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Choice behavior of tourism destination and travel mode: A case study of local residents in Hangzhou, China

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ABSTRACT

The social and economic growth as result of promoting the rapid development of tourism in China has brought tremendous pressure on the urban transportation systems. Research of travel behavior concerning the characteristics of tourists has provided effective information for transportation planning. Due to different city plans, public transportation system design, car parking design and management, etc., the local situation in developed countries differs from the counterpart in China. However, little research has studied the factors influencing the choice of travel destinations in tourism. The research aims to study the tourism destination and mode choice behavior of tourists and provides suggestions to improve tourism transportation service system. An online questionnaire survey is used to collect data including the travel characteristics and personal attributes of local tourists in different holidays in Hangzhou, China. A multinomial logit model is constructed with the trip destination set as the dependent variable. Results show that age, residential type, car ownership, companion type and holiday length have a significant impact on destination choice. To determine what influences modal choice for such trips, a second logit model is established with travel mode set as the dependent variable with the explanatory variables of age, gender, companion type, car ownership, holiday length and travel destination found to be significant. The results demonstrated that people aged 26 to 44 prefer suburban areas, and they are the main group driving to their travel destination. Public transport use frequency decreases when the destination is located outside of the main tourist area. Finally, suggestions have been proposed to mitigate the congestion and parking problem based on model analysis from the perspective of the bus line setting, transfer improvements, and the policy to limit cars, respectively.

1. Introduction

In transition countries such as China, traveling is no longer a luxury activity. As a basic activity to improve and enrich people's daily leisure and entertainment, it has largely come into the public life as it did in countries who had greater wealth in the 20th century. Along with this expanding leisure activity, the problems of tourism transportation have been drawn more and more attention in China. Western countries have witnessed this problem previously and various responses can be seen. For example, the construction of the Bronx River Parkway in New York in 1923 was a manifestation of the integration of tourism transportation into road traffic planning (Lu, 2009). By the 1990s, tourism transportation planning occupied an important position in the transportation planning of the United States. The German federal government also set up the summer holiday traffic forecast information system with traffic signs around tourist site, starting in 1978 (Huang et al., 2007). With the continuous development of the social economy in China and other such countries, the number of private cars and tourists increase year by year, which indicates the growth in demand for tourism transportation and a higher development requirement of infrastructure. It is difficult to ensure a highly efficient transport service when the basic transport infrastructure supply fails to meet the need demand of tourist traffic. In order to provide advice for the establishment of tourism planning, tourism traffic information platforms, and tourism traffic

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service systems, it is necessary to investigate, analyze and summarize the behavioral characteristics of tourists from the perspective of travel demand.

In the Case of Hangzhou, it received a total of 184.03 million tourists in 2018, with a year-on-year increase of 13%. The total tourism revenue reached 358.9 billion Yuan ($51.11 billion, with a year-on-year increase of 18%), while foreign exchange revenue from tourism reached $3.83 billion (a year-on-year increase of 8.1%) (*2018 Hangzhou Statistical Bulletin on National Economic and Social Development*, 2020). As the capital of Zhejiang province and the central city of the Yangtze River delta city cluster, Hangzhou is a major tourist city in China. The increasing number of tourists not only promotes the continuous prosperity of Hangzhou's tourism and culture industry, but also brings great pressure to Hangzhou's transportation system. Studying the travel behaviors of tourists may be an efficient way to help put forward several advices for improving the system.

Considerable research exists on tourists' travel behavior. As for the destination choice, much research focus on international tourism. Factors such as cultural distance (Bi and Lehto, 2018), familiarity (Lee and Tussyadiah, 2012), demographic characteristics (Xiang et al., 2017) and trip expenditure (Guillet et al., *2011*) are found to have influence on outbound tourists' destination choice. Keshavarzian et al. (Keshavarzian and Wu, 2020) found that tourists destination choice behavior can be affected when the airline ticket information is presented before the tourism features, by establishing a multinomial logit model based on a Stated Preference (SP) choice experiment. Topics on travel mode decisions have also been chosen by great amount of relevant research. Some scholars found that factors related to the physical environment, such as land use, population density (Ding et al., 2017), travel activity selection (Krygsman et al., 2007) and random regret minimization psychological mechanism (Chorus et al., 2008) exert varying degrees of influence on the decision of travel mode. Mars et al. (2018) stated that limitations, changes in original locations, and new activity locations are determinants for rescheduling travel mode choices (Mars et al., 2018). In 2019, based on Support Vector Machine classification technique, Pirra proposed a new approach to recognize travel mode choice (Pirra and Diana, 2019). Zhang et al. (Zhang et al., 2017) selected three scenic spots in Beijing for questionnaire survey, and used the multinomial logistic model to show the factors including age of the tourists, cars ownerships, monthly income, the number of peers and the type of companions have significant impact on the choice of the tourists' travel mode. For the methodology, Logit model is widely used in the tourism traffic (Guan et al., 2005), especially in the choice behavior of destination and travel mode, which also can be seen in the literature reviewed above.

Although public transport and private cars are often taken as a focus in such research, mode choice of shared mobility has also been scrutinized. Chen et al. (Chen et al., 2017; Chen et al., 2018) ran two intercept surveys including scenic spots to shed light on the characteristics of bike-sharing users and found that leisure is one of the main reasons of that mode's selection. Campbell et al. (Campbell et al., 2016), on the other hand, analyzed the factors influencing the choice of shared bicycles and shared electric bikes, pointing out that e-bikeshare choice is more sensitive to user heterogeneities.

In tourism research, the choice of trip chaining is also an important area of research as people often have a series of trips within a day. Zhao and Guan (2012) used travel attributes and personal attributes as influencing factors to conduct multiple logit modeling of trip chaining choice (Zhao and Guan, 2012). The results show that career, age, travel time, familiarity with scenic spots, local tourists or not and how to arrange travel activities all have significant influence on trip chaining choice. In terms of the decisional order between mode choice and trip chain decisions, Islam et al. (Islam and Habib, 2012) used a 6-week travel diary collected in Thurgau, Switzerland, to unravel the relationship between trip chaining and mode choice, reporting that mode choice decision precedes the trip chaining decision for non-work trips on weekdays. Finally, Yang et al. (2016) compared the relationship of travel mode and trip chaining choices between holidays and weekdays (Yang et al., 2016) and found that in holiday travel people tend to choose the travel mode before the trip chaining which means a whole travel schedule including not only scenic spots but also shop stores and restaurants.

The former research provides solid foundation both theoretically and methodologically. However, most of the research on destination selection based on tourists' motivation preferences, psychological factors (Yoo et al., 2018), marketing, business-related added value and tourism management. Little research has taken tourists' travel behavior as a starting point, such as who to travel with, when to travel and how to travel, which may provide a lot of useful information for tourism transportation system improvement. In previous studies, domestic research on travel behavior generally focused on the choice of travel mode and trip chain. The topic of destination choice still needs to be explored greatly. In addition, the local situation in developed countries differs from those in transition countries, such as China. So, it is necessary to scrutinize through the specific travel behavior and mode choice in the field of tourism in Chinese cities.

This study aims at investigating choice behavior of tourism destination and travel mode, summarizing and analyzing the travel characteristics of tourists, identifying the factors influencing the choices and establishing the relationship among personal attributes, travel attributes and choice behavior. Suggestions could be made to improve tourism transport services according to useful information provided by the research results and findings. The site of the research is additionally meaningful because most of the previous research in transition countries has focused on mega-cities such as Beijing, the Chinese capital. Research on smaller centers is needed as mega-cities are an exception. In this research, the types of holidays are taken into consideration to provide basic information for different transportation policies in different periods of time.

The remainder of this paper is organized as follows: the following section explains the online survey design and sample description; the third and fourth sections introduce the multinomial logistic models for destination choice and for travel mode respectively. The final part of the article contains the discussion and conclusion.

2. Survey and sample description

In this study, holidays are divided into three types: two days, three days, and seven days. The types of questionnaires are divided into A, B, and C, which correspond to different types of holidays. Type A is for two days, referring to weekends. Type B is for three days, which refers to China's Ching Ming Festival and the May Day holiday, while type C is for seven-day holidays, which refers to the China National Day holiday in this study. To allow for comparison, the survey questions of the three types are the same. The participants responded to the relevant survey and answered questions including personal attributes, travel characteristics about the recent trip experience on corresponding holiday and satisfaction for parking. After submitting the answers, they received a reward of one Chinese Yuan.

The questionnaire was published on the Wenjuanxing website,[1] where data were collected online from April 5th to May 10th, 2019. A total of 1140 questionnaires were collected (380 type A, 575 type B, 185 type C). Among them, 1120 questionnaires (374 type A, 565 type B, 181 type C) were eligible for this study.

The online survey was adopted based on the following considerations:

[1] (https://www.wjx.cn/jq/37631572.aspx, https://www.wjx.cn/jq/38058014.aspx, https://www.wjx.cn/jq/37627797.aspx)

a. Flexible, simple, and easy to operate. Many questionnaires can be completed in a short period of time, and feedback is real-time. Chinese popular application platforms such as QQ, WeChat, local tourism BBS were all used to introduce the survey and spread links to websites in this research.
b. Save manpower and time costs.
c. Ensure high data accuracy and avoid data entry errors.
d. Without face-to-face psychological pressure, respondents will give a more realistic answer to relatively private questions like monthly income.
e. Wide range of data sources.

The sample statistics are listed in Table 1 including personal attributes and travel characteristics of the survey participants. The respondents are residents living in Hangzhou. Three categories are set as "temporary resident", "long-term resident" and "non-local student". Long-term residents are people who are registered citizens in Hangzhou. Temporary residents refer to migrants who work in Hangzhou to make a living. Non-local students are people who study in the universities of Hangzhou from other cities.

Three destination choices are listed for respondents including "West Lake District", "other districts in Hangzhou" and "places outside of Hangzhou". The West Lake is a unique and representative landmark in Hangzhou with a large flow of tourists, shared by local and non-local tourists. The other scenic spots around the West Lake including Song Dynasty Town, Xixi Wetland Park, several national parks etc. also attract a large number of tourists in the influence of the West Lake. All of these scenic spots including the West Lake are located in the same district, that is, the West Lake District, so they are grouped as one category in the questionnaire as marked in Fig. 1. Moreover, the West Lake District is also the focus of this research. The "other districts in Hangzhou" mainly include the suburbs of Hangzhou and "places outside of Hangzhou" refers to any other cities.

Table 1
Sample statistic of tourist characteristics.

Variable	Category	N	Percentage %
Gender	Male	569	50.8
	Female	551	49.2
Age	25,or younger	475	42.4
	26–34	350	31.3
	35–44	203	18.1
	45,or older	92	8.2
Monthly income (RMB)	0–3000	425	37.9
	3000–6000	204	18.2
	6000–10,000	232	20.7
	10,000–20,000	165	14.7
	20,000,or more	94	8.4
Car ownership	No car	601	53.7
	At least one	519	46.3
Resident type	Temporary resident	146	13.0
	Long-term resident	555	49.6
	Non-local student	419	37.4
Destination choice	West Lake District	418	37.3
	Other districts in Hangzhou	371	33.1
	Places outside of Hangzhou	331	29.6
Holiday length	Two days	374	33.4
	Three days	565	50.4
	Seven days	181	16.2
Companion type	Family	513	45.8
	Friend	367	32.8
	Group	71	6.3
	Alone	169	15.1
Whether accompanied by the old	No	966	86.3
	Yes	154	13.8
Whether accompanied by children	No	754	67.3
	Yes	366	32.7
Travel mode	Walk	48	4.3
	Bike or e-bike	126	11.3
	Bus	129	11.5
	Subway	156	13.9
	Automobile	430	38.4
	others	231	20.6

Note: Sample size = 1120, RMB = Chinese Yuan.

Four categories of companion type are used: "family", "friend", "group" and "alone". "Group" refers to traveling with both family and friend, or traveling with tour group. In other words, "group" refers to mixed structure of companion.

The two questions, whether accompanied by the old or whether accompanied by children, are set to know whether there are children or the old on their journey. The old are defined as people over 60 according to Chinese law. If the respondent is older than 60, the answer is also "yes".

Among the categories of travel mode, e-bike refers to electric bike. "Others" mainly contain modes of long-distance type such as train, high-speed train and airplane.

In the survey, the gender ratio of respondents is balanced. From the resident type, the largest proportion of respondents is made up of long-term residents, which account for nearly half of the total. Non-local students make up 37.4% of the whole sample, explaining why the proportion of people under the age of 25 and those with a monthly income below 3000 Chinese Yuan account for a large percent to some extent. About half of respondents have at least one car.

Travel characteristics of tourists contain destination choice, holiday length, companion condition and travel mode. There are some views about the parking from people who drive to travel destination.

Most of the respondents reported that they travel with their families more often than with friends. The proportion of respondents with a child is higher than those accompanied by the old. Percentages of the three categories of holiday length depended on the respective diffusion of three types of questionnaires.

The part about parking problems of the survey for people who chose to drive their own cars (results not in the table) find that 74.9% of people are dissatisfied with parking. Parking is a large downside of private vehicle use as it requires a large amount of space to store vehicles during visits that are conducted on infrequent bases. Among them, 80.4% reported a shortage of parking spaces. High parking fee accounts for 37.6%. The problem of unclear signs such as limited access to information, and the long walking distance after parking account for 28.9% and 23.6% respectively. Less people are dissatisfied with vehicle safety and management attitude.

All statistical analyses below are based on 1020 observations after data cleaning was conducted.

3. Multinomial logit model for destination choice

To find the relationship between destination choice and other factors, a multinomial logit model is constructed with the destination as the dependent variable. Table 2 shows the variables and their labels. The tourism destination choice for local residents in Hangzhou is the dependent variable. The dependent variable has three possibilities: the West Lake District, Other districts in Hangzhou, places outside of Hangzhou.

The probability of choosing the West Lake District, other districts in Hangzhou, and places outside of Hangzhou are set as P_1, P_2, P_3. Then the following two regression equations (Eq. 1) are formed (P_2 as a reference):

$$\begin{aligned} logit\frac{P_1}{P_2} &= \alpha_0 + \beta_j A_j + \beta_g G + \beta_k R_k + \beta_c CAR + \beta_m CO_m + \beta_n H_n \\ logit\frac{P_3}{P_2} &= \alpha_1 + \beta_j A_j + \beta_g G + \beta_k R_k + \beta_c CAR + \beta_m CO_m + \beta_n H_n \end{aligned} \quad (1)$$

where P1 + P2 + P3 = 1, β_j, β_g, β_k, β_c, β_m, β_n are the estimated parameter

Fig. 1. The West Lake district in Hangzhou.

Table 2
Variables and labels in multinomial logit model for travel destination.

Variable		Value label
Y_i	Travel destination	i: West Lake District, other districts in Hangzhou, outside of Hangzhou
A_j	Age	j: 25 or younger, 26–34, 35–44, 45 or older
G	Gender	1 = male, 0 = female
R_k	Resident type	k: temporary resident, long-term resident, non-local student
CAR	Car ownership	1 = at least one car, 0 = no car
CO_m	Companion type	m: family, friend, group, alone
H_n	Holiday length	n: two days, three days, seven days

of age, gender, resident type, car ownership, companion type, holiday length, α_0, α_1 = constant in each equation.

Similar to the stepwise regression approach for linear models, likelihood ratio tests are performed on the inclusion versus exclusion of each variable individually, to decide whether a given variable should be retained in the model. If sig. <0.05, the effect of the independent variable on the destination choice is statistically significant. Conversely, if sig. >0.05, then the independent variable is considered to be weak for the destination choice and should be discarded.

As significance of gender (0.226) has little effect on destination choice, age, resident type, car ownership, companion type and holiday length all have a significant impact on destination choice. Therefore, gender is removed and multinomial logit model is determined.

Multinomial logistic regression must meet with the Irrelevant Alternatives (IIA) assumption. The IIA assures that the probability ratio of the original choices remains the same in the case of any choice selection such as removing an alternative or adding an alternative (*Li, 2011*). Small-Hsiao is an approach to test IIA (Thrane, 2015). Hypothesis to be tested is that odds are independent of other alternatives. When destination1 is omitted, $p = 0.2625$. When destination 2 is omitted, $p = 0.8625$. When destination 3 is omitted, $p = 0.4666$. The results of test show that IIA is not violated.

The parameter estimation is performed through the iterative maximum-likelihood algorithm. The interpretation coefficient and significance are listed in Table 3. The reference category of destination choice is "other districts in Hangzhou". The last category in each factor is set as the reference for comparison. The results of estimated parameters deserve analysis only if the significance meets the requirements.

Compared to the benchmark model (constant only), the full model with all significant variables reduces −2 log likelihood from 831.946 to 644.380. Though pseudo r-squares shown in Table 3 are not high, the significance of classical Pearson and deviance goodness-of-fit tests are 0.547 and 0.122, higher than 0.05. It indicates that a statistically significant amount of information has been explained by the model.

When B is a positive number, it means that the ratio of probabilities (P_1/P_2 in the column "West Lake District", P_3/P_2 in the column "places outside of Hangzhou") in this category is higher than for the reference category in the same factor. A negative number means lower ratio of probabilities.

The ratio (P_3/P_2) of people aged 26–34 is obviously lower than that of people over 45 years old, and the B-value is −0.889. It is caused by the

Table 3
Results of multinomial logistic regression for travel destination.

Independent variable	B(destination[a])	
	West Lake district	Places outside of Hangzhou
Age[b]		
25 or younger	−0.442	−0.514
26–34	−0.463	−0.889**
35–44	−0.066	−0.511
Resident type[c]		
Temporary resident	−0.702***	−0.640**
Long-term resident	−0.992***	−1.068***
Car ownership[d]		
No car	0.527*	−0.059
Companion type[e]		
Family	−0.193	0.150
Friend	−0.229	−0.651**
Group	−0.064	−0.404
Holiday length[f]		
Two days	−0.226	−1.726***
Three days	−0.507**	−0.657***
Constant	1.283**	2.133***
−2 Log Likelihood (intercept)	831.946	
−2 Log Likelihood (full model)	644.380	
Nagelkerke's R-squared	0.154	
McFadden's R-squared	0.174	
Cox–Snell's R-squared	0.077	

Note: Sample size = 1020. B = interpretation coefficient.
* Significance at α = 0.1.
** Significance at α = 0.05.
*** Significance at α = 0.01.
[a] "Other districts of Hangzhou" = base category.
[b] >45 = reference category.
[c] Non-local student = reference category.
[d] At least one car = reference category.
[e] Alone = reference category.
[f] Seven days = reference category.

special preference to "other parts of Hangzhou" in the former age group. 42.9% of people aged 26–34 choose to travel to other parts of Hangzhou except the West Lake, and 25.1% choose to travel out of Hangzhou, while 31.5% of people over 45 choose the other districts in Hangzhou and 39.1% for out of Hangzhou in our survey.

However, why do people over 45 prefer to go outside Hangzhou and people aged 26–34 tend to stay in Hangzhou except the West Lake? Examining the information of the two age groups, we can find a high salary (over 20,000) for people over 45 accounts for 20.7%, while only 8.3% of people aged 26 to 34 have a higher salary than 20,000. This may be related to the better living conditions of the elderly who can fill in the questionnaire online. In addition, contrary to the older age group, time and energy are at a premium for those aged 26 to 34, who are on their way up the career ladder. Further, long-distance travel may be considered too luxurious, and the West Lake too familiar for them.

Non-local students are most likely to choose the West Lake district or areas outside Hangzhou, followed by temporary residents, and long-term residents at the last. B-values in the categories of resident type are all negative, with "long-term resident" lower than "temporary resident" in both destination choice column. Other district of Hangzhou is the first choice for long-term resident as the West Lake is likely too familiar and crowded.

When traveling inside city, the West Lake seems to be a better choice for car-free people. The significance is lower than 0.01, and the B-value (0.527) is positive, which explains in different ways that the public transportation of West Lake is good.

In companion type, only the category "go with friend" in the second column is statistically significant. The B-value is 0.651. Extracting the tourist information of two destinations ("other districts in Hangzhou" and "places outside of Hangzhou"), it shows that the two destinations have similar distribution of resident type. Students account for about 65%, which may be caused by the uneven diffusion of questionnaires. The regression results are mainly influenced by students, who are less likely to go to other parts of Hangzhou alone than to travel outside Hangzhou alone.

The B-value of holiday length follows common sense. The longer the holiday, the greater tendency to choose to go out of Hangzhou.

4. Multinomial logit model for travel mode

In order to find the factors influencing the travel mode choice, a multinomial logit model can be similarly constructed with the travel mode choice as the dependent variable. The model only focuses on the four common travel modes inside Hangzhou, and a total of 698 valid samples are obtained.

As mentioned in the sampling analysis, travel mode is for the recent trip experience of resident tourists. The variables and labels in multinomial logit model are listed in Table 4. The Forward approach was used to select the relevant variables. There are no factors in the model at the beginning. Then the most significant factor is added to the model at each step until any factor left outside the model do not have significant statistical effects after being added to the model. The results of model likelihood ratio test are listed in Table 5.

At last, six factors are added into the model, including age, gender, companion type, car ownership, holiday length and destination, which have significant influence on the choice of travel mode. Changing these factors, the choice will change accordingly.

Adding the factors to the model help to reduce −2 log likelihood from 1175.034 to 728.191. The pseudo r-square of 'Cox and Snell' and 'Nagelkerke' are respectively 0.473 and 0.509, It indicates that the fit of the model is considered acceptable-to-good within the range of typical value found in travel behavior research.

After regression, the interpretation coefficient and significance are listed in Table 5. The reference category of travel mode choice is "automobile". The principle of B-value is consistent with the previous model.

Corresponding to age, column "bus" is most significant. B-values of 25 and younger, 26 to 34, 35 to 44 are all negative, respectively, which are −1.196, −1.813 and − 1.023. The coefficient reflects the choice ratio of bus and automobile. It is obvious that people aged from 26 to 34 are less likely to use the bus, and that older people are the most likely to use the bus. Actually, people aged from 26 to 44 are the most likely to drive. Older people may avoid driving because of their physical issues. Further, discount fares exist for this older age group and other study in China suggests that elder people choose the bus first rather than subway as going up and down the stairs in subway stations is a hindrance especially for the elderly (Pi, 2018).

For men, the B-value in column "bus" is −0.708. This suggests that men are more likely than women to choose to drive themselves than to take the bus.

With automobile as the reference, the possibility of choosing bike or

Table 4
Variables and labels in multinomial logit model for travel mode.

Variable		Value label
Y_i	Travel mode	i: bike or e-bike, bus, subway, automobile
X_j	Age	j: 25,or younger, 26–34, 35–44, 45,or older
G	Gender	1 = male, 0 = female
R_k	Resident type	k: temporary resident, long-term resident, Non-local student
CAR	Car ownership	1 = at least one car, 0 = no car
CO_l	Companion type	l: family, friend, group, alone
H_m	Holiday length	m: two days, three days, seven days
O	Whether accompanied by the old	1 = yes, 0 = no
CH	Whether accompanied by children	1 = yes, 0 = no
T	Tourism destination	1 = West Lake District, 0 = Other districts in Hangzhou

Table 5
Results of Multinomial Logistic Regression for Travel Mode.

Independent variable	B (traffic mode choice[a])		
	Bike or e-bike	Bus	Subway
Age[b]			
25 or younger	−0.661	−1.196**	0.747
26–34	−1.042*	−1.813***	0.011
35–44	−0.905	−1.023**	−0.551
Gender[c]			
Male	0.023	−0.708***	−0.292
Companion type[d]			
Family	−2.306***	−1.117**	−1.346***
Friend	−0.941**	−0.149	−0.236
Group	−1.480***	−2.025***	−1.048*
Car ownership[e]			
No car	2.101***	2.654***	2.205***
Holiday length[f]			
Two days	−0.710*	−0.266	0.145
Three days	−1.425***	−0.608	0.265
Destination choice[g]			
West Lake District	0.784***	1.042***	0.606**
Constant	0.894	0.045	−1.502*
−2 Log Likelihood (intercept)	1175.034		
−2 Log Likelihood (full model)	728.191		
Nagelkerke's R-squared	0.509		
McFadden's R-squared	0.242		
Cox–Snell's R-squared	0.473		

Note: Sample size = 698. B = interpretation coefficient.
* Significance at α = 0.1.
** Significance at α = 0.05.
*** Significance at α = 0.01.
[a] "Automobile" = base category.
[b] >45 = reference category.
[c] Female = reference category.
[d] Alone = reference category.
[e] At least one car = reference category.
[f] Seven days = reference category.
[g] Other districts of Hangzhou = reference category.

e-bike when traveling alone is higher than other companion type. The B-value of family (−2.306) suggests that people are least likely to choose bike or e-bike when traveling with family. Traveling with friends have less impact on bicycle choice than traveling with family as the B-value of friends is −0.941. For families, car travel is the most likely, with all modes having a negative B-value in relation to it. This is perhaps because they can arrange their trips in a more flexible way.

People without private cars are more willing to use bike, bus or subway. This follows common sense, as they would need to rent or take a taxi if they want to use automobile making its use-cost more evident. The B-values of no car in the three choice columns are 2.101, 2.654 and 2.205. These higher values compared with other factors are consistent with the result of other researches in China (and elsewhere) that car ownership is one of the most important predictors of travel mode choice (He and Thøgersen, 2017). As the value for "bus" is the largest, it would appear that when people own a car, the tendency to switch from bus to car is the greatest. This maybe implies that the bus still has space for improvement, because of the change in attitude toward bus after owing a private car. A 2015 survey of Hangzhou public transport satisfaction seems to support the point. The survey shows people were significantly more satisfied with the subway than with bus and the authors puts forward some suggestions such as adding bus lines to improve bus service quality (Lu and Liu, 2016).

When the destination is West Lake, its B-value is positive in the three columns, respectively 0.784, 1.042 and 0.606. This shows that compared with the other districts in Hangzhou, people prefer public transportation or bike when they go to West Lake. When being out of West Lake, this tendency will weaken. The West Lake District is both a landmark and a scenic spot in Hangzhou with a high flow of people, as such the public transportation infrastructure is highly developed, as it attracts large numbers of tourists every day. However, bus connections between the main urban area and the suburbs are weak.

5. Conclusions and discussions

This paper answers the question, "What are the factors influencing the tourism destination choice and the mode choice?" Related factors including travel characteristics, personal attributes in different holidays divide tourists into different groups, and choice behaviors of different tourists for different destinations and travel mode are analyzed, based on the descriptive analysis and the multinomial logistic regression. Following the research findings, advice is proposed on how to improve the transportation system for tourism.

For the travel characteristics, the travel modes mainly combined with non-motorized vehicles, buses, metro system and automobiles, and are relatively balanced in the West Lake area. There are 75% of tourists driving to travel destination are not satisfied with the parking situation. Limited parking spaces is one of the most focused problems. However, this is a common problem for people using cars where the space required to store the vehicle is quite significant, but they are unwilling to pay for it. This could be used as a policy leverage tool to convince people to travel by more sustainable modes that reduce congestion and spatial impact on the tourist destinations. The logit model with destination as the dependent variable explores the relationship between destination choice behaviors and tourists' characteristics. The results show that age, resident type, car ownership, companion type and holiday length all have a significant impact on destination choice. Long-term residents, compared with temporary residents and students, are less likely to travel to the West Lake. Those aged from 26 to 44 show a clear preference toward other parts of Hangzhou than the West Lake. But what is the travel mode they choose when they go to the West Lake and other parts of Hangzhou? So, the second multinomial logit model is constructed with the mode choice set as the dependent variable to give an answer. From the results, public transport use frequency is reduced in the area outside of the West Lake District and people tend to use cars more than other modes. For such areas, improved bus service could help broaden the range of people to have access to those destinations and limit the dependency on car-ownership and limit its heavy space requirements on those areas.

Considering the above results, several advices can be proposed to improve the public transportation service. For short-term planning, two special bus lines can be set up. One is in other districts in Hangzhou, and the other is to places outside of Hangzhou during the long holidays since the tendency to choose to go out of Hangzhou is stronger at China National Day (seven-day) holiday than three-day holiday and weekends (see Table 3). Setting different fares, different departure frequencies and different operating hours depending on destination and holiday length, it encourages people living in Hangzhou to visit those areas. In order to stimulate the use of public transport or active travel, policymakers should therefore focus more on measures to improve the tourists' experience (De Vos, 2019). Improving facilities and services can attract tourists to switch travel mode from driving to public transportation. For long-term planning, Rail transit plays a very important role. Hangzhou subway has only five lines in total at present and subway construction is speeding up. Hangzhou will open a total of 15 subway and light rail lines with a cumulative mileage of more than 500 km before the 2022 Asian Games, forming a network that can cover all districts in the city to make traveling much easier. Moreover, improving the transfer between bus and subway is also promising. This can make full use of existing infrastructure and make travel mode more flexible and convenient. Besides, it is also necessary to formulate a reasonable car limit policy to alleviate the congestion situation on some specific areas around scenic spots. Restricting the use of the private car is one of important conditions on the supply side for successful public transport services (Gronau and Kagermeier, 2007).

This paper is a study on choice behaviors of residents living in

Hangzhou. Future research could focus on non-local residents, and more factors will be added such as round trip travel time, residence location, crowding level, ticket fee and so on. Dynamic tourists' behavior will also be considered to find out the correlation between two adjacent trips.

CRediT authorship contribution statement

Xinyi Tang: Methodology, Formal analysis. **Dianhai Wang**: Conceptualization. **Yilin Sun**: Supervision, Writing - original draft. **Mengwei Chen**: Formal analysis, Writing - review & editing. **E. Owen D. Waygood**: Visualization, Writing - review & editing.

Declaration of Competing Interest

None.

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