

# Character Analysis of the Cognition, Willingness and Behavior of Tourists on Low-carbon Tourism—A Case Study of Mount Tai Scenic Spot

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**Abstract:** Low-carbon tourism is a new way of tourism, which helps to reduce carbon emissions and promote carbon neutrality in the process of tourism. Taishan Scenic Area is a national 5A-level scenic area. This study takes tourists in Taishan Scenic Area as the research object and collects relevant information such as demographic characteristics, low-carbon tourism cognition, willingness and behavior characteristics of tourists. The results show that tourists have a high degree of low-carbon tourism cognition, but age, income, education level and occupation category have different degrees of influence on tourists' low-carbon tourism cognition. Tourists have strong intention of low-carbon tourism, and education level and income have obvious influence on tourists' intention of low-carbon tourism. The effect of tourists' low-carbon tourism behavior is low, because tourists pay more attention to factors such as their ability to pay, comfort and convenience. Finally, we take the implementation of low-carbon tourism development suggestion from the government, enterprises, tourists three aspects.

**Keywords:** Low-carbon tourism; Taishan scenic area; Cognition; Willingness; Behavior

## 1. Introduction

Climate warming and resource and environmental problems have brought great impact on the sustainable development of mankind, and the concept of low-carbon development should be born in this era. In 2020, China proposed that CO<sub>2</sub> emissions should peak before 2030 and strive to achieve carbon neutrality by 2060. This is the first time that China has made a clear commitment to carbon neutrality and comprehensively stepped up long-term emission reduction actions, which is of great significance to social and economic development and the response to climate change. The main path to achieve the "two-carbon" goal includes three aspects: energy efficiency improvement, zero carbon emission and negative carbon technology<sup>[1]</sup>. Among various industries, tourism is responsible for 4.4% of global climate change, and its carbon emissions are expected to continue to grow at a rate of 3.2% per year<sup>[2]</sup>. In particular, the rapid development of China's tourism industry in recent years, the increasing number of tourist trips and tourism activities bring about the multiplier rise of carbon emissions, which poses a great threat to the realization of carbon neutrality.

In order to achieve the goal of double carbon as soon as possible, China's cultural tourism industry starts from energy saving and emission reduction, low-carbon technology and other forms. Low-carbon tourism is a new way of tourism. By developing low-carbon technologies, choosing green consumption patterns, and advocating tourists to reduce carbon emissions in the process of tourism, it will bring greater benefits to society, environment and economy and contribute to the early realization of carbon neutrality<sup>[3]</sup>. The development mode of low-carbon tourism has the characteristics of low energy consumption, low pollution and low emission, and the realization of its low-carbon goal requires the joint efforts of all stakeholders<sup>[4]</sup>. Tourists are the main body of tourism activities and the fundamental support for the development of tourist attractions. Different choices of tourists in different links such as transportation, accommodation and catering will affect the energy consumption in the tourism process. The low-carbon behavior of tourists is very important for the realization of low-carbon tourism. Low carbon cognition is the basis for the formation of low carbon attitude and low carbon behavior, and a higher level of low carbon cognition is easy to promote the right low carbon attitude, and then transform into positive low carbon behavior. Therefore, identifying the low-carbon cognition level of tourists can help guide their behavior. Therefore, the research on the three elements of low-carbon cognition, low-carbon intention and low-carbon behavior of tourists in the process of tourism and the mechanism between the three elements have a significant impact on the development of low-carbon tourism in scenic spots.

At present, there are few researches on low-carbon tourism in China, and they focus on the perspectives of scenic spots, governments and enterprises, and few studies are conducted from the perspectives of tourist behaviors, characteristics and needs. Meanwhile, quantitative research results are also relatively lacking. Taishan is a world natural and cultural heritage, a national key scenic area, a national 5A scenic spot, and has the reputation of "the only five mountains", and enjoys the title of "the first mountain in the world". Taishan Scenic Area attracts more and more tourists to travel, and is the benchmark of tourism development in Tai'an city and even Shandong Province. However, the high emissions brought by tourists in the process of travel is still a problem that cannot be underestimated. With the increase of tourists and the in-depth development of tourism resources, the pressure of ecological environment is gradually increasing, and the implementation of low-carbon tourism development has important practical significance for the formation of a virtuous cycle of local tourism industry. Therefore, we take Mount Tai Scenic Area as an example to investigate the tourists' perception, willingness and behavior characteristics of low-carbon tourism, explore the low-carbon tourism development of Mount Tai from the perspective of tourists, and also provide references for the construction of low-carbon tourism scenic spots in natural heritage sites in China.

## 2. Experimental design

The questionnaire consists of four parts, including: (1) Demographic characteristics of the sample, gender, age, education level, monthly income, occupation and other basic background data of tourists in Taishan Scenic area; (2) Tourists' awareness of low-carbon tourism, mainly to investigate the understanding degree of tourists on "greenhouse efficiency", "low-carbon tourism", "carbon footprint", "low-carbon scenic spot" and other low-carbon tourism related concepts and ways to obtain low-carbon tourism related knowledge; (3) The willingness of tourists to practice low-carbon tourism, including the willingness of tourists to learn low-carbon tourism knowledge, participate in low-carbon tourism activities, and the willingness to make carbon compensation; (4) Low-carbon behavior of tourists, mainly investigate the behavior of tourists in the process of catering, accommodation, transportation, sightseeing, shopping, entertainment and other tourism.

In mid-March and early May 2023, field investigation and questionnaire survey were carried out in Taishan Scenic Area. A total of 175 questionnaires were randomly distributed, and 168 were valid, with an effective rate of 96%.

## 3. Research results

### 3.1 Demographic characteristics of tourists

Table 1: Demographic characteristics of tourist sample

Basic situation	Category	Number	Percent	Basic situation	Category	Number	Percent
Sex	Male	84	50	Occupation	Teacher	12	7.14
	Female	84	50		Civil servant	11	6.55
Age	<18	15	8.93		Company staff	29	17.26
	18-25	70	41.67		Private owner	4	2.38
	26-35	26	15.48		Individual laborer	14	8.33
	36-45	23	13.69		freelancer	17	10.12
	46-60	25	14.88		Peasant	9	5.36
	>60	9	5.36		Pupil	59	35.12
Educational level	Below junior high school	15	8.93		soldier	0	0
	Junior high school	14	8.33		other	13	7.74
	High school/secondary school/higher vocational school	34	18.45	Monthly salary	>30000	9	5.36
	Junior college	27	16.07		15000-30000	13	7.74
	Undergraduate course	59	35.12		8000-15000	21	12.50
	Master	19	11.31		4000-8000	53	31.55
	Learned scholar	3	1.79		<4000	72	42.86

The proportion of male and female tourists is equal, the respondents are mainly young and middle-aged, and the age is mainly concentrated in 18-35 years old. The education level of the respondents is relatively high, among which the education level of the respondents with a master's degree accounted for 48.22%, followed by junior college and high school education, accounting for 34.52%. The respondents'

monthly salary is less than 8,000 yuan, accounting for 74.47%. The majority of respondents were middle school students, accounting for 35.12%. Detailed results are shown in Table 1.

### 3.2 Tourists' cognition, willingness and behavior characteristics of low-carbon tourism

Tourists' awareness of "low carbon tourism" is relatively high in general, 20.24% of them are very familiar with "low carbon tourism", and 32.74% of them are relatively familiar with it. Only 19.05% of the people have a good understanding of "carbon emissions", and 66.67% of the people have a good understanding of "carbon emissions". For the concept of "carbon neutral and carbon peak", 33.93% of people have a general understanding, while most people do not know much about "low-carbon scenic spots". Detailed results are shown in Table 2.

Table 2: Characteristics of tourists' awareness of low-carbon tourism

Degree	Know very well(%)	Better understand (%)	General (%)	Don't know much (%)	Have no idea(%)
Low-carbon tourism	20.24	32.74	34.52	8.93	3.57
Carbon emission	19.05	35.12	31.55	10.71	3.57
Carbon neutral, carbon peak	19.64	22.62	33.93	17.26	6.55
Low-carbon scenic spot	18.45	30.36	33.93	13.69	3.57

The survey results show that tourists' willingness to low-carbon tourism is generally high, and the proportion of willing to choose low-carbon tourism scenic spots, learn low-carbon tourism knowledge in schools, participate in low-carbon tourism activities, carry out low-carbon consumption and talk about compensation is more than 70%. The overall willingness of tourists is high, and most tourists are willing to practice low-carbon behaviors in these five projects. Detailed results are shown in Table 3.

Table 3: Characteristics of tourists' willingness to low-carbon tourism

Degree	Very willing (%)	Willing (%)	General (%)	Reluctant (%)	Very reluctant (%)
Choose low-carbon tourist attractions	39.29	39.29	19.64	1.79	0
Learn about low-carbon travel	41.07	33.33	23.81	1.79	0
Participate in low-carbon tourism activities	35.12	38.69	23.21	2.38	0.6
Low carbon consumption when traveling	33.33	44.05	21.43	0.6	0.6
Carbon offsets after travel	33.93	38.10	26.19	1.79	0

Low-carbon tourism behavior means that in the process of tourism, the negative impact on the environment should be reduced as much as possible, especially the emission of carbon dioxide and greenhouse gas. Tourists' awareness of low-carbon tourism and their willingness to low-carbon tourism will be reflected in their low-carbon tourism behavior. Only by effectively achieving low-carbon tourism can a complete closed loop be formed.

Most respondents strongly agree with the practice of low-carbon behavior in catering, whether it is to reduce the use of disposable tableware during dining or to practice the action of CD-ROM without wasting food, 80% of tourists agree or strongly agree. It can be seen that most people strongly agree with the practice of low-carbon behavior in catering, and almost no one holds a negative attitude. Low-carbon tourism is widely expected. Tourists have a strong intention to practice low-carbon behavior in accommodation. For example, 30.95% of tourists strongly agree to choose a more low-carbon homestay accommodation environment when lodging, and 44.64% of tourists agree to choose a low-carbon homestay accommodation environment. 38.69% of tourists strongly agree to bring their own daily necessities to reduce the consumption of hotel disposable supplies, 38.69% of tourists agree to bring daily necessities to reduce the consumption of hotel disposable supplies. In the transportation to and from Tai'an, the vast majority of tourists are willing to choose a relatively low-carbon travel mode, accounting for 74.4%, and 22.62% of tourists generally agree with the attitude, which may be due to the need to consider specific circumstances when buying tickets, and basically no tourists who do not agree with low-carbon travel if economic conditions allow. However, in the process of going up and down Mount Tai, the number of people taking the cable car has increased significantly, which may be due to physical

reasons or time reasons, and the willingness to choose the cable car is larger. However, most people still agree to visit Mount Tai on foot, practicing low-carbon tourism while exercising their body. Detailed results are shown in Table 4.

*Table 4: Behavioral characteristics of tourists in low-carbon tourism*

Investigation item	Very willing (%)	Willing (%)	General (%)	Reluctant (%)	Very reluctant (%)
Minimize the use of disposable utensils during meals	33.93	46.43	18.45	1.19	0
Don't waste food by practicing the CD or packing leftovers	39.88	41.07	17.86	1.19	0
Compared with the more comfortable hotel accommodation environment near Taishan, you prefer a more low-carbon homestay accommodation environment	30.95	44.64	21.43	2.38	0.6
When staying, you will bring your own daily necessities to reduce the consumption of disposable items	38.69	38.69	20.24	2.38	0
Rather than the easy and convenient cable car, you would rather visit Mount Tai on foot	29.17	42.26	19.64	7.74	1.19

#### 4. Conclusions and Suggestions

According to the survey results of the cognitive intention and behavior of tourists in Mount Tai Scenic Area on low-carbon tourism, it can be seen that most tourists are enthusiastic and positive about the development of low-carbon tourism, which indicates that the ideas and comprehensive quality of our tourists are constantly improving, and most of them consciously implement the national strategic plan. But we can not stop here, Taishan scenic area and even Tai 'an city of low-carbon tourism development still have a long way to go. The following suggestions are put forward for Taishan Scenic area: To promote the use of public transport to and from Taishan. Encouraging tourists to use public transportation to Mount Tai Scenic area, such as high-speed rail, buses, etc., can reduce the use of personal cars, reduce carbon emissions, and call on tourists to make carbon compensation. Building environment-friendly accommodation facilities. More environmentally friendly accommodation facilities can be built in and around Mount Tai Scenic area, for example, solar energy can be used for heating and lighting to reduce carbon emissions. Strengthen the classification and disposal of garbage in scenic spots. Improve the environmental awareness of tourists, set up placards and guide boards, let tourists put garbage into classification, strengthen garbage classification and treatment, and reduce the impact on the environment. Actively carry out environmental protection themed activities. Some environmental protection themed activities can be carried out in the Taishan Scenic area, and publicity can be carried out through live broadcasting, calling on more tourists to participate in environmental protection actions and forming a consensus of environmental protection in the whole society.

Low-carbon tourism is a sustainable way of tourism, which can reduce the impact of tourism on the environment and bring more long-term development of tourism. Therefore, the following suggestions are put forward for the development of low-carbon tourism in Tai 'an City to advocate low-carbon travel for citizens: tourists should choose low-carbon travel modes such as walking, cycling and public transportation, rather than using private cars or planes and other high-carbon emission transportation modes. Promote green accommodation: Promote green accommodation, including energy-saving and environmentally friendly hotels, ecological homestays, etc., so that local people and foreign tourists can enjoy the beautiful scenery at the same time, but also enjoy an environmentally friendly, healthy and comfortable accommodation environment. Strengthen garbage classification and treatment: Increase the number of garbage cans in the streets and tourist attractions in the urban area, set up prominent signs, advocate and guide tourists to classify garbage, establish a garbage disposal system, and minimize pollution. Develop environmental protection tourism projects: Develop and organize environmental protection tourism projects, such as ecological sightseeing, nature reserve exploration, etc., so that tourists can understand environmental protection knowledge and enhance environmental protection awareness while experiencing nature. Guide the development of low-carbon tourism business: tourism businesses can be encouraged to adopt low-carbon business methods, such as the use of environmentally friendly materials, energy-saving equipment, so that business and environmental protection promote each

other.

As the main body of tourism activities, tourists should take the initiative to learn the relevant knowledge of low-carbon tourism, actively participate in low-carbon themed tourism, and consider whether their tourism behavior is indicative of low-carbon requirements, consciously regulate their own tourism behavior, starting from the six tourism elements of tourism catering, tourism accommodation, tourism transportation, tourism tour, tourism shopping and tourism entertainment. Support the development of low-carbon tourism with low-carbon behavior, establish the concept of low-carbon tourism consumption and implement the consumption mode of low-carbon tourism. Realize the organic combination of low-carbon concept, low-carbon participants and low-carbon practice<sup>[5]</sup>. Only when more tourists penetrate the concept of low-carbon tourism consumption into the whole tourism process and carry out the consumption mode of low-carbon tourism into the whole tourism process can it really be beneficial to improving the tourism environment and promoting the sustainable development of low-carbon tourism.

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