

# Analysis of Choice Behavior of Tourist Transportation Mode in Xiamen

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**Abstract:** Tourism transportation is the foundation and necessary condition for the development of tourism. Tourism transportation has a profound impact on the development of local tourism economy. Both sides complement each other and promote together. For one thing, a well-developed tourism transportation network can attract more tourists to visit and accelerate the development of the tourism industry. For another, the development of the tourism economy will counteract the construction of the tourism transportation network. This paper selects Zhongshan Road in Xiamen City to conduct a questionnaire survey to analyze the choice behavior of Xiamen's tourism transportation mode.

## 1 Introduction

With the development of the tourism industry, more and more people choose to travel in spare time. As one of the most popular tourist attractions, Xiamen has seen an increasing number of tourists. At the same time, the negative problems brought about by tourism traffic have become increasingly prominent, such as urban road congestion and overloaded transportation networks. While the tourism industry has brought huge income to the local economy, it has also brought more severe transportation problems to Xiamen, which was originally traffic congested, and seriously affected the service quality of Xiamen's tourism transportation. Therefore, the tourist traffic problem in Xiamen needs to be solved urgently.

## 2 The current situation of tourist traffic in Xiamen

### 2.1 Current situation of Xiamen

Xiamen City is located in the southeast of Fujian Province, adjacent to the west bank of the Taiwan Strait, and is the center of the Golden Triangle of Southern Fujian (Zhangzhou, Xiamen, Quanzhou).<sup>[1]</sup> Xiamen City is divided into six administrative districts: Siming District, Huli District, Jimei District, Haicang District, Tong'an District, and Xiang'an District. Among them, Siming District and Huli District are collectively called the island, Jimei District, Haicang District, Tong'an District and Xiang'an District are collectively called Off the island. According to the data from the "Xiamen Special Economic Zone Yearbook 2020", as of 2019, the city has 6 districts with a total area of 1700.61 square kilometers (including Gulangyu), a sea area of about 390 square

kilometers, a permanent population of 4.29 million, and a registered population of 2611.0 thousand people, with a permanent migrant population of 2.21 million. In 2019, Xiamen achieved a regional GDP of 599.504 billion yuan, an increase of 7.9% over the previous year. Among them, the added value of the primary industry was 2.649 billion yuan, an increase of 0.7%; the added value of the secondary industry was 249.399 billion yuan, an increase of 9.7%; the added value of the tertiary industry was 347.456 billion yuan, an increase of 6.6%.<sup>[2]</sup> Xiamen's consumption scale continues to rise as the economic aggregate continues to adjust, and the consumption structure continues to be adjusted. The driving forces such as new business formats, high-end, new enterprises and branding have optimized the structure, boosting the general trend of consumption upgrading, and the exploration of consumption momentum shows "growth potential" and "innovative and dynamic" two positive aspects.<sup>[2]</sup>

### 2.2 Current Status of Transportation in Xiamen City

The transportation road connecting the island and Off the island is the "four bridges and one tunnel", namely Xiamen Bridge, Xinglin Bridge, Jimei Bridge, Haicang Bridge, Xiang'an Tunnel. In 2019, the "four bridges and one tunnel" average daily traffic volume reached 568,900 vehicles, an increase of 6% year-on-year, and the average daily activity of vehicles increased by 3.7%,<sup>[3]</sup> as shown in Table 1 below. The means of transportation include private cars, taxis, buses, bus rapid transit (BRT), subways and other forms. Among them, the Xiamen BRT system includes 8 BRT express lines (Kuai 1, Kuai 2, Kuai 3, Kuai 5, Kuai 6, Kuai 7, Kuai 8, Kuai 9), and 1 BRT airport dedicated line; it is the first BRT airport line in China. BRT system in viaduct mode. In addition, Xiamen's subway

network is still under construction, and 10 subway lines are expected to be constructed. As of December 2020, Xiamen's subway has opened and operated 2 lines, including Line 1 and Line 2, and there are 3 lines under construction, including Line 3, Line 4, Line 6.<sup>[4]</sup>

**Table1.** Average daily activity of vehicles in Xiamen in 2019

Divided by area		
Area	Average daily activity of vehicles	Compared to last year
Island	483,000 vehicles	Up 1.2%

**Table2.** Xiamen City's total passenger traffic and passenger turnover in 2019

	2019	2018	compared to 2018 Growth (%)
<b>Passenger volume (ten thousand)</b>	<b>10 449.68</b>	<b>10 143.67</b>	<b>3.02</b>
Railway (sending) (ten thousand)	2819.39	2795.55	0.85
Highway (ten thousand)	4136.77	3950.93	4.7
Water transportation (ten thousand)	752.27	741.85	1.41
Aviation (ten thousand)	2741.25	2655.34	3.24
<b>Passenger turnover (ten thousand kilometers)</b>	<b>5727076.89</b>	<b>5298407.95</b>	<b>8.09</b>
Highway (ten thousand kilometers)	206390.42	233342.04	-11.55
Water transportation (ten thousand kilometers)	9305.06	9531.81	-2.38
Aviation (ten thousand kilometers)	5511381.42	5055534.10	9.02

With the rapid economic development, the per capita disposable income of residents has increased, and the number of vehicles used by citizens has increased year by year. According to statistics from the "Xiamen Special Economic Zone Yearbook 2020", in 2019, the number of motor vehicles exceeded 1.66 million, of which the number of civilian cars exceeded 1.4 million, and the number of private cars exceeded 1.16 million, as shown in Table 3 below. However, the rapid growth of car ownership has also made Xiamen's urban traffic congestion more and more serious.

**Table3.** Statistics of Xiamen Citizens' Vehicles in 2019

Civil vehicle (Vehicle)	1 660 702
Civilian car	1 403 993
# Private car	1 162 126
# Passenger car	1 277 632
Large	8 443
Medium	3 344
Small	1 259 251
Micro	6 594

### 3 Problems in Xiamen's tourism transportation

#### 3.1 Insufficient planning of tourist transportation routes

Xiamen City is located by the sea, with beautiful scenery

Off the island	473,000 vehicles	Up 6.3%
Divided by vehicle ownership		
vehicle ownership	Average daily activity of vehicles	Compared to last year
Local car	640,000 vehicles	Up 2.4%
Nonlocal car	316,000 vehicles	Up 6.6%

According to the statistics of the "Xiamen Special Economic Zone Yearbook 2020", it can be seen that passenger traffic and passenger turnover in 2019 have shown a positive growth trend, as shown in Table 2 below.

and pleasant climate. Whether it is traveling or working, it is loved by people. As one of the popular tourist cities, tourist transportation is an indispensable part of the urban transportation network. The transportation network in Xiamen is extremely congested during peak tourist seasons. The existing transportation network in Xiamen cannot satisfy the daily commuting traffic volume. Planners devote most of their energy to daily transportation planning, leading to tourism. The planning of traffic routes is seriously inadequate.

#### 3.2 The modes of transportation for tourists are limited.

Although Xiamen's existing travel modes include bicycles, private cars, taxis, buses, BRT, subways, etc., for tourists, the more commonly used travel modes are taxis, buses, subways and BRT. Among them, taxi prices are relatively high, and most tourists are unwilling to take them, especially family travellers. Taxis cannot satisfy the needs of traveling with more than 4 people. Bus waiting and travel time is relatively long. BRT and subway lines Limited, especially as the subway lines is still under construction, they have fewer direct attractions, which makes tourists still inconvenienced in travel.

#### 3.3 Insufficient connection of transportation in scenic spots.

Some scenic spots are located in remote areas, BRT and subways cannot directly reach the scenic spots. They can only be reached by private cars, taxis or buses. However, these scenic spots often have fewer buses, and it is not easy

to take taxis, and tourists have to wait for a long time. The public transportation between the scenic area and the scenic area is not sufficiently connected, and it is more troublesome for tourists to transfer, and the travel experience is poor.

Zhongshan Road in Xiamen City for the survey, 400 questionnaires were sent out and 400 questionnaires were returned, of which 368 were valid questionnaires. After a comprehensive arrangement, the following analysis results can be obtained.

#### 4 Analysis of behavior choice of travel mode

There are many factors that affect the choice of transportation modes for tourists, including: age, income, source of tourists, whether to own a private car, travel mode, travel time, travel distance, number of companions, etc.

Based on the current tourism situation in Xiamen City, combined with the existing public transportation routes in Xiamen City, a questionnaire survey was conducted on a scenic spot that can be reached by private cars, taxis, buses, BRT, and subways. Therefore, this paper selects

#### 4.1 Factor analysis of source of origin and whether to own a private car

According to the measurement statistics of tourist source (divided into local tourists and foreign tourists) and whether they own a private car, the results are shown in Table 4 below. Whether they are local tourists or foreign tourists, the proportion of travel by private cars, BRT and subway is higher than taxis and buses. Among tourists who own private cars, those who travel by private cars are relatively high, while among those who do not have private cars, the proportion of tourists who travel by subway is relatively high.

**Table4.** Source of tourists, whether to own a private car, and transportation options

Transportation	Source of tourists				whether to own a private car				Total	
	Local tourists		Nonlocal tourists		Yes		No			
	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage
Private cars	58	27%	36	23%	94	45%	0	0%	94	26%
Taxi	11	5%	8	5%	6	3%	13	8%	19	5%
Bus	30	14%	22	14%	10	5%	42	26%	52	14%
BRT	53	25%	38	24%	46	22%	45	28%	91	25%
Subway	59	28%	53	34%	52	25%	61	38%	112	30%
Total	211	100%	157	100%	208	100%	160	100%	368	100%

#### 4.2 Choice of transportation mode by age and income

According to the survey results, the sample can be divided

into four age stages. As shown in Table 5 below, tourists under 18 years old are more inclined to travel by bus, tourists 18-24 years old are more inclined to travel by BRT and subway, Tourists aged 25-55 are more inclined to travel in private cars, and tourists over 55 years old are more inclined to travel by private cars, subways and BRT.

**Table5.** Age and transportation options

Transportation	Under 18		18-24 years old		25-55 years old		Over 55 years old		Total	
	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage
Private cars	0	0%	5	4%	57	53%	32	28%	94	26%
Taxi	3	13%	6	5%	6	6%	4	3%	19	5%
Bus	10	42%	17	14%	8	7%	17	15%	52	14%
BRT	5	21%	42	35%	16	15%	28	24%	91	25%
Subway	6	25%	51	42%	21	19%	34	30%	112	30%
Total	24	100%	121	100%	108	100%	115	100%	368	100%

When choosing transportation, different tourists have different sensitivity to travel expenses. The monthly income and transportation options are shown in Table 6. Most tourists have a relatively high probability of choosing subway and BRT transportation. With the increasing monthly income, the proportion of tourists who

choose to travel by private cars is gradually increasing.

**Table6.** Monthly income and transportation options

Transportation	Below 2000 yuan		2001-5000 yuan		5001-10000 yuan		Above 10,000 yuan		Total	
	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage
Private cars	0	0%	24	24%	32	35%	38	47%	94	26%
Taxi	3	3%	5	5%	7	8%	4	5%	19	5%
Bus	18	19%	15	15%	13	14%	6	7%	52	14%
BRT	30	32%	28	27%	18	20%	15	19%	91	25%
Subway	42	45%	30	29%	22	24%	18	22%	112	30%
Total	93	100%	102	100%	92	100%	81	100%	368	100%

**4.3 Number of travelers and choice of transportation mode**

The influencing factors of the travel mode chosen by different travel groups are not the same, as shown in Table 7 below. When there is only one person in the travel group, most of the selected tourist transportation is public

transportation. When traveling with less than 4 people, as the number of travelers increases, the proportion of choosing private cars to travel gradually increases. When traveling with a group of 5 or more people, it is limited by the number of people traveling and the number of people who can be carried by private cars. The proportion of people who choose public subway and BRT to travel is relatively large.

**Table7.** Number of travelers and choice of transportation mode

Transportation	1 person		2 people		3 people		4 people		5 people and above		Total	
	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage	sample capacity	percentage
Private cars	0	0%	20	21%	27	26%	32	35%	15	27%	94	26%
Taxi	1	4%	4	4%	6	6%	8	9%	0	0%	19	5%
Bus	8	32%	18	19%	12	12%	8	9%	6	11%	52	14%
BRT	8	32%	24	26%	24	24%	20	22%	15	27%	91	25%
Subway	8	32%	28	30%	33	32%	24	26%	19	35%	112	30%
Total	25	100%	94	100%	102	100%	92	100%	55	100%	368	100%

In addition, according to the survey results, more tourists choose private cars to travel with their family members, while those who travel alone or with friends choose public transportation. Among out-of-town tourists, with the increase of travel distance, the greater the probability of choosing public transportation, among which the number of people traveling by subway or BRT is more. The longer the travel time, the longer the waiting time allowed for tourists to spend on travel tools.

are tight, and the problem of parking difficulties has always been an important factor hindering self-driving trips. It is very necessary to increase the construction of parking lots around scenic spots. Through overall planning and coordination of communication between various departments such as local industry, tourism, transportation, public security, etc., the service "last mile"<sup>[5]</sup> is opened up, thereby enhancing the comprehensive tourism service capabilities of Xiamen City.

**5 Conclusion**

This article conducted a questionnaire survey on tourist attractions in Xiamen City, and finally got 368 valid questionnaires. After sorting out, it can be seen that the factors that affect tourism traffic mainly include age, income, source of tourists, whether to own a private car, travel mode, travel time, travel distance, number of companions, etc. At the same time, it can be seen that most tourists prefer the subway and BRT, which are fast, short, and low-cost public transportation vehicles when traveling. The construction of such transportation facilities around the scenic spot should be increased. For tourists with private cars, parking spaces in scenic spots on the island

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