{ij} - X_{ij}(\min)}{X_{ij}(\max) - X_{ij}(\min)}.$$

$$\text{For negative metrics } X_{ij} = \frac{X_{ij}(\max) - X_{ij}}{X_{ij}(\max) - X_{ij}(\min)}.$$

$$\text{Next calculate the system coupling degree } C = \sqrt{\frac{U1 \times U2}{(U1 + U2)^2}}.$$

A single degree of coupling is difficult to reflect the degree of coordination of the industry, therefore, the coupling coordination degree model is further constructed:

$$D = \sqrt{C \times T} \quad (9)$$

In this paper, the cultural industry and tourism industry are given the same weight, i.e.  $a$  and  $b$  are taken as 0.5.

Digital culture and tourism is a visual manifestation of the effectiveness of the development of digital technology-enabled industries in China's rural areas, therefore, this paper adopts the coupled coordination degree model and constructs three subsystems of digitization, tourism industry, and cultural industry to measure the level of the development of digital culture and tourism in China's rural areas:

$$C = \sqrt{\frac{U1 \times U2 \times U3}{(U1 + U2 + U3)^3}}, T = \frac{1}{3}U1 + \frac{1}{3}U2 + \frac{1}{3}U3 \quad (10)$$

### 3.3. Model construction

**3.3.1. Moran's I Index.** This paper adopts Exploratory Spatial Data Analysis (ESDA) to further measure the existence of correlation in the digital cultural tourism industry, which is a collection of methods used to reflect the spatial correlation of data indicators in the study area, and Moran's index is often used to measure the existence of spatial autocorrelation. The global Moran Index is usually used to study whether there is spatial dependence of a spatial attribute in a region, and the local Moran Index is usually used to study whether there are spatial correlation patterns in different geographic locations in a region.

The calculation process is as follows:

$$I = \frac{\sum_{i=1}^n \sum_{j=1}^n W_{ij} (X_i - \bar{X})(X_j - \bar{X})}{S^2 \sum_{i=1}^n \sum_{j=1}^n W_{ij}} \quad (11)$$

$$Z = \frac{I - E(I)}{\sqrt{Var(I)}} \quad (12)$$

$$I_i = \frac{X_i - \bar{X}}{S^2} \sum_{j=1}^n W_{ij} (X_j - \bar{X}) \quad (13)$$

where  $n$  denotes the number of provinces and cities,  $X$  is the coupled coordination measure, and  $W_{ij}$  is the spatial weight matrix.

1) Global spatial autocorrelation. Global spatial autocorrelation is a representation of the spatial characteristics of attribute values in the whole region, and it is mainly used to analyze the degree of spatial correlation and spatial difference in the region as a whole through the chronic illnesses of global spatial autocorrelation statistics, such as Global Moran's I and Geary's C. The global spatial autocorrelation of attribute values in the whole region is also used as a basis for determining the degree of spatial coordination of target attributes in the region. In this paper, the Global Moran's I statistic is chosen as the basis for determining the aggregation of target attributes, and its expression is:

$$I(d) = \frac{\sum_{i=1}^n \sum_{j \neq i}^n W_{ij} (x_i - \bar{x})(x_j - \bar{x})}{s^2 \sum_{i=1}^n \sum_{j \neq i}^n W_{ij}} \quad (14)$$

$x_i$  and  $x_j$  denote the economic development level scores of research units  $i$  and  $j$ ,  $W_{ij}$  is the spatial weight matrix, which is used to reveal the spatial linkages of the research units,  $s^2 = \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2$

Moran's I takes the value range of  $[-1, 1]$ , if the value of Moran's I lies in the interval of  $[0, 1]$ , it means that the economy is positively spatially correlated, and the closer the value of Moran's I to 1 means that the regions with a high (or low) level of economic development are significantly spatially clustered, and the greater the spatial distribution of correlations, the smaller the spatial differences. spatially significant agglomeration, the greater the correlation of spatial distribution, the smaller the spatial difference. If Moran's I value is located in the interval of  $[-1, 0]$ , it indicates negative economic spatial correlation, and the closer to -1 indicates that there is a significant spatial difference in the level of economic development between the research unit and the region to the right, and if the value of Moran's I is close to 0, it indicates that the research units have a strong stochasticity in economic spatial distribution.

2) Local spatial autocorrelation. In the case of regional overall spatial differences in the reduction of spatial differences, local spatial differences are likely to show a trend of expansion, so in addition to the use of global Moran's I analysis, it is also necessary to use ESDA local spatial autocorrelation analysis method, the essence of which is to decompose the global spatial autocorrelation value of Moran's I value to the various units of the study area, the The formula is:

$$I(d) = Z_i \sum_{j \neq i}^n W_{ij} Z_j \quad (15)$$

$Z_i$  and  $Z_j$  are the standardized values of the study units and  $W_{ij}$  is the spatial weight matrix.

In practical analysis, the spatial heterogeneity of the study area is often expressed with the help of Moran scatter plots and LISA agglomeration plots.

3.3.2. Fixed effects model. In order to verify the impact of the level of development of digital technology on the level of development of digital cultural tourism, this paper constructs a fixed-effects benchmark model to verify it, with the following formula:

$$cti_{i,t} = \tau_i + \gamma_t + \sum_{k=2}^k \beta_k x_{kit} + \mu_{i,t} \quad (16)$$

where  $\tau_i$  denotes individual and  $\gamma_t$  denotes time.

3.3.3. Spatial Durbin model. This paper adopts the spatial Durbin model to measure the path and the degree of influence of digital technology on the level of development of the digital cultural tourism industry, which takes into account both the autocorrelation between the spatial error terms and the influence of other spatial explanatory variables:

$$Y_{i,t} = \rho W_{ij} Y_{i,t} + \beta X_{i,t} + \theta W_{ij} X_{i,t} + \varepsilon_{i,t}, \varepsilon_{i,t} \sim N(0, \delta^2) \quad (17)$$

where  $i$  denotes individual and  $t$  denotes time.

3.3.4. GMM models. This paper constructs a GMM construct to measure the level of digital technology development to affect the level of rural cultural tourism industry development, the model is as follows:

$$P(x) = \sum_{k=1}^K \alpha_k \cdot N(\mu_k, \sum k), \sum_{k=1}^K \alpha_k = 1 \quad (18)$$

3.3.5. Mediated effects model. In order to test the specific path of the level of development of digital technology affecting the level of upgrading of industrial structure, this paper adopts the mediating effect model to verify the impact of the level of development of digital technology on the mediating variables, and introduces two mediating variables to test the process of the role of digital technology in affecting the development of cultural and tourism industry, with the following formula:

$$cti_{i,t} = \gamma_0 + \gamma_1 DEDL_{i,t} + \gamma_2 Y_{i,t} + \gamma_3 control_{i,t} + \mu_{i,t} \quad (19)$$

where  $Y_{i,t}$  denotes the mediating variable.

## 4. Empirical analysis of the impact of digital rural tourism on the sustainable development of rural economy

### 4.1. Spatial spillover effects of digital rural tourism affecting rural revitalization

The raw data of the indicators selected in this section come from the statistical bulletin of tourism and the statistical bulletin of ecological environment in each province, and the time span of the indicators is 2017-2022, and some of the missing data are made up by interpolation method the total sample size of this paper is 320 samples. The results of the spatial spillover effect data are shown in Table 1. From the standard deviation of each indicator, the standard deviation of each variable in the sample is relatively small, meaning that the data are relatively smooth. In the core explanatory variable (RT), the logarithmic mean of digital village tourism is 0.252, the minimum and maximum values are 0.043, 0.782, and the standard deviation is 0.147, indicating that there is a large gap in the level of construction and development of digital village tourism in each region. Among the control variables, the mean value of the logarithm of the village construction input strength (Vic) is 7.594, and the standard deviation is 0.869, indicating that there is a difference in the input of funds, talents and other aspects of the construction of local villages among the regions. The mean value of the logarithm of the average educational attainment (Edu) of rural residents is 2.038, and the number of years of education

will continue to rise, and talent is one of the key elements of rural revitalization, thus increasing the level of sustainable development of the rural economy. The mean value of the logarithm of the urban-rural consumption gap (UR) is 3.55, the minimum and maximum values are 1.838 and 4.112, and the standard deviation is 0.441. There is still a big gap between the urban and rural consumption levels, which may inhibit the development of the sustainable level of the rural economy. The mean value of the logarithm of Rural Hardened Road Construction (Road) is 9.946, and the standard deviation is 1.023. In order to get rich, we should first build roads, so it is still necessary to strengthen the construction of rural hardened roads in central and western regions of China. The mean value of the logarithm of the degree of external distribution (Open) is 1.025, and there is a certain gap in the amount of agricultural exports in each region, which may be related to the level of development of digital technology in each region. The mean value of the logarithm of the rural digitization level (Dig) is 4.775, the level of digital development in economically developed regions is better, and the level of digital development in economically relatively backward regions is lower, and the local government should increase its investment in digital construction. The mean value of the population anti-siphon effect (PoP) is 3.536, and there is a big gap between the number of employees in rural secondary and tertiary industries in each region. The difference between the minimum value and the maximum value of agricultural technology adoption level is 2.457, and the higher the level of agricultural technology, the higher the level of sustainable economic development of the region.

**Table 1.** Rural tourism affects rural economic development

| Index | Sample size | Mean  | Standard deviation | Minimum value | Maximum value |
|-------|-------------|-------|--------------------|---------------|---------------|
| RT    | 320         | 0.252 | 0.147              | 0.043         | 0.782         |
| Sdre  | 320         | 0.236 | 0.086              | 0.084         | 0.523         |
| UR    | 320         | 3.55  | 0.441              | 1.838         | 4.112         |
| Edu   | 320         | 2.038 | 0.079              | 1.779         | 2.286         |
| Road  | 320         | 9.946 | 1.023              | 7.462         | 12.347        |
| Open  | 320         | 1.025 | 1.186              | -1.248        | 3.826         |
| Vic   | 320         | 7.594 | 0.869              | 5.362         | 9.322         |
| Dig   | 320         | 4.775 | 1.597              | -0.745        | 7.257         |
| POP   | 320         | 3.536 | 0.746              | -0.579        | 4.482         |
| Tec   | 320         | 1.348 | 0.463              | 0.406         | 2.863         |

#### 4.2. Regression analysis of digital rural tourism on rural revitalization

In this paper, the benchmark regression is chosen to select a fixed effects model, and the regression results are shown in Table 2. (The result of (1) is a regression that controls only for year fixed effects and province fixed effects, does not take into account the control variables, and regresses only on the core explanatory variables and the explanatory variables. (The results of (2), on the other hand, are regressed with the control variables taken into account. From the regression results, the coefficient of the impact of digital rural tourism on the sustainable development of rural economy is 0.322 when only considering the effect of the core explanatory variables and it is significant at 1% level, which indicates that digital rural tourism significantly contributes to the sustainable development of the rural economy, which is completely consistent with the theoretical proposition. While considering the control variables, the impact coefficient of digital rural tourism on the sustainable development of rural economy is 0.138, although the impact coefficient decreases, it is still significant at 1% level, which indicates that the consideration of control variables does not change the direction and significance level of the impact of digital rural tourism on the sustainable development of rural economy, which are both positive and remain significant at 1% level. Overall, the continuous

improvement of the development and construction of digital rural tourism will contribute to the significant improvement of the sustainable development of rural economy.

**Table 2.** Rural tourism is a regression analysis of rural economic development

| Variable | Sdre(1)             | Sdre(2)              |
|----------|---------------------|----------------------|
| RT       | 0.322***<br>(16.34) | 0.138***<br>(5.74)   |
| UR       |                     | -0.072***<br>(-2.72) |
| Edu      |                     | 1.142***<br>(4.30)   |
| Road     |                     | 0.079***<br>(4.63)   |
| Open     |                     | 0.103**<br>(2.27)    |
| Vic      |                     | 0.028*<br>(1.75)     |
| Dig      |                     | 0.084***<br>(5.63)   |
| _cons    | 0.174***<br>(33.94) | -5.237***<br>(-9.67) |
| City     | Yes                 | Yes                  |
| year     | Yes                 | Yes                  |
| N        | 320                 | 320                  |
| R2       | 0.468               | 0.794                |

#### 4.3. Analysis of the mediating effect of digital rural tourism on rural revitalization

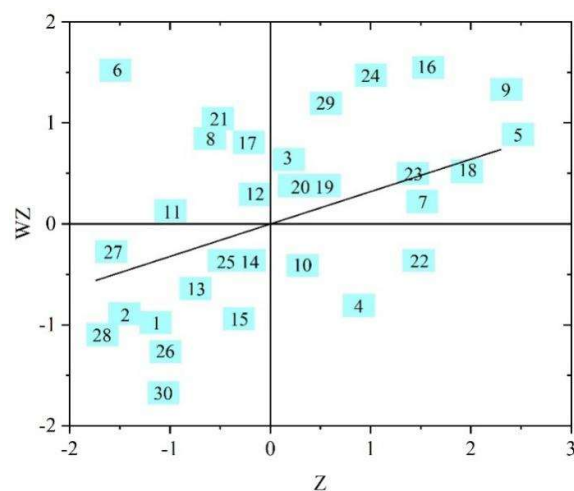
The results of the mediated effect analysis are shown in Table 3. Among them, column (1) tests the results of the direct effect of digital rural tourism on the level of rural non-farm employment, the coefficient of digital rural tourism is 0.784, and it is significant at 1% level, which indicates that digital rural tourism has a direct and significant promotion effect on the level of rural non-farm employment. Column (3) tests the results of the direct effect of digital rural tourism on the level of agricultural technology adoption, at which point the coefficient of digital rural tourism is 0.312. The results of the second step of the mediation effect test are reported in column (2)(4), where column (2) incorporates both digital rural tourism and the level of rural non-farm employment into the mediation effect model, and the estimated coefficient of the interaction term RT is 0.112, which indicates that digital rural tourism can contribute to the sustainable development of the rural economy by increasing the level of local rural non-farm employment.

**Table 3.** The mechanism of rural tourism to rural economic show is tested

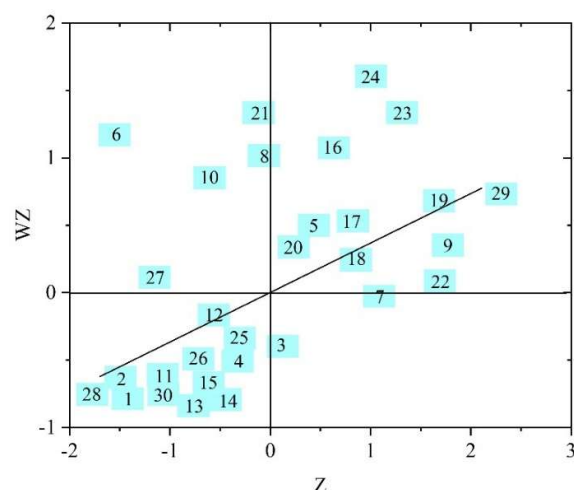
| Variable         | Employment effect   |                     | Technical effect  |                      |
|------------------|---------------------|---------------------|-------------------|----------------------|
|                  | POP                 | Sdre                | Tec               | Sdre                 |
| RT               | 0.784***<br>(4.42)  | 0.112***<br>(1.98)  | 0.312**<br>(2.53) | 0.048*<br>(1.94)     |
| POP              |                     | 0.135*<br>(2.12)    |                   |                      |
| Tec              |                     |                     |                   | 0.096*<br>(1.86)     |
| Bootstrap test   |                     | 0.184***<br>(3.11)  |                   | 0.348***<br>(4.63)   |
| _cons            | -3.762**<br>(-2.74) | -4.573**<br>(-5.42) | 2.867**<br>(2.51) | -3.685***<br>(-3.41) |
| City             | Yes                 | Yes                 | Yes               | Yes                  |
| Year             | Yes                 | Yes                 | Yes               | Yes                  |
| Control variable | Yes                 | Yes                 | Yes               | Yes                  |
| R2               | 0.24                | 0.76                | 0.89              | 0.98                 |
| N                | 320                 | 320                 | 320               | 320                  |

#### 4.4. Local spatial autocorrelation analysis of digital rural tourism

In this paper, the local spatial correlation test is added, and its spatial agglomeration types are categorized into high-high, low-high, low-low and high-low agglomerations, so as to conduct a more in-depth study on the spatial correlation and heterogeneity of each province. The Moran index of sustainable development of digital rural tourism and rural economy is measured based on the data of 2017 and 2022, which is visualized through the form of scatter plot, and the presentation results are shown in Fig. 1.1-Beijing, 2-Tianjin, 3-Hebei, 4-Liaoning, 5-Jiangsu, 6-Shanghai, 7-Zhejiang, 8-Fujian, 9-Shandong, 10-Guangdong, 11-Hainan, 12-Shanxi, 13- Inner Mongolia, 14-Jilin, 15-Heilongjiang, 16-Anhui, 17-Jiangxi, 18-Henan, 19-Hunan, 20-Hubei, 21-Chongqing, 22-Sichuan, 23-Guizhou, 24-Yunnan, 25-Shanxi, 26-Gansu, 27-Qinghai, 28-Ningxia, 29-Guangxi, 30-Xinjiang. In 2017 and 2022, most of the provinces are low-low agglomeration, then high-high agglomeration, and only a very few provinces are both low-high agglomeration and high agglomeration respectively, which suggests that most of the agglomeration of rural tourism has a strong positive spatial correlation. With the rapid development of digital rural tourism in all provinces, the spatial and temporal correlation of the aggregation of digital rural tourism in all provinces has become increasingly close, and the synergistic effect of its aggregation has become more and more prominent.



(a) The local Moran's map in 2017



(b) The local Moran's map in 2022

**Fig. 1.** Local Moran's scatter diagram

#### 4.5. Analysis of the comprehensive development level of digital rural tourism and rural revitalization in counties

Using hierarchical analysis to measure the development potential of digital rural tourism and its subsystem index in a regional unit of Guizhou county, the results are shown in Table 4. The comprehensive evaluation index of digital rural tourism in the sample area from 2017 to 2022 is 0.34, 0.40, 0.48, 0.64, 0.82, 0.67. From the perspective of the time series, although the comprehensive evaluation index of digital rural tourism in the sample area declined in 2021-2022, it still maintains the form of increase in general, which indicates that the digital rural tourism in the sample area is generally in a state of continuous development, the reason for the decline in 2021 may be due to the epidemic factor, due to the epidemic prevention and control, the tourism industry suffered a big blow. 2020-2021 sample area digital rural tourism comprehensive evaluation index appeared a large increase, the reason for this situation may lie in the fact that due to the instability of the epidemic makes the tourists give up the long distance travel which is long time and risky. The reason for this may be that the instability of the epidemic has caused travelers to abandon long-distance travel that takes a long time and carries high risks, and to choose digital rural tourism that is closer, less costly and less risky, thus promoting the rapid development of digital rural tourism and causing the growth of the comprehensive evaluation index of tourism. The overall evaluation index of digital rural tourism

in the sample area is at a high level, and the development of digital rural tourism is good.

**Table 4.** National tourism evaluation index

| Time | Rural comprehensive tourism evaluation index | Rural revitalization comprehensive evaluation index | Coupling degree | Coupling coordination | Relative development coefficient |
|------|----------------------------------------------|-----------------------------------------------------|-----------------|-----------------------|----------------------------------|
| 2017 | 0.34                                         | 0.25                                                | 0.484           | 0.352                 | 1.176                            |
| 2018 | 0.40                                         | 0.35                                                | 0.496           | 0.422                 | 1.034                            |
| 2019 | 0.48                                         | 0.52                                                | 0.512           | 0.483                 | 1.102                            |
| 2020 | 0.64                                         | 0.41                                                | 0.483           | 0.472                 | 1.914                            |
| 2021 | 0.82                                         | 0.54                                                | 0.492           | 0.553                 | 1.685                            |
| 2022 | 0.67                                         | 0.71                                                | 0.506           | 0.564                 | 1.023                            |

#### 4.6. Digital Rural Tourism Service Quality and Tourist Satisfaction

Regression analysis of service quality and tourists' satisfaction was carried out using SPSS software for the sample area, and the results of the regression analysis are shown in Table 5. Service quality is the difference between perceived service quality and expected service quality, analyzing the relationship between service quality and tourist satisfaction, the regression coefficient value of tangibility is 0.432 ( $P=0.001$ ), which indicates that tangibility will have a significant positive impact on satisfaction. The regression coefficients of tangibility, reliability, and responsiveness are 0.432, 0.471, and 0.428 respectively, with a significant P-value, indicating that tourists' satisfaction is positively and significantly correlated with these dimensions of digital countryside service quality, and is not significantly correlated with assurance and empathy. Analysis of results: digital rural tourism service quality tangibility, reliability, responsiveness is a positive influence on tourist satisfaction, assurance, empathy has little correlation with tourist satisfaction. Smart devices and cell phone terminals can effectively and timely provide the corresponding services, the sample area should strengthen the improvement of infrastructure in this area, strengthen the publicity at the same time to follow up the service, set up the tickets reasonably, improve the quality of service, realize the digital empowerment, and enhance the overall experience of tourists in a personal way.

**Table 5.** Perceived service quality and visitor satisfaction regression results

| Independent variable | Nonnormalized coefficient |                | Normalization factor | T       | P       | R2    | Adjust R2 | F      |
|----------------------|---------------------------|----------------|----------------------|---------|---------|-------|-----------|--------|
|                      | B                         | Standard error | Beta                 |         |         |       |           |        |
| Constant             | -4.79                     | 0.062          |                      | -85.426 | 0.001** | 0.987 | 0.996     | 21.984 |
| Tangible             | 0.432                     | 0.022          | 0.362                | 27.978  | 0.001** |       |           |        |
| Reliability          | 0.471                     | 0.034          | 0.387                | 17.727  | 0.001** |       |           |        |
| Responsive           | 0.428                     | 0.034          | 0.382                | 16.254  | 0.001** |       |           |        |
| Guaranteed sex       | -0.033                    | 0.022          | -0.031               | -1.672  | 0.096   |       |           |        |
| Transference         | 0.034                     | 0.022          | 0.026                | 1.463   | 0.156   |       |           |        |

## 5. Coping strategies

### 5.1. Enhanced digital technology enablement

Strengthening digital technology empowerment is not simply a shallow combination of digital technology and cultural and tourism industry, its core essence is to transform the technical energy into industrial development momentum. Only in this way can we effectively and efficiently bring the functions of digital technology into play, and realize the true meaning of cultural and tourism digitization. Strengthen the digital technology empowerment, need to further consolidate the digital infrastructure construction, enrich the digital transformation of national characteristics and cultural resources, as well as to strengthen the level of application of digital technology and the construction of professional personnel.

To realize digital cultural tourism to empower rural revitalization, it is necessary to clarify the idea of integrating digital cultural tourism with other systems. To promote the development of rural cultural tourism industry, it is necessary to develop the synergistic role of culture holders, cultural tourism creation and cultural heritage in the integrated development of digital cultural tourism.

First, realize the transformation of culture holders to digital cultural tourism ambassadors. Unlike the general public, rural culture holders are familiar with rural culture, folklore, local customs and other cultural and tourism resources, and are the most influential subject in upgrading cultural resources into rural cultural and tourism industry. The transformation of culture holders into digital cultural tourism ambassadors can not only continue to maintain the stability and uniqueness of rural civilization, but also enhance the strength and intensity of the integration of rural cultural tourism industry and digital technology. Secondly, to realize the transformation of cultural tourism creation to digital cultural tourism products. The development and application of digital technologies such as 5G, Internet of Things, data centers, artificial intelligence, etc., have built a convenient, intelligent, and experiential platform for villages to condense and create rural cultural tourism resources. This is an effective way to obtain economic benefits by virtue of the development of cultural tourism creativity to digital cultural tourism products, and on this basis, to open up the links of production, circulation and consumption of digital cultural tourism products.

Finally, realize the transformation of intangible cultural heritage to digital cultural tourism core resources. The pure and original rural lifestyle can be realized under the integration of digital technology to transform the traditional farming civilization from abstract concept to concrete

experience of digital cultural tourism products, and then through science and technology, capital and other means to retain the rural civilization of primitive, mysterious, commemorative and other qualities, so as to transmit and exchange the rural text symbols and cultural heritage, and on this basis, transformed into the core resources of the rural digital cultural tourism.

### *5.2. Compacting digital infrastructure*

Digital infrastructure is a new type of infrastructure with network communication, big data, cloud computing, blockchain, Internet of Things and other digital technologies as the main application, which is the underlying structure and technical support of digital cultural tourism, the link between the real physical space and the virtual cyberspace, and the real carrier of data interaction, operation, storage and circulation. Digital infrastructure provides a good technical environment for the value co-creation of multiple subjects in digital cultural tourism.

Into the digital industrial era, the strong rise of digital technology, its impact has obviously been immersed in the rural cultural industry and tourism production and operation of various fields, which requires us to have to grasp the degree of integration of technology and industry and the development trend from a holistic perspective. First of all, it is necessary to continue to promote the construction of digital infrastructure for rural culture and tourism. With the acceleration of China's digitalization process, information technology plays a key role in the production, circulation, supply and other aspects of the socio-economic fields, in order to promote the further acceleration of the modernization process in rural areas, the national strategy level has also begun to implement the "digital countryside" construction. On the one hand, special attention should be paid to the construction of digital cultural tourism infrastructure in backward areas. By improving the overall level of digital culture and tourism, we can promote the development of culture and tourism in the more backward villages. On the other hand, it is necessary to promote the digital transformation of the traditional cultural tourism infrastructure in the countryside in real time. Timely optimization and updating of information and communication technology, the construction of convenient and smooth circulation channels of cultural and tourism elements, and the use of rural digital cultural and tourism radiation role to drive the further development of rural revitalization of industry, talent, culture, ecology and organization. Secondly, it is necessary to promote the multiple applications of digital cultural tourism to empower rural revitalization. Relying on technical advantages, docking different needs, continue to promote the digital process of rural cultural tourism products and services, promote the unity of personalization and diversity of rural cultural tourism products, and realize the overall multi-element display of situational, three-dimensional and comprehensive. Finally, it is necessary to improve the comprehensive guarantee ability of digital cultural tourism to empower rural revitalization. The industry-university-research cooperation model is the construction direction of the integrated development of rural digital cultural tourism. At the same time, it is necessary to achieve key technological breakthroughs in the field of digital culture and tourism, reasonably guide the inflow of social capital, strengthen the protection of intellectual property rights in digital culture and tourism, and carry out risk assessment of the relevant digital sources of danger, so as to create a good environment for the development of rural digital culture and tourism in terms of network security and ecological civilization.

### *5.3. Accelerate the transformation of characteristic digital cultural resources*

The digital construction of culture and tourism not only stays in the tourism industry, and then the digitalization of the cultural industry nowadays has risen to the background of the national strategy, the digital specialization of the cultural resources must also pay more attention. Accelerate the transformation of characteristic digital cultural resources, not only for the inheritance of excellent traditional culture, to achieve innovative development, but also for the implementation of the policy of cultural strength of the country's solid foundation project, at present, the villages in developed areas

of China have realized the digital transformation of cultural heritage and intangible cultural heritage, and has made remarkable achievements, and realized the data collection, classification, finishing, output, feedback and regeneration of cultural resources. Utilizing the digital cultural tourism platform as an intermediary, it connects the four dimensions of management, development, use and consumption of cultural resources together, forming an effective closed loop and promoting the digital transformation of Yunnan's cultural resources.

Along with the advancement of urbanization, the rural population is decreasing and villages are gradually disappearing. As an important carrier of cultural inheritance, the importance of population and villages for the continuation and development of farming civilization is self-evident. This requires digital technology to digitally preserve rural folk culture, record the characteristic natural landscape and human heritage in an all-round way, and realize the sharing of cross-regional cultural resources by means of digital technology rendering and virtual images and other means of displaying and rendering of cultural material carriers such as temples. It can also increase the exposure of rural cultural tourism resources with the help of public numbers, jittery sound, microblogging and other network media, improve the desire of tourists to sightsee and experience, and promote the dissemination of rural cultural tourism resources in different regions and among different fields. The value of rural cultural and tourism resources is reflected in the two aspects of intelligent tourism and tourism transactions. For these two aspects, one is to build a rural digital cultural tourism smart service platform. The platform should include general services such as introduction of attractions, introduction of opening hours, recommendation of tourist routes, transportation and travel, ticketing platform, etc. It can also provide multi-module intelligent service functions such as contact information of scenic spots, opening of online communication services, real-time monitoring of rural tourist areas, etc., on the daily function carriers such as public numbers, small programs and customized APPs. Secondly, it is necessary to build a rural digital cultural and tourism convenience e-commerce platform. The large-scale rise of e-commerce has changed the original mode of business activities, which can effectively reduce operating costs and improve service efficiency. The main role of the platform is to realize the output of rural cultural tourism products, mainly using network communication technology, financial payment technology, supply chain technology to realize the online trading process of cultural tourism products. WeChat small programs, mobile shopping malls, e-commerce websites and other tools have become essential to the public's consumption life, and rural cultural and tourism resources can use these trading platforms to build sales centers for agricultural products and cultural and tourism products, and improve the rural digital cultural and tourism e-commerce ecosystem in the process of realizing the digital transformation of the rural areas.

#### *5.4. Strengthening the professional talent team*

Whether it is the cultural tourism industry or the digital cultural tourism platform, the starting point and final destination of technological innovation are specific people. Digital platform and digital technology as a tool for industrial development, the digital literacy of the using group determines the final cultural and tourism experience. On the one hand, it is necessary and obligatory to strengthen the learning and use of digital technology by cultural tourism practitioners, combine industry data to achieve the optimization and upgrading of algorithms, and use cutting-edge digital technology to give rise to more distinctive and experiential value of cultural tourism products and services. The industry innovations in the cultural tourism industry all require practitioners to have a high level of digital literacy. For example, VR, AR, big data, cloud computing, AI, blockchain, digital twins and other kinds of digital technology link mapping. Enhancing the digital literacy of the cultural tourism practitioner group is the road to the digitalization of the cultural tourism industry, and it is also the basic condition for digital rural cultural tourism to achieve innovative development. Similarly, having high-level professionals is the core driving force for the innovation of the business model and service model of the digital rural cultural tourism platform.

### 5.5. *Improving digital governance of rural cultural tourism markets*

The application of digital technology breaks through the limitations of traditional governance mechanisms and methods, and can realize the efficient transformation of rural cultural tourism governance. Considering the level of the main body of governance, it is necessary to play a synergistic role in promoting the government, villagers, enterprises and other multiple subjects. First, strengthen the digital management of the government cultural tourism authorities. The government should strengthen the "digital + service" management project, closely track the development process of rural digital cultural tourism, and carry out forward-looking research on effective governance, and establish a scientific and reasonable management chain and management process. Secondly, improve the participation and responsibility consciousness of farmers. Digital technology has broken the traditional way of communication between villagers, awakened the villagers' subjective consciousness in the governance of rural digital cultural tourism, and realized the transformation of one-way management mainly by the government to two-way management by the government and villagers. At the same time, the information feedback channels between the government and the village people are more convenient and smooth, breaking the communication barriers between the government and the people, and laying down effective realization conditions for the implementation of the digital self-government of the villagers' main body in the development of digital cultural tourism. Thirdly, explore the synergistic development mode of the multiple forces of rural digital cultural tourism. The development direction of rural digital cultural tourism governance in the new era should be committed to the inclusion of new township sages, social organizations and other multi-party forces into the digital cultural tourism industry integration governance system. Considering the governance content level, it is necessary to optimize the overall environment of rural cultural tourism. First, to create a good innovation atmosphere for rural digital cultural tourism. The combination of traditional rural cultural tourism industry and digital technology is itself in the ecosystem of digital cultural tourism industry development. To continue to innovate on this basis, it is necessary to pay attention to the latest developments in the current cultural tourism market and dock with the market hotspots. Secondly, create a good ecological environment for rural digital cultural tourism. The protection of the ecological environment into the development of rural cultural tourism is a necessary move for the overall optimization of the rural ecological environment under the transformation situation of digital cultural tourism development. The results of digital technology can not only be applied to cultural communication, tourism industry and other fields, but also in the rural production, life extension. "Intelligent agriculture" "digital countryside" and other trends, can ensure that rural digital cultural tourism conditions, agricultural production is cleaner and safer, more efficient resource utilization cycle. Third, to create a good rural digital cultural tourism environment of the rule of law. Digital is based on the existence of a new development model of digital space, the application of the field has a certain degree of public, which requires corresponding regulatory policy to ensure that the relevant aspects of the main body involved in the development of rural digital cultural tourism behavior. At the same time, it is also necessary to pay attention to the protection of intellectual property rights, especially in the use of big data, artificial intelligence and other emerging technologies in the process, we should place extra emphasis on the protection of intellectual property rights for cultural producers, skills inheritors and other cultural tourism subjects. In addition, the comparative analysis of international research can be added to explore how digital technology in the world promotes the development of rural tourism, and the uniqueness and extensibility of Chinese experience in the global background. This will not only improve the international vision of research, but also provide reference for policy formulation and academic exchanges at home and abroad.

## 6. Conclusion

This paper uses the entropy power method to measure the development level of digital technology,

cultural tourism industry, and digital cultural tourism industry in rural areas. It also empirically verifies the impact of digital rural tourism on the sustainable development of rural economy by using macro panel data from 2017 to 2022, through fixed effect model, mediation effect model, spatial autocorrelation test and other models. The results show that:

- 1) The minimum and maximum values of the rural digitalization level are -0.745 and 7.257, respectively, which indicates that there is an imbalance in development between economically developed and economically underdeveloped regions, and the level of rural digitalization should be increased.
- 2) In the mediating effect and regression analysis, the impact coefficient of digital rural tourism on the sustainable development of rural economy is significant at the level of 0.1, which promotes the development of rural economy. The local spatial autocorrelation analysis learns that digital rural tourism is developing rapidly in each province from 2017 to 2022.
- 3) A region in Guizhou is selected as a sample region, and it is measured that its digital rural tourism development is better, and the digital rural tourism service has a positive impact on the satisfaction of tangibility, reliability and responsiveness.
- 4) With the development of digital technology, the design of digital rural tourism services inevitably faces the challenges of technological innovation and demand upgrading, and needs to continuously explore and innovate, improve the level of design and technological capabilities, and carry out sustainable research and practice in the field of digital rural construction tourism services in an effort to realize the theoretical and practical innovation of rural revitalization.

## Fund Project

Zhejiang Province 2024 Soft Science Program: Mechanism, Evaluation and Policy Research on Digital Culture and Tourism Enabling Rural Revitalization in Zhejiang Province (Grant NO.:2024C35050).

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