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ORIGINAL RESEARCH ARTICLE

Consumer preference and influencing factors for participating in "forest cloud tourism" in the post-epidemic era

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ABSTRACT

Affected by COVID-19, "cloud tourism" has become a new way of forest tourism. Based on the survey data of 778 Internet respondents, frequency analysis and binomial Logistic regression model were used to analyze the preference and influencing factors of respondents' participation in forest cloud tourism. The results show that the respondents prefer to relax in terms of travel motivation; In terms of tourism content, they prefer forest sightseeing activities. In terms of the mode of tourism video playback, they prefer short video or live broadcast; Preferred social media and short video software in terms of platform selection; In terms of playing time, they prefer the videos of 21–40 minutes; Prefer natural sounds or soft music in the background. Variables such as gender, age, education level, occupation, income level, travel restriction and travel experience are the main factors influencing consumers' choice of forest cloud tourism activities. Therefore, it is suggested that the content of forest cloud tourism should be relaxing, the video playing time should be 21–40 min, and step charging mode should be adopted.

Keywords: forest; cloud travel; preferences; binomial logistic regression; consumers

1. Introduction

In 2020, the COVID-19 epidemic caused a severe impact on the national tourism industry[1], and people's outbound travel was restricted, but the demand for travel did not disappear. Therefore, in the post-epidemic era, more virtual tourism replaced real tourism, namely the "cloud tourism" phenomenon. For example, the "cloud viewing channel" opened by Wuhan University in the cherry blossom season is one of the forms of cloud tourism. "Cloud tourism" is an online and offline product derived from cloud computing and based on tourism big data, it is a new way of tourism services[2,3]. The outbreak of COVID-19 has prompted cloud tourism, which is mainly based on live broadcasting on online platforms, short video production and real person experience, extending the concept of cloud tourism and enabling tourists to get a sense of travel experience and gain without leaving home.

According to statistics, in 2019, the number of forest tourists in China exceeded 1.8 billion, creating a comprehensive social output value of 1.75 trillion yuan, and forest tourism has become a new growth

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point of forestry economy. How to improve the development speed of forest tourism in the period of epidemic mitigation has become an urgent issue to be considered, and the emergence of cloud tourism provides a direction for the development of forest tourism. At present, researches on forest tourism mainly focus on forest park tourism[4], forest health[5], tourism carrying capacity[6] and other aspects. In the post-epidemic era, how to combine cloud tourism with forest tourism and accelerate the new development direction of forest tourism is the focus of research. Some scholars point out that forest cloud tourism can be studied from the demand side[5], because consumers' intentions and behavior attitudes are inextricably related to market supply and demand. Factors that influence tourists' preference or behavior involve tourists' demographic characteristics, subjective attitude, preference characteristics, behavioral characteristics and psychological characteristics[7,8], as well as tourists' cognition of tourist destinations, characteristics of tourist destinations and social environment[9,10]. However, none of these researches have been conducted with cloud tourism as the theme, which cannot answer questions such as market preference and willingness to participate in forest cloud tourism in the post-epidemic era.

On the basis of extensive investigation, frequency analysis is adopted to analyze respondents' preference for forest cloud tourism, and then binomial Logistic regression model is adopted to analyze respondents' willingness to participate in forest cloud tourism and its influencing factors, in order to provide reference for the development and construction of forest cloud tourism.

2. The research methods

2.1. The data source

From July to October 2020, questionnaire survey was conducted online on platforms such as we chat group and moments of friends, a total of 818 questionnaires were sent out and 778 valid ones were recovered, with an effective rate of 95.11%. The questionnaire mainly includes two parts: preference of respondents to participate in forest cloud tourism and influencing factors of preference of respondents to participate in forest cloud tourism, specific variables of each part are selected as follows:

Respondents' preference for participating in forest cloud tourism

According to the theory of consumer behavior, consumers' desire to buy or choose goods comes from their inner psychological and physiological nature, and goods should have the ability to satisfy consumers' desire. Therefore, can be used from the type of the product, motivation, use kind, use of time and cost, etc. to understand consumer preferences, which choose the tourist motives, experience method, this study platform, the types of cloud forest tourism, cloud experience time, cost, psychological price, background music, background music type nine variables to understand the respondents in cloud forest tourism preferences. The specific variables and descriptive statistical results are shown in **Table 1**, among the 9 variables, the two variables of whether to choose background music and whether to pay are set as single choice, and the other variables are set as multiple choice. If the background music variable is "Yes", the interviewees choose the background music type; If the choice is willing to pay the cost.

Influencing factors of respondents' preference for participating in forest cloud tourism

The influencing factors of consumer preference involve demographic characteristics and subjective preferences, therefore, among the factors of consumer forest cloud tourism choice willingness and influencing factors, demographic factors choose gender, age, education level, occupation and income as variables; The subjective attitudes of tourists choose whether COVID-19 affects outing, whether they have participated in actual forest tourism, whether they have the habit of watching short videos, and whether the platform can provide convenient services as variables, the specific variables and the assigned values of response items are shown in **Table 2**.

Table 1. Respondent preference analysis of forest cloud tourism

Primary variable	Secondary variable	Descriptive statistical results	
		Frequency	Percentage (%)
Tourist motives	To kill time	213	27.38
	Relax	523	67.22
	Rich experience	425	54.63
	Close to nature	450	57.84
	Parent-child science	200	25.71
	Understand the scenic spot	243	31.23
The background music	Yes	457	58.74
	No, natural sounds will do	321	41.26
Background music type (consult select back scene music man)	Rock and roll	103	22.54
	Pop	253	55.36
	Jazz	133	29.10
	Folk	223	50.11
	Light music	278	60.83
	Classical music	212	46.39
	other	49	10.72
Broadcast platform	Short video software (Tiktok, etc.)	459	59.00
	Live broadcasting platform (Douyu, etc.)	401	51.54
	Social media (Official account)	472	60.67
	Official website of scenic spot	344	44.22
Tourism type	Forest tourism	486	62.47
	The forest adventure	390	50.13
	The forest culture	426	54.76
	Forest on holiday	412	52.96
	Forest science education	306	39.33
	other	58	7.46
Cloud experience time	20 min or less	97	12.47
	21–40 min	417	53.60
	41–60 min	211	27.12
	More than 60 min	53	6.81
Cost	Willing to pay	501	64.40
	Unwilling	277	35.60
Psychological price (consult someone willing to pay)	100 yuan or less per time	379	75.65
	More than 100 yuan/time	106	21.16
	It depends	16	3.19
Experience the way	Short video	498	64.01
	Livestreaming	515	66.20
	VR (virtual reality) browsing	360	46.27

2.2. Analysis method

Frequency analysis

Frequency analysis is the basis of statistical analysis, through which the status of variable values can be understood. This study conducts frequency analysis on respondents' preference data of choosing forest cloud tourism, so as to understand respondents' choice in variables such as tourism motivation and video playing mode, and then understand consumers' preference.

Binomial Logistic regression analysis

The willingness and influencing factors of

consumers to choose forest cloud tourism are the data of choice willingness, which belongs to discrete data, and the dependent variable "whether consumers are willing to participate in forest cloud tourism activities" is a dichotomous variable, and the independent variable is a continuous or categorical variable, the main research methods include Logistic model, Probit model, C2 test, etc.[11] In this study, a binomial Logistic regression model was constructed for analysis, and the equation is as follows:

$$Logist(\rho) = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \cdots \beta_k\chi_k \quad (1)$$

In equation, ρ is the probability that tourists are willing to participate in forest cloud tourism activities. $x_1, x_2, \ldots, x_k$ was the independent variable, and the independent variable types were continuous, disordered multi-classification and ordered multi-classification. β_0 is a constant term, $\beta_1, \beta_2, \ldots, \beta_k$ is the regression coefficient. The logits transformation of ρ is:

$$\text{Logist}(\rho) = \ln\left(\frac{\rho}{1-\rho}\right) \quad (2)$$

Thus we can obtain:

$$\rho = \frac{\exp(\beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \cdots + \beta_k\chi_k)}{1 + \exp(\beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \cdots + \beta_k\chi_k)} \quad (3)$$

Table 2. Variable selection and descriptive statistics of the model

Variable group	Variable name	Respondent assignment		Descriptive statistics results	
				Frequency	Percentage (%)
The dependent variable	(Y) Willingness to participate in forest cloud tourism activities	1 = Yes		725	93.19
		0 = No		53	6.81
The independent variables	(X_1) Gender	1 = Man		430	55.27
		0 = Women		348	44.73
	(X_2) Age	1 = 25 years old and below		151	19.41
		2 = 26–40 years old		429	55.14
		3 = 41–54 years old		171	21.98
		4 = 55 years old and above		27	3.47
	(X_3) Education level	1 = Junior high school and below		51	6.56
		2 = High school (or secondary school)		195	25.06
		3 = University (or college)		428	55.01
		4 = Master and above		104	13.37
	(X_4) Career	X_{41} = Civil servants and career staff	1 = Yes	203	26.09
			0 = No	575	73.91
		X_{42} = Business people and freelancers	1 = Yes	344	44.22
			0 = No	434	55.78
		X_{43} = Retirees and students	1 = Yes	182	23.39
			0 = No	596	76.61
		X_{44} = Others	1 = Yes	49	6.30
			0 = No	729	93.70
	(X_5) Monthly income per capita	Less than 3,000 yuan		209	26.86
		3,000–5,000 yuan		304	39.07
		5,001–7,000 yuan		158	20.31
		Over 7,000 yuan		107	13.75
	(X_6) Does the Newcastle Pneumonia outbreak affect your travel (travel restrictions)?	1 = Yes		763	98. 07
		0 = No		15	1.93

Table 2. (*continued*)

Variable group	Variable name	Respondent assignment	Descriptive statistics results	
			Frequency	Percentage (%)
The independent variables	(X_7) Have you ever participated in forest tourism activities (tourism experience)?	1 = Yes	655	84.19
		0 = No	123	15.81
	(X_8) Is there a habit of surfing video software such as Tiktok?	1 = Yes	754	96.92
		0 = No	24	3.08
	(X_9) Does the platform provide convenient services (explanation, interaction, purchase channels, etc.)?	1 = Yes	682	87.66
		0 = No	96	12.34

3. Analysis of respondents' preference for forest cloud tourism

3.1. Cloud travel motivations and types

Cloud Travel Motivation

Table 1 shows that the main motivation for respondents to participate in forest cloud tourism is to relax (67.22%), the second is to be close to nature (57.84%) and rich experience (54.63%). It can be concluded that respondents' motivation to participate in forest cloud tourism is similar to that of field forest tourism, which is a compensatory tourism behavior to make up for their inability to participate in forest tourism activities. Therefore, when making content related to forest cloud tourism, we should consider how to relax tourists and get close to and understand nature through technical means and broadcasting content in a limited time.

Cloud tourism types

As can be seen from **Table 1**, respondents mainly choose forest cloud tourism as forest sightseeing tourism (62.47%), followed by forest cultural tourism (54.76%), forest vacation tourism (52.96%) and forest adventure tourism (50.13%). Thus, when selecting forest cloud tourism activities, respondents are more inclined to choose environments with rich forest landscapes and diverse types of animals and plants, and prefer the content of forest cloud tourism that is easy and does not need to think more.

3.2. The background music

As for whether background music is needed for forest cloud tourism, it can be seen from **Table 1** that 58.74% of respondents hope to have background music, while the rest think it is better to have natural sounds. Respondents who hope to have background music believe that the music type should be relatively light and quiet light music (accounting for 60.83%) or folk music (accounting for 50.11%), which is related to the motivation and type of respondents to choose forest cloud tourism, and hope that forest cloud tourism provides a relaxing tourism activity.

3.3. loud experience time and cost

Cloud experience time

In order to get a travel experience, 53.60% of consumers willing to pay 21–40 min time watching live or short video, but the existing video software tend to short video playback time not more than 5 min, so cloud forest tourism of the broadcast content can be split into several small drama, convenient consumers choose content to watch. Video content or too short or too long will lead to consumers' impression is not deep, do not have the time or patience to watch, time control to be aired cloud forest tourism in 21–40 min, and split into many small video, and consumers have a rest after the work time to match, can let the consumer to relax during this period, briefly the purpose of being closer to nature.

Cost situation

The results show that 64.4% respondents are willing to pay the fee, and 75.65% of those who are willing to pay the fee hope to pay 100 yuan or less each time. Among those who choose to pay more than 100 yuan each time, the multi-choice experience mode is VR (virtual reality) browsing. Overall, the

amount of money willing to pay is comparable to the cost of field trips, and varies with respondents' own income, video content and quality, level of interaction, and presentation technology.

3.4. Cloud experience playing platform and mode

Respondents preferred social media (WeChat official account, etc., accounting for 60.67%) and short video software (Tiktok, etc., accounting for 59%), and live broadcast (66.20%) or short video (64.01%) for experience. It can be concluded that interviewees are more adapted to simple playing forms, such as short video, which can be watched by clicking play. Therefore, we should make reasonable use of we chat public account and short video software and other platforms to regularly push short forest cloud tourism videos.

4. Analysis of influencing factors of respondents' forest cloud tourism intention

Table 2 shows that 93. 19% of respondents are willing to participate in forest cloud tourism activities. Variables such as gender, age, education, occupation, income, epidemic situation and forest tourism experience are the main factors affecting respondents' willingness to participate in forest cloud tourism activities, however, whether they have the habit of video software such as Tiktok and whether the platform provides convenient services have no significant impact on respondents' willingness to participate in forest cloud tourism activities. Stata15 software was used to conduct binomial Logistic regression analysis on the data in **Table 2**, tolerance and variance inflation factor (VIF) were used to test the collinearity of the model, the average rate of VIF was 1.96, and the maximum value was 4.55, at the same time, the tolerances were all larger than 0.1, indicating that there was no obvious multicollinearity between independent variables. The prediction accuracy of the model was tested, and the result was 94.73%. After deleting insignificant variables, the parameter test results of the final model are obtained as shown in **Table 3**.

Table 3. Parameter test results of the final model

The variable name	Coef.	Std. Err.	z	P > |z|
X_1	0.826	0.404	2.04	0.041**
X_2	1.485	0.445	3.34	0.001***
X_3	-1.830	0.382	-4.79	0.000***
X_{41}	4.000	0.857	4.6	0.000***
X_{42}	2.395	0.624	3.84	0.000***
X_{43}	1.094	0.630	1.74	0.082*
X_5	-0.570	0.201	-2.84	0.005***
X_6	4.870	1.134	4.30	0.000***
X_7	-1.569	0.837	-1.87	0.061*
Constant term	7.112	1.677	4.24	0.000***

Note: "*", "* *" and "***" indicate that the statistical test has reached the significance level of 10%, 5% and 1% respectively.

4.1. Analysis of sex and age variables

Analysis of gender variables

Gender variable (X_1) is significant at the significance level of 5%, and the variable coefficient is positive, indicating that women are more willing to participate in forest cloud tourism activities than men. At present, the social structure is still affected by the idea of men ploughing and women weaving, compared with men, women are more family-oriented and reluctant to leave their families too much, forest cloud tourism activities can realize the purpose of consumers visiting the forest at home and relaxing. Therefore, women are more willing to participate in forest cloud tourism activities than men.

Age variable analysis

The age variable (X_2) is significant at the significance level of 1%, and the coefficient of the variable is positive, indicating that the older the interviewees are, the more willing they are to participate in forest cloud tourism activities. As respondents grow older, they enter the workforce and have less time to travel. At the same time, older people are less physically fit and less likely to leave home and travel farther than younger people. Therefore, it is easier to accept forest cloud tourism activities with increasing age.

4.2. Education level variable analysis

The education level variable (X_3) is significant

at the significance level of 1%, and the coefficient sign of the variable is negative, indicating that the higher the education level, the less willing they are to participate in forest cloud tourism activities. According to the results of the questionnaire, the more educated people think that forest tourism is an experiential activity, which is more suitable for them to experience it in person rather than through the screen, meanwhile, they have more time and financial resources to enter the forest and experience forest tourism in person.

4.3. Analysis of occupational and income variables

Occupational variable analysis

The regression results of occupation variable (X_4) show that civil servants and public institution personnel, business people and freelancers are more willing to participate in forest cloud tourism activities. Compared with retired people and students, such people have less rest time and it is difficult to go to tourist destinations for field trips, so they are more willing to use cloud tourism to replace actual tourism activities.

Analysis of income variables

The income variable (X_5) is significant at the significance level of 1%, and the coefficient sign of the variable is negative, indicating that consumers are more willing to participate in forest cloud tourism activities when the income level is lower. Forest parks are usually located in the suburbs of cities, compared with forest cloud tourism, it costs more to participate in forest activities on the spot, in order to reduce costs, consumers with lower income are more willing to participate in forest cloud tourism activities. Therefore, the paid items of forest cloud tourism should take into account the income level of consumers, and step charging can be set to control prices.

4.4. Analysis of travel restriction and travel experience variables

Analysis of travel restriction variables

By analyzing the impact of COVID-19 on outing (travel restriction) variable (X_6), it is found that whether consumers are willing to participate in forest cloud tourism is significantly affected by whether they can go out. When they can't go out, consumers are more willing to participate in cloud travel instead of going out.

Analysis of tourism experience variables

The variable (X_7) of whether they have participated in forest tourism activities (tourism experience) is significant at the significance level of 10%, and the coefficient sign of the variable is negative, indicating that respondents who have experienced field forest tourism activities are more willing to accept forest cloud tourism activities.

4.5. Analysis of insignificant variables

The influence of two factors—whether there is the habit of surfing video software like Tiktok (X_8), and whether the platform can provide convenient services (X_9)—on the respondents' willingness to choose to participate in the activities of cloud forest tourism is not significant, as a result of the survey USES the network method, the majority of the respondents used online life, itself has a habit brush trill, namely survey audience caused by incomplete. 96.92% of the respondents are in the habit of using video software such as Dou yin, and 87.66% hope that the platform can provide convenient services, indicating that these two factors are important factors affecting consumers' choice of forest cloud tourism activities, so these two factors should still be taken into account in the experience design of forest cloud tourism activities, set the operation mode and interface of forest cloud tourism to be simple, convenient and clear.

5. Conclusions

Respondents prefer to participate in forest cloud tourism activities, the content of which can make them relax, close to nature, rich experience of forest tourism, forest cultural tourism and other activities; in terms of operation mode, they tend to choose forest cloud tourism activities with simple operation

and played by common software, for example, the short video of forest cloud tourism pushed on WeChat public account; In terms of background setting, they tend to choose natural sound or soft music as the background sound of forest cloud tourism activities. In terms of the setting of broadcast time and cost, they tend to be willing to watch short videos of 21–40 min, most interviewees are willing to pay for forest cloud tourism, and the amount of cost will change with the technological level, content quality and other factors provided by forest cloud tourism. Therefore, the time setting of forest cloud tourism should give full consideration to enabling consumers to get a sense of experience and set the time range to 21–40 min, so as to satisfy consumers' regret of not being able to travel in reality by using virtual tourism; Forest cloud tourism projects can be set up according to the different content and interactive degree of step-charging, to meet the experience needs of different consumers; The operation mode and interface of forest cloud tourism should be set up simple, convenient and clear. The main content to be played should be marked below the video or live broadcast for consumers to choose.

Respondents have a strong willingness to participate in forest cloud tourism activities. Variables such as gender, age, education level, occupation, income, travel restrictions and tourism experience are significant factors influencing whether respondents choose to participate in forest cloud tourism activities, the habits of video software such as Tiktok and the convenient services provided by the platform have no significant influence on whether respondents choose to participate in forest cloud tourism activities, but these two factors have a greater impact on the experience design of forest cloud tourism. Among the 7 significant influencing factors, travel restriction variable is the most important one, followed by occupation variable. Women, middle-aged and elderly people, civil servants and business people who have scattered leisure time are more likely to participate in forest cloud tourism activities. Therefore, according to the characteristics and needs of the audience, the content of forest cloud tourism should be diverse, the main content can set the forest cloud tourism activities with natural landscape as the core resources, and the background music can be selected to make people relax.

Conflict of interest

The authors declare no conflict of interest.

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