Low-carbon Tourism Traffic Behavior Research: The Case of the Residents in Wuhan

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Abstract. This paper, Wuhan residents as the research object, establishes variable system of influencing low-carbon tourism traffic behavior intentions, constructs influence factor model of low-carbon tourism traffic behavior intention. By descriptive analysis, reliability analysis, factor analysis, correlation analysis and variance analysis, verify the relationship and significantly effect between the variables and low-carbon tourism traffic behavior intention. The analysis results based on survey data show that: (1) low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control have the biggest positive impact on low-carbon tourism traffic behavior intention; (2) there is no significant difference between demographic variables of respondents and most of these factors.

1. Introduction

The State Council of the PRC "*Opinions on speeding up the development of Tourism*" clearly pointed out that the promotion of low-carbon tourism, vigorously promote energy saving and emission reduction [1]. The Ministry of transport of the PRC "*Guidance Opinions on Speed up the development of green low-carbon transportatio*n" integrate the construction of ecological civilization into the transportation development of all aspects and the whole process, speed up the building of a resource-saving and environment-friendly transportation industry, realize green transport development, development cycle, low carbon development. To Wuhan as a tourist city, the development of low-carbon tourism traffic is very necessary [2]. In recent years, the research results of low carbon Tourism literature. This paper takes Wuhan residents as research object, the behavior intention concept of low carbon tourism traffic, to explore the low-carbon tourism traffic behavior intention, enrich the research intention, provide a reference for the tourism traffic management departments and enterprises, and promote low-carbon tourism traffic development. In recent years, many research literature on low carbon tourism are emerging. This paper takes Wuhan residents as research object, introduces the concept of behavioral intention to low-carbon tourism traffic research, to explore the low-carbon tourism traffic behavior intention, enrich the research intention, provide a reference for the tourism traffic management departments and enterprises, and promote low-carbon tourism traffic development.

Scuttari, A. (2013) [3] introduces tourism mobility analysis is a tool available to policy-makers when developing integrated and effective sustainable transport and tourism policies. This method is an innovative tourism-traffic analysis based on survey techniques which allows the identification of tourism-related components and an estimate of their environmental impact on a destination.

HOU Yuanxin (2013) [4] analyzes research situation of the self-drive travel abroad, this paper discusses the influence factors of self-driving tourist traffic behavior. DENG Xin-fang (2013) [5] explores under the background of new traffic system, travel preferences and change of tourism consumption patterns, based on the questionnaire survey of self-drive tourists, through factor analysis, variance analysis, independent sample T test. GUAN Hongzhi (2015) [6] established the models of driving behavior in China and Beijing by Logit model, drew the conclusion that income is one of the

crucial factors, which have influence on the driving demand. WANG Zhao-feng (2014) [7] studies tourists' perception dimensionality, and its impact on tourists' destination satisfaction and behavioral intention in Zhangjiajie city by method of factor analysis. WANG Xiang-zheng (2012) [8] by discrete choice model achieved the characters of tourists were, gave the critical factors affecting traffic mode choice conducted in Beijing Olympic Park. WENG Biyun (2012) [9] examines the characteristics of tourist's choice behavior on travel model of urban tourism peripheral areas in Hangzhou based on the questionnaire survey.

HUANG Xueli (2013) [10] and HU Bing (2014) [11] reveal the driving factors, the formation mechanism and intention characteristics of low-carbon touristic living behaviors based on Theory of Planned Behavior. ZHANG Yan-fei (2013) [12] constructs structural equation model of tourist consumption habits, the consumption environment and the tourist's willingness to participate in low-carbon tourism in the development of low-carbon tourism of natural heritage. LIU Ya-ping (2013) [13] analyzed the differences between two different groups in cognitive degree of low-carbon tourism, willingness and their influencing factors as well as the differences between their willingness and their behavior by adopting logistic function model and crosstabs analysis.

LI Li (2012) [14] introduces the concept of accessibility, and analyzes the influence of urban low-carbon public transport to the accessibility of tourist attractions by means of spacious/time accessibility matrix. LIU Chang-sheng (2012) [15] establishes date enveloping approach (DEA) and stochastic frontier approach (SFA) for the evaluation of "Low-carbon Tourism" service providing efficiency, and makes an empirical analysis on environmental protection and transport service of "Low-carbon Tourism" in Zhangjiajie scenic areas. WU Chen (2012) [16] constructed the scenic area low carbon traffic pattern in term of vehicles site settings, road planning and operations management. LI Bo-hua (2012) [17] and DU Peng (2015) [18] builds calculation model of tourism transportation system carbon footprint, and reveals obvious differences in the structural characteristics of different types of traffic.

This paper reviews and summarizes the research literature of low carbon tourism to build the survey questionnaire of low-carbon tourism traffic behavior and intention influencing factors, and uses the factor analysis, correlation analysis and variance analysis to analyze the behavior attitude, subjective norm, perceived behavioral control and knowledge of low-carbon tourism traffic of Wuhan residents.

2. Questionnaire Design and Statistics of Demographic Characteristics of the Respondents

2.1 Questionnaire Design

This paper mainly analyze data collection by questionnaire survey. The questionnaire is divided into three parts: personal attribute information, survey of low-carbon tourism traffic behavior, survey of low-carbon tourism traffic behavior intention influencing factors. The first part is investigating the essential information of Wuhan residents. The second and the third part is measuring behavior intention and behavior intention influencing factors of low-carbon tourism for Wuhan residents by scale with Likert 7-point scale method.

Based on mature scale from the existing literature, this paper, with the research purpose, initially formed a questionnaire, and consult relevant experts, deleted and trimmed measurement items of questionnaire scale, and to adjust and optimize the questionnaire, build questionnaire scale for the study, the second part of the scale variables include the behavior attitude, subjective norm, perceived behavioral control and knowledge of low-carbon tourism traffic and tourism traffic consumption concept (Figure 1).

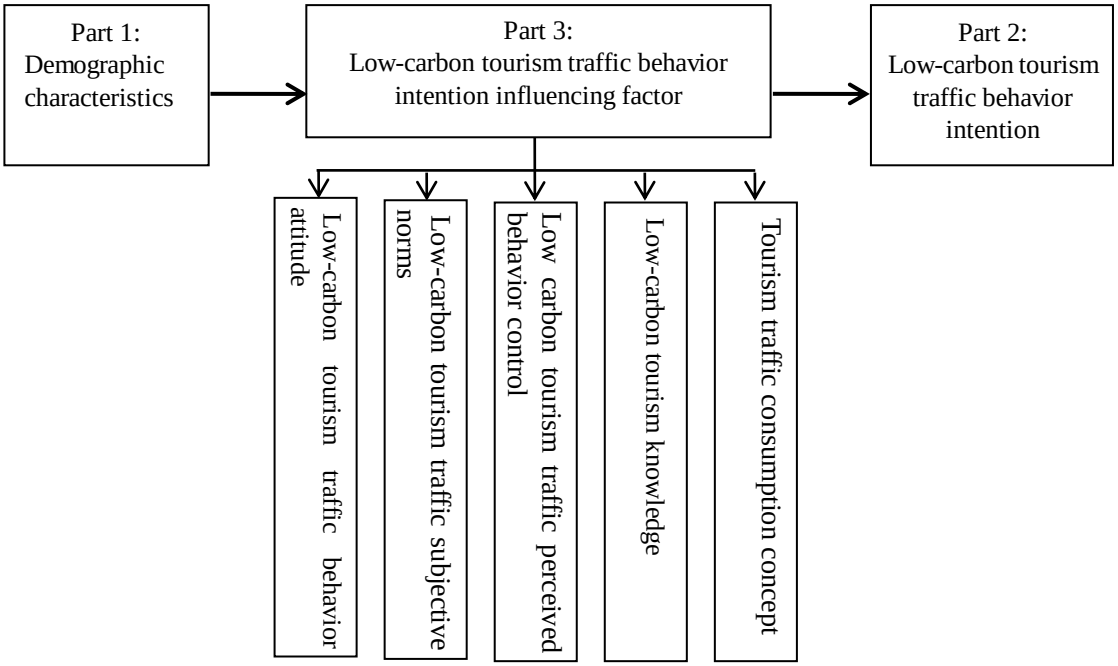

Fig.1 Variable scale structure of low-carbon tourism traffic behavior intention and influencing factor

2.2 Analysis on Demographic Characteristics of the Respondents

A total of 150 questionnaires were sent out, and the effective recovery of the questionnaire was 120, and the effective recovery rate was 80%. Descriptive statistical analysis was used to analyze the demographic characteristics of the respondents, including five basic characteristics of gender, age, education, monthly income, occupation.

Tab.1 The Statistics of Demographic Characteristics of the Respondents

Item	Type	Number	Percent	Item	Type	Number	Percent
Gender	Male	66	55.0	Occupation	Student	49	40.8
	Female	54	45.0		Civil servant	6	5.0
Age	Under 16 years	4	3.3		Institution staff	15	12.5
	16-25 years	64	53.3		Staff and workers of enterprise	16	13.3
	26-40 years	24	20.0		Medical Staff	7	5.8
	41-60 years	21	17.5		Professional	11	9.2
	Above 61 years	7	5.8		Unemployed or unemployed	9	7.5
Education	Bachelor	14	11.7		Others	7	5.8
	Undergraduate	59	49.2	Monthly Income	No income	52	43.3
	Junior college education	17	14.2		3000 yuan and below	17	14.2
	High school	17	14.2		3001 - 5000 yuan	26	21.7
	Below high school	13	10.8		5001 - 7000 yuan	14	11.7
					7001 yuan and above	11	9.2

Table 1 shows the demographic characteristics of the sample: 55% of men, 45% of women; the main research object in 16-60 years Wuhan residents, 16-25 years residents accounted for 53.3%, 26-40 years residents accounted for 20%, 41-60 years residents accounted for 17.5%. Because Wuhan is the largest number of college students in China, the highest proportion of students to participate in the survey accounted for 40.8%; Institution staff and workers of enterprise also accounted for a large part, respectively12.5% and 13.3%. Education level of the respondents is mainly above high school, accounting for 89.2%, below high school education level accounted for only about 10.8%. No

economic income of the respondents accounted for the majority, mainly students.

3. Reliability analysis of questionnaire scale data

3.1 Reliability analysis of scale

In this paper, the static data is used to test the internal reliability of the scale. Cronbach alpha coefficient is usually used to express the test values of the intrinsic reliability, the higher the value of Cronbach alpha, the higher the reliability. Most scholars agree that the value of Cronbach alpha is greater than 0.7, and the reliability is very good, the range from 0.5 to 0.7, the reliability can be accepted, and the value is lower than 0.5, the reliability refuse to be accepted. In this study, we need to test the reliability of the questionnaire scale.

Tab.2 Reliability analysis of the whole and each variable

Whole and variable	Overall questionnaire	Overall influence factors	Behavior intention	Behavior attitude	Subjective norms	Perceived behavior control	Tourism traffic consumption concept	Low-carbon tourism knowledge
Cronbach's Alpha	.924	.913	.762	.852	.861	.732	.802	.852
Number of items	30	27	3	7	7	6	3	4

As shown in Table 2, the total items of questionnaire scale is 30, Cronbach alpha value is 0.924, of which Low-carbon tourism traffic behavior intention influencing factor scale has 27 items, Cronbach alpha value is 0.913, Cronbach alpha value of the above both scales are higher than 0.9. Cronbach alpha value of the variables, such as behavioral intention, behavioral attitude, subjective norm, were all the range from 0.7 to 0.9, which indicated that the reliability of the questionnaire scale was high.

3.2 Scale validity analysis

This paper uses factor analysis to verify the construct validity of the questionnaire scale by KMO value and Bartlett spherical test. The purpose of this study is to test whether the questionnaire scale is suitable for factor analysis. The value of KMO is used to test the correlation and partial correlation between scale variables, KMO value more than 0.9, very suitable for factor analysis; KMO value range from 0.8 to 0.9, suitable for factor analysis; KMO value range from 0.8 to 0.7, generally suitable; KMO value range from0.6 to 0.7, minimally suitable for factor analysis; KMO value less than 0.6, not suitable for factor analysis. The P value is less than the given significance level, the scale is suitable for factor analysis.

Tab.3 Validity analysis of variable

		Behavior intention	Behavior attitude	Subjective norms	Perceived behavior control	Tourism traffic consumption concept	Low-carbon tourism knowledge
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.738	.791	.840	.775	.706	.728
Bartlett's Test of Sphericity	Approx. Chi-Square	93.130	399.053	403.412	133.390	114.017	236.495
	df	3	21	21	15	3	6
	Sig.	.000	.000	.000	.000	.000	.000

As shown in Table 3, KMO value of low-carbon tourism traffic behavior intention scale is 0.738, and KMO values of 5 variable scales of low-carbon tourism traffic behavior intention influencing factor are greater than 0.7. Sig. of 6 variables the questionnaire scale of scale is 0.000, which shows there is a correlation between measurable variables of low-carbon tourism traffic behavior intention and influencing factors of it, both are suitable for factor analysis.

3.3 Scale factor analysis

In this paper, the exploratory factor analysis was used for the variables of questionnaire scale, the

principal component analysis method was used to extract the factors, and the maximum variance rotation method is selected to perform orthogonal rotation. Based on the principle that the eigenvalue greater than 1 is extracted, 6 factors is obtained. According to the factor load split items after the different items processed in the orthogonal rotation, and then the precipitation factor will be named. The above shown in table 4.

Tab.4 Factor analysis results

Extraction Factor	Item	Factor loading	Initial Eigenvalues	Variance Contribution	Cumulative Explained
Behavior intention	B2.1	.862	2.048	68.280	68.280
	B2.2	.821			
	B2.3	.795			
Behavior attitude	A2.1	.826	3.777	53.952	53.952
	A2.2	.821			
	A2.3	.778			
	A2.4	.749			
	A2.5	.699			
	A2.6	.643			
	A2.7	.592			
Subjective norms	R2.1	.868	3.975	56.781	56.781
	R2.2	.838			
	R2.3	.807			
	R2.4	.772			
	R2.5	.760			
	R2.6	.689			
	R2.7	.469			
Perceived behavior control	C2.1	.733	2.600	43.339	43.339
	C2.2	.714			
	C2.3	.691			
	C2.4	.675			
	C2.5	.562			
	C2.6	.551			
Tourism traffic consumption concept	S2.1	.868	2.156	71.864	71.864
	S2.2	.851			
	S2.3	.823			
Low-carbon tourism knowledge	T2.1	.863	2.782	69.556	69.556
	T2.2	.850			
	T2.3	.841			
	T2.4	.780			

4. Correlation analysis and variance analysis of scale data

4.1 Correlation analysis

In this paper, the 30 interrelationship items reduce to 6 factors by factor analysis, then analyze the relevance between the 6 factors and low-carbon tourism traffic behavior intention by Pearson simple correlation analysis method.

Tab.5 Correlation analysis of influencing factors

		Behavior intention	Behavior attitude	Subjective norms	Perceived behavior control	Tourism traffic consumption concept	Low-carbon tourism knowledge
Behavior intention	Pearson Correlation	1	.804**	.773**	.521**	-0.049	.432**
	Sig. 2-tailed)		0	0	0	0.597	0
Behavior attitude	Pearson Correlation	.804**	1	.827**	.524**	-0.056	.357**
	Sig. 2-tailed)	0		0	0	0.545	0
Subjective norms	Pearson Correlation	.773**	.827**	1	.659**	0.077	.401**
	Sig. 2-tailed)	0	0		0	0.404	0
Perceived behavior control	Pearson Correlation	.521**	.524**	.659**	1	.307**	.531**
	Sig. 2-tailed)	0	0	0		0.001	0
Tourism traffic consumption concept	Pearson Correlation	-0.049	-0.056	0.077	.307**	1	.236**
	Sig. 2-tailed)	0.597	0.545	0.404	0.001		0.01
Low-carbon tourism knowledge	Pearson Correlation	.432**	.357**	.401**	.531**	.236**	1
	Sig. 2-tailed)	0	0	0	0	0.01	

**. Correlation is significant at the *.01 level (2-tailed)*.

Table 5 shows that the value of Pearson correlation coefficient between low-carbon tourism traffic behavior intention and one of the four including low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control and knowledge respectively were 0.804, 0.773, 0.332. Sig. is 0.000 less than 0.01, which express significantly at the 0.01 level. Correlation between low-carbon tourism traffic behavior intention and one of the four including low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control and knowledge is significant at the 0.01 level.

However, the Pearson correlation coefficient between low-carbon tourism traffic behavioral intention and tourism traffic consumption concept is -0.049, which indicates that there is a negative correlation between them. Sig. is 0.597 greater than 0.05, which shows that correlation between them is not significant at the 0.05 level.

4.2 Variance analysis

One-factor analysis of variance was used to test F, and then according to the significance coefficient of the F value of to determine the degree of the impact of the age, education, monthly income and occupation on the factors.

From table 6, different education respondents on low-carbon tourism traffic behavior intention and behavior attitude exists significant difference, different occupation respondents on low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control and knowledge exists significant difference, the same to different monthly income on low-carbon tourism traffic behavior attitude and knowledge. The Sig. of the F value for most of the other demographic variables on each factor was greater than 0.05, indicating that demographic variables of the majority of respondents have no

significant impact on each factor.

Tab.6 One-factor analysis of variance

Measurement factors	F					Sig.				
	Gender	Age	Education	Occupation	Monthly Income	Gender	Age	Education	Occupation	Monthly Income
Behavior intention	.907	.931	1.195	1.071	1.198	.645	.607	.024	.395	.243
Behavior attitude	.794	.698	1.306	1.635	2.395	.723	.801	.038	.255	.041
Subjective norms	.998	.485	1.131	2.227	1.506	.630	.868	.584	.031	.483
Perceived behavior control	.585	.842	1.095	2.327	.859	.847	.680	.541	.003	.669
Tourism traffic consumption concept	1.081	.951	.728	1.113	.903	.389	.582	.889	.348	.657
Low-carbon tourism knowledge	1.475	1.276	.944	2.162	1.599	.093	.205	.595	.005	.055

5. Conclusion

This paper makes an empirical study on the relationship among low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control and knowledge, tourism traffic consumption concept and low-carbon tourism traffic behavior intention, and obtained low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control and knowledge, tourism traffic consumption concept, tourist traffic consumption is how to influence low-carbon tourism traffic behavior intention.

Low-carbon tourism traffic behavior attitude, subjective norm, perceived behavior control have the biggest positive impact on low-carbon tourism traffic behavior intention. If the higher and the positive evaluation of tourism traffic low-carbon behavior, the more correct understanding of the moral standard, the more confident in their ability to travel, the stronger cognition, low-carbon tourism traffic behavior intention tourists follows is greater.

From the aspects of gender, age, education, income and occupation, by investigating the relationship among demographic variables of respondents, low-carbon tourism traffic behavior intention and influencing factors of that, there is no significant difference between demographic variables of respondents and most of these factors.

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