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Tourists' Preferences and Willingness to Pay for Biodiversity, Concession Activity and Recreational Management in Wuyishan National Park in China: A Choice Experiment Method

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Abstract: It is necessary for national parks to exert multiple forms of influence. One innovative function of national parks is leisure and recreation. By optimizing the recreation function, national parks can enhance public participation and tourists' willingness to pay to achieve sustainable development. This paper surveys 435 tourists in Wuyishan National Park with a discrete choice experiment, applies mixed logit models to explore their preferences for recreational attributes from three dimensions and analyzes the heterogeneity. The findings indicate that attributes such as the number of concession activities, transportation variety, the density of recreational facilities, biodiversity, sightseeing zone and combined ticket fee significantly impact tourists' willingness to pay. Higher-educated, younger and willing-to-revisit tourists are more likely to pay for the park and hope to optimize the facilities and activities. The estimated recreational value of the park is RMB 164.51 (about USD 22.75) per person. Here, heterogeneity exist: higher-educated tourists ask for larger sightseeing zone, younger ones prefer more diverse activities and those who are willing to revisit incline to variety means of transportation.

Keywords: national park; the choice experiment; tourists; recreational attributes; willingness to pay



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1. Introduction

The national park system is a worldwide advanced ecological protection model. It effectively reconciles the conflict between ecological protection and resources utilization, being regarded as an important symbol of “harmonious co-existence between man and Nature” [1]. The concept of the national park was first proposed by the US government in the 19th century, with the aim of strictly protecting scarce natural landscapes. As time progressed and the economy grew, people shifted their focus from material satisfaction to the pursuit of natural recreation. In 1994, the International Union for Conservation of Nature (IUCN) established a classification system for protected areas, defining national parks as the cornerstone for providing spaces for scientific, educational and recreational activities. To fulfill the multiple functions of nature conservation, scientific research, natural education and recreation, national parks need to optimize their management systems, adjust their facilities and equipment and focus on the natural and cultural landscapes. These practices are collectively referred to as “national park construction”. However, the implementation of these optimizations, especially ecological protection, requires a certain level of funding, which is unsustainable if solely reliant on government financial support. If national parks can be developed in an appropriate way within certain regulatory framework, it can increase public participation and willingness to pay, thereby expanding the sources of funding and contributing to sustainable development. Therefore, it can be concluded that national park construction requires the joint participation of the government and public. Moreover, the main form of public participation is related to consumption activities.

China's protected areas have been classified into three categories: national park, nature reserve and natural parks. China is relatively late to the construction of national parks, with the first mention of establishing a national park system in the "Decision of the Central Committee of the Communist Party of China on Comprehensively Reforms on Several Major Issues" in 2013. The official announcement of China's first five national parks—Sanjiangyuan National Park, Giant Panda National Park, Northeast Tiger and Leopard National Park, Hainan Tropical Rainforest National Park and Wuyishan National Park—were made by President Xi Jinping at the 15th Conference of the Parties to the United Nations Convention on Biological Diversity in 2021. Wuyishan National Park was established in 2020 through the merger of a national nature reserve, a national scenic area, a national forest park and other protected areas. As a typical demonstration and leading example in the construction of China's national park system, the park has been committed to achieving a balance between strict ecological protection and multiple functions, such as education, scientific research and recreation. The Fujian Provincial Government has introduced concession activities into the park's operation to reconcile the conflict between the protection and utilization of resources and fulfilling the ecological, social and economic benefits of the park [2]. Despite its positive efforts, Wuyishan National Park still faces numerous challenges, including low public participation, limited concessionary operation scopes, irregular management, incomplete infrastructure and economic benefit below expectation. In short, within the tolerable range of negative impacts on natural ecological protection, the construction of multiple functions in Wuyishan National Park, such as scientific research, nature education and recreation, has not yet met its expected performance.

Therefore, in the promoting process of national park construction, some crucial issues need to be explored, such as the optimization of public participation and concession activities, the efficiency of resources utilization and management. Therefore, this paper applies the choice experiment method within tourists in Wuyishan National Park as an example to investigate tourists' preferences and willingness to pay for the parks' recreational conditions and then analyzes the influence and heterogeneity.

The choice experiment is one of the main methods used to account for non-market value in the global academic community. It has been applied by global scholars in different fields, such as public willingness to offset carbon emissions from tourism [3], public willingness for ecological policies [4–6], public preferences for healthcare service [7], willingness to participate in ecological governance [8–10] and demand preferences for urban green space [11,12]. Similar to this paper, some scholars have introduced the choice experiment method into studies about the evaluation of recreational resources and consumer preferences in national parks and nature reserves. Shi et al. explored the public's preferences for the improvement of ecosystem service in nature reserves with the choice experiment [13]; Mzek et al. investigated tourists' preferences and willingness to pay for Malaysian tiger conservation in Malaysian National Park [14]. Cheng et al. analyzed the factors influencing the value of recreational resources in wetland reserves under different states in Fujian Province, China [15]; Juutinen et al. took Finland Oulanka National Park as an example and explored the relationship between ecology and recreation in the construction of national parks. The results showed that tourists gain the most utility in the conservation of biodiversity, but ecological conservation and tourism development can cause conflicting welfare effect [16]. Cao et al. and Han et al. similarly used Wuyishan National Park as an example to account the welfare value of tourists from natural, social, economic and public health dimensions [17,18]. Most of these studies used the mixed logit model, the multivariate logit model and the conditional logit model.

It is noteworthy that previous scholars who used choice experiment methods to study public participation in national parks did not set key attitudes holistically from different dimensions. Thus, this led to the omission of critical perspectives, such as government policies and park regulations, ultimately resulting in less accurate calculations of tourists' willingness to pay. In brief, a holistic perspective is necessary in attribute setting to observe

public preferences more effectively. Therefore, this paper respectively sets attributes from three dimensions, i.e., policy, management and environment, to conduct the research. The aim is to further optimize the concessionary operation regulations of national parks, enhance public participation and willingness to pay and improve the realization rate of natural asset values in the parks. We hope to provide improvement measures and policy recommendations to the Wuyishan National Park Administration and relevant concessionary enterprises. Additionally, we can draw valuable insights from the practical experience and empirical research of Wuyishan National Park for the construction of other national parks in China and worldwide that face similar challenges. The reasons for the attribute settings are detailed in Section 2.

2. Literature Review and Hypotheses

China's national parks are based on the concepts of "ecological protection first", "universal participation" and "nationally representative" [1]. Nature reserves in China are characterized by several issues, such as the lack of top-level policy, unreasonable protection scopes, overlapping institutional settings and missing regulations. These problems have hindered the increase in public willingness to pay for recreational activities in these protected areas [19]. Therefore, the primary goal of the national park system construction is to optimize the existing system while improving the protecting level of Chinese precious ecological resources [20]. "National representative" is the fundamental nature of national parks. As the highland of national ecological security, national parks are often regarded as the most vivid spokespeople for the country's image [21]. They are precious natural legacies inherited from previous generations, with the property rights owned by the state. This determines that the public is the ultimate service target for national parks. Moreover, since "universal participation" indicates that they are owned by the public, it is necessary to emphasize the public participation in the construction and management of national parks [22]. Natural recreation and education are the main ways for the public to take part in the national parks' construction. To investigate the issue of low participation rates, it is necessary to consider the attributes of national parks themselves as influencing factors. These factors can be summarized into three dimensions: policy, management and environment. The following section will elaborate on the specific meaning of these dimensions in turn.

2.1. Studies about the Developing Mechanism of National Parks from Policy Dimension

Samuelson's economic theory categorizes goods into different attributes. National parks are the kind of quasi-public goods that exhibit local competitiveness and exclusivity, with their service scope being moderate and limited [23]. Meanwhile, the externalities generated during the services by national parks cannot be internalized by either the operating entities or consumers. It requires the intervention of central and local governments [24].

Therefore, the government plays a leading role in the management and development of national parks. For the government, national parks, as a kind of quasi-public goods, not only serve the basic ecological function, but also continuously generate economic and social benefits [25]. The supply and consumption of these benefit are primarily guided by public choice, combined with market mechanisms and public participation mechanism. Therefore, it is necessary for the government to promote a combination of government management and marketization in national parks. However, due to the limitations of the construction concept of government-led national parks [1], their market-oriented development is subject to more constraints compared to conventional tourism attractions [26].

Currently, the construction plans issued by China's national park management departments not only stipulate the permissible scope and degree of business development in national parks, the preservation of ecological integrity and the protection of surrounding communities, but also restrict market-oriented commercial activities by enterprises or individuals in principle [1]. Therefore, national parks are facing insufficient government investment and weak attractiveness to the social capital due to excessive policy restrictions,

which results in the ineffectiveness of construction and public participation of the park. To solve these problems, the central administration of national parks chooses the path of concession. The concession system is a policy tool commonly used worldwide that plays a significant role in restricted market-oriented operations and ecological compensation [27]. In the case of Wuyishan National Park, the government delegates concessions under its supervision to indigenous residents, encouraging them to participate in the development of tourism and industries of non-timber forest-based products, such as rock tea [28]. Ultimately, the utility gained by tourists is a reflection of the rationality and efficiency of the policies implemented by government management departments in market-oriented operations. In the international academic community, there are limited studies that directly determine the choice experiment attributes of national parks from a policy perspective. However, numerous studies have focused on determining attributes and measuring tourists' utility based on park regulations. Juntine et al. adopted "the expected number of tourists" as an attribute to represent park management measures [16]; Mao Biqu, Suresh et al. and other scholars chose "the enlargement scope of park development [29,30]; Chaminuka et al. used "accommodation" business held by indigenous communities to describe the concession condition of national parks [31]. Moreover, there are studies that have cited other attributes, such as the restriction of daily tourist flow [17], the crowding level [18,32–35] and the park visibility [36].

Based on the aforementioned literature, we have observed a high correlation between attributes such as daily visitor limits, crowd congestion levels and park enlargement areas with the area of the park that tourists are allowed to visit in national parks. The latter attribute better reflects the openness of national parks. Furthermore, the number of unique programs or activities within the park is a significant indicator of concession rights. Therefore, in this paper, we propose to use two attributes—visiting scope and the number of unique programs—to describe the policy dimension. Based on this, we formulate the first hypothesis: the visiting scope and the number of unique programs within national parks have a significant impact on visitor satisfaction and utility.

Based on the aforementioned literature, a high correlation is found between attributes such as "the restriction of daily tourist flow", "the crowding congestion level" and "the engagement of the park". The latter attribute better reflects the openness of national parks. Furthermore, the number of concession activities within the park is a significant indicator of concession rights. Therefore, this paper applies two attributes—"sightseeing zone" and "the number of concession activities"—to describe the policy dimension, and proposes the first hypothesis:

Hypothesis 1 (H1). *Tourists' preference and utility are influenced by attributes of national parks from policy dimension.*

Hypothesis 1a (H1a). *The expansion of sightseeing zone has a significant positive effect on tourists' choice preference.*

Hypothesis 1b (H1b). *The increase in the number of concession activities has a significant positive effect on tourists' choice preference.*

2.2. Studies about the Impact of National Parks' Infrastructure and Regulations on Tourists' Participation Willingness

The core nature of recreational activities is to satisfy consumers' needs as consumable commodities [37], and scenic spots are especially important to attract tourists. From the perspective of the park operation, scenic spots can provide two kinds of services: hardware services refer to the necessary infrastructure, such as the restrooms and stations, while software services refer to non-material services, such as online guidance, management regulations and admission rules. These two kinds of services constitute the basic conditions to fulfill tourists' recreational experiences. Therefore, tourists' willingness to visit is closely

related to the parks' basic conditions [38,39]. Although national parks are nature reserves from a natural perspective, psychological studies of tourist behavior are still applicable to the national parks' development of tourism. In the global academic community, a large number of scholars have cited representative variables of the facility management into their studies: Juutinen et al. used the number and size of rest places in the most frequently visited places to describe the facility management of national parks [16]; Mzek et al. cited the number of rangers to describe the level of management [14]; Han et al. took the sanitary condition of facilities, the number of public venues and the number of medical rooms as the attributes to study [17]; Liu, Ge and Cao et al. cited the number of garbage from the dimension of management [18,33,35]; Kularatne et al. took the three-star accommodation and recreational facilities as the attributes to assess the construction level of the national parks' infrastructure [40]. It is remarkable that the pricing strategy is one of the key issues in the parks' operation and management, and the studies above all cited the admission fee as an attribute from the dimension of management.

Based on the above literature, it is evident that scholars typically set attributes from the perspective of recreational infrastructure and scenic area operational management rules. Based on this, we formulate the second hypothesis:

Hypothesis 2 (H2). *Tourists' preference and utility are influenced by attributes of national parks from the dimension of management.*

Hypothesis 2a (H2a). *The increase in facilities, such as route signage, restrooms and transportation stations, have a significant positive effect on tourist's choice preference.*

Hypothesis 2b (H2b). *The increase in transportation variety has a significant positive effect on tourist's choice preference.*

Hypothesis 2c (H2c). *The decrease in combined ticket fee has a significant positive effect on tourist's choice preference.*

2.3. Studies about the Impacts of National Parks' Ecological Construction on Tourists' Participation Willingness

Well-protected ecosystems in national parks will provide higher utility to tourists. Therefore, the ecological environment is a necessary factor that influences tourists' willingness to visit national parks. The value provided by the ecosystem can be regarded as the tourist perceived value [41], which is the combination of tourists' perception of ecosystem quality and the corresponding payment in national parks [42]. Based on the nature of national parks, this paper assumes that the main attraction for tourists comes from the well-preserved pristine ecosystem, which can satisfy their curiosity about pristine nature. Therefore, improving the quality of the ecological environment will also provide greater ecological perceived value to tourists. In related studies, most scholars have considered setting attributes from the ecological dimension, mainly focusing on ecological evaluation indexes such as forest coverage [15,18,32,43], water quality [15,18,33], habitat quality [29] and biodiversity [11,16,43].

Certainly, using biodiversity as an attribute to describe the environment dimension is justifiable. Therefore, this paper proposes the third hypothesis:

Hypothesis 3 (H3). *Tourists' preference and utility are influenced by attributes of national parks from an ecological dimension.*

Hypothesis 3a (H3a). *The increase in biodiversity in national parks has a significant positive effect on tourist's choice preference.*

3. Research Methods

3.1. Model Specification

The choice experiment is a method for evaluating the value of ecological resources and calculating consumer surplus in the field of applied economics. It originates from the theory of consumer behavior and the random utility theory proposed by Australian scholar Lancaster [44]. This theory suggests that a product is composed of multiple attributes, and the utility derived from consuming the product arises from its attributes. There are different levels of each attribute, and under the assumption of consumer utility maximization, changes in the level of a particular attribute may influence the consumer's ultimate choice. Consequently, we need to identify the key attributes that compose the subject of study (the product) and their various levels. Through experimental design, different levels are combined into a virtual choice set, which is then presented to respondents for selection (for instance, respondent i chooses option j). In practical implementation, the first step is to define the random utility function:

$$U_{ij} = \beta V_{ij} + \varepsilon_{ij} \quad (1)$$

This function is usually written in the following form:

$$\begin{aligned} U_j &= V_{ij} + \varepsilon_{ij} \\ &= ASC_j + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \gamma_1 C_1 + \cdots + \gamma_n C_n + \varepsilon_j \end{aligned}$$

where U_{ij} is the utility of respondent i 's choice of scheme j , V_{ij} is the deterministic term representing the utility of the observable attributes, ε_{ij} is the unobservable random error term, C_n reflects other control variables, including individual social characteristic, economic characteristics and cognition, etc., and ASC (alternative specific constant) is the chosen constant, which represents the constant term corresponding to scheme j , which is mainly used to explain the baseline utility of maintaining the status quo without categorization. This constant term needs to be set manually in the actual data (1 for choosing one of the listed schemes and 0 for choosing none of them). With the mixed logit model, assuming that the random error term is independently and identically distributed, which follows an extreme value distribution, the probability that respondent i chooses scheme j is:

$$P(y_i = j \mid x_{ij}) = \frac{\exp(\beta V_{ij})}{\sum_{k=1}^J \exp(\beta V_{ik})} \quad (2)$$

In this paper, the individual's social characteristic, economic characteristic, cognition and other control variables will have impacts on their choices. In order to explore whether the tourists' choices are heterogeneous or not, this paper expresses the observable utility function V_{ij} as follows by referring to the previous studies [45]:

$$V_{ij} = ASC_j + \sum_{k=1}^K (\beta_k \pm \omega_{ik}) X_k \quad (3)$$

where ω_{ik} is the standard deviation of the k -th attribute variable in the choice scheme of tourist i . If it is significant, it indicates that the tourists' preference of the k -th attribute in choosing the combined scheme is heterogeneous. When further investigating the sources of heterogeneity, this paper refers to the method of the previous work [46] and introduces the cross term of specific attributes and individual characteristic, which is formulated as:

$$V_{ij} = ASC_j + \sum_{k=1}^K (\beta_k \pm \omega_{ik}) X_k + \sum_{n=1}^n \alpha_n (X_k \times C_{in}) \quad (4)$$

where $X_k \times C_{in}$ is the cross term of the k -th key attribute and a particular tourist's individual characteristic variable and α_n is the to-be-estimated coefficient of the cross term of X_k and C_{in} . If α_n is significant, it can explain the heterogeneity of tourists' preference with different characteristics for the k -th attribute. After obtaining the final utility U_{ij} through the above utility function, the marginal value can be used to calculate the impact on the utility obtained by tourists with the change of each attribute in Wuyishan National Park. Then, the tourists' willingness to pay for each attribute can be obtained. The function is as follows:

$$\text{Willingness to pay} = -\frac{\beta_{\text{whler auribues}}}{\beta_{\text{price}}} \quad (5)$$

where $\beta_{\text{whler auribues}}$ is the coefficient of each key attribute and β_{price} is the coefficient of the monetary attributes.

3.2. Choice Experiment Design

3.2.1. Study Range

The north side of Wuyishan National Park has extended to the boundary of Jiangxi Province, and its south side connects with Huangkeng Town in Jianyang District. In the west of the park is Chongren Town in Guangze Prefecture, and its eastern boundary is Wuyi Street in Wuyishan City. The park's area includes the original Wuyishan National Nature Reserve, Wuyishan National Scenic Spot, Jiuqu River Upstream Protection Zone, Wuyi Tianchi National Forest Park, the surrounding public welfare forests in Guangze Prefecture and part of the Longhu state-owned forest farm in Shaowu City. The park covers a total area of 1279.82 km², involving 29 administrative villages of 9 towns in 4 counties (cities and districts), which include 45,800 people, while more than 3350 people reside in the area. The park has a forest area of 120,900 hectares, with a coverage rate of 94.45% and a forest storage capacity of 9,676,500 m³. There is a great variety of wild plants and animals, including 126 kinds of key protected animals. Moreover, there are currently 8 main concession-operated scenic areas and 4 concession activities in the park, generating a cumulative tourism revenue of approximately CNY 875 million (about USD 121 million) from 2020 to the present. Figure 1 shows the location of Wuyishan National Park.

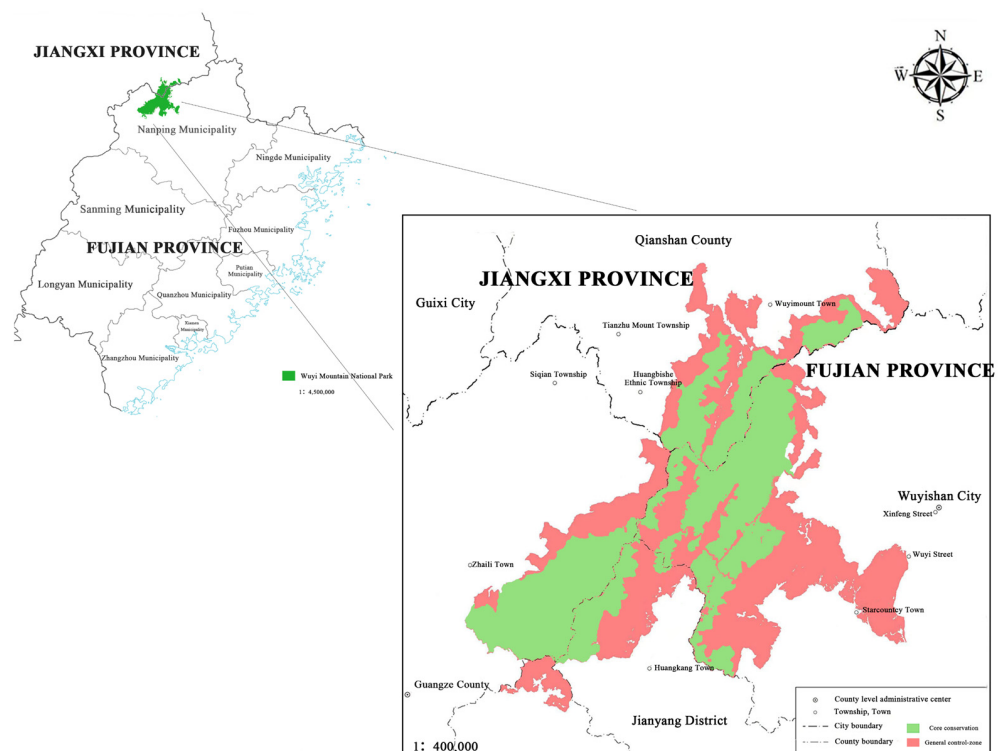


Figure 1. Wuyishan National Park location.

3.2.2. Key Attributes Description

Based on previous studies and policies, such as the “Pilot Implementation of Wuyishan National Park System” and the “Interim Measures of the Administration of Commercial Concession in Wuyishan National Park”, this paper designs the key attributes of the choice experiment from three dimensions after three rounds of pre-surveys. The final six attributes in Wuyishan National Park and corresponding levels are defined as shown in Table 1.

Table 1. Attribute description.

Dimension	Key Attributes	Attributes Level
Policy	Sightseeing zone	0 = Stay 1 = 10% increase 2 = 20% increase
	Number of concession activities	0 = 4 1 = 6 2 = 8
	Density of recreational facilities	0 = Stay 1 = 30% increase 2 = 50% increase
Management	Transportation variety	0 = Stay (sightseeing buses or walking) 1 = Add one more kind (e.g., bicycles)
	Combined ticket fee	RMB 140 (about USD 19.33) RMB 170 (about USD 23.47) RMB 200 (about USD 27.62) RMB 230 (about USD 31.76)
Ecology	Biodiversity	0 = Stay 1 = 10% increase 2 = 20% increase

The attributes and their levels of each dimension are explained below.

Policy dimension: The market-oriented operation of Wuyishan National Park must strictly adhere to the requirements in regulations formed by government, such as the “Wuyishan National Park Regulations”, especially the concession part. This is the most significant policy guiding the market-oriented operation of the national park. This paper sets two attributes from this dimension:

- (1) **Sightseeing zone:** This refers to the proportion of the park’s open area set by the government, i.e., the proportion of area that can be visited by tourists to the total area of Wuyishan National Park. The higher the ratio, the higher the opening degree of the park. Correspondingly, it is more conducive for tourists to choose different exploration routes according to their different needs. The current ratio of the sightseeing zone that can be visited in Wuyishan National Park is 36.4%. Based on this, the level of this attribute is categorized into three kinds, which are maintaining the status quo, a 10% increase in size and a 20% increase in size.
- (2) **The number of concession activities:** This refers to the concession projects in the park and the featured tourism projects around the park, which are explicitly stipulated in the “Interim Measures for the Administration of Franchised Operations in Wuyishan National Park”. Currently, these include four specific items: bamboo rafting, environmental-friendly sightseeing buses, the Jiuqu River rafting and the cultural performance “Impression Dahongpao”. The number of concession activities reflects the development status of concession operations. A higher number indicates a more thorough utilization of the park’s natural and cultural resources, providing a richer

and more fulfilling experience for tourists. The level of this attribute is categorized into three kinds, i.e., four (status quo), six and eight concession activities.

Management dimension: Effective operation and management can make an important contribution to the parks' recreational service function. Appropriate recreational facilities, diverse means of transportation and reasonable pricing strategy are the main elements of the park management, and therefore, the following three attributes are set from this dimension:

- (1) The density of recreational facilities: This refers to the parks' infrastructure, such as route signage, restrooms and transportation stations. The area of Wuyishan National Park is immense, and the current recreational infrastructure is unable to adequately meet the diverse needs of tourists. The level of this attribute is categorized into three kinds: maintaining the status quo, a 30% increase in density and a 50% increase in density.
- (2) Transportation variety: This refers to the means of transportation between attractions or within attractions in Wuyishan National Park. The distance between attractions in the park is relatively long. Since the park is integrated by a number of tourist attractions, there are many and scattered places can be visited within it. At present, walking or taking sightseeing buses (for a fee) are the main ways to visit the park. However, tourists can obtain a better experience and a higher degree freedom while visiting if there are more choices of sightseeing vehicles. Therefore, the level is categorized into two kinds, i.e., maintaining the status quo (sightseeing buses and walking) and adding one more kind of vehicle (e.g., bicycles).
- (3) Combined ticket fee: This consists of the admission fee, the sightseeing bus fee and a rafting tour fee. The admission fee is the necessary cost for tourists to enter Wuyishan National Park and is RMB 140 (about USD 19.33) per person. The sightseeing bus fee and the bamboo rafting tour fee for a single day is RMB 75 (about USD 10.36) and RMB 135 (about USD 18.64), respectively. Under normal circumstances, the admission ticket and the sightseeing bus ticket are necessary purchases. After the end of the epidemic in 2023, in order to attract tourists, the park opened up a preferential policy that the year-long admission ticket is free of charge, though the sightseeing bus and the rafting tour ticket need to be purchased separately. The combined ticket fees are set at RMB 140 (about USD 19.33), RMB 170 (about USD 23.47), RMB 200 (about USD 27.62) and RMB 230 (about USD 31.76), respectively.

Ecological dimension: The core nature of national parks is to protect ecosystem resources and the derivation of recreational value also stems from this. The richness of species within the park is a direct outcome of the protection of ecosystem resources. Therefore, this paper identifies only one attribute from environment dimension—biodiversity. Specifically, it refers to the richness of environmental structure in the national park's habitat. A higher level of species richness indicates a higher level of protection for the national park's ecosystem, resulting in greater ecological benefits and better satisfying tourists' appreciation for ecosystem resources and the environment. The level of the attribute is categorized into three kinds: maintaining the status quo, a 10% increase and a 20% increase.

3.2.3. Choice Set Design

Based on the number of attributes and levels determined above (Section 3.2.2), there are a total of $3 \times 3 \times 3 \times 2 \times 4 \times 3 = 648$ kinds of combinations. To ensure the quality of questionnaire collection and the efficiency of completion, this paper uses the orthogonal design to screen out 24 choice schemes, constituting 12 choice sets. Since the quality of the final questionnaire may be affected by allowing one respondent to make 12 consecutive choices, this paper randomly divided the 12 choice sets into three questionnaires, with each questionnaire corresponding to 4 choice sets. An opt-out option is added to each choice set, i.e., if a respondent is not satisfied with option 1 and option 2, they can choose the option of "Do not choose any of the above option". Figure 2 shows an example of a choice set.

Please tick ✓ for the option you prefer.

Attribute	Option 1	Option 2	No Action
 Sightseeing zone	 20% increase	 10% increase	STAY
 the Number of concession activities	 Stay (4 activities)	 6 activities	
 the Density of recreational facilities	 30% increase	 50% increase	
 Transportation variety	 Stay (sightseeing buses or walking)	 Add one more kind (e.g. bicycles)	
 ¥ 140 Combined ticket fee	 ¥ 170 ¥ 170	 ¥ 200 ¥ 200	
 Biodiversity	 10% increase	 Stay	

Choose ONE preferred option ☐ ☐ ☐

Figure 2. Choice set example.

3.2.4. Questionnaire Design

The questionnaire consists of two parts. The first part provides a set of choice for the respondents to choose. The second part asks respondents personal characteristics and tour-related questions, including their basic information, such as gender, age, education level, knowledge of national parks and tour experience. The design of the questionnaire is as shown in Table 2.

Table 2. Questionnaire design.

Variable	Variable Description and Assignment
Gender	1 = Male; 0 = Female
Age	1 = Under 18; 2 = 19–35; 3 = 36–60; 4 = Over 60
Education	1 = Junior high school and below; 2 = Senior school or vocational high school; 3 = Specialized training school; 4 = Undergraduate; 5 = Master or above
Travel distance	<i>Travel time from the city of residence to Wuyishan:</i> 1 = 1–4 h; 2 = 5–8 h; 3 = 9–12 h; 4 = 13 h or above
Monthly income	1 = RMB 3000 (about USD 414.23) and below; 2 = RMB 3000 (about USD 414.23) – RMB 7000 (about USD 966.54); 3 = RMB 7000 (about USD 966.54) – RMB 11000 (about USD 1518.85); 4 = RMB 11000 (about USD 1518.85) – RMB 15000 (about USD 2071.17); 5 = RMB 15000 (about USD 2071.17) or above
Available time	<i>Free time available to tourists during the year (Compared with the statutory and weekend holidays):</i> 1 = Less than it; 2 = Equivalent to it; 3 = More than it
Knowledge about the park	<i>Tourists' knowledge about the concept, policy and status of national parks:</i> 1 = Not know with not aware; 2 = Much less known with of slightly aware; 3 = Less known with moderately aware; 4 = Known with aware; 5 = Very familiar
Willingness to revisit	1 = Yes; 0 = No

3.2.5. Sampling Design and Data Sources

The research team traveled to Wuyishan National Park in Nanping City, Fujian Province in July 2023 to conduct the offline survey. Firstly, three pre-surveys were carried out in the park. After the first pre-survey, the relevant attributes and levels in the choice experiment were determined. Also, the description content of the experimental setup and the design of choice set was confirmed; after the second pre-survey, the design was optimized and the questionnaire with other relevant questions was carried out; after the third pre-survey, the two parts of experiment and questions were finalized after preliminary analyses. In the formal survey, besides distributing the questionnaire on various online platforms, the team conducted the survey on tourists at the exits of the main attractions, such as Tianyou Peak, Yunv Peak, Bamboo Raft Ferry, Yixiantian Spot and Wuyi Palace, in different periods of time. In the determination of the sample size, this paper refers to the method proposed by some scholars [47]:

$$N = 500 \times \frac{L}{A \times C} \quad (6)$$

where N is the sample size, L represents the maximum number of levels in the key attribute, A is the number of schemes in a choice set and C is the number of choice sets to be completed by the respondent. Therefore, the minimum sample size requires 167. The team sent out 447 questionnaires in total, including 297 offline ones and 150 online ones. In total, 435 valid questionnaires were answered, which is 2.604 times more than the abovementioned requirement. The number of questionnaires in different versions is basically the same, and the validity rate of the questionnaires is 97.32%.

4. Empirical Model and Result Analyses

4.1. Descriptive Statistics

4.1.1. Tourist Choices

The descriptive statistics describe the data about the tourists' choices. It shows that the proportion of the samples choosing “maintain the status quo” is low, i.e., only 1.84%. The following table shows the chosen indicators for each attribute. The mean value of each attribute is close to that of the unit, indicating that the data are balanced and representative. Table 3 shows all selected indicators for each attribute.

Table 3. The selected indicators for each attribute.

Variable	Obs	Mean	Std. Dev.	Min	Max
Sightseeing zone	1740	0.866	0.785	0	2
The number of concession activities	1740	0.974	0.824	0	2
The density of recreational facilities	1740	0.997	0.773	0	2
Transportation variety	1740	0.543	0.498	0	1
Combined ticket fee	1740	0.913	0.809	0	2
Biodiversity	1740	1.472	1.181	0	3

4.1.2. Tourist's Characteristics

Of the 435 valid samples, 49.5% were male tourists and 50.5% were female tourists, which shows a generally balanced ratio. In terms of “age”, tourists between 19–35 years old take the largest proportion, accounting for 62.8%. Moreover, 68.1% of tourists had a bachelor's degree, which indicates that the majority of the respondents were well-educated and had the ability to comprehend the choice experiment model. The income of tourists is more evenly distributed, with most of the tourists (25.8%) earning an average monthly income of RMB 7000–11,000 (about USD 966.54–1518.85). In terms of travel distance, 57.6% of tourists traveled 0–4 h from their home to Wuyishan National Park. The proportion gradually decreases with the increase of time. The proportion of tourists whose travel time to the park is more than 12 h is only 3.4%. The distribution is relatively even and reasonable in structure, basically meeting the model requirements.

As for tourists' knowledge of the national park concept, the mean value is 3.242, which shows that the overall number of tourists are slightly aware of what a national park is. In total, 2.6% of tourists did not know anything about national park concept, 28.2% of tourists were not very aware of it, 25.6% of tourists were slightly aware of it, 29.6% were quite aware of it and 14% of tourists were very familiar with it. Moreover, 59.5% of tourists were visiting Wuyishan National Park for the first time and 40.5% of tourists had visited the park several times before. Tourists' willingness to revisit is an important indicator for judging the operation efficiency of a scenic attraction, which can reflect the satisfaction and loyalty of tourists to it [48]. In total, 84.8% of tourists would like to revisit and would recommend the park to others in the future, while 15.2% of tourists did not want to come back. The specific sample information is shown in Table 4.

Table 4. Statistical description of respondent characteristics.

Variable	Samples	Mean	Sd	Min	Max
Gender	435	1.505	0.500	0	1
Age	435	2.268	0.598	1	4
Education	435	3.763	0.941	1	5
Travel distance	435	1.578	0.786	1	4
Monthly income	435	2.768	1.311	1	5
Available time	435	2.422	0.690	1	3
Knowledge about the park	435	3.242	1.088	1	5
Willingness to revisit	435	1.151	0.359	1	2

4.2. Benchmark Regression Result Analysis

This paper uses Stata18.0 (StataCorp LLC., College Station, TX, USA) to empirically analyze the data of the 435 tourists, with a total of 5220 ($3 \times 4 \times 435$) observations. Model (1) uses the Conditional Logit Model (CLM) for the parameter estimation of key attributes and model (2) uses the Mixed Logit Model (CLM). Based on this, model (3) then adds personal characteristic variables for parameter estimation. In model (2) and model (3), “sightseeing zone”, “transportation variety” and “the number of concession activities” are set as random variables. Fixed variables are “the density of recreational facilities”, “biodiversity” and “combined ticket fee”, which are estimated by Halton sampling 1000 times. The estimation results of the model are shown in Table 5.

Table 5. Conditional logit model and mixed logit model result.

Variable	(1) CLM	(2) MLM	(3) MLM
<i>Attributes</i>			
<i>Fixed variable</i>			
Density of recreational facilities	0.570 *** (0.052)	0.418 *** (0.143)	0.510 *** (0.165)
Combined ticket fee	−0.003 * (0.045)	−0.013 ** (0.154)	−0.016 ** (0.191)
Biodiversity	0.398 *** (0.049)	0.284 ** (0.127)	0.337 ** (0.154)
<i>Random variable</i>			
Sightseeing zone	0.418 *** (0.062)	0.265 * (0.157)	0.326 * (0.192)
Transportation variety	0.698 *** (0.107)	0.552 ** (0.237)	0.675 ** (0.296)
Number of concession activities	0.618 *** (0.051)	0.636 *** (0.216)	0.784 *** (0.278)
<i>Random parameter standard deviation</i>			
Sightseeing zone		1.048 ** (0.446)	1.154 *** (0.426)
Transportation variety		3.138 ** (1.244)	4.159 *** (1.561)
Number of concession activities		1.119 *** (0.434)	1.332 *** (0.513)
<i>Social and economic characteristic</i>			
Gender			0.388 (0.653)
Age			−0.777 * (0.403)
Education			0.777 ** (0.338)
Travel distance			0.131 (0.404)
Monthly income			0.010 (0.288)
Available time			0.976 (0.622)
Knowledge about the park			−0.489 (0.414)
Willingness to revisit			1.858 ** (0.796)
<i>Constant term</i>			
ASC		3.026 *** (0.488)	3.368 * (1.885)
Number of obs	5220.000	5220.000	5220.000
Likelihood	−2098.093	−1300.2155	−1283.4994

Note: *, ** and *** represent significant at 10%, 5% and 1% statistical levels, respectively.

From the regression result, it can be seen that all six key attributes are significant. The Hausman test shows that the MLM model is more robust than the CLM model, so the next section will focus on analyzing the parameter estimation obtained by the MLM model. The constant terms of model (2) and model (3) are significant and greater than 0. This indicates that the overall model is significant, while the experiment has a high attraction to tourists and a strong practical significance. In MLM model (2), “sightseeing zone”, “transportation variety” and “the number of concession activities” are set as random variables which have large standard deviation coefficients and are significant at the 10%, 5% and 1% levels, respectively. It indicates that tourists’ preference for these attributes is heterogeneous.

With the addition of tourists' social and economic characteristic in the MLM model (3), the significance of the random parameter variables is further improved, all reaching the 1% level. Moreover, it indicates that tourists with different characteristics have significant heterogeneity in their recreational consumption preference for Wuyishan National Park. The following section analyzes the degree of tourists' preference for the attribute variables from each dimension.

- **From the policy dimension:**

First, the attribute of "the number of concession activities" is significant at the 1% level (coefficients of 0.636 and 0.784, respectively), suggesting that tourists prefer the activities based on the concession policy. Concession-based tourism activities are usually operated under the framework of management, with special selection on the basis of merit by governments and other regulatory agencies [28]. Compared with traditional tourism activities, the featured concession-based ones are more guaranteed in terms of quality and recreational experience, which can show the brand and image of national parks. Therefore, the increase in the number of concession activities can bring more utility to the tourists.

Second, the attribute of "sightseeing zone" is significant at the 10% level (coefficients of 0.265 and 0.326, respectively), suggesting that with larger sightseeing zone, tourists will receive more utility. This is related to the discovering psychology of tourists. National parks are usually the strictest nature reserves with pristine areas and ecosystems that are difficult to see in cities. Moreover, the large mid-subtropical forest ecosystem in Wuyishan National Park can attract tourists. Therefore, enlarging the sightseeing zone properly will satisfy tourists and they can obtain more utility, which is also consistent with the result of the actual interviews.

- **From the management dimension:**

Third, the attribute of "transportation variety" is significant at the 5% level, with positive marginal benefit (coefficients of 0.552 and 0.675, respectively), indicating that tourists have requirements for the freedom of visiting. Wuyishan National Park is large and the attractions are scattered, while tourists can travel through the attractions only by sightseeing buses or walking in it. The limited means of transportation leads to the limited freedom of visiting, and adding diverse means of transportation will improve tourists' utility.

Fourth, the attribute of "the density of recreational facilities" is significant at the 1% level, with positive marginal utility (coefficients of 0.418 and 0.510, respectively). It suggests that more infrastructure investment in the park, such as optimizing the distribution density and the number of restrooms, stations and roads signage, will significantly increase tourists' willingness to pay.

Fifth, the attribute of "combined ticket fee" is significant at the 5% level with a negative marginal benefit (coefficients of -0.013 and -0.016). It indicates that as a nature resource asset, Wuyishan National Park becomes an ecological product which is able to be consumed in the tourism development. Moreover, it is in line with the law of diminishing marginal utility in economic principles.

- **From the ecological dimension:**

Finally, the attribute of "biodiversity" is significant at the 1% level, showing positive marginal benefit (coefficients of 0.284 and 0.337, respectively). As China's highest-level nature reserve, the high biodiversity of national parks proves that the "ecological protection first" goal is effectively accomplished. At the same time, it can provide unique and diverse tourism experiences for tourists. The tourists' utility may increase because of the ability to visit rare species, to see flora and fauna at close range and to enjoy the rich natural landscape.

The MLM model (3) is based on model (2) with the addition of personal characteristic variables, and the result shows that different personal characteristics have different impacts on tourists' willingness to pay and visit. The variable of "age" produces negative marginal

benefit (coefficient of -0.777), indicating that younger tourists get more utility from their visit to Wuyishan National Park. On the other hand, the variable of “education” produces positive marginal benefit (coefficient of -0.777), indicating that tourists with better education gain more utility from their visit. The variable of “willingness to revisit” produces a positive marginal benefit (coefficient of 1.858), indicating that the tourists with willingness to revisit have a better impression of Wuyishan National Park and gain more utility.

4.3. Tourist Preference Heterogeneity Analysis

The MLM model (2) shows that the standard deviation coefficients of the attributes of “sightseeing zone”, “transportation variety” and “the number of concession activities” are large and significant at the 10%, 5% and 1% levels, respectively. Similarly, model (3) shows that the standard deviations of the above three attributes are all significant at the 1% level, indicating that there is heterogeneity in tourists’ preference for these variables. In order to further investigate the sources of heterogeneity, this paper builds model (4), model (5) and model (6) based on model (2) and model (3). The estimation results of the model are shown in Table 6.

Model (4) introduces the cross terms between the attributes of “sightseeing zone” and each of the three tourist characteristic variables (“age”, “education” and “willingness to revisit”) to explain the heterogeneity of tourists’ preferences for different levels of these attributes. The cross term between “sightseeing zone” and “education” is positively significant at the 10% level with the coefficient of 0.303 , which indicates that higher-educated tourists hope for the enlargement of sightseeing zone more. The reason may be that highly educated individuals are more exposed to the promotion of concepts related to Wuyishan National Park, which makes it easier for them to understand the preciousness and significance of national parks. This, in turn, increases their desire to explore the primitive ecology within Wuyishan National Park.

Model (5) introduces the cross terms between the attributes of “transportation variety” and each of the three tourist characteristic variables (“age”, “education” and “willingness to revisit”) to explain the heterogeneity of tourists’ preferences for different levels of these attributes. After introducing the cross-terms, the mean value of “transportation variety” became insignificant, indicating that individual differences among tourists can fully explain their heterogeneity in preferences. The cross term between “transportation variety” and “willingness to revisit” is positively significant at the 10% level with a coefficient of 0.964 , indicating that tourists with revisit intention prefer diverse means of transportation in the park. A possible explanation for this is that the limited transportation options within the park restrict tourists’ freedom to explore different areas. This sense of regret among these tourists contributes to their desire to revisit the park, hoping to experience different transportation options between attractions in future visits.

Model (6) introduces the cross terms between the attributes of “the number of concession activities” and each of the three tourist characteristic variables (“age”, “education” and “willingness to revisit”) to explain the heterogeneity of tourists’ preferences for different levels of these attributes. After the introduction of cross-terms, the mean and standard deviation of “the number of concession activities” are both significant, indicating that individual differences among tourists can partially explain the heterogeneity of their preferences for the number of concession activities. Moreover, the cross term between “the number of concession activities” and “age” is negatively significant at the 10% level with a coefficient of -0.382 , which suggests the younger tourists would like to have more concession activities. A possible explanation for this observation is that younger tourists, compared to older ones, possess greater physical strength, desire for exploration and energy, which subsequently influences their consumption mindset. Consequently, they are more inclined to spend on unique and regional tourism projects. The cross term between “the number of concession activities” and “the willingness to revisit” is positively significant at the 10% level with a coefficient of 0.589 , suggesting that tourists who have a strong willingness to revisit and express high satisfaction are more likely to desire a greater number of concession activities, and they seek to experience these through multiple revisits.

Table 6. Heterogeneity of the mixed logit model result.

Variable	(4) MLM	(5) MLM	(6) MLM
<i>Attributes</i>			
<i>Fixed variable</i>			
Density of recreational facilities	0.493 *** (0.164)	0.423 *** (0.148)	0.452 *** (0.156)
Combined ticket fee	−0.015 ** (0.182)	−0.013 ** (0.160)	−0.014 ** (0.173)
Biodiversity	0.337 ** (0.143)	0.291 ** (0.131)	0.311 ** (0.137)
<i>Random variable</i>			
Sightseeing zone	−0.302 (0.706)	0.278 * (0.164)	0.303 * (0.177)
Transportation variety	0.669 ** (0.287)	−0.366 (0.868)	0.596 ** (0.262)
Number of concession activities	0.769 *** (0.251)	0.648 *** (0.225)	2.159 *** (0.801)
<i>Random parameter standard deviation</i>			
Sightseeing zone	1.010 *** (0.386)	1.036 ** (0.453)	1.120 ** (0.435)
Transportation variety	4.140 *** (1.554)	3.235 ** (1.314)	3.543 ** (1.480)
Number of concession activities	1.245 *** (0.423)	1.097 ** (0.435)	1.050 ** (0.419)
<i>Cross term</i>			
Sightseeing zone × Age	0.060 (0.194)		
Sightseeing zone × Education	0.303 * (0.165)		
Sightseeing zone × Willingness to revisit	0.559 (0.361)		
Transportation variety × Age		−0.133 (0.251)	
Transportation variety × Education		0.032 (0.163)	
Transportation variety × Willingness to revisit		0.964 * (0.558)	
Number of concession activities × Age			−0.382 * (0.200)
Number of concession activities × Education			0.020 (0.116)
Number of concession activities × Willingness to revisit			0.589 * (0.321)
<i>Constant term</i>			
ASC	3.366 *** (0.516)	3.271 *** (0.500)	3.310 *** (0.505)
Number of obs	5220.000	5220.000	5220.000
Likelihood	−1293.2583	−1296.3805	−1294.2249

Note: *, ** and *** represent significant at the 10%, 5% and 1% statistical levels, respectively.

4.4. Tourists' Willingness to Pay Analysis

Tourists' willingness to pay for the attributes refers to the marginal monetary cost that they are willing to pay for when one of the attribute levels changes. According to Function (5), this section uses the results of Models 2–6 to calculate tourists' willingness to pay for each attribute under each model. The results of the WTP are shown in Table 7.

Table 7. Results of the WTP.

Key Attributes	Willingness to Pay				
	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Density of recreational facilities	32.15 ***	31.86 ***	32.87 ***	32.54 ***	32.29 ***
Biodiversity	21.85 **	21.07 **	22.47 **	22.38 **	22.21 **
Sightseeing zone	20.38 *	20.38 *	0 (−20.01)	21.38 *	21.64 *
Transportation variety	42.46 **	42.19 **	44.60 **	0 (−28.15)	42.57 **
Number of concession activities	48.92 ***	49.01 ***	51.27 **	49.85 **	154.21 **
Total (RMB)	165.76	164.51	151.21	136.15	272.92
	(about USD 22.98)	(about USD 22.75)	(about USD 20.97)	(about USD 18.88)	(about USD 37.85)

Note: *, ** and *** represent significant at the 10%, 5% and 1% statistical levels, respectively, and the actual values are in parentheses.

On different model settings, the overall result shows a high degree of consistency. Tourists' willingness to pay for each attribute can be listed in descending order as "the number of concession activities", "transportation variety", "the density of recreational facilities", "biodiversity" and "sightseeing zone". Model (2) and model (3) are benchmark regression models without introducing the cross term. Model (3) introduces individual economic characteristic variable on the basis of model (2), which can better reflect the tourists' willingness to pay. Thus, this paper mainly uses the calculation result of model (3) for the analysis. The result of model (3) shows that tourists are most affected by the number of concession activities, and for every two additional concession activities, tourists are willing to pay RMB 49.01 (about USD 6.79) more. Also, they are willing to pay RMB 42.19 (about USD 5.85) more for each additional means of transportation between attractions, RMB 31.86 (about USD 4.42) for each 10% increase in the density of recreational facilities, RMB 21.07 (about USD 2.92) for each 5% increase in biodiversity and RMB 20.38 (about USD 2.83) for each 10% increase in sightseeing zone, which totals RMB 164.51 (about USD 22.75). This is similar to the current combined ticket fee (RMB 170) in Wuyishan National Park, which includes a single-day admission fee, a sightseeing bus fee and a bamboo rafting fee. It is worth noting that in 2023, Wuyishan National Park opened up a preferential policy that the general admission ticket is free of charge. As of 31 December 2023, tourists do not have to spend RMB 140 (about USD 19.33) for a separate admission ticket to enter the park. The current ticket price may change if the Wuyishan National Park operating strategy is changed in the future.

As heterogeneity analysis models, models 4–6 introduce the cross term between tourists with different characteristics and attributes. The estimation of the willingness to pay is affected by the heterogeneity of tourists' preference. The coefficients of "sightseeing zone" in model (4) and "transportation variety" in model (5) are not significant in the regression estimation, so the value of willingness to pay calculated by both of them has no practical significance, and will be marked as RMB 0. It can be seen that the calculated value of willingness to pay for the attributes in model (4) and model (5) are approximately the same as model (3), except for the insignificant attributes. The cross term between "the number of concession activities" and "individual economic characteristic" is introduced in model (6), and "the willingness to pay for the number of concession activities" reaches RMB 154.21 (about USD 21.39), which indicates that younger tourists as well as tourists who are willing to visit Wuyishan National Park for many times more pursue to increase the number of concession activities, and their willingness to consume is stronger.

In summary, tourists prefer to pay for "active-guiding tours". Moreover, they prefer those scenic attractions with more featured performances, more interesting activities and better infrastructure construction. This is reflected in the higher willingness to pay for the number of concession activities, transportation variety and the density of recreational facilities. Tourists are less interested in a "self-exploring tour" and care less about the environmental conditions of Wuyishan National Park, such as the park's open area, flora and fauna and forest coverage. This is probably because these conditions are indirectly related to the utility of their visit, whereas the number of concession activities and in-

infrastructure have direct impacts on their recreational experiences. As a result, there is a lower willingness to pay for the biodiversity and sightseeing zone than the previous three attributes.

5. Conclusions and Suggestions

National parks are a crucial nature reserve system in China. In the public welfare functional circle chain of “ecological protection + recreational utilization + value realization”, tourists act as both consumers and suppliers. They realize the value of ecological products in national parks through the utility gained from recreation, and their paid contributions provide social funds for the parks’ ecological construction. In addition to government investment, it will form an effective self-sustaining mechanism for national parks if managed effectively. Taking Wuyishan National Park as an example, this paper conducts a survey using the choice experiment method and analyzes the obtained 435 tourist samples with a mixed logit model. By exploring tourists’ preferences for the six attributes from policy, management and environment dimensions, this paper proposes effective suggestions for national parks to better provide service, increase public participation and strengthen willingness to pay, thereby contributing to the improvement of national parks’ management and operation.

The analysis results indicate that the hypotheses mentioned in Section 2 have all been proven to be valid. Tourists’ preferences and utility are influenced by the attributes of national parks from policy, management and environment dimensions, with varying degrees of impact. Tourists are most sensitive to changes in the number of concession activities and are willing to pay RMB 48.92 (about USD 6.78) more for each additional recreation activity. Compared to other attributes, tourists show less concern for the available sightseeing area, with a willingness to pay only RMB 20.38 (about USD 2.83) more for each 10% enlargement. Consistent with common sense, tourists’ willingness to pay for attributes other than “combined ticket” is positive, indicating that improving and optimizing these aspects in management will significantly increase public participation and their utility. Moreover, interestingly, tourists with varying characteristics exhibit significant heterogeneity in their choice and willingness to pay. This suggests that the design of national parks should take into account the needs of different groups of tourists to maximize consumer surplus. In fact, there are still some national parks around the world that share similar situations with Wuyishan National Park, and local managers also hope to increase public participation through optimizing parks’ recreational function [49–51]. Therefore, this paper would like to provide multidimensional references and suggestions for national park policymakers worldwide.

Firstly, from the perspective of policy, national park administrations can allow operators to independently increase the number of recreational activities and reasonably adjust the sightseeing areas. A concession system tailored to local conditions will facilitate operators in developing more unique and attractive recreational activities, ensuring an effective supply of tourism products and enhancing the appeal of national parks. It is true that ecological protection is the core function of national parks, but on the premise of adhering to the overarching goal of “ecological protection first”, the government should allow appropriate decentralization of decision-making authority to national park administrations. This includes establishing core areas that require mandatory protection, while in non-core areas, full utilization of social capital and local indigenous communities can be achieved. Also, establishing communication mechanisms with social capital and indigenous communities can help in reasonably adjusting the sightseeing area and developing appropriate concession activities. In that way, with a win–win outcome, the value of ecological products and the public welfare goal of national parks can be achieved more effectively.

Secondly, from the perspective of management, the park administration needs to diversify transportation option within the park, optimize infrastructure and set a reasonable pricing strategy to optimize tourists’ utility. The transportation options within national park directly impact tourists’ freedom of movement and in turn, their willingness to visit. Park administrations and operators can draw inspiration from existing cases and change

the current transportation model that primarily relies on official sightseeing buses. Instead, they can appropriately develop new and modern tourism modes, such as green hiking trails, RV camping, helicopter tours and self-driving options. In Wuyishan National Park, it can be considered to connect the main roads within the park to external highways to further enhance tourists' transportation convenience. Regarding recreation-related infrastructure, some tourists have reported in surveys that there is a serious lack of information on road signs within the national park. These are all issues that require urgent optimization. As for ticket price, Wuyishan National Park can continue to implement a policy of free entry while charging for additional services. However, it is necessary to adjust the prices of additional services appropriately based on tourists' actual paying capacity to attract more visitors.

Thirdly, from the ecological perspective, maintaining the function of reserving the nature is the basis for Wuyishan National Park. It is necessary to strictly stick to the goal of "ecological protection first" and give full play to the function of ecological service.

Lastly, some broader suggestions. The situation of Wuyishan National Park is not an isolated case. It reveals a common problem in national parks' management worldwide: the limited autonomy of operating units in national parks often leads to a loss of resource utilization efficiency, making it difficult to improve the service level of national parks according to local conditions. Through the study of Wuyishan National Park, the government should adjust the regulatory scope of administration and operating units in national parks, strengthening the "self-sufficiency" capacity of national parks. Under the premise of adhering the ecological protection goal, the government should delegate appropriate powers to operating units, providing them with autonomy to make operational decisions based on market demand, while encouraging the park administration to improve the park's operating income. Regarding the relationship between the park and social capital, a capital introduction mechanism primarily based on concession can effectively cover areas unreachable by government financial support, and then, can help improve the service level of national parks.

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