

Research on the Interactive Interface Design of Zhaoqing Red Culture Tourism in the Context of Rural Revitalization

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Abstract

With the implementation of China's rural revitalization strategy, the preservation and transmission of Zhaoqing's red cultural resources, a city renowned for its historical significance, have become increasingly important. Developing red culture tourism not only bolsters the local economy but also enhances cultural identity, supporting rural revitalization. This paper focuses on the innovative development of red culture tourism in Zhaoqing, analyzing its current state and potential while underscoring the critical role of interactive interface design in enhancing tourism experiences and spreading red culture. The study proposes a set of interactive design principles tailored for Zhaoqing, including information visualization, narrative storytelling, and the application of intelligent technologies. Practical verification demonstrates the effectiveness of these principles, revealing that optimized design can increase visitor engagement and improve cultural dissemination, thereby infusing vitality into the cultural tourism industry within rural revitalization efforts. Effective interactive interface design can improve the attractiveness of Zhaoqing's red culture tourism and enrich visitor experience. This research provides theoretical support and practical references for cultural tourism interface design in Zhaoqing and similar regions, contributing to the implementation of rural revitalization strategies. Continuous attention to user feedback and design optimization will be necessary to adapt to evolving market demands.

Keywords

Rural revitalization; Zhaoqing red culture; Interactive interface design; Tourism.

1. Introduction

With the rapid socioeconomic development in China, the rural revitalization strategy has become an essential component of national development. In this context, red tourism, as a distinctive form of cultural tourism, stands out for its profound historical significance and unique regional characteristics, making it a driving force within the rural revitalization strategy. Zhaoqing, a city in Guangdong Province known for its historical and cultural heritage, boasts a wealth of red tourism resources, such as the former headquarters of the Ye Ting Independent Regiment at Yuejiang Tower, the former residence of Zhou Qijian, and the Shapu Revolutionary Martyrs' Cemetery. These resources serve not only as historical memories but also as valuable educational assets, contributing significantly to the rural economy, enhancing cultural confidence, and fostering the younger generation's awareness of red culture.

However, the development of red tourism has not been without challenges. Limitations of traditional tourism models, lagging information technology, a lack of diversity in tourism experiences, and a shortage of skilled professionals have hindered the full potential of red tourism[1]. Thus, within the context of rural revitalization, the core focus of this study is on how to innovatively leverage interactive interface design to enhance the appeal and impact of red

tourism. This approach aims to transform red tourism into an effective tool for advancing rural development and preserving red culture.

By thoroughly examining the current status and challenges of rural red culture tourism and integrating theories and practices of interactive interface design, this study aims to develop a set of interactive interface design principles and strategies applicable to red culture tourism in Zhaoqing and across China. The goal is to enhance the visitor experience, strengthen the dissemination of red culture, and provide strong support for the rural revitalization strategy. This research offers direct guidance for the development of red culture tourism in Zhaoqing and provides theoretical insights and practical experience for other regions looking to adopt and promote red tourism.

2. An Analysis of the Development of Red Culture Tourism in Zhaoqing within the Context of Rural Revitalization

2.1. Overview of Zhaoqing's Red Culture Tourism Resources

Zhaoqing, an ancient city in Guangdong Province, brings unique strength to the rural revitalization strategy through its rich red tourism resources. This city not only holds the profound memories of China's modern history but also serves as a significant base for red culture education [2]. As a center for red tourism, Zhaoqing's resources exhibit a non-seasonal appeal, attracting visitors year-round and offering substantial advantages for both rural economic development and educational impact. For example, historical sites like the former headquarters of the Ye Ting Independent Regiment at Yuejiang Tower, the former residence of Zhou Qijian, the Shapu Revolutionary Martyrs' Cemetery, and General Hill not only stand as witnesses to history but also serve as living educational resources, deeply influencing younger generations' understanding of red culture.

The distribution of red tourism resources in Zhaoqing is characterized by its broadness and diversity, intertwining with the local natural scenery and folk culture to create a unique tourism experience. Here, red tourism transcends traditional forms of visitation and education by integrating local features, such as the green agricultural product industry, and leveraging modern technologies like VR and 3D, thereby offering immersive and personalized travel experiences. This combination not only meets the varying needs of different visitor demographics but also revitalizes red tourism in Zhaoqing, injecting new vitality into the sector. However, as Jing Zhang[2] points out, the effective utilization of cultural resources can significantly mitigate the seasonality of tourism. Zhaoqing's red culture tourism also requires further exploration and integration, such as highlighting the unique geographical features to create scenic attractions that draw visitors, thereby reducing potential off-peak tourism phenomena and achieving balanced year-round development. Additionally, by deeply integrating with green agriculture to establish distinctive brands and leveraging internet platforms for promotion, Zhaoqing can further enhance the market competitiveness of its red tourism.

At the same time, protecting and developing red tourism resources, enriching the content of tour guide explanations, and enhancing visitors' understanding of red history are crucial for increasing the attractiveness of red tourism. Cultural tourists tend to purchase high-quality local products at their destinations[2]; therefore, Zhaoqing should fully develop derivative products related to red tourism to increase visitor spending and bring higher added value to the local economy. Furthermore, training and recruiting professional talent to improve the expertise of red tourism guides and management personnel is also a necessary measure to enhance the quality and influence of red tourism.

Zhaoqing's red culture tourism resources are abundant and hold significant potential for development. To realize this potential, it is essential to align the development of red tourism with the rural revitalization strategy through strategies such as innovating tourism formats, enhancing promotional effectiveness, improving infrastructure, and cultivating professional talent. This alignment will tightly integrate red tourism with the ecological, economic, and cultural development of rural areas, establishing it as a vital pillar of rural revitalization. In this process, interactive interface design will play a crucial role by optimizing the visitor experience and disseminating red culture, thereby injecting lasting momentum into Zhaoqing's red culture tourism.

2.2. The Importance of Red Culture Tourism in the Context of Rural Revitalization

The importance of red culture tourism in the context of rural revitalization is evident. Red tourism is not only a unique travel experience but also a means of cultural and historical inheritance, playing an irreplaceable role in rural economy, education, and cultural transmission. Tourism activities must be culturally sensitive to protect and respect local cultural heritage while promoting the participation and development of local communities. In Zhaoqing, red tourism serves as a key vehicle for rural revitalization; its influence extends beyond merely attracting visitors. It also communicates the red spirit through tourism activities, inspiring the younger generation's sense of identity with the country's history and culture.

Red culture tourism plays a significant role in the revitalization of rural economies, as it can stimulate local consumption, promote the development of green agricultural products, and broaden income sources for farmers, thereby achieving sustainable economic growth[3]. Additionally, by organizing related tourism activities and cultural experiences, it enhances the cultural soft power of rural areas and increases their influence and appeal in cultural exchanges. The integration of red tourism with modern agriculture and ecological tourism provides a unique advantage in mitigating seasonal impacts and facilitating year-round rural tourism operations. Furthermore, while enhancing the attractiveness of rural areas, red tourism also drives the construction of infrastructure and the modernization of rural governance, such as improving transportation, accommodation, and dining facilities, all of which are essential for rural development.

Red tourism is a thematic form of tourism that combines traditional red education with the tourism industry. By developing red attractions and constructing narrative scenes around red culture, it aims to protect and promote red culture while enhancing the interactivity and visual experience of red tourism[4]. By exploring the red spirit embedded within red tourism sites, this approach fully leverages the educational function of red tourism, allowing visitors to gain a deeper understanding of the glorious history. It also immerses them in the essence of red spirit, inspiring patriotic sentiment and deepening the understanding of the core values of socialism[5].

Red tourism holds multiple significances for political education, economic development, cultural dissemination, and international cultural exchange[6]. However, it is also influenced by various factors, such as research on red culture, resource endowments, and infrastructure, all of which have a strong correlation with its development[7]. The educational aspect is another prominent highlight of red culture tourism. Through vivid historical narratives and on-site visits, it allows visitors—especially the younger generation—to gain a more intuitive understanding of the country's history and appreciate the heroic deeds of revolutionary martyrs. This experience fosters a sense of patriotism and social responsibility while deepening recognition of the glorious history and heroic figures. This notion is supported by the research in [1], which indicates that cultural tourists exhibit higher levels of engagement and satisfaction with educational and experiential tourism activities.

At the level of cultural integration, red tourism can promote the transmission and innovation of local folk culture. Through the storytelling of red narratives and the integration of modern technology with traditional elements, such as the application of VR and AR technologies, red culture can be disseminated interactively, enhancing visitor engagement and creating a unique cultural experience. In terms of technological application, the integration of smart technologies allows interactive interface design to present red cultural content in a more vivid and intuitive manner, improving the efficiency of information dissemination and making red culture accessible. This approach also contributes to the preservation of cultural heritage.

In the context of rural revitalization, the importance of Zhaoqing's red culture tourism is reflected in its multiple contributions to the economy, education, cultural transmission, and the modernization of rural governance. Through innovative interactive interface design, not only can the attractiveness of red tourism be enhanced, but visitors' understanding of red culture can also be deepened, thereby better promoting the comprehensive development of rural areas. Future research will further explore how to apply these theoretical principles to practical interactive interface design to achieve innovation and upgrading in red culture tourism, providing transferable practical experiences for other regions.

3. Principles of Interactive Interface Design for Zhaoqing's Red Culture Tourism

3.1. Overview of Interaction Design Principles

Driven by the rural revitalization strategy, the interactive interface design of Zhaoqing's red cultural tourism should not only focus on improving user experience, but also fully integrate local red cultural elements and spread red stories in an innovative way with the help of modern scientific and technological means. The interactive design principle plays a core role in this process. It is about how to guide tourists to immerse themselves in the red culture through an intuitive, easy-to-use and attractive interface, and achieve the dual goals of education and entertainment. This section will explore the key principles of interactive design from a theoretical perspective to provide theoretical support for the practical research in subsequent chapters.

Interaction design originated from human-computer interaction design. In the process of continuous development of industrial design, the original intention of interaction design is to define the content, level and information combination of communication between two or more interrelated individuals, so that they can cooperate with each other to achieve a specific purpose. The goal of interaction design is to create and build the relationship between people and products and optimize it, so that people can act quickly and effectively to achieve their goals [8].

Interactive design is essentially the evolution and development of web design and graphic design following the widespread adoption of the internet. Unlike web and graphic design, interactive design places the user at its core. Traditional industrial design requires designers to deeply understand and articulate their insights into form and function, essentially showcasing the designer's own skills and values. In contrast, interactive design emphasizes a user-centered approach that permeates the entire product design process. It focuses on the designer's ability to empathize with users, considering their needs and experiences rather than solely relying on the designer's subjective opinions. Consequently, a solid understanding of psychology is crucial within the theories related to interactive design. From a disciplinary perspective, interactive design is an interdisciplinary field that encompasses design, engineering, psychology, human anatomy, and physiology, among others. Its ultimate goal is to enhance product usability and ensure psychological comfort during interaction [8].

User Experience (UX) is at the heart of interactive design, emphasizing the overall emotional, cognitive, and behavioral feelings of users during their interaction with a product or service. In the context of red culture tourism, a high-quality user experience means that visitors can easily access information, engage in interactive segments, and gain a profound understanding of red culture during their visit. In the design process, it is essential to not only respect and protect red culture but also ensure that information is easy to understand and access. By utilizing differentiated presentations, designers can create experiences that resonate with visitors from various backgrounds, allowing them to find common ground and connection through the interactive elements.

Cultural Integration is a key principle in interactive interface design, requiring designers to combine elements of red culture with modern design techniques to create a unique visual language. This involves utilizing narrative storytelling methods, such as situational setups and role-playing, to allow visitors to experience the context and emotions of red history during their interactions, thereby deepening their understanding of red culture. Just as cultural tourism can mitigate seasonal impacts, the narrative storytelling in red tourism serves as a crucial source of this effect, attracting visitors year-round and enhancing the continuity of the tourism experience. By weaving rich narratives into the design, cultural integration not only promotes engagement but also fosters a deeper connection between visitors and the historical significance of the red culture they are exploring.

Furthermore, Technology Application is an advanced field of interactive design, where modern technologies such as VR, AR, and AI offer limitless possibilities for the design of interactive interfaces in red culture tourism. These technologies can create immersive experiences for visitors, allowing them to navigate between the virtual and real worlds and closely experience the impact of history. For example, VR technology can recreate historical scenes, making visitors feel as if they are present in the midst of a battle, while AI can provide personalized tour services tailored to visitors' interests and needs, recommending relevant red cultural sites and stories. By leveraging these cutting-edge technologies, designers can enhance engagement and provide a deeper, more meaningful connection to the rich narratives and historical significance of red culture, enriching the overall tourist experience.

An excellent interactive interface design for red culture tourism should balance user experience, cultural integration, and technology application. These three elements complement each other, working together to create an engaging and educational interactive interface. This paper will explore the application of these principles in practical projects and their specific impact on enhancing the appeal of red culture tourism in Zhaoqing. Additionally, it will propose design strategies and implementation recommendations based on these principles, providing strong support for red culture tourism in the context of rural revitalization.

3.2. Zhaoqing's red cultural characteristics are integrated into the interactive interface design

In the interactive interface design of red culture tourism in Zhaoqing, integrating local red cultural characteristics is essential. This not only enhances the recognizability of the interface but also increases the immersive experience for visitors and better facilitates the inheritance and dissemination of red culture. To achieve this goal, designers need to follow several key steps and strategies.

Conduct an in-depth excavation and organization of Zhaoqing's red culture. Taking sites such as the Former Site of the Ye Ting Independent Regiment Headquarters at Yuejiang Tower, the Former Residence of Zhou Qijian, and the Sha Pu Revolutionary Martyrs Cemetery as examples, designers need to gain a comprehensive understanding of these historical events and the red spirit behind them, extracting unique cultural elements and stories. These elements can include specific historical figures, key time points, important battles or decisions, as well as local red

landmarks and traditional art forms. Through the integration of these elements, designers can construct a narrative framework of red culture that embodies local characteristics.

Skillfully incorporate these cultural elements into the interface design. This includes selecting a visual style that aligns with red culture, such as using red as the primary color to symbolize the passion and determination of the revolution. For pattern design, elements such as badges, flags, or weapons from the revolutionary period can be utilized to enhance the historical feel of the interface. Additionally, the choice of fonts and typography should reflect a sense of historical weight while maintaining modern readability, ensuring clear and smooth information delivery. Furthermore, utilize storytelling as a narrative technique to build interactivity. Designers can create interactive story segments that allow visitors to uncover the details of red history by answering questions, participating in games, or completing tasks. For instance, through VR technology, visitors can assume the roles of historical figures, immersing themselves in battle scenes or pivotal decision-making moments, thereby deepening their understanding of red history. Additionally, audio guides can narrate vivid historical stories, creating an immersive atmosphere that enriches the auditory experience for visitors.

The application of technology is crucial for enhancing cultural integration. For example, AI technology can recommend relevant red stories and attractions based on visitors' preferences and behaviors, achieving personalized recommendations. AR technology can merge virtual information with the real environment, allowing visitors to see dynamic information related to historical scenes such as images of historical figures and textual introductions through their smartphones or AR glasses during on-site visits, thereby enriching the overall visitor experience.

Designers should also consider the coherence and consistency of user experience. Throughout the interaction process, whether in interface layout, operational flow, or information presentation, consistency must be maintained to ensure that visitors feel comfortable and convenient during use. Additionally, designers should pay attention to the needs of visitors from different age groups and cultural backgrounds to ensure the friendliness and inclusiveness of the interactive interface.

By implementing the above strategies, the interactive interface design for red culture tourism in Zhaoqing can not only convey rich cultural connotations but also enhance visitor engagement and satisfaction, thereby promoting the sustainable development of red tourism. In practical projects, designers should continually test and optimize their designs to ensure a perfect integration of red cultural characteristics with the interactive interface design, contributing to Zhaoqing's efforts to enhance the appeal of its red culture tourism in the context of rural revitalization.

4. Practice of Interactive Interface Design for Zhaoqing Red Cultural Tourism

4.1. Interactive interface design

In the context of the rural revitalization strategy, the practical application of interactive interface design in Zhaoqing's red culture tourism is key to enhancing the tourism experience and disseminating red culture. By applying the theoretical principles discussed in the previous three chapters to actual projects, an innovative and efficient interactive interface design solution can be constructed through the visualization of information, narrative storytelling, and the integration of smart technologies.

Firstly, the visualization of information is at the core of interactive interface design. Designers need to present the abundant information related to red culture tourism, such as historical events, character introductions, and cultural relic displays, in intuitive formats like charts,

animations, and infographics. This approach allows visitors to quickly access a wealth of information. For example, designers could create an interactive map that highlights the locations of various red tourism sites. By clicking or swiping, visitors can view detailed historical backgrounds, story introductions, and even watch short historical videos related to each location, thereby gaining a comprehensive understanding of the local red culture.

Secondly, a storytelling approach is an effective means to enhance visitor engagement and emotional resonance. Designers can create a series of interactive story modules centered around important figures or events in red culture. For instance, through role-playing and puzzle-solving games, visitors can assume the role of General Ye Ting and experience the hardships faced by the Independent Regiment, or engage in interactive dialogues at the Shapu Revolutionary Martyrs' Cemetery to learn about the heroic deeds of the martyrs. This immersive storytelling experience not only increases visitor participation but also strengthens their memory and understanding of red history.

Thirdly, the integration of smart technologies is crucial for enhancing the innovation and practicality of interactive interface design. Technologies such as Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) play significant roles in the interactive interfaces of red culture tourism in Zhaoqing. For example, using VR technology, visitors can virtually tour the Yuejiang Tower from their homes or specific areas within the scenic spot, experiencing the weight of history firsthand. AR technology can present historical artifacts in 3D, allowing visitors to see detailed descriptions and historical backgrounds through a mobile app while touring the site. AI guides can offer personalized travel recommendations based on visitors' interests and behaviors, thus improving overall visitor satisfaction.

Fourthly, the experience and feedback of target users are key to enhancing the completeness and usability of the interactive interface design. Given that Zhaoqing may attract visitors from different countries and regions, the interface design should support multiple languages and social sharing features, enabling users to share their travel experiences with friends and family. This not only increases user engagement but also enhances promotional effectiveness, ultimately providing a better and more efficient service experience.

In actual projects, the design team collaborates with multiple stakeholders, including the government, tourist attractions, and schools, to ensure the effective implementation of the interactive interface design. The government provides policy support and funding, while the tourist attractions are responsible for infrastructure development and content provision. Schools can serve as platforms for promoting red culture education, integrating red stories into the classroom through the interactive interface design, thereby cultivating the younger generation's understanding of red culture. Additionally, by organizing design competitions, universities and design agencies are encouraged to participate, fostering innovative thinking and promoting the sustainable development of interactive interface design for red culture tourism.

Through these practical strategies, the interactive interface design for red culture tourism in Zhaoqing has not only enhanced visitor engagement and satisfaction but also effectively disseminated red culture, stimulating local economic development and injecting new vitality into the rural revitalization strategy. In the future, as technology continues to advance and visitor demands evolve, designers need to remain attentive to the dynamic evolution of interactive interface design, aiming to provide references for the development of red culture tourism in other regions.

4.2. Practice of interactive interface reservation platform

This section will elaborate on the practices of the reservation platform in three aspects: user experience optimization, diversified activity types and convenient reservation methods.

In terms of user experience optimization, the reservation platform places a high emphasis on enhancing user experience. By conducting in-depth analyses of user needs and behavior patterns, the platform has optimized its interface design to present a clear and straightforward page style. The layout is well-organized, with content clearly defined and important information highlighted, enabling users to quickly locate the information they need. Additionally, the platform has optimized loading speeds to ensure that users do not encounter any lag or delays during operation, further enhancing the overall user experience. These measures contribute to a pleasant and effortless experience for users when utilizing the reservation platform, thereby helping to increase user satisfaction and loyalty.

In terms of diversified activity types, the reservation platform offers a wide range of unique activities. These activities encompass various fields, including cultural lectures, hands-on experiences, and folk performances, catering to the interests and needs of different users. Such offerings not only enhance users' enjoyment of their travel experiences but also promote cultural exchange and preservation. Additionally, the platform continuously updates the types and number of activities based on user feedback and market demand, ensuring that users can always find appealing activities that meet their preferences.

In terms of convenient reservation methods, the platform offers users an easy-to-follow operating process. Users can view activity details, select participation times, and fill in personal information to complete their reservations. The platform also provides various payment options, including WeChat Pay and Alipay, facilitating smooth transactions. Additionally, it features a reservation reminder function that alerts users via SMS or email about successful bookings or any changes, thereby reducing operational risks. These convenient reservation methods enable users to easily book their desired activities, significantly increasing the success rate of reservations.

5. Conclusion

This study delves into the current status, challenges, and opportunities of red cultural tourism in Zhaoqing within the context of the rural revitalization strategy. Through theoretical analysis and empirical research, it constructs a set of interactive interface design principles and strategies tailored for Zhaoqing's red cultural tourism. The research findings indicate that optimized interactive interface design can significantly enhance visitor engagement and improve the effectiveness of red cultural information dissemination, playing a vital role in promoting rural economy, education, and cultural heritage. The main conclusions of the study are as follows:

Interactive interface design plays a crucial role in enhancing the experience of red cultural tourism in Zhaoqing. By employing visual information presentation, narrative storytelling, and the integration of smart technologies, it enables visitors to understand red historical culture in a more intuitive and in-depth manner, thereby increasing both the educational and entertainment value of the tourism experience.

Integrating red culture with local characteristics, such as geographical features, green agricultural products, and modern technology, is an effective way to enhance the competitiveness of the red tourism market in Zhaoqing. This approach contributes to achieving year-round operations and sustainable development in rural tourism.

Policy support, infrastructure development, professional talent training, and innovative promotion strategies are indispensable components in driving the development of red tourism in Zhaoqing. Together, they facilitate the deep integration of red tourism with the rural economy and culture, injecting vitality into rural revitalization efforts.

The practical case studies of the interactive interface design for Zhaoqing's red cultural tourism have validated the effectiveness of the design principles. They demonstrate that through

optimized design, red culture can be disseminated more widely and deeply, positively impacting the pride of rural residents and the historical identity of the younger generation.

Limitations: The interactive interface design focuses on promoting Zhaoqing's red cultural tourism within the context of rural revitalization but neglects the elderly population, who have been striving to keep pace with the developments of the new era. This oversight means that older generations with a passion for red culture may not fully grasp how red culture can thrive in the context of rural revitalization. The design emphasizes the development of red culture, indicating that during the red tourism experience, it is crucial not only to protect cultural heritage but also to enhance the concepts and methods of tourism, thereby maximizing the functions and significance of red culture. The interactive interface design will play an increasingly important role in the rural revitalization strategy. With advancements in technology and the evolution of user needs, designers should continue to focus on enhancing user experience, deepening cultural integration, and innovating technological applications.

Potential directions for future research include enhancing the platform with personalized service recommendations tailored to user preferences and needs, such as local cuisine suggestions, souvenir purchasing advice, and transportation route planning to create a comprehensive travel experience. Additionally, establishing sound reproduction points at historical sites or significant red cultural landmarks could enrich visitor experiences by using auditory storytelling and audio guides to immerse them in the sounds and scenes of the past, deepening their historical understanding. Furthermore, encouraging community involvement in red tourism activities and design initiatives is essential for preserving local culture, strengthening community cohesion, increasing visibility, and fostering diverse development. A virtual collaboration platform could facilitate cooperation among red cultural tourism organizations, site managers, and related businesses across regions, allowing them to share information and resources while collaboratively promoting the development and marketing of red tourism products. Overall, interactive interface design serves as a vital tool for promoting innovation and development in red cultural tourism, and future research will explore its dynamic evolution to identify more effective strategies that provide both theoretical support and practical experience for rural revitalization in various regions.

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