A Study on Tourist Experience Optimization and Satisfaction Improvement under the Empowerment of Smart Tourism—Taking Smart Scenic Area Service Scenarios as an Example

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ABSTRACT Smart tourism driven by the integration of digital technology and traditional tourism is reshaping tourist service experience and consumption behavior. Taking smart scenic area service scenarios as the research object, this study examines the mechanism by which smart tourism technology optimizes tourist experience and improves satisfaction. A smart tourism technology framework is constructed from four dimensions: intelligent tour guide systems, online reservation platforms, intelligent payment facilities, and virtual experience technology. Based on perceived value theory, a theoretical model of experience optimization and satisfaction improvement is developed. Field research is conducted in a national 5A scenic area, and 486 valid questionnaires are collected. Descriptive statistics, reliability and validity testing, and structural equation modeling are used to analyze the effects of different smart tourism technologies on tourist experience quality. The study clarifies the influence paths among technology use, information acquisition efficiency, service convenience, interaction quality, personalized experience, and tourist satisfaction. The findings provide theoretical support and operational reference for refined management and service optimization in smart scenic areas.

INDEX TERMS smart tourism, smart scenic area, visitor experience, satisfaction improvement, digital services

I. INTRODUCTION

THE rapid advancement of information technology and the extensive popularization of the mobile internet have catalyzed an unprecedented digital transformation within the tourism industry, fostering a new synergy with the industry through the digitizing of industrial heritage and production sites. This evolution enables tourists to engage with the technical precision of manufacturing through smart platforms, effectively merging historical craftsmanship with modern digital travel experiences. Smart tourism, as an important form of such transformation, combines emerging technologies such as the Internet of Things, big data, and artificial intelligence to make tourism more convenient, efficient, and personalized; that is, to provide tourists with better service experiences. Against this background, smart scenic spots, as the core carriers of smart tourism, have a direct influence on the quality of the experience of tourists and the market competitiveness of the destination by virtue of their construction and service quality.

In recent years, China has taken great leaps in the construction of smart scenic areas. According to data released by the Ministry of Culture and Tourism, by the end of 2024 more than 80% of 4A level and above scenic areas nationwide have completed smart transformation of varying degrees to cover multiple aspects of services such as smart access control, electronic guides, and online reservations. However, while the construction of smart facilities has been rapidly advancing, some problems have also occurred: certain scenic areas have suffered from the lack of balance between the technological facilities and the needed services of tourists, several complex operations of the system have caused a too-high barrier to the target, and serious data silos have hindered the collaboration of services. These problems not only have an impact on the actual application effect of smart tourism technologies, but also to some extent weaken the service experience and satisfaction of tourists.

Based on this, this study chooses to take the smart scenic area service scenario as its starting point and focuses on the following core questions: Which dimensions of smart tourism technology have a significant impact on optimizing the tourist experience? Through what pathways are these dimensions of technology influencing tourist satisfaction?

How are the considered different technology applications with synergistic effect manifested? Addressing these questions establishes a scientific foundation for optimizing services in smart scenic areas while providing decision-making references for the digital transformation of tourist destinations that integrate historical manufacturing sites. This dual approach ensures that the technological evolution of the destination preserves the technical precision and cultural significance of the industry within a modernized digital framework.

II. RELATED WORK

Digital technology is reshaping the landscape of the tourism industry from multiple dimensions. Kumar et al. [1] pointed out that the popularization of the Internet and smartphones has brought tremendous growth to the Indian tourism industry, and the diverse natural and cultural resources are an important foundation for the development of the tourism industry. Michael et al. [2] explored how destination marketing organizations can use photos on Instagram to create visual narratives and shape the image of the destination. Yanis et al. [3] showed that the integration of QR codes with web programming is an effective tourism development tool. It can not only provide tourists with unrestricted dynamic information and enhance the tour experience, but also serve as a medium for the community to conduct volcanic environmental hazard education. Martínez et al. [4] conducted a comprehensive content analysis of all Airbnb hosts' advertisements and guest reviews in the Villaverde area to explore how marginal areas can participate in the platform tourism economy. Sharma and Sharma [5] proposed a comprehensive framework to understand the drivers and barriers to the adoption of digital marketing by small and medium-sized enterprises in the tourism industry.

Fernández-Díaz et al. [6] called on policymakers and industry practitioners to place digital inclusion at the core of smart tourism development. Kuntariati et al. [7] explored the relationship between the application of immersive tourism experiences and metaverse technology in hotel scenarios and the behavior of business and leisure travelers. Migliaccio et al. [8] focused on the role of web portals in connecting tourists with local resources and promoting local development. Tuomi et al. [9] found that the acceptance of digital cultural tourism services by the elderly is not simply determined by age, but is influenced by a variety of factors such as technology anxiety, perceived ease of use, perceived usefulness and past experience. Noviarita et al. [10] emphasized that digital means can more effectively promote tourism products and services that comply with Islamic law. There is still a lack of in-depth and systematic exploration of the micro-mechanisms of how technology empowerment is specifically and process-wise transformed into the core experience optimization of tourists and ultimately improves their satisfaction. Especially in the typical and complex service scenario of smart scenic spots, various intelligent facilities, mobile applications and data services are intertwined, and the dynamic impact mechanism of their influence on tourists' perception, emotion and behavioral intentions still needs to be clarified.

III. METHODS

A. RESEARCH DESIGN

This study adopts a mixed research method by combining questionnaire survey and field observation to obtain the multi-dimensional data on smart scenic spots visitor experience. The study takes a national 5A level tourist attraction as a case study site. The scenic spot has completed its smart upgrade and transformation in 2022, and has relatively complete smart service facilities, including smart guide system, online reservation platform, an aggregated payment system that supports mainstream mobile payment methods (WeChat/Alipay) and virtual experience equipment and so on, which is typical and representative for carrying out smart tourism experience research [11,12]. To delve into the micro-psychological mechanisms behind technological empowerment, this study, building upon macro-quantitative analysis, introduces a process-oriented micro-perspective, focusing on the psychological dynamics of tourists interacting with smart technologies. Specifically, through semi-structured interviews and the critical incident technique, it captures the "cognition-emotion-behavior" chain reaction of tourists using intelligent tour guide systems: from the initial perception of ease of use and usefulness (cognition) upon contact with the technology, to the pleasure or frustration arising from immediate feedback or smooth operation during use (emotion), and finally to the formation of an overall evaluation and willingness to share (behavioral intention). For example, it tracks how tourists, when faced with virtual experience technology, are triggered by initial "novelty" to engage in exploratory behavior, experience "presence" and "flow" in immersive interaction, and ultimately enhance their understanding and satisfaction with the cultural connotations of scenic spots (such as manufacturing processes) due to this emotional resonance. This micro-level psychological journey provides a vivid processual explanation for understanding the path relationships between variables in macro-statistical models.

The research design is conducted in the following technical approach: firstly, the key technological elements in the smart scenic area service scenarios were determined through preliminary field surveys; secondly, the theoretical analysis framework was built up based on the theory of perceived value among tourists; thirdly, the structured questionnaire design and large-scale data collection methods were employed; finally, the statistical analysis methods were applied to verify the research hypotheses and draw conclusions. The authenticity and reliability of the data collected were very emphasized throughout the research process and informed consent was sought from all respondents for all the data collection in accordance with academic ethical standards.

B. VARIABLE MEASUREMENT AND QUESTIONNAIRE DESIGN

The core variables of this study include three levels: smart tourism technology, visitor experience optimization, and visitor satisfaction. Considering that mobile payment has become an infrastructure for daily consumption in China, this study considers intelligent tour guide systems, online booking platforms, and virtual experience technologies as core technologies deployed in scenic areas when constructing the technology dimension of smart tourism. At the same time, it measures intelligent payment facilities as an important basic service environment (i.e., "basic service environment"), aiming to examine the impact of the degree of integration and optimization of these general technologies by scenic areas on the experience. Each sub-dimension has 3 to 4 measurement items, and a five-point Likert scale is used for scoring, with scores ranging from 1 to 5 points from "strongly disagree" to "strongly agree".

Tourist experience optimization variables are measured from four perspectives: information acquisition efficiency, service convenience, interactive experience quality and Personalized experience quality. Tourist satisfaction is used as the outcome variable, and is comprehensively evaluated using three items: overall satisfaction, recommendation intention and revisit intention. In addition, the questionnaire also sets control variables such as tourist demographic characteristics and tourism behavior characteristics, including information such as gender, age, education level, occupation, monthly income, frequency of travel, and length of stay [13].

To address the potential impact of peak tourist season on visitor perceptions, this study added two control variables to the questionnaire: perceived crowding ("I think the scenic area is very crowded today," using a five-point Likert scale) and weather comfort ("The weather today is suitable for my visit," using a five-point Likert scale). These two variables will be included as control variables in the model in subsequent analyses to examine whether special environmental factors during peak season affect the relationship between smart tourism technology and visitor experience.

During the questionnaire design process, the research team conducted multiple rounds of expert consultation and pre-testing. First, three experts in tourism management were invited to review the questionnaire structure and item wording. After revisions based on expert feedback, 50 pre-test questionnaires were distributed at the scenic area. Through reliability analysis of the pre-test data, items with low reliability were eliminated, resulting in a final questionnaire with 35 items. The Cronbach's α coefficient of the final questionnaire was 0.912, with α coefficients for all dimensions above 0.8, indicating good internal consistency.

C. DATA COLLECTION AND SAMPLE CHARACTERISTICS

Formal data collection occurred between July and August 2024, self-sufficient tourist season in the scenic, where the flow of tourists was abundant and diverse. The research team used a combination of convenience sampling and systematic sampling by distributing questionnaires at select locations (i.e., entrance to the scenic area, visitor center, and major attractions). The survey period included weekdays and weekends to help establish sample representativeness. A total of 550 copies of the questionnaire were distributed and 523 copies were returned. After discarding incomplete questionnaires or obviously perfunctory questionnaires; 486 valid questionnaires were obtained, the valid response rate was 88.4%.

The basic characteristics of the sample include that in terms of the gender composition, the number of female tourists accounts for 52.3% while the number of male tourists accounts for 47.7%, basically with a balanced ratio between males and females. In terms of age distribution, tourists aged from 18 to 30 account for 31.2%, tourist aged from 31 to 45 years account for 30.6%, tourist aged from 46 to 60 years account for 19.3% and tourist aged 60 years and above account for 18.9%, with young and middle-aged groups constituting the main source of tourist. In terms of education level, the number of tourists with a bachelor's degree and above is 71.4%, which means the overall education level of the attendant is not low. In terms of the monthly income distribution, the proportion of tourists with a monthly income of 5,000 to 10,000 yuan is the largest at 42.8%, followed by the group of people with a monthly income of 10,000 to 20,000 yuan with a proportion of 31.5%. In terms of frequency of travel are first-time 45.7% and repeat visitor 54.3% including first-time visitor and repeat visitor in sample help to get comprehensive understanding of the functioning of smart services facility [14,15].

From the perspective of environmental perception, the mean value of tourists' perceived crowding was 3.82 (SD=0.91), indicating that tourists generally felt a high degree of crowding during the peak season; the mean value of weather comfort was 3.41 (SD=1.02), reflecting that the high summer temperatures had a certain impact on the experience of some tourists. The inclusion of these two variables allows this study to examine in subsequent analyses whether special factors of the peak season would interfere with the core research conclusions.

D. DATA ANALYSIS METHODS

This study used the software of the statistical package (SPSS 26.0, and AMOS 24.0) for processing and analyzing data. First, descriptive statistical analysis of basic distribution characteristics of each variable was performed. Second, reliability and validity tests were conducted to ensure the quality of the measuring tools. Third, correlation analysis was applied to explore the relations of variables in a preliminary way. Finally, structural equation modeling was applied to study the impact paths of different dimensions of smart tourism technology on tourist experience optimization and satisfaction.

In the structural equation modeling process, maximum

likelihood estimate was adopted for parameters estimation and model's goodness of fit was determined by using parameters such as Chi square ratio of degrees of freedom, Comparison fit index, Normalized fit index and Root mean square errors of approximation. For testing the mediating effect, bootstrap method was adopted to obtain the confidence interval of estimation to confirm mediating role of experience optimization between dimensions of smart technology and satisfaction.

IV. RESULTS AND DISCUSSION

A. ANALYSIS OF THE CURRENT STATUS OF SMART TOURISM TECHNOLOGY USE

Statistical analysis of 486 valid questionnaires can give a fuller understanding of the actual use of the smart service facilities in smart scenic areas by tourists. The highest number of usages was for the smart tour guide system, used by 89.3% of the tourists, among them 62.4% who used the guide service (via a mobile app) and 26.9% who used the smart tour guide devices provided by the scenic area. The usage rate for the online reservation platform was 76.8%, which shows that most of the tourists prefer to plan their trip in advance and book their tickets online. Among the smart payment facilities, the usage rate is 94.1%, and WeChat Pay and Alipay basically occupy the top two positions, accounting for 58.6% and 32.4% respectively, while the all-in-one card of the scenic area accounts for 8.1%. The usage rate of virtual experience technology was relatively low at 43.6%, and was mainly concentrated in VR landscape experiences and AR interactive tour guides. Table 1 shows the differences in the use of smart tourism technologies between different target groups of tourists with different demographic characteristics. From a gender perspective, male tourists demonstrated a slightly higher rate of usage for the virtual experience technologies than female tourists at 46.2% and 41.1% respectively, though there were no significant differences in the rate of usage for the other technology applications. A clear differentiation was observed in the age group wherein the 18 - 30 age group show higher rate of use of all type of smart technology as compared to other age groups. The rate of usage of virtual experience technologies has been 61.3% in the present group, whereas, in the age group 60+, 18.4% was their usage rate, which shows the difference in the technology acceptance between digital natives and digital immigrants. Regarding education level, the usage rate of smart tour guide systems and the virtual experience technologies was significantly higher in the group with a bachelor's degree or higher compared to tourists with an associate's degree or less, with differences of 12.7% and 18.4% respectively.

TABLE 1. Smart tourism technology usage rate (%) among tourists with different demographic characteristics

Demographic characteristics	Category	Intelligent tour guide system	Online booking platform	Smart payment facilities	Virtual experience technology
Gender	Male	88.4	75.9	93.5	46.2
	Female	90.1	77.6	94.7	41.1
Age	18-30 years old	94.7	88.3	98.2	61.3
	31-45 years old	89.5	76.4	94.8	42.7
	46-60 years old	82.1	68.9	89.4	28.5
	60 years and older	71.6	52.3	78.6	18.4
Education level	Associate degree and below	81.3	71.6	91.2	32.8
	Bachelor's degree or above	94.0	80.4	96.3	51.2
Tourism frequency	First visit	92.5	83.6	95.9	48.7
	Repeat visits	86.7	71.2	92.6	39.2

Analyzing from the point of view of visit frequency, the more than first-time visitors the use of the Online booking platforms and the virtual experience technologies were used 12.4% and 9.5% more, respectively. This may be related to the first-time visitors being unfamiliar with the scenic area, and if they use the smart guide services more. Repeat visitors, on the other hand, know the layout and depend more on more traditional methods of guiding. This finding has important implications for the differentiated service strategies of scenic areas: for first-time visitors, the promotion of smart guide and virtual experience services should be strenuous, while for returning visitors, the focus should be on improving convenience and personalization of services. During its smart tourism development, the scenic area placed particular emphasis on breaking down data silos and achieving inter-system collaboration. By establishing a unified smart tourism cloud platform, it integrated data from the intelligent tour guide system, online booking platform, smart payment facilities, and virtual experience technology, enabling cross-system sharing of tourist information. For example, after a tourist books tickets online, their personal information and preferences are automatically synchronized to the intelligent tour guide system. When the tourist enters the scenic area, the system can push personalized tour routes and explanations based on their historical behavior. Simultaneously, the smart payment data is integrated with the virtual experience system, allowing tourists to instantly gain access to AR interactive experiences after payment. This data fusion mechanism effectively solves the problem of independent operation and information asymmetry in traditional scenic areas, creating a seamless service experience for tourists. According to the scenic area's technical director, they adopted an API gateway and data platform architecture, and established unified data interface standards to ensure real-time data exchange between subsystems. Furthermore, the scenic area established a data security management system to ensure compliant data use while protecting tourist privacy. These measures laid a solid foundation for overcoming data silos and improving service synergy.

B. ANALYSIS OF THE IMPACT OF SMART TOURISM TECHNOLOGY ON OPTIMIZING TOURIST EXPERIENCE

To examine the specific effects of other dimensions of smart tourism technologies on optimizing the tourist experience,

this study involved the construction of a multiple regression model with intelligent tour guide systems, online booking, smart payment facilities and virtual experience technologies as independent variables, and information acquisition efficiency, convenience of service provision, quality of interactive experience and individual satisfaction as dependent variables. Table 2 shows regression coefficients and significance levels according to each dimension of technology regarding different indicators of experience optimization.

TABLE 2. Regression Analysis Results of Smart Tourism Technology Dimensions on Tourist Experience Optimization

Dependent variable	Intelligent tour guide system	Online booking platform	Smart payment facilities	Virtual experience technology	R^2
Information acquisition efficiency	0.423***	0.186**	0.089	0.201**	0.412
Service convenience	0.198**	0.356***	0.412***	0.127*	0.538
Interactive experience quality	0.267***	0.098	0.156*	0.489***	0.476
Personalized experience quality	0.312***	0.234**	0.178*	0.298***	0.451

Note: * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$

The outcome of the analysis results indicates that the influence of the intelligent tour guide system on the information acquisition efficiency is the most significant, the standardized regression coefficient is 0.423, which is significant at the 0.001 level. This means that the intelligent tour guide system is effective in solving the problem of information acquisition for tourists at scenic areas in terms of functions such as real-time location, voice explaining, and route recommendations. Specifically, on average, the time spent by tourists using the intelligent tour guide system to look for attractions and calculate routes is approximately 35% lower than that of non-users, and the accuracy of information retrieval is 42% higher. This finding provides validation to the main value of intelligent tour guide technology optimisation of spatial cognition and decision-making efficiency of tourists.

Online reservation platforms made the biggest contribution to service convenience, with a regression coefficient of 0.356. Data indicates that the average duration of waiting for visitors who buy tickets via online

platforms was 8.3 minutes, and the average duration of waiting for visitors who buy tickets on-site was 23.6 minutes, which saves the time of 64.8%. Furthermore, the reservation system of the online reservation system, through its time slot reservation mechanism, effectively relieved the pressure of the peak hour flow of visitors, and the peak hour flow of visitors was evenly distributed in the instantaneous carrying capacity of the major scenic spots, so that the perception of the too crowded situation by visitors could be reduced by 28.4%. Smart payment facilities had the highest impact coefficient on the service convenience which was 0.412. According to survey data, the average transaction time of tourists using smart payments reached 12 seconds, while the average transaction time of cash payments was 87 seconds, resulting in an increase of 86.2%. This high efficiency isn't an invention of the scenic area itself, but rather a result of its successful integration with widely available mobile payment infrastructure, eliminating the efficiency bottlenecks of traditional cash transactions. More importantly, the widespread adoption of mobile payments reduces tourists' security concerns about carrying cash, thereby increasing their willingness to spend. Statistics show that, under the same conditions, tourists who habitually use mobile payments spend 34.6% more on secondary purchases within the scenic area than those who primarily use cash. This fully demonstrates the positive incentive effect of scenic areas integrating into the social and technological ecosystem on consumer behavior.

The impact coefficient of virtual experience technology on the quality of interactive experiences is the highest, which is 0.489 and it is much higher than other technological dimensions. This result suggests that immersive technologies, like VR landscape reproduction and AR interactive guides, have a high impact on the sense of participation and presence of the tourist. At the attractions with virtual experience technology application, the average stay time of tourists was increased by 18.5 minutes, the rate of photo sharing effect was increased by 56.3%, and the social media dissemination effect was significant. However, the influence of virtual experience technology on service convenience is relatively less, whose coefficient is only 0.127, indicating that the effect of this type of technology on the emotional level of experience is relatively greater than that on the functional level of convenience.

The level of Personalized experience quality is affected by a combination of multiple dimensions of technologies, among which the intelligent tour guide systems and virtual experience technologies have a somewhat significant effect with a coefficient value of 0.312 and 0.298, respectively. This reflects on the fact that smart tourism technologies, by means of the provision of precise push notifications, of customized recommendations and of immersive presentations, effectively satisfy the personalized needs of tourists. It is interesting to note that the four technological dimensions account for 45.1% of the degree of Personalized experience quality, which shows that the smart services have a significant advantage in achieving personalized tourism experiences, however, more than half of personalized needs require other service elements to be met. The analysis of control variables showed that perceived crowding had a significant negative impact on service convenience ($\beta = -0.215$, $p < 0.001$) and interactive experience quality ($\beta = -0.176$, $p < 0.001$), indicating that peak season crowding does indeed weaken the quality of the tourist experience to some extent. Weather comfort had a significant positive impact on information acquisition efficiency ($\beta = 0.112$, $p < 0.05$) and interactive experience quality ($\beta = 0.134$, $p < 0.05$), suggesting that high temperatures may reduce tourists' patience and engagement in using smart devices.

Crucially, after controlling for perceived crowding and weather comfort, the influence coefficients of each dimension of smart tourism technology on tourist experience optimization, while slightly decreasing, remained significant, and the direction and relative magnitude of the influence did not change. This result indicates that although the special environmental factors of peak season do affect tourist experience, the core relationship between smart tourism technology and tourist experience revealed in this study is robust and not severely distorted by peak season factors.

C. IMPACT OF TOURIST EXPERIENCE OPTIMIZATION ON SATISFACTION AND MEDIATING EFFECT TEST

After verifying the positive impact of smart tourism technology on optimizing tourist experience, this study further examines the mechanisms by which various dimensions of experience optimization affect tourist satisfaction. Table 3 shows the standardized path coefficients and model fit indices of the structural equation model.

TABLE 3. Path Analysis of the Impact of Tourist Experience Optimization on Satisfaction

Path	Standardized path coefficient	Standard error	t-value	p-value	Effect type
Information acquisition efficiency → overall satisfaction	0.298	0.042	7.095	< 0.001	direct effects
Service convenience → Overall satisfaction	0.356	0.038	9.368	< 0.001	direct effects
Interactive experience quality → Overall satisfaction	0.287	0.041	7.024	< 0.001	direct effects
Personalized experience quality level → Overall satisfaction	0.312	0.039	7.897	< 0.001	direct effects
Information acquisition efficiency → Recommendation willingness	0.267	0.044	6.068	< 0.001	direct effects
Service convenience → Willingness to recommend	0.298	0.041	7.268	< 0.001	direct effects
Interactive experience quality → Recommendation intention	0.334	0.040	8.350	< 0.001	direct effects
Personalized experience quality level → Recommendation intention	0.289	0.042	6.881	< 0.001	direct effects
Information acquisition efficiency → willingness to revisit	0.234	0.046	5.087	< 0.001	direct effects
Service convenience → Willingness to revisit	0.278	0.043	6.465	< 0.001	direct effects
Interactive experience quality → willingness to revisit	0.312	0.042	7.429	< 0.001	direct effects
Degree of Personalized experience quality → Willingness to revisit	0.301	0.044	6.841	< 0.001	direct effects

As reported in Table 3, all four dimensions of experience optimization significantly affect overall satisfaction, recommendation intention and revisit intention; all the path coefficients are significant at the 0.001 level. Among the paths in which service convenience affects overall satisfaction, the standardized path coefficient is 0.356, which is the largest of the four dimensions, indicating that in the smart scenic area service scenarios, enhance convenience is one of the important factors that contribute to higher satisfaction among tourists. This finding is in accordance with the "efficiency first" principle in tourism service management that is, when the basic service processes are optimized it considerably improves the overall evaluation of the tourist. Interactive experience quality had the largest impact on recommendation intention, coming to a value of 0.334, which is higher than its impact on overall satisfaction (0.287). This phenomenon tells us that experiences with high levels of interactivity and engagement will have better scope to stimulate the desire of tourists to communicate and spread positive word-of-mouth. In today's highly developed social media environment, the sharing of experiences on the web by tourists has become an important channel for destination marketing. Therefore, the smart scenic spots should pay attention to the investment and optimization of the interactive experience technology to make the most of the effect on word-of-mouth marketing.

The impact coefficient of Personalized experience quality on the intention to repeat visit was 0.301, second to quality of interactive experience of 0.312. This result reveals the important role of personalized service in developing the loyalty of tourists. When the tourists felt that the service offered them highly matched their personal preferences then they were likely to have an emotional connection with the destination, thereby creating a desire to visit again. While the willingness to revisit is influenced by objective factors such as geographical distance, travel costs, and leisure time, data shows that among tourists who felt the smart services "perfectly met their personal needs," 78.4% said they "would definitely visit again"; while among tourists who felt the services "completely failed to meet their needs," this figure was only 23.6%. This suggests a strong positive correlation between personalized service experiences and the willingness to revisit. Smart scenic spots can enhance tourist loyalty by strengthening personalized services, while also needing to differentiate their operations based on the characteristics of their target markets.

V. CONCLUSION

This study focuses on smart scenic area service scenarios by systematically exploring how smart tourism technology optimizes the tourist experience and satisfaction within the context of industrial heritage and modern fiber production sites. By analyzing the impact mechanism of digital integration, the research highlights how the technical precision of the industry can be transformed into engaging, technology-driven visitor interactions. Through empirical analysis of 486 valid questionnaires, the following main conclusions are drawn:

First, the different dimensions of smart tourism technologies have significantly different effects on optimizing the tourist experience.

Second, optimizing the tourist experience plays a crucial mediating role between smart tourism technologies and tourist satisfaction.

Third, there are synergistic and substitution effects among smart tourism technologies.

Based on the above research findings, the following suggestions are made for the construction and operation of smart scenic spots: First, a technology configuration mechanism oriented towards tourist needs should be established to provide differentiated smart services according to the characteristics of different customer groups; second, the synergistic integration between technologies should be strengthened to create a seamless service process; third,

the application of emerging technologies such as virtual experiences should be emphasized to give full play to their unique value in enhancing interactive experiences and promoting word-of-mouth marketing; finally, a dynamic evaluation mechanism for the effectiveness of smart services should be established to continuously optimize technology configuration and service processes.

AUTHOR CONTRIBUTIONS

Jindong Liu designed, collected and analyzed the data, and drafted the manuscript. Jindong Liu conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Jindong Liu participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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