WILEY | Hindawi

Research Article

Design Innovation of Ethnic Cultural Wisdom Tourism Products Based on Digital Information Technology

Yi Zhou and Shaohan Chen (iD)

Department of Product Design, College of Art, Guilin University of Technology, 541006 Guilin, Guangxi, China

Correspondence should be addressed to Shaohan Chen; 2017051@glut.edu.cn

With the improvement of people's living standards, ethnic tourism has begun to develop in an all-round way, and correspondingly, ethnic cultural products have become more and more dazzling. However, the current tourists' satisfaction with ethnic cultural tourism products is generally low, so the innovative design of tourism products is an important means to improve the satisfaction of tourism products. The purpose of this paper was to use digital information technology to study the innovation of national cultural wisdom tourism product design and to optimize tourism products. This paper first expounded the experiential design of ethnic cultural tourism products which applies the TEAR theory, and the ASEB grid analysis introduced the four factors of theme, environment, activity, and reaction, analyzed the experience of tourism from the perspective of tourists, then introduced the extraction and development process of digital information technology, and then built a three-dimensional digital model of ethnic cultural tourism product design to lay a solid foundation for product design. In addition, this paper took the development of ethnic cultural tourism products in Yunnan ethnic villages as a case to investigate and analyze the tourist market and tourist needs and finally put forward some product design ideas and suggestions. Through the research and analysis of tourists, it is found that there are more young and middle-aged tourists in Yunnan ethnic villages, and most of them travel with their families. According to the survey of tourists' preferences, more than 80% of tourists like high-quality and low-cost tourism products, and nearly 50% of tourists want to gain a thinking experience in tourist attractions. The most popular forms of tourists were ethnic art and traditional culture. Therefore, designers can design tourism products according to the preferences of tourists and improve the satisfaction of tourism products.

1. Introduction

Today's cultural and creative industry is a symbol of national cultural soft power in the new era, and countries are paying more and more attention to the development and innovation of cultural creative industries. But at present, only a very small part of the ethnic cultural tourist souvenirs in tourist attractions are relatively high quality. On the whole, the tourist products of most scenic spots lack a certain aesthetic feeling, the product quality is low, and their style are same. They are without the characteristics and connotations of unique scenic spots. Therefore, innovative research on the design of ethnic cultural tourism products is an important way to improve the satisfaction of ethnic cultural tourism products. Since the 21st century, ethnic tourism has moved

towards a rational development path. Driven by the rapid economic and social development, ethnic tourism has developed in an all-round way. From the perspective of the tourism market, the proportion of products such as vacations, scientific expeditions, and studies in ethnic tourism has increased significantly; tourists from all over the world have shown a clear preference for ethnic products with unique scenery and rich customs. Ethnic tourism has received more attention, and together with natural sightseeing tours and historical sites tours, three major tourism products have been formed.

With the development of tourism, tourists have higher and higher requirements for the quality and service of ethnic cultural tourism, which have been given greater expectations in terms of service and experience. People's demand for

ethnic cultural tourism products is not just a simple commodity supply, but it has transformed into a more comfortable humanistic experience or spiritual satisfaction. This demand not only promotes the innovative design of cultural tourism products but also stimulates the self-innovation of cultural creative industries. Using the most cutting-edge information network technology and equipment accurately and timely obtains various tourism-related data information and applies it. In this way, the purpose of intelligence and automation in tourism management, marketing, service, and experience can be achieved so as to promote the transformation and development of the overall tourism industry towards comprehensive, integrated, and compatible aspects which can effectively promote the development level of ethnic cultural tourism and then promote the overall tourism satisfaction and cultural identity of tourists.

The digital signal transmission of digital information technology is stable and reliable, and it is suitable for digital special effects and image processing. The innovations of this paper are as follows: (1) Starting from the connotation of tourism culture of Yunnan ethnic villages, it interprets how ethnic culture is rooted in tourism products and thus obtains the premise of the interaction between ethnic culture and tourism products, that is, there must be a certain point of convergence between the two. (2) Based on digital information technology, the application of digital technology in product development improves the design and processing efficiency of products, making the products more detailed and exquisite. Then combined with TEAR theory and ASEB grid analysis method, the satisfaction of tourists' ethnic cultural tourism products is conducted to analyze in-depth.

2. Related Work

Many scholars have paid attention to the innovation research on the design and innovation of ethnic cultural wisdom tourism products. Zhang et al. used the questionnaire survey method to study the social-political significance of cultural creative tourism to national identity, and they determined the specific role of cultural factors affecting national identity. The results of the study confirm that cultural creative tourism helps tourists build a sense of national identity [1]. Taking Vanuatu as a case, Jin studied the development of characteristic cultural tourism products and created a series of cultural tourism products and characteristic tourism souvenir brands with the theme of national cultural tourism, which effectively enhanced Vanuatu's cultural influence and the level of modern service industry and realize the optimization of tourism consumption structure [2]. Through the research on the development of ecological cultural tourism products in the imperial palace, Yafei et al. analyzed the innovative countermeasures of the experiential ecological cultural products in the imperial palace trying to bring inspiration and reference to the development of ecological cultural tourism products in other scenic spots [3]. Datta et al. studied tourists' attitudes towards purchasing ethnic cultural tourism products online and investigated the factors that influence travelers' online purchase of tourism products. The research results have shown that income

and age are the biggest factors affecting tourists' online purchasing attitudes [4]. But these methods lack an accurate algorithmic model to design and improve products.

The three-dimensional model based on digital information technology can effectively shorten the design and development cycle of products and speed up the production efficiency of tourism products. Kirpes et al.'s survey demonstrates the value of using 3D product models for product design and assembly, the current state of organizations that do not use the model, and their expected value for possible future implementations. The results of this research can be applied to product design in various fields [5]. Liu described the product development and design process of enterprises under the mass customization production mode and formed a software system that can be applied to actual product development. Through experiments and analysis, the feasibility of the tourism product design process has been verified [6]. Park and Koo examined emerging trends in 3D technology in apparel design research and product development to achieve rapid prototyping and effectively to evaluate product performance. The research results can effectively improve consumers' satisfaction with product functionality, aesthetics, and comfort of various kinds of clothing including sportswear, performance clothing, and ethnic clothing [7]. Chu and Chien researched whether designers' use of S3D could help them improve their ability to interpret product features. The independent variables of the experiment included spatial ability, task complexity, and display mode. The results of this research are widely used in the design and development of tourism products [8]. However, these studies have not been combined with the preference survey of intended customers; thus, the results obtained will inevitably be somewhat discrepancies.

3. Methods of Innovation of National Cultural Wisdom Tourism Products

3.1. Experience-Based Design of Ethnic Cultural Tourism Products

3.1.1. TEAR Theory of Experiential Design of Ethnic Cultural Tourism Products. Tourism is a remote experience, which tries to create a remote feeling, happy travel, and wonderful experience for tourists [9]. Before the experiential design of tourism products, through the investigation and analysis of tourists' tourism motivation, experience needs, etc., and the design and optimization of the products according to the actual needs of tourists, it can effectively improve tourists' satisfaction with ethnic cultural tourism products [10].

(1) Experience Theme. Liking a moving drama, a beautiful experience needs a seductive theme which is the foundation and soul of the experience. From the tourist's point of view, an attractive and healthy theme can effectively arouse their associations, make them have expectations, then resonate with the information conveyed by the sights in front of them during the tour, and then make positive reflections. Thus, a two-way interaction between the host and the guest can be generated smoothly. From the product's point of view, the theme seems to be the "Shen Yun" of the product, which

makes each item in the product "scattered in shape but not in spirit." So, how can tourists grasp and better understand and feel the theme? According to the context of the theme product and the experience needs of tourists, experience clues (such as ethnic song and dance culture, ethnic religious culture, and ethnic science and technology culture) are proposed, so that tourists can accurately grasp the meaning of the product. In this way, the sense organs of tourists can be fully mobilized, so that they can leave an unforgettable experience and strengthen the travel experience.

(2) Environment Creation. One of the key points of experiential design of ethnic cultural tourism products is to create a unique and distinctive cultural atmosphere, to create an aesthetic realm that can generate lasting appeal so as to form its own unique tourism value and then win the market [11]. By rendering the atmosphere, creating the environment, and designing the scene and other methods to achieve the purpose of tourism experience and taste the national cultural customs, these can make the interaction between the subject and the object, then generate feelings from the scene, and finally realize the mutual blending of the situation and the scene so as to enhance the tourists' travel experience.

(3) Participate in Activities. The process of interaction between the tourist subject and the experience object is the process of experience generation. Ethnic cultural tourism theme products provide tourists not only a superficial experience, but an in-depth experience in various aspects [12, 13]. Different from the surface experience, the in-depth experience allows tourists to participate in various folk activities and taste local delicacies, so that they can have some physical and mental contact and communication with tourist attractions and service personnel in tourist areas (points). At the same time, tourists can understand the local ethnic culture in immersive which can create a unique experience for them. The future development direction of ethnic cultural tourism theme products will guide tourists to try another way of life [14].

(4) Visitor Reaction. The experience is interactive, and tourists are the main body of the experience. The end of tourism activities does not mean the end of the experience. The actual feelings of tourists about the tourism product will provide ideas and inspiration for the experience design of tourism products [15]. The response of tourists after experiencing the national cultural tourism theme products involves four aspects of sensory experience, emotional experience, thinking experience, and action experience, which refers specifically to tourists' perceptions of ethnic culture including landscapes, atmosphere creation, folk activities, singing and dancing performances, infrastructure, service quality, tourism prices, and the satisfaction when tourists getting along with local residents or service staff.

3.1.2. Model of Experiential Design of Ethnic Cultural Tourism Products. Based on the above description, the experiential design mode of ethnic cultural tourism products is obtained, as shown in Figure 1.

This model shows that guided by the tourism market, the experience theme of tourism products has been brought out on the basis of the analysis and evaluation of ethnic cultural tourism resources, tourism market and existing tourism products, comprehensive analysis of the context of tourism areas, and analysis of tourists' experience needs. Then various experience clues were selected around the theme, and experiential design was carried out for the attractions, participatory activities, special souvenirs, facilities, and services of ethnic cultural tourism theme product. After the theme product was put into the market, the designer should continue to track the changes in tourists' experience needs and experience quality and then make timely adjustments to the details of the ethnic cultural tourism product according to the response of tourists.

3.1.3. ASEB Raster of Tourism Products. The ASEB raster analysis is a comprehensive application of the ASEB analysis and SWOT analysis. It takes tourists as the center and analyzes the experience process from the perspective of tourists. At the same time, it guides the managers of tourist areas (points) to strengthen the experience of the main body through the experience-based design of tourism products and improve the satisfaction of tourists [16, 17].

The ASEB raster analysis is a joint derivative of SWOT analysis and ASEB requirement hierarchy. The horizontal axis is the four levels of requirements, and the vertical axis is the four aspects of SWOT [18]. The ASEB raster analysis is a binary matrix, which is applied to the experience design of ethnic cultural tourism theme products. It can be concluded that the so-called activities are various tourism activities carried out around a specific theme, including characteristic folk activities. The background is the environment and atmosphere; the experience is the feeling that tourists get when consuming the national cultural theme tourism products; the final benefit is the tourists' evaluation of the satisfaction and gain of the tourism experience. The details can be seen from Table 1: the background is the environment and atmosphere; the experience is the feeling that tourists get when consuming the national cultural theme tourism products; the final benefit is the tourists' evaluation of the satisfaction and gain of the tourism experience.

3.2. Digital Information Technology. In the field of design, the application of digital technology has changed the traditional design methods and processes to a certain extent, which gives design and creation a new context and challenging the original structural form and aesthetic characteristics [19]. The application of digital technology to product development is to replace the original backward manual creation mode with digital design and manufacturing, so that the design has a wider space for change and development, the generation and expression of the design are more accurate, and the design modification and evaluation are more accurate, that greatly improve the design and processing efficiency and shorten the research and development cycle. The finished product manufacturing process is more concise and intuitive, and the data is more accurate.
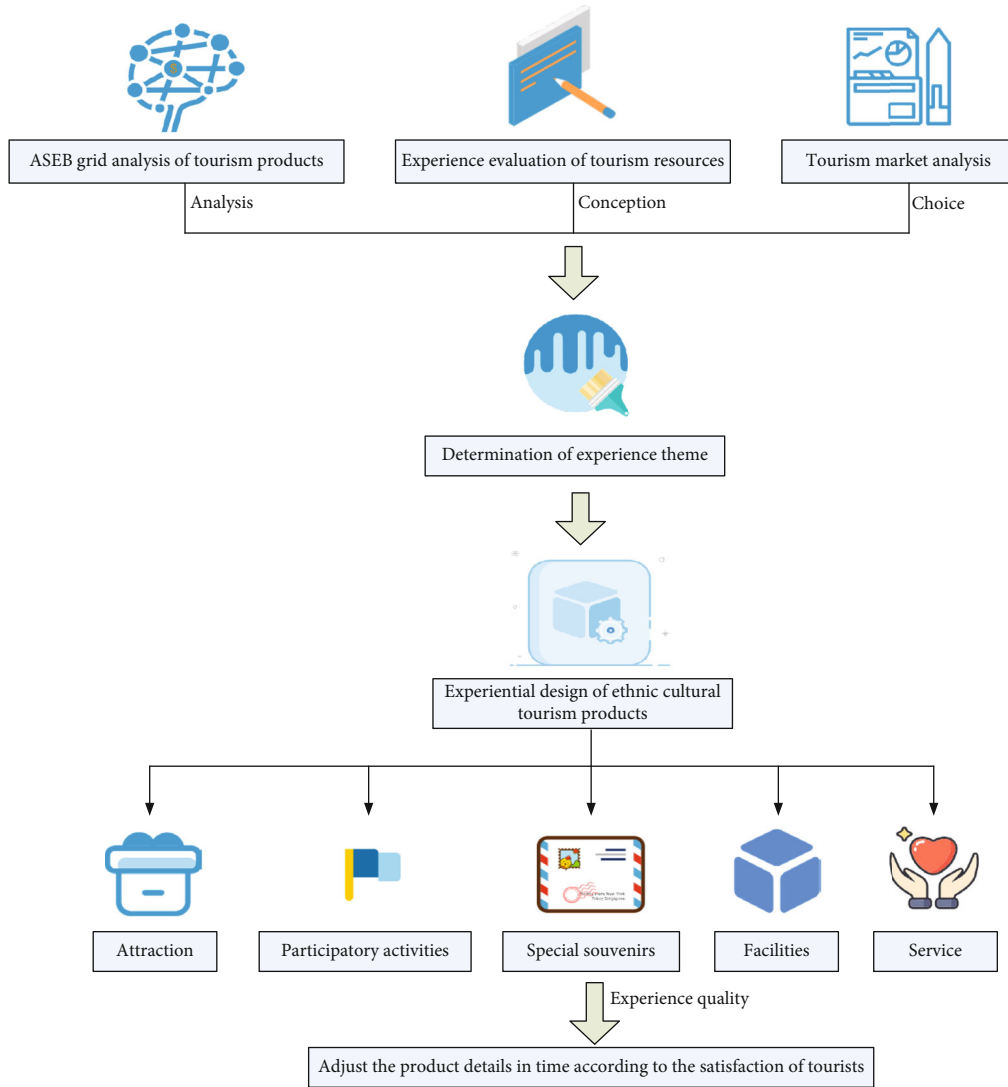
FIGURE 1: Design of the experiential model of ethnic cultural tourism products.

TABLE 1: ASEB raster analysis.

Element	Level			
	Activities	Settings	Experiences	Benefits
Strengths	SA	SS	SE	SB
Weakness	WA	WS	WE	WB
Opportunities	OA	OS	OE	OB
Threats	TA	TS	TE	TB

3.2.1. Digital Extraction Technology. In the design process, when designers apply design materials, they often have to extract naturally existing materials into applicable design elements before they can be applied to the design process. The realization of the extraction process requires the help of digital extraction technology. Digital extraction is the process of digitally collecting and processing design materials in the form of two-dimensional and three-dimensional data by using digital equipment, such as digital cameras, computers, and scanners.

Two-dimensional data extraction mainly relies on digital cameras and computer graphics image editing software to complete. The specific process is as follows: using a digital camera to collect naturally existing design materials into picture format and importing the pictures into computer graphics image editing software, such as Illustrator, Corel-Draw, and Photoshop. In the graphics and image processing software, the designable elements are extracted by means of tick, draw, cut, cut, etc. and then modified, improved, and saved according to the design requirements, that is, a complete two-dimensional data design element is obtained, as shown in Figure 2.

3D data extraction is the process of reconstructing the 3D model of the actual product by using technical means such as reverse engineering. Reverse engineering technology is to use a 3D scanning system to collect point cloud data on the solid surface, then process the point cloud with the help of reverse engineering software, and rebuild the 3D model based on the point cloud data results [20, 21]. Using reverse engineering technology to achieve 3D data extraction
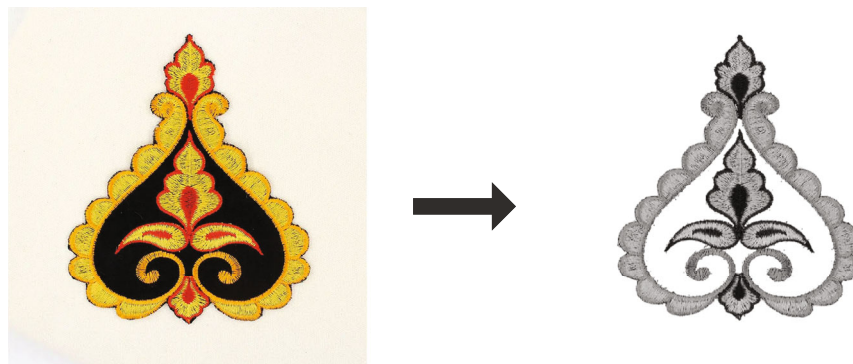
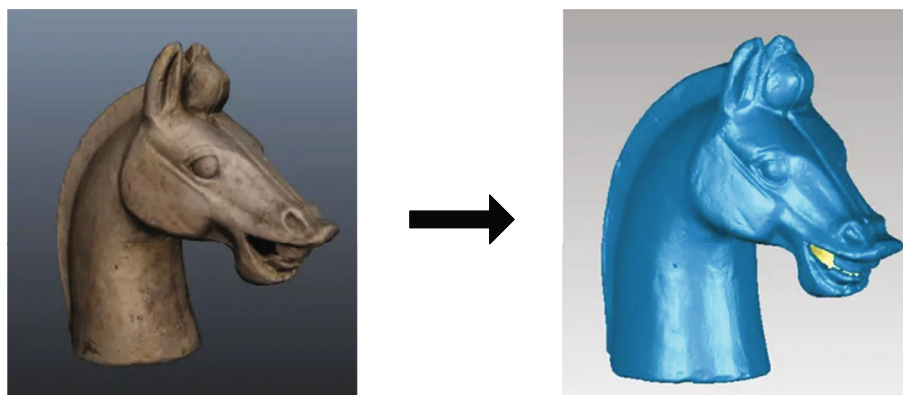FIGURE 2: Process of extracting patterns as 2D data.

FIGURE 3: Process of extracting OIT objects into 3D data models.

requires three steps of solid surface digitization, surface reconstruction, and solid model reconstruction. Among them, solid surface digitization is to extract the surface data of solid samples and then process the data; surface reconstruction is to reconstruct the surface model of the collected object; solid model reconstruction is the process of recreating a high-quality CAD model with complete structure and perfect surface using digital modeling technology based on the surface model, as shown in Figure 3.

In contemporary times, the application of digital extraction technology not only accumulates a large number of digital materials for the innovative research and development of tourist souvenirs but also allows more people to appreciate the characteristic national culture from multiple dimensions, so that the national culture can get better dissemination and protection in the society with the rapid development of information technology.

3.2.2. Product Design and Development Process in Digital Information Technology Environment. Digital design is an innovative design for the purpose of making design works more full and accurate. It is a thinking concept and design method that runs through the entire product design process from the overall situation. Digital design should not be simply used as a drawing or performance tool [22]. Under the conditions of digital technology, different design software will be applied to different stages of product development, and the development of design ideas and the methods and processes

used in design will show a new look. Table 2 shows the application of digital design software and hardware at each stage of ethnic cultural tourism product design.

In the process of product digital design, the expansion and development of the design are all carried by the 3D data model. The designer does not need to participate in all the design work but cooperates with other professionals who carry out product research and development at the same time. This way of working overturns the serial design mode in which the designer has the sole authority to create products in the past. It allows more relevant personnel to participate in the design process in a timely manner, complete design tasks synchronously and cross-wise, communicate the dynamics of design development, and change in a timely manner so as to ensure the smooth development of products. The use of digital technology has not only improved the way designers work but also revolutionized the form and approach of product design. In the digital technology environment, product design and development are more accurate and faster, and the design process is more systematic and complete.

3.2.3. Design of Ethnic Cultural Tourism Products Based on Digital Information Technology. Tourism souvenir design is a complex creative activity. The design and development of national cultural tourism souvenirs based on digital information technology, then on the basis of traditional processing technology, adopt the digital product design and

TABLE 2: The use of digital information technology in each stage of product design.

| Design phase	Software	Application content
Conceptual design	AutoCAD; Photoshop; Illustrator; etc.	Elaboration of plane sketch or construction of three-dimensional grass motorcycle
Deepening design	AutoCAD; 3dsMAX; Skechup; etc.	Determine the product design scheme, refine the details of the product and conduct three-dimensional modeling
Collaborative design	Solidworks; rhino; etc.	Design all components
Virtual machining	Solidworks; JDpaint; etc.	Simulated machining
Production and processing	JDpaint; etc.	Machining parts and surface treatment
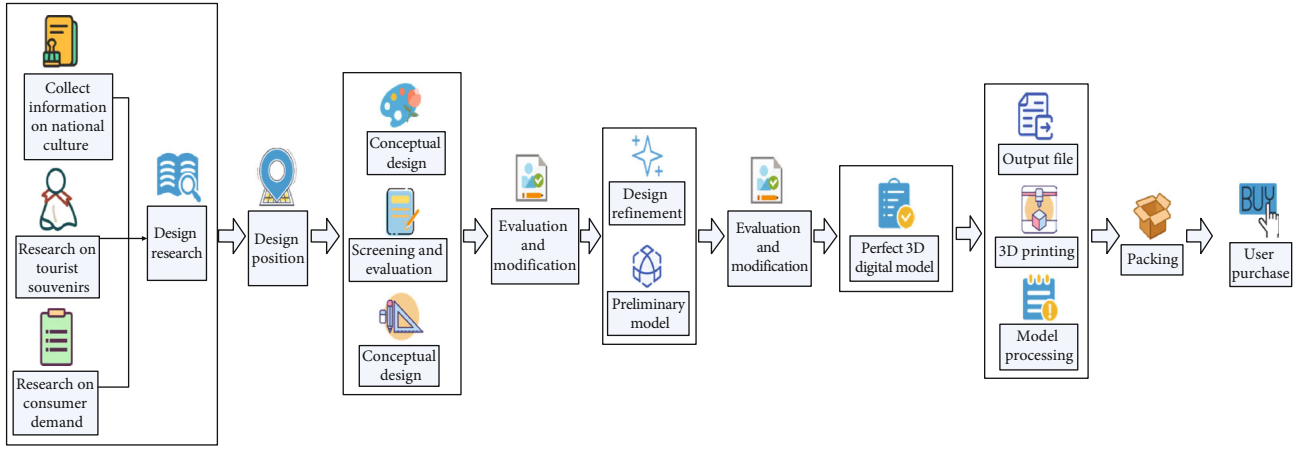
FIGURE 4: Design process of ethnic cultural tourism souvenirs based on digital information technology.

development process then apply 3D printing technology, thus changing the previous method and process of tourism souvenir design, greatly shortening the design and development process. The design process of ethnic cultural tourism souvenirs based on digital information technology is shown in Figure 4.

3.3. 3D Digital Model of National Cultural Tourism Product Design.

The information of MBD model is the only data source for manufacturing, which can be stored and transmitted between different information management platforms. It not only realizes the production steps of product design, process, manufacturing, inspection, etc. but also shortens the whole life cycle of the product. Process information covers all kinds of information in product manufacturing, such as product design, tooling, process, manufacturing, inspection, etc., while MBD process information model is the representation of products in different design, manufacturing, and other processes. In the manufacturing process, the MBD model is the basis for process information transmission and the only data information carrier. It adds process information required for process design at different stages and manages the process information of different models [23, 24].

Supposing the sequence of input MBD model data is

$$A = a_1 a_2 \cdots \cdots a_n. \tag{1}$$

The output encoding sequence is

$$B = b_1 b_2 \cdots \cdots b_n. \tag{2}$$

The relationship between A and B satisfies

$$B = \begin{cases} s, & s = 1 \\ \min \{e | a_{s-e-1} a_{s-e} = a_s a_{s-1}\}, & a_{s-e-1} a_{s-e} \neq a_s a_{s-1}. \end{cases} \tag{3}$$

If $b_{s-1} = b_s$, a_s is considered in repeat mode; otherwise, it is in normal mode. If

$$b_s = b_{s+1} = \cdots = b_{s+\lambda} (\lambda \geq 1), \tag{4}$$

$$b_s = b_{s+1} \cdots b_{s+\lambda} \neq b_{s+\lambda+1}, \tag{5}$$

then its corresponding string $a_s a_{s+1} \cdots \cdots a_{s+\lambda}$ forms a repeating pattern of $\lambda + 1$.

In order to increase the matching length of one time, the following can be set:

$$m = b_{s-1}. \tag{6}$$

If

$$b_s < b_{s+1}, \tag{7}$$

then a_s does not belong to the repeating pattern; if a_{s-1} is the repeating pattern, the repeating pattern ends here.

Then construct the adaptive Huffman optimal tree. Let D denote an optimal prefix-encoded complete binary tree for character set U. The frequency of the character u in U is $g(u)$. Get the optimal encoding:

$$g(p) = g(a) + g(b), \tag{8}$$

$$D' = D - \{a, b\}, \tag{9}$$

$$U' = U - \{a, b\} \cup \{p\}. \tag{10}$$

The average code length $T(D)$ of D can be represented by the average code length $T(D')$ of D'. For any $u \in U - \{a, b\}$, there are

$$v_D(u) = v_{D'}(u). \tag{11}$$

Therefore, there is

$$g(u)v_D(u) = g(u)v_{D'}(u). \tag{12}$$

On the other hand

$$v_D(a) = v_D(b) = v_{D'}(p) + 1. \tag{13}$$

Thus

$$g(a)v_D(a) + g(b)v_D(b) = (g(a) + g(b))(v_{D'}(p) + 1). \tag{14}$$

Get that

$$T(D) = T(D') + g(a) + g(b). \tag{15}$$

When formula (15) is satisfied, the constructed tree is the optimal substructure.

Variable-length coding is performed according to the constructed improved adaptive Huffman optimal tree. There are two forms of encoding. One is that the string belongs to the normal mode. According to the principle of the adaptive Huffman compression algorithm, the encoding is performed in the form of "0" and "1" according to the left and right subtrees. The other is that the string belongs to the repeating pattern and is encoded according to the principle of its string repeating finder—the letter representing the repeating pattern is prefixed. The length of the variable-length encoding is the shortest, and the compression effect is achieved.

$$Q(O) = \lim_{n \to \infty} \frac{1}{n} R_n. \tag{16}$$

Among them $Q(O)$ is the entropy of the adaptive

Huffman coding:

$$R_n = - \sum_{k_1=1}^{k_1=O} \sum_{k_1=2}^{k_2=O} W(A_1 = k, A_2 = k_2, \cdots, A_n = k_n) \log W$$
$$\cdot (A_1 = k, A_2 = k_2, \cdots, A_n = k_n), \tag{17}$$

$$W(A_1 = k, A_2 = k_2, \cdots, A_n = k_n) = \frac{C_x}{n}. \tag{18}$$

Among them, C_x is the frequency of character occurrence, that is, the weight value, $W(A_1 = k, A_2 = k_2, \cdots, A_n = k_n)$, is the probability of character occurrence, O represents the source character, and $Q(O)$ represents the entropy.

For the source character O set

$$I = \{i_1, i_2, \cdots\cdots i_k\}. \tag{19}$$

Its probability model is

$$\{W(i_1), W(i_2), \cdots\cdots W(i_k)\}. \tag{20}$$

The average length of the encoding is expressed as

$$\bar{H} = \sum_{j=1}^{k} W(i_j) H_j, \tag{21}$$

$$Q(O) - \bar{H} = \sum_{j=1}^{k} W(i_j) \log_2 W(i_j) - \sum_{j=1}^{k} W(i_j) H_j \le \log_2 \left[\sum_{j=1}^{k} 2^{-H_j} \right]. \tag{22}$$

Using the improved adaptive Huffman compression algorithm to lighten the data information of the MBD model, it can achieve the effect of greatly reducing the weight of the MBD model data, reduce the amount of information transmitted by the network, improve the transmission efficiency, and reduce the occupied memory space.

So far, the three-dimensional digital model of ethnic cultural tourism product design has been constructed. Next, we will conduct tourist market research and tourist demand research for tourism product development, master the preference elements of tourists' ethnic cultural products, and carry out targeted design and development.

4. Experiment of National Cultural Tourism Product Design

4.1. Investigation of Tourist Market in Yunnan Minzu Village Tourism Product Development. Aiming at the core attraction of ethnic cultural tourism and the demand of the tourism market, statistics on personal characteristics and behavior of tourists are carried out. The questionnaires are randomly distributed in Yunnan ethnic village scenic spots, and 300 questionnaires are distributed in total. Through recovery and review, a total of 294 valid questionnaires were obtained, with an effective recovery rate of 96%.
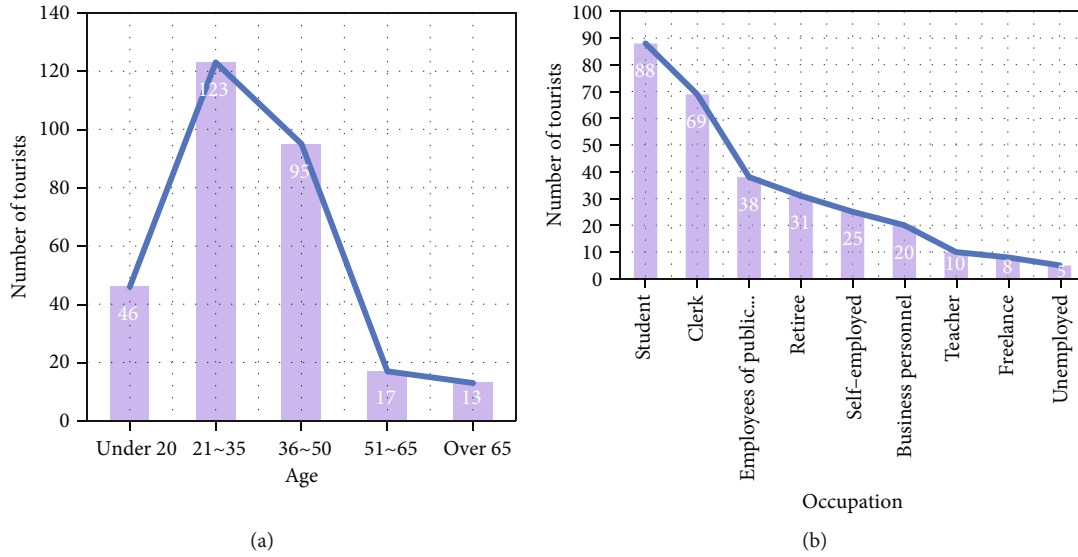
FIGURE 5: Survey of personal characteristics of tourists. (a) Age group of tourists. (b) Occupational level of tourists.

4.1.1. Personal Characteristics Survey of Tourists. The age level and occupational structure of tourists to Yunnan Minzu Village are shown in Figure 5.

From the age group in Figure 5(a), the most tourists are in the age group of 21-35, with 123 people, accounting for 41.8%; followed by the age group of 36-50, with 95 people, accounting for 32.3%; under 20 years old, there are 46 people in the age group, accounting for 15.7%, 17 tourists aged 51-65, accounting for 5.8%, and 13 tourists over the age of 65, accounting for 4.4%. It can be seen that most of the tourists visiting ethnic villages are young and middle-aged people aged 21 to 35. People at this stage are full of energy and have sufficient leisure time to travel, and the travel rate is generally higher than that of other age groups.

From the occupational level of tourists in Figure 5(b), among the tourists visiting ethnic villages, students account for the largest proportion, with 88 people accounting for 29.9%; students have more spare time, have national statutory holidays, and have a strong desire to learn, and the travel rate is higher; followed by company employees, there are 69 people, accounting for 23.5%; institutions have 38 employees, accounting for 12.9%; retirees have 31 people, accounting for 10.6%. There are 25 self-employed persons, accounting for 8.5%, 20 business personnel, accounting for 6.8%, 10 teachers, accounting for 3.4%, 8 freelancers, accounting for 2.7%, and 5 unemployed persons, accounting for 1.7%. In the occupational composition of tourists, the proportion of students and company employees is the largest, so the design of products can take into account the needs of these two groups.

4.1.2. Other Personal Surveys of Tourists. Figure 6 shows the monthly income and travel status of tourists to Yunnan Minzu Village.

From Figure 6(a), the monthly income of tourists visiting ethnic villages shows that, except for students, the monthly income of 4,000-5,000 Yuan accounts for the largest proportion, with 83 people, accounting for 28.2%,

followed by 5,000-6,000 Yuan and 3,000 Yuan. There are 68 people and 60 people with ~4,000 Yuan, accounting for 23.1% and 20.4%, 42 people with less than 3,000 Yuan, accounting for 14.3%, and 41 people with more than 6,000 Yuan, accounting for 14.0%. Most of the tourists who go to Yunnan ethnic villages are in the middle income level, and the proportion of the upper middle and upper income levels is relatively small. Therefore, tourism products that meet the needs of tourists at this level should be developed.

From Figure 6(b), tourists who travel together with their families account for the majority, with a total of 72 people, accounting for 24.5%, followed by couples traveling together, with 58 people, accounting for 19.7%, and friends traveling together. There are 50 tourists, accounting for 17%, 42 couples travel together, accounting for 14.3%, one parent and children travel together with 36 people, accounting for 12.3%; brothers and sisters travel with 23 people, accounting for 7.8%, and tourists traveling alone. There are 13 people, accounting for 4.4%. Paying attention to the cotouring status of tourists in ethnic villages is conducive to doing a good job in reception work in tourism service work, improving service quality, and creating good service experience and tourism products for tourists.

4.1.3. Tourist Activity Pattern Survey

(1) Tourist Motivation Survey. Through the questionnaire survey and statistical analysis using the SPSS software, the average values of the following nine tourism motivations of tourists in Yunnan ethnic villages are obtained, as shown in Table 3.

Likert scales 1 to 5 are rated on average between 1 and 2.4 for disapproval, 2.5 to 3.4 for neutral, and 3.5 to 5 for agreement. As can be seen from Table 3, among the 9 tourist motives, tourists agreed with 7 of them and expressed neutral opinions on the motives of "investigation and artistic creation" and "making new friends." The motives of most
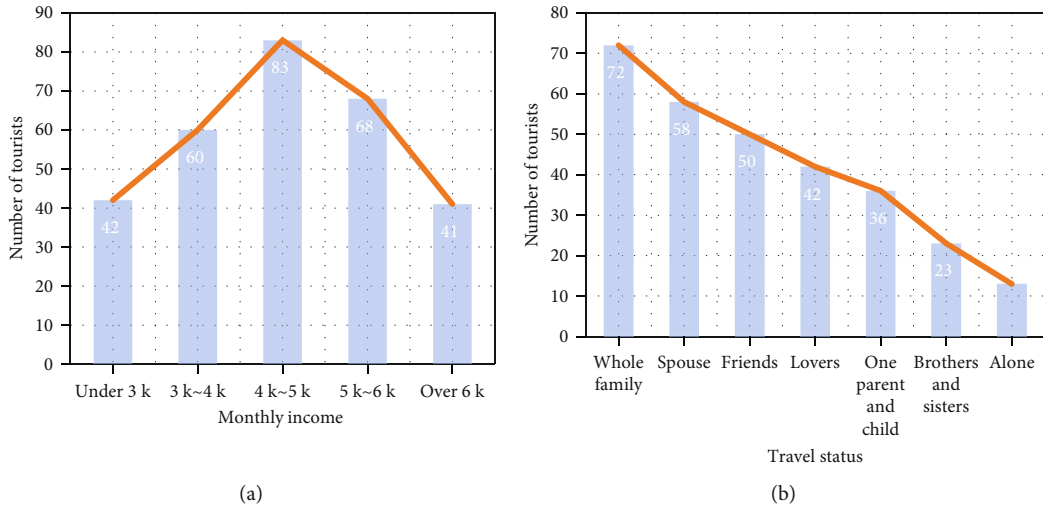
(a)

(b)

FIGURE 6: Survey of other personal conditions of tourists. (a) Monthly income status of tourists. (b) Status of tourists traveling together.

TABLE 3: Motivation survey of tourists in Yunnan ethnic villages.

| Order number	Tourism motivation	Average value	Standard deviation	Approval rate (%)
1	Leisure and entertainment	4.38	0.72	84.6
2	Get rid of the troubles from daily life	3.87	0.81	62.2
3	Increase experience	3.64	0.89	49.7
4	Investigation and artistic creation	3.20	0.94	40.3
5	Enrich life experience	4.03	0.92	57.4
6	Experience national culture	4.29	0.80	80.1
7	Improve cultural cultivation	3.86	0.82	75.5
8	Increase contacts with friends	3.95	0.85	62.8
9	Make new friends	3.28	0.91	47.8

(a)

(b)
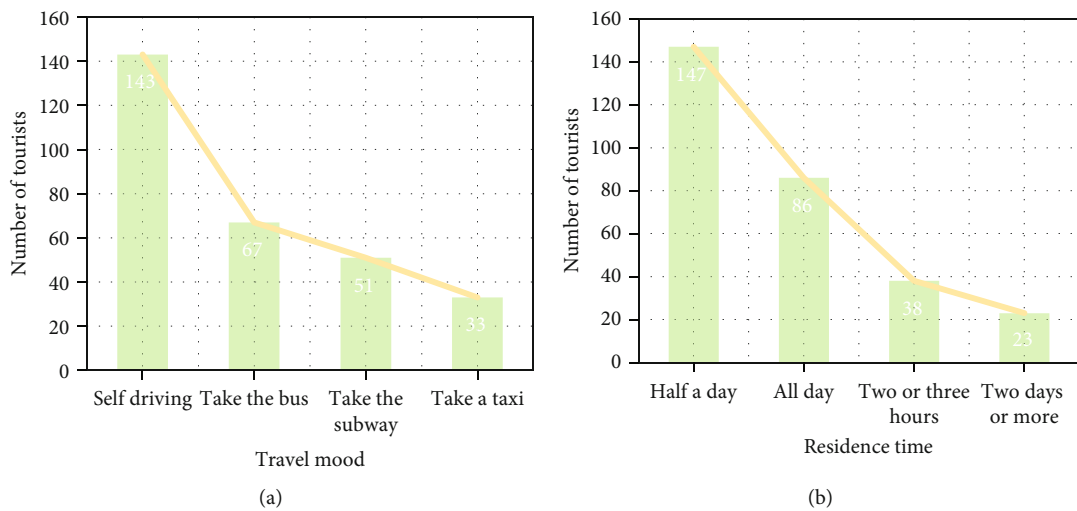
FIGURE 7: Survey of tourists' activity patterns. (a) The mode of transportation of the visitor. (b) The duration of the visitor's stay.
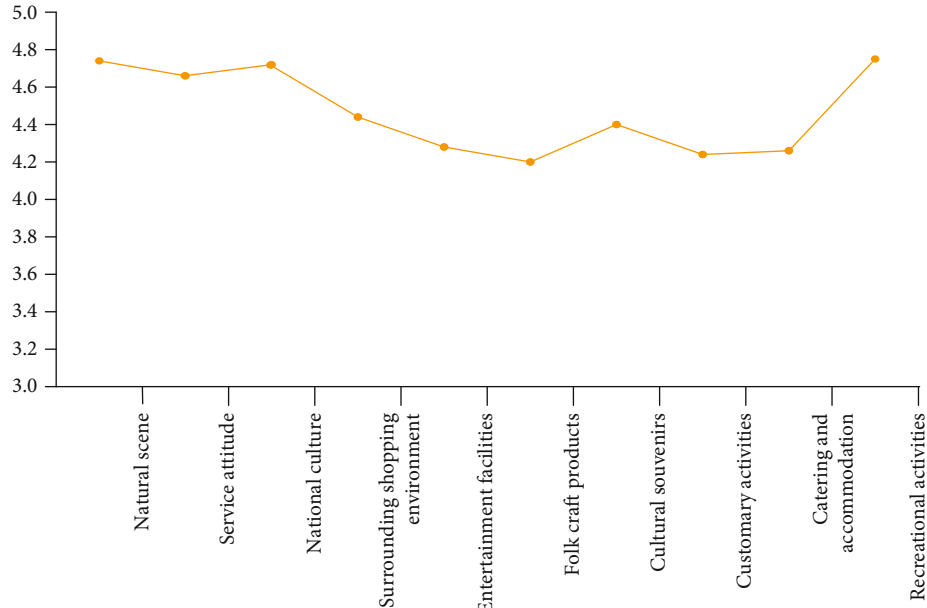
(a)
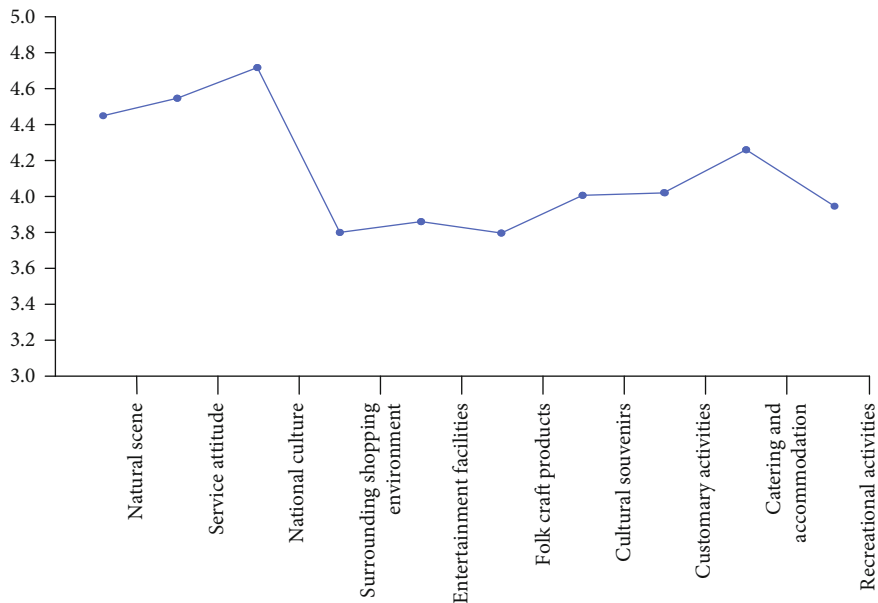
(b)

FIGURE 8: Survey of tourists' expectations and satisfaction. (a) Tourists' expectations for the experience elements of Yunnan ethnic villages. (b) Tourists' satisfaction with the experience elements of Yunnan ethnic villages.

tourists to Yunnan ethnic villages are "leisure and entertainment," "enriching life experience," and "experience ethnic culture." Therefore, ethnic cultural tourism products can be designed around these three tourism motivations.

(2) Tourist Activity Pattern Survey. The travel mode and stay time of tourists to Yunnan Minzu Village are shown in Figure 7.

From Figure 7(a), it can be seen from the survey on the transportation mode of tourists that among the tourists visiting Minzu Village, the transportation modes such as self-driving, bus, and subway account for a large proportion. Among them, there are 143 tourists who drive by themselves, accounting for the largest proportion, followed by tourists by bus, 67, tourists by subway, 51, and tourists by taxi, 33. Self-driving tourists have strong travel autonomy and high consumption level. At the same time, their expectations and requirements for travel are also higher, and they also have a greater demand for parking. Therefore, ethnic villages should make more targeted improvements in infrastructure and supporting facilities.

The length of stay of tourists visiting Minzu Village is shown in Figure 7(b), the proportion of staying for half a

TABLE 4: Questionnaire on the type of experience tourists want to get in ethnic villages.

Mode	Sensory experience	Emotional experience	Thinking experience	Action experience
Type	Visual; auditory; smell; etc.	Joy; anger; sadness; joy; etc.	Increase knowledge; understand culture; etc.	Participate in various activities
Proportion	42.3%	33.4%	49.7%	39.4%

Note: This is a multiple choice question, and respondents can choose multiple options according to their own situation.

TABLE 5: Survey of tourist souvenirs favored by tourists.

Type	Percentage
Reflect local ethnic characteristics and cultural connotation	53.2%
Own participation in production and has commemorative significance	31.8%
Has symbolic meaning	47.1%
Good quality and low price	84.3%

Note: This is a multiple choice question; respondents can choose multiple options according to their own situation.

day and one day is the largest, with 147 and 86, respectively; the second is two or three hours, with 38 people; the proportion of two or more days is the smallest, only 23 people. This shows that the attraction of ethnic villages to tourists is not enough. Whether it is attractions, folk activities, or facilities and services, they cannot meet the needs of tourists to a large extent.

4.2. Investigation of Tourist Demand for Tourism Product Development in Yunnan Ethnic Villages

4.2.1. Survey of Expectations.
Investigating and analyzing the expectation index of tourists' experience elements before the tour and the satisfaction after the experience and the results are shown in Figure 8.

In the evaluation variables of the experience elements of cultural tourism products in ethnic villages, the experience expectation value of folk handicraft products dropped from 4.2 to 3.8, and the experience expectation value of ethnic cultural creative products dropped from 4.4 to 4.0. It can be seen that cultural products in Yunnan ethnic villages cannot be meet the expectations of tourists. Scenic spots need to intensify efforts to innovate the design of cultural and creative products and folk handicraft products in ethnic villages. However, compared with folk handicraft products, cultural and creative products need to be given priority to innovative design.

4.2.2. Survey of the Types of Experiences that Tourists Desire.
It can be seen from Table 4 that 49.7% of tourists want to get thinking experience in ethnic villages, followed by action experience, accounting for 39.4% of the total number, and sensory experience and emotional experience are 42.3% and 33.4%, respectively. These data show that tourists who go to Yunnan ethnic villages have diverse needs for tourism experience; especially, the thirst for knowledge and cultural experience is very prominent. Therefore, product designers should include all four types of experiences.

TABLE 6: Questionnaire of ethnic cultural expressions that tourists are interested in.

Type	Percentage
National costume	56.4%
Folk dances	47.8%
Ethnic architecture	31.4%
National competitive activities	34.5%
Religious sacrifice	28.6%
National art and traditional culture	58.8%

4.2.3. Investigation of Tourist Souvenirs that Tourists Love.
Investigating the types of tourist souvenirs that tourists love, the data are shown in Table 5.

The results of the questionnaire survey show that tourists' favorite tourist souvenirs are high-quality and inexpensive tourist souvenirs, followed by tourist souvenirs that can reflect local ethnic characteristics and cultural connotations, factors that take into account in tourist preferences.

4.2.4. Investigation of Ethnic Cultural Expressions that Tourists Are Interested in.
Investigating the ethnic cultural expressions that tourists are interested in, the data are shown in Table 6.

There are six basic forms of ethnic culture. From Table 6, it can be seen that the most popular forms of tourists are ethnic art and traditional culture, accounting for 58.8% of the total number of people; secondly, colorful ethnic costumes are also very popular among tourists, accounting for 56.4%; again, ethnic singing, dancing, and ethnic competitions account for 47.8% and 34.5%, respectively; ethnic architecture and religious sacrifices that are not easily understood by the public accounted for only 31.4% and 28.6%, and travel preferences and personality traits are closely related. Therefore, according to the needs and preferences of tourists, designers should focus on these types of national

cultural expressions favored by tourists in the experiential design.

4.3. Design Ideas of Ethnic Cultural Tourism Products

4.3.1. Enhance the Experience of Cultural Tourism Products. In a tour group, the tour guide has the closest contact with the tourists, and the tour guide's behavior directly affects the tourists' experience consciousness. Enriching the types of tourism experience projects is a good way to expand the tourist experience. On the basis of some semifinished products, tourists can process and perfect them by themselves. They not only have a sense of participation but also realize the inheritance of traditional skills. In the long history of national cultural development, the national diet has formed a variety of unique styles with distinctive features. An open kitchen is set up to allow tourists to experience the authentic ethnic cuisine in person. The results obtained through labor are of commemorative value. Through the on-site teaching of food, visitors can learn the production of traditional food, which is a different experience, and can taste and share the fruits of their labor on the spot. On the way to travel, through the interactive experience of cooking, they not only learn skills but also increase the connotation of tourism products.

4.3.2. Realize the Improvement of the Added Value of Cultural Tourism Products. Most of cultural tourism products are service products, which contain the main value and added value. The main value of cultural tourism products satisfies the purpose of tourists coming to the destination, not only to see the scenery but also to relax. In addition to the main value of tourism destination, there is also the added value of tourism products. In addition to meeting the main value needs of tourist destinations, it can also meet other needs of tourists. For example, the main value of tourism products in Yunnan Minzu Village Scenic Spot is sightseeing, and the added value of tourism is learning, entertainment, and leisure. A tourist destination can only provide tourists with one main value, but it can provide a variety of tourism added value at the same time.

4.3.3. Product Emotional Resonance Principle. The emotional resonance design of cultural tourism products in ethnic villages can be expressed in the following forms: first, through the relevant elements inside the ethnic villages to form historical and cultural identity; second, through the memory and experience of each tourist's individual tourist attractions for personal emotions and feelings, use the behavioral memory of the series of activities in the scenic spot to design a series of cultural and creative products related to the interaction of ethnic villages, to stimulate tourists to develop a special emotional attachment to the ethnic villages, thereby conveying emotional needs; and third, based on the sensibility and innocence of tourists, the method of landscaping in ethnic villages is a way of returning to nature and returning to the true human emotion. Tourists can perceive different degrees of landscape when visiting ethnic villages, which is also a common sense of sharing emotion. The research work of this paper has made a certain contribution to the innova-

tive design of ethnic cultural tourism products, but there are still some shortcomings. Due to the limited survey sample and large differences among different individuals, the conclusions drawn may not be accurate enough. In the future work, we should collect more data from different groups of people and different scenic spots and try to minimize the error.

5. Conclusion

Through the analysis of this paper, the following conclusions are drawn: (1) Yunnan ethnic villages are rich in cultural tourism resources, of various types, and the cultural relics are intact. Cultural tourism resources rely on the natural environment, with prominent local characteristics of folk customs. The cultural tourism resources of ethnic villages have profound ethnic heritage and extensive social significance, which are extremely attractive to tourists. (2) Interregional exchanges have brought tourism activities, and with the development of tourism activities, tourism products have emerged as the times require. The tourism products of ethnic tourism destinations promote the change and development of ethnic culture through their diversity, integration, and sharing. (3) By guiding and regulating the behavior of residents, tourism development operators, and tourists in the destination, it is beneficial to explore the tourism resources of ethnic culture in ethnic areas, transform them into tourism products suitable for the market, and convey the connotation of culture for tourists. (4) In terms of tourists' research, tourists have high expectations for ethnic cultural and creative products. More than 80% of tourists prefer high-quality and low-cost products, and the design of products should be aimed at improving cost performance; nearly 60% of tourists show product display. They have a strong interest in ethnic art and traditional culture, and product design should reflect ethnic characteristics; nearly half of the tourists want to gain a thinking experience, and tourism products can be designed to be more intelligent and interesting.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

Acknowledgments

References

[1] S. N. Zhang, W. Q. Ruan, and T. T. Yang, "National identity construction in cultural and creative tourism: the double mediators of implicit cultural memory and explicit cultural

learning," *SAGE Open*, vol. 11, no. 3, article 215824402110407, 2021.

[2] X. U. Jin, "Thoughts on the development of characteristic cultural tourism products of the Republic of Vanuatu," *Journal of Landscape Research*, vol. 12, no. 1, pp. 126–129, 2020.

[3] H. Yafei, W. Jinye, and R. Lili, "Research on the innovation of eco-cultural tourism products of Royal Prime Minister's palace in Shanxi Province from the perspective of experiencing consumption," *IOP Conference Series: Earth and Environmental Science*, vol. 267, no. 5, pp. 52035–52035, 2019.

[4] B. Datta, M. Sajnani, and J. Thomas, "Travellers attitude towards online purchase of travel products: an empirical study of online travel portals," *Geojournal of Tourism and Geosites*, vol. 21, no. 1, pp. 133–142, 2018.

[5] C. Kirpes, D. Sly, and G. Hu, "Value of the 3D product model use in assembly processes: process planning, design and shop floor execution," *Applied System Innovation*, vol. 4, no. 2, pp. 39–39, 2021.

[6] F. Liu, "Fast industrial product design method and its application based on 3D CAD system," *Computer-Aided Design and Applications*, vol. 18, no. S3, pp. 118–128, 2020.

[7] H. Park and H. Koo, "Emerging trends in 3D technology adopted in apparel design research and product development," *Journal of the Korean Society of Clothing and Textiles*, vol. 42, no. 1, pp. 195–209, 2018.

[8] P. Y. Chu and Y. H. Chien, "The effectiveness of using stereoscopic 3D for proportion estimation in product design education," *Eurasia Journal of Mathematics Science and Technology Education*, vol. 13, no. 10, pp. 6535–6548, 2017.

[9] T. Jerlei, "My address is the Soviet Union – or is it? Baltic identity in souvenir production within the Soviet discourse," *Journal of Material Culture*, vol. 27, no. 2, pp. 147–165, 2022.

[10] G. Tang and H. Zeng, "Evaluation of tourism E-commerce user satisfaction," *Journal of Organizational and End User Computing (JOEUC)*, vol. 33, no. 5, pp. 25–41, 2021.

[11] Y. Wu, "Model research on the factors affecting tourist satisfaction of wellness tourism products based on IPA model," *Revista de la Facultad de Ingenieria*, vol. 32, no. 15, pp. 617–624, 2017.

[12] O. Topcheeva, "Cultural and ethnic features of experiencing extreme situations of the Ukrainian ethnic group," *Bulletin of Science and Practice*, vol. 7, no. 1, pp. 375–381, 2021.

[13] A. A. Borissova, N. A. Zaitseva, E. V. Andreeva, A. A. Larionova, and A. N. Mayorova, "Perspectives for the development of ethnic, eventual and cultural-cognitive tourism in the republic of Sakha (yakutia)," *Man in India*, vol. 97, no. 14, pp. 149–157, 2017.

[14] J. Y. Hong, H. Ko, and J. H. Kim, "Cultural Intelligence and ARCS model for digital era," in *Proceedings of The 9Th International Conference on Web Intelligence, Mining and Semantics*, pp. 1–4, United States, June 2019.

[15] W. H. Tan, V. H. Lee, B. Lin, and K. B. Ooi, "Mobile applications in tourism: the future of the tourism industry?," *Industrial Management & Data Systems*, vol. 117, no. 3, pp. 560–581, 2017.

[16] I. M. A. I. Yasuyoshi, S. A. G. A. W. A. Jo, T. S. U. C. H. I. D. A. Teppei et al., "Welcome to Kochi prefecture!-consideration of the proposed method of tourism measures for local creation," *The Journal of Information Science and Technology Association*, vol. 67, no. 5, pp. 264–270, 2017.

[17] L. Y. Hsieh, S. M. Lin, and Y. H. Lee, "Benefit analysis of service quality degradation: a case study of the tourism industry," *Journal of Information & Optimization Sciences*, vol. 38, no. 8, pp. 1347–1356, 2017.

[18] E. Marchiori, E. Niforatos, and L. Preto, "Analysis of users' heart rate data and self-reported perceptions to understand effective virtual reality characteristics," *Information Technology & Tourism*, vol. 18, no. 1-4, pp. 133–155, 2018.

[19] Z. Wen and D. R. Fesenmaier, "Assessing emotions in online stories: comparing self-report and text-based approaches," *Information Technology & Tourism*, vol. 20, no. 1-4, pp. 83–95, 2018.

[20] A. A. Ryabev, M. M. Pokolodna, and O. M. Kravets, "Use of some information technologies to maintain the sustainability of tourism during COVID-19," *Business Inform*, vol. 5, no. 520, pp. 221–226, 2021.

[21] I. K. Suwena and K. A. Ni, "Green tourism development as community empowerment efforts in Pemuteran Village, Buleleng, Bali," *Udayana Journal of Social Sciences and Humanities (UJoSSH)*, vol. 1, no. 1, pp. 108–108, 2017.

[22] I. Idris, K. R. Adi, R. Firmansyah, A. Nadhianty, and E. R. Wahono, "Developing smart tourism using virtual reality as a tourism promotion strategy in Indonesia," *Geojournal of Tourism and Geosites*, vol. 35, no. 2, pp. 332–337, 2021.

[23] E. Denk and N. S. Blc, "Evaluation of the products that have a geographical indication (GI) of the province of Erzurum in the scope of gastronomy tourism," *Gastroia Journal of Gastronomy And Travel Research*, vol. 5, no. 1, pp. 102–122, 2021.

[24] G. Jin and L. Fan, "Application of 3D CAD in the design of inspection and planning system of intelligent three-coordinate measuring machine," *Computer-Aided Design and Applications*, vol. 18, no. S3, pp. 141–152, 2020.