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Urban Underground Street Planning and Visitors' Willingness to Revisit: A Perspective from Tourist Preference

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Abstract: Underground street is an important recreational resource and tourism resource, and it is one of the signs of urban tourism and the window of tourism image. Among underground street visitors, tourists are the most important group of visitors who have no direct interest with developers, planners and managers. Tourist preferences are one of the criteria and important references to test whether planners' underground street planning and design works are popular with the public. This paper reviews the literature on tourist preference and underground street at first and finds that there is no relevant literature on urban underground street planning from the perspective of tourist preference in academia. Then, this paper uses the method of questionnaire survey and SPSS software to analyze the reliability, validity, descriptive analysis and regression analysis of the survey data. The results show that there is a close relationship between the planning of urban underground street and visitors' willingness to revisit. The environment, decoration, commercial form, public facilities, traffic and other factors involved in underground street planning and design are the main factors affecting tourists' revisit. Under the background of space-time compression and shared city, tourist preference has a direct role in promoting underground street planning and design.

Keywords: Urban Planning, Urban Design, Underground Street, Visitors' Willingness, Revisit, Tourist Preference

1. Introduction

Underground Street refers to a street built under a busy business district or a crowdsourcing center in a city. It first appeared in the 1930s and was expanded from the sidewalks or pedestrian crossings of underground railways. Japan is the first country to develop underground streets in the world. In 1930, Japan built shops on both sides of the Underground Channel of Nagano Station in Tokyo Metro, and later opened underground streets at Japanese Bridges and Ginza in Tokyo. Since the 1950s, due to the population concentration, building density and land shortage in big cities, especially in the central business district, a large number of underground streets have been built in developed countries, including Japan, USA, Canada and other countries or regions.

With the development of tourism, underground street has gradually become an important tourist resource to attract tourists to travel for leisure, shopping and tourism. Because underground street is a blend of historical and cultural heritage and modern commercial culture, which concentrates local customs and consumption pursuit, after natural screening and time continuation, it has deposited its unique cultural and commercial characteristics. These are precious tourism cultural resources, the richest tourism ornamental value, the easiest to arouse tourists' feelings of nostalgia and sighing for the present. For this reason, tourist preference has become one of the criteria to test whether underground street planning and design are popular with the public.

China's territory spans three climatic zones, namely, the cold zone, temperate zone and subtropical zone. In addition, the differences between the urbanization of the inland and coastal areas require different urban problems, which make the underground streets almost cover the problems faced by the underground streets of all countries in the world. For example, those who develop underground streets against the influence of cold climate include those in Harbin, Shenyang and Dalian; those

who develop underground streets to protect the original urban environment include underground shopping malls in Xi'an Bell Tower Plaza; those who expand underground street construction under the influence of subway development include those in big cities such as Beijing, Guangzhou, Shanghai, Nanjing, Tianjin and Suzhou; and those who make use of the existing underground streets in big cities such as Beijing, Guangzhou, Shanghai, Nanjing, Tianjin and Suzhou. The underground street expanded by the defense project includes the underground street of civil air defense in Anshan Station Square and the underground street of Yanshikou, Chengdu, etc. However, due to the lack of scientific planning, design and rational utilization, many underground street resources have been wasted in vain or have not been effectively exploited.

A typical case is Chengdu Diyi Underground Street. It was first built in the center of Chengdu during the Cold War for the purpose of war defense. The Chengdu municipal government began to transform the air-raid shelter in this area into an underground commercial street since the 1990s, named "Tianzuo Mall", and then closed in a few years. In 2009, a big company took over and spent a lot of money on the renovation of the Tianzuo Mall, which was named Diyi Underground Street. It was thought that it would flourish from then on. But unfortunately, it seemed to be doomed to failure from its inception. In contrast to the flourishing and crowded public space on the ground, except for a short period of excitement during the opening of the street, most of the time the doors were deserted, and few people visited. Several re-plannings and re-designs ended in failure.

In March 2017, this study selected Nagoya City, Japan, which is comparatively similar to Chengdu, for field research. The number of underground streets in Nagoya City is second only to Tokyo and Osaka, with about 170,000 square meters. Here, underground Street is a very busy business area, with numerous shops surrounded by well-known department stores, such as Mitsukoshi and Matsuzaka Department Stores. Underground street has a wide range of cheap and beautiful goods, but it is not easy to get lost. It is the most characteristic recreational space in Nagoya, which is not affected by climatic conditions. The underground street here is a must-visit place for foreign tourists, and its status is no less than the representative scenic spots of Nagoya.

To sum up, what is the reason that makes Chengdu Diyi Underground Street not as prosperous as the underground streets of big cities in Japan? Why do tourists not want to visit Diyi Underground Street? Even if it's windy and rainy or hot summer or cold winter, why is there not much popularity in the underground street? Compared with the embarrassment of underground streets, many supermarkets in shopping malls are underground, but consumers are willing to go shopping. Why? This has aroused the autour's strong interest in research. From the perspective of tourist preference, the main motivation and purpose of this paper is to study the relations between urban underground street and visitors' willingness and the deep reasons why tourists do not enter the underground street, so as to provide solutions for the development and utilization of recreational resources in urban underground streets in China.

2. Literature Review

Tourist preference is a very broad concept [1], which refers to a psychological tendency of tourists to recognize specific and abstract tourism products based on their personal preferences and known information. It is the external expression of tourists' desires or needs. Everyone likes different forms of tourism activities because of the differences in gender, age, psychology, interest, occupation, income, education, social status, family structure, geographical location of permanent residence and natural conditions. There are also differences in the choice of tourist destinations and products, thus forming the common or different preferences of tourists. In urban tourism planning and design, tourist preference can be used to test whether the works of planners and designers are popular with the public. Because tourist preference is influenced by many factors and information asymmetry exists objectively, the works of planners and designers in the traditional sense are not necessarily recognized by tourists. This is closely related to the differences of tourist preference and perceptive images. In 1956, Boulding put forward the concept of image, pointing out that human behavior is not only guided by knowledge and information, but also the image product that individuals can perceive [2]. In the 1970s, image theory and method were applied to study the image space of urban tourist destination [3]. Researchers analyzed the types, elements and multiple characteristics of tourists' perception of urban image from different perspectives [4-8].

For urban planning and design, planners and designers usually organize, process and refine the image of the external environment and information in their minds. Combining the design objectives and their own style and preferences, they transform ideas into works, including symbolic information, semantic information and performance information. Planners and designers have images that cannot be easily described, such as insight, inspiration, visual perception (such as aesthetics, sense of order) and experience, especially the ability to create the overall structure and overall effect of the scheme, which are often hidden in their personal minds. They are the implicit knowledge of planners. They only use visual symbols such as lines, colors, structures and face, as well as numbers. Words and other linguistic symbols can be perceived only after they are expressed. For tourists, they always intentionally or unintentionally combine environmental perception and self-awareness to form a kind of expectation in their brain, that is, a kind of compound city perception. This perception is based on his or her experience (or even prejudice) of the city and combined with his or her expectations of the future city, to form the current planning and design plan.

Tourist preference based on the above perception is very important. Especially in the context of time and space constraints, tourist preference has become an important criterion to choose urban tourism destinations and test whether urban tourism products meet his or her needs. The result of time-space compression of tourism is reflected in the change of the proportion of urban tourists to residents. For example, in the central historical city of Venice, Italy, the proportion of tourists and residents has reached 89.4 (Table 1, Jan van der

Borg et al, 1996) [9]. This means that these famous tourist cities are in fact not only belong to their original residents, but also become "share" cities for residents and tourists. This sharing is mainly reflected in the common ownership and use of urban recreational space (square, green space, park, street, shopping and entertainment places, etc.). In the city, tourists are not only active in the traditional tourist attractions and tourist areas, but also in the central business district, the streets where local small shops are concentrated, public buildings and ordinary blocks. Underground streets, as a link of urban commerce and transportation, should become a shared recreational place for urban residents and tourists with their superior location and strong local characteristics.

Table 1. *Ratio of Tourist and Residents in Some European Cities.*

Cities	Ratio of tourist and residents
Aix- Provence	8.0
Amsterdam	5.9
Bruges	23.4
Florence	9.8
Oxford	11.5
Salzburg	36.0
Venice (Central Historic District)	89.4
Venice (city area)	27.6

Source: Jan van der Borg et al, 1996.

According to the literature searched by the study, no matter in the field of urban planning or urban tourism, there are few papers on underground street planning and visitors' willingness to revisit. The literature on underground street from tourist preference has not been found, although underground street has been well developed in many countries or regions for nearly 100 years. In Scientific Citation Index (SCI) and Social Science Citation Index (SSCI) data base, by searching the key words "underground street", "underground city" and "underground town", 85 relevant literatures with this study were obtained (Table 2).

Table 2. *Sources and Quantities of Relevant Literature from SCI / SSCI in This Study.*

Journal Name	Number of Papers
Tunnelling and Underground Space Technology	35
International Journal of Rock Mechanics and Mining Sciences	24
Procedia Engineering	8
Underground Space	2
Nuclear Physics B - Proceedings Supplements	1
Engineering Geology	5
Soil Dynamics and Earthquake Engineering	1
Journal of Applied Geophysics	3
Energy Procedia	6

Source: Scientific Citation Index (SCI) and Social Science Citation Index (SSCI) catalogue databases.

In the literature retrieved, the study of underground street in academia is mostly discussed in the following three directions:

The first is from the perspective of civil engineering to explore the investigation, structure, materials, engineering design, engineering survey, construction organization and engineering management of underground street. For example, Kind-Barkauskas (1993) introduced a development case of underground street in Germany and analyzed its structure [10]. P. Be´langer (2007) discussed the development mode of underground pipeline network and its future as an important infrastructure in the city [11]. Van der Hoeven & Juchnevic (2016) analyzed the design principles of underground space, open platform, underground form and texture [12].

The second is from the perspective of urban planning to explore the development of underground street. For example, Birger Jansson (1978) discussed the relations between city planning and urban underground [13]. Admiraal & Cornaro (2016) analyzed urban planning policy and underground space's future [14]. Zacharias & He (2018) introduced the planning experience of Hongkong underground street [15].

The third direction is to discuss the daily management of underground street, such as propaganda, operation, safety and disaster prevention, from the angle of operation and management of underground street. For example, Torbjorn Winqvist (1981) discussed how can society encourage the rational use of underground space [16]. Donald Reis (1982) discussed public-private partnership for the development of underground pedestrian systems [17]. J. Cui et al (2013) wanted to explore the prevalence of climate, subway construction, land use and economic environment [18]. H. Li et al. (2016) analyzed comprehensive strategies for sustainable development of urban underground space: from three aspects of strategy, economy and society [19].

There are two points in common in these three directions: first, they are confined to the discussion by the developers, designers and managers of the underground street itself, too much of which is injected into the thinking of the developers, designers and managers, less involving the users, that is, the customer groups of the underground street, and there is a disconnection between the first three and users, after all the development and utilization of the street users must be residents and tourists. The second is to ignore the recreational development value of underground streets or the value of tourism development. As a kind of public space resources, the recreational value of underground street will develop with the continuous development of urban tourism. The development and utilization value of this kind of resources is no less than that of urban tourism resources. Therefore, the development and utilization of underground streets must pay attention to the recreational experience of residents and tourists. This is of great significance to the development of underground streets in large cities and the establishment of a comprehensive theoretical system of underground recreational space.

Japan is the first country to develop underground streets, and Japanese scholars have made relatively more research achievements on underground streets. This study retrieved some research literature of Japanese scholars and found that there are some typical ones. For example, Tatsukami (1986) made a case study on an underground shopping mall in Japan [20]. Chun and Tamura (1998) analyzed and compared the thermal environment and people's reflection on underground street and department store [21]. Shigeyuki Kurose and Kazuhiro Itou (2007) clarified the relationship between pedestrian behavior characteristics and individual travel length in Tenjin underground street of Fukuoka [22]. Satoko Yamauchi (2012) used the augmented reality (AR)

technology to study the illusion in underground space [23]. Kenichi Moriyama (2012) studied the influence of underground and surrounding environment on underground streets [24]. Motohiro Sawada et al (2016) revised the maintenance of earthquakes or floods to make use of underground shopping malls as important urban infrastructure [25]. Funabiki Etsuko et al (2016) studied visitor behaviors and how do they gather to these spaces in JR Kyoto Station [26]. However，it is a pity that most of the above research literature written in Japanese.

3. Methodologies

3.1. Case Study Method

The key to case study is that the choice of cases must be typical and representative. In the development and utilization of recreational resources in urban underground streets, this study chooses an unsuccessful case, namely, Chengdu Diyi Underground Street, as the research object, rather than successful cases as the research object. This advantage lies in the fact that the main users of the underground street, namely residents and tourists, and comparing successful cases with relevant theories, we can find out the reasons for the failure of development and utilization, so as to put forward pertinent reform suggestions and opinions.

Chengdu, capital of the Sichuan Province, is known throughout China for giant pandas, tea houses, spicy food, and as one of the most relaxing cities in China. Chengdu is located in the middle of Sichuan Province which borders Hubei, Hunan, Guizhou, Yunan, Tibet, Qinghai, Gansu and Shaanxi Provinces. It covers an area of 146,000 square kilometers and has a resident population of around 16 million and a floating population of 6 million (Figure 1). Chengdu is also one of the six major cities in China with main industries in machinery, chemicals, textiles, tools, computers, electronics, metallurgical products, wood processing, and more.

Figure 1. *Location of Chengdu in China.*

Chengdu is the first batch of national historical and cultural cities, the best tourist city in China and one of the best tourist destinations in the world. UNESCO (United Nations Educational Scientific and Culture Organization) gives Chengdu the title of "world food capital" just because of Sichuan Cuisine, Hotpot, and Snacks. Benefiting from Dujiangyan Irrigation Project which was built in 256 B. C., Chengdu is reputed as Tian Fu Zhi Guo in Chinese, which means the land of abundance. Chengdu has two World Heritage Sites and two World Preparatory Heritage Sites. It has the largest number of World Heritage projects in central and Western China. It is also the "most famous Chinese cultural city" with a history of 3,200 years. In 2017, Chengdu received 210 million domestic tourists and 3 million 13 thousand inbound tourists.

As an important base of electronic information industry in the world, Chengdu has 30 state-level scientific research institutions, 67 state-level R & D (Research and Design) platforms, 56 universities and 285 international enterprises (top 500 in the world). There are 17 countries including the United States, Germany, Australia and India set their consulates in Chengdu. On September 1, 2013, Chengdu Airport implemented a 72-hour transit visa-free policy for foreigners from 45 countries. Holding a third country visa and a transferring ticket to a third country (region) within 72 hours, tourists can enter and leave Chengdu Shuangliu International Airport and travel in Chengdu without a Chinese visa and stay for 72 hours (Calendar year data are shown in the Figure 2).

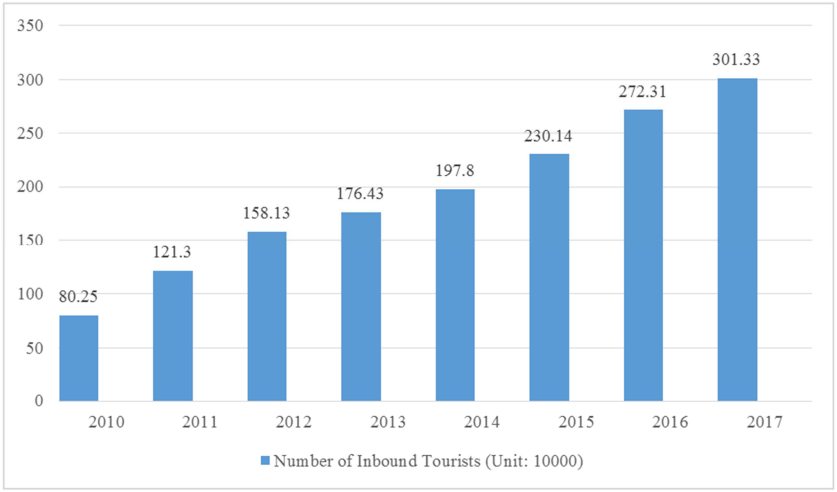

Figure 2. *Statistics on the Number of Inbound Tourists in Chengdu (2010-2017).*

Diyi Underground Street is located in the center of Chengdu, between Chunxi Road, Yanshikou and Luomashi, the three traditional CBDs in Chengdu (Figure 3). The underground street is T shaped. The ground is Shuncheng Street and people's East Road with huge traffic volume. Because it is very close to the three CBD, there are so many large department stores and office buildings around. There are subway and bus stations near the underground street.

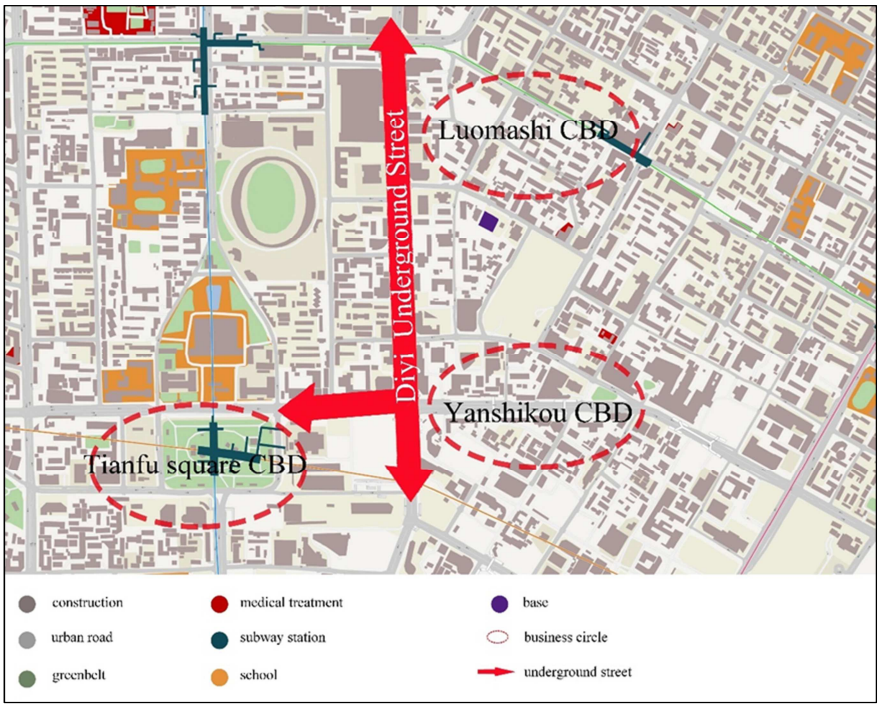

Figure 3. *Location of Diyi Underground Street.*

This underground street began with the Yuhe civil air defense project built in September 1971. Later, after several times of planning and design, the underground street has expanded in scale. The total area of newly developed Diyi Underground Street is 90,500 square meters. The whole length of Shuncheng Street is 1,216 meters from Fuli Department Store to Yanshikou Business Circle in the north and 425 meters from Tianfu Square, the largest metro transfer station in Chengdu in the west. There are 24 entrances in the whole section. However，the majority of stores in Diyi Underground Street have closed, and this once-powerful underground street brand will completely withdraw from Chengdu by the end of March 2018. Not only that, its developer, Renhe Group, also want to sell all the underground street operation rights, including those located in Harbin, Guangzhou, Wuhan, Dongguan and other cities in China.

3.2. Questionnaire and Data Collection

The questionnaire is divided into three sections: the first section is the demographic characteristics of the respondents,

including the gender, age, occupation, income, education and marital status. The second section is about the important items of underground street planning and design, which are divided into six dimensions: environment, decoration, facilities, format, traffic and other dimensions. A total of 58 items were designed in the questionnaire. All items were measured by Likert Scale. The scores of each item indicate the respondents' identification with the indicators, and the scores from 5 to 1 indicate that the respondents' identification gradually decreases. Among them, the score of the willingness of tourists to visit the underground street is 5=very willing, 4=more willing, 3=general, 2=more unwilling, 1=very unwilling; the score of the influencing factors of tourists to visit the underground street is 5=very important, 4=more important, 3=important, 2=not important, 1=not very important. The third section is the willingness of the tourist to visit the underground street again in the future.

After the preliminary design of the questionnaire, some suggestions from peer experts were given to the questionnaire. So, the evaluation factors of some items were revised and supplemented. Then, 50 teachers and students from a university in Chengdu were selected to carry out the pre-test of the questionnaire, which was revised and perfected again, and a formal questionnaire was formed.

A total of 250 questionnaires were distributed to the tourists and 236 questionnaires were recovered, with a recovery rate of 94.40%. Among them, there were 220 valid questionnaires, with an effective rate of 93.22%.

3.3. Data Analysis

The software used in the data analysis is IBM SPSS Amos 22.0. SPSS is a powerful data analysis software that supports research and theory by extending standard multivariate analysis methods (including regression, factor analysis, correlation analysis and variance analysis). With the help of SPSS Amos, attitudinal and behavioral models can be constructed using intuitive graphical or programmed user interfaces. Compared with standard multivariate statistical methods, these models can more accurately reflect complex relationships.

4. Results

4.1. Sample Information

The demographic distribution of tourists in this survey is shown in Table 3. 42.73% of the tourists lived outside Chengdu and within the province, and 25.91% of the tourists came from other parts of the country. More than half of the tourists visited Chengdu for the first time.

Table 3. *Demographic Characteristics of Tourists' Questionnaire.*

Category		Count	Occupation ratio
Gender	Male	93	42.27%
	Female	127	57.73%
Age	18-25 years old	14	6.36%
	26-35 years old	75	34.09%
	36-45 years old	78	35.45%
	46-60 years old	37	16.82%
	Over 60 years old	16	7.27%
Occupation	Civil servant	51	23.18%
	Enterprise staff	74	33.64%
	Freelancer	11	5.00%
	Self-employed	31	14.09%
	Student	18	8.18%
	Others	35	15.91%
Monthly income	Less than 2000 RMB	19	8.64%
	2001-3500 RMB	13	5.91%
	3501-5000 RMB	79	35.91%
	5001-7500 RMB	76	34.55%
	7501-10000 RMB	23	10.45%
	More than 10000 RMB	10	4.55%
Education	High school	29	13.18%
	Undergraduate	125	56.82%
	Master	45	20.45%
	Doctor	21	9.55%
Marital status	Married	38	17.27%
	Unmarried	182	82.73%
Come from	Outside the city or within the province	94	42.73%
	Beijing, Shanghai, Guangzhou, Shenzhen	41	18.64%
	Other parts of China Mainland	57	25.91%
	Taiwan, Macao, Hongkong	16	7.27%
	Foreign country	12	5.45%
Number of visiting Chengdu	1	122	55.45%
	2	44	20.00%
	3	26	11.82%
	4	16	7.27%
	More than 5	12	5.45%

4.2. Reliability and Validity

4.2.1. Reliability Analysis

Table 4. *Reliability Analysis of the Questionnaire.*

Dimension name	α value	Items
Aggregate table	.863	48
Environment	.849	8
Decoration	.900	10
Commercial form	.933	16
Public facilities	.723	6
Traffic	.782	5
Other	.682	3

Table 4 shows that the total α value of the tourist questionnaire is 0.864>0.60, which indicates that the reliability of the tourist questionnaire is high, and the overall reliability is strong. The α values of environment, decoration, commercial form, public facilities, traffic and other dimensions were 0.849, 0.900, 0.933, 0.723, 0.782 and 0.682, respectively, which were all greater than 0.60, indicating that the design of each dimension of the scale was more reliable.

4.2.2. Validity Analysis

Table 5. *KMO and Bartlett Test of the Questionnaire.*

KMO sampling appropriateness		.818
Bartlett sphericity test	Approximate chi square	5648.127
	Freedom	1128
	Saliency	.000

From Table 5, we can see that the KMO value of the part of tourist questionnaire is 0.818>0.60, the chi-square value of Bartlett sphericity test is 5648.127, P=0.000<0.01, so the part of tourist questionnaire is suitable for factor analysis.

Table 6. *Factor Analysis Results of the Questionnaire.*

	Number of Items	Index	Component						Cumulative variance interpretation rate
			1	2	3	4	5	6	
Environment	Q1	Air quality			.614				16.751
	Q2	Space			.601				
	Q3	Day lighting			.589				
	Q4	Noise			.819				
	Q5	Ventilation			.628				
	Q6	Temperature			.806				
	Q7	Humidity			.585				
	Q8	Hygiene			.839				
Decoration	Q9	Decoration style		.507					28.288
	Q10	Decorating material		.832					
	Q11	Decoration technology		.799					
	Q12	Lighting decoration		.770					
	Q13	Floor covering		.625					
	Q14	Ceiling decoration		.735					
	Q15	Wall decoration		.725					
	Q16	Shop decoration		.678					
	Q17	Public landscape		.883					
	Q18	Color matching		.608					
Commercial form	Q19	Brand clothing store	.699						37.048
	Q20	Accessories store	.694						
	Q21	Digital appliance store	.726						
	Q22	Book store	.732						
	Q23	Fast food restaurant	.551						
	Q24	Snack Bar	.598						
	Q25	Coffee shop/ Teahouse	.611						
	Q26	Bar	.781						
	Q27	Drugstore	.713						
	Q28	Convenient store	.541						
	Q29	Household goods store	.792						
	Q30	Mother and baby shop	.780						
	Q31	Children's Playground	.783						
	Q32	Beauty salon	.808						
	Q33	Ballroom / Kara OK Hall	.845						
Public facilities	Q34	Cinema					.751		43.166
	Q35	Toilet					.512		
	Q36	Bank ATM					.692		
	Q37	Rest table and chair					.561		
	Q38	Communication facilities					.590		
	Q39	Elevator					.603		
	Q40	Guide sign					.506		

	Number of Items	Index	Component						Cumulative variance interpretation rate
			1	2	3	4	5	6	
	Q41	Connecting with subway				.720			
	Q42	Connecting with bus stop				.625			
Traffic	Q43	Connecting with department sore				.773			49.220
	Q44	Connecting with office building				.777			
	Q45	Connecting with parking lots				.659			
	Q46	Theatrical performance						.764	
Other	Q47	Commercial promotion activities						.796	53.353
	Q48	Public security						.672	

From Table 6, six factors were extracted from the tourist questionnaire, and the cumulative equation interpretation rate was 53.353%. After the rotation of the maximum variance method, the factor loads on each item of the six factors are all greater than 0.5, and the practical significance of each factor is the same as that of the resident questionnaire. Therefore, the six factors are named environment, decoration, commercial form, public facilities, traffic and other factors respectively. This result is the dimension of the questionnaire design for tourists. The results show that the questionnaire has good structural validity.

4.3. Descriptive Analysis

Table 7. *Descriptive Analysis of Tourist Questionnaire.*

Dimension	Minimum value	Maximum value	Average value	Standard deviation
Environment	1.00	4.00	2.4070	.71882
Decoration	1.00	4.80	2.4718	.90661
Commercial form	1.00	4.27	2.2300	.82250
Public facilities	1.00	3.43	1.9322	.52692
Traffic	1.00	3.60	1.8382	.66730
Other	1.00	5.00	3.4408	.94007
Willingness of visiting the street (if the street is redeveloped according to the survey)	1.00	4.00	2.0818	.74799
Willingness of recommending friends to visit the street (if the street is redeveloped according to the survey)	1.00	4.00	2.0773	.80434

Table 7 shows that, unlike the local residents, tourists attach most importance to public facilities, traffic and commercial form, with an average of 1.93, 1.84 and 2.23, respectively, while the requirements for environment and decoration are relatively low, with an average of 2.40 and 2.47, respectively. Similarly, tourists pay less attention to commercial promotional activities, literary and artistic performances, public security and other dimensions, with an average of only 3.44. Similar to the residents, tourists also have a more active willingness to visit again to the underground street and recommend the underground street to the people around them, with an average of 2.08.

In this survey, a total of 16 tourists have not visited Diyi Underground Street. We investigated the reasons for this. It can be found that 44% of visitors said they had never heard of the street, 31% said they did not know how to get to the street, and 13% did not have time to visit the street. These data show that the popularity of the underground street is still low, and the traffic supporting facilities are also poor, resulting in its low attention.

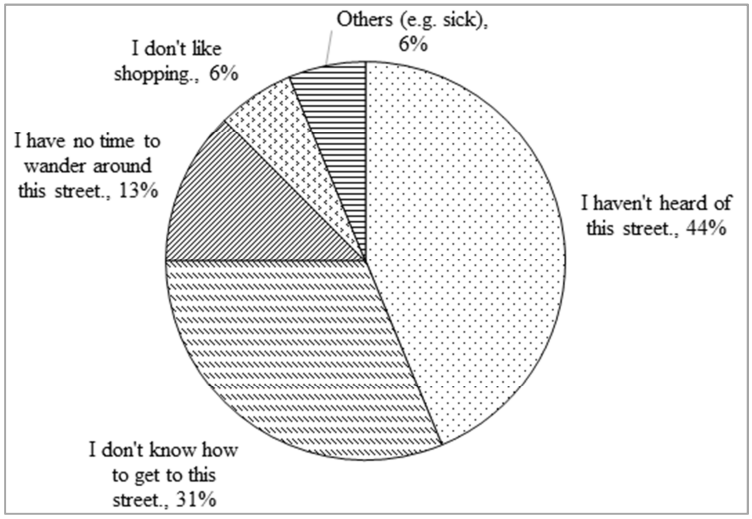

Figure 4. *Survey Result of "the Main Reason for Not Visiting This Street".*

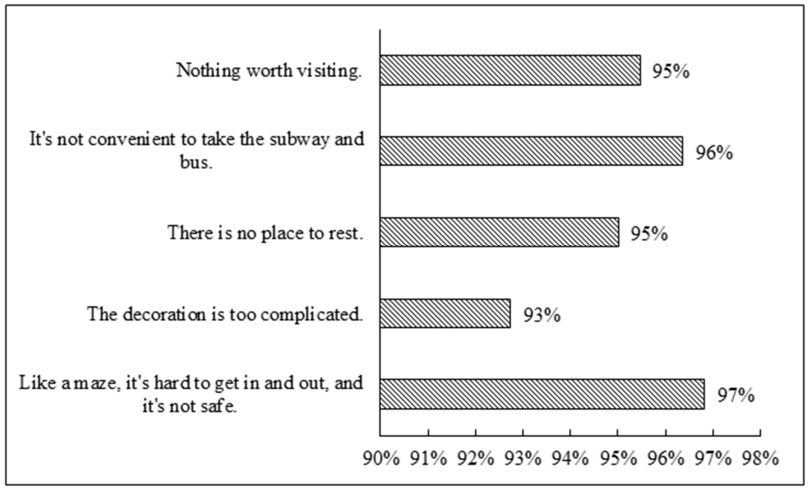

Figure 5. *Survey Results of "Bad Impression of This Street".*

At the same time, we conducted a survey of the tourists who have been to Diyi Underground Street to understand the negative impression of the underground streets. It can be found that among all the bad impressions, more than 90% of the people chose, especially 97% of the tourists felt that the underground street was "like a maze" and 96% of the tourists felt that it was inconvenient to take buses and metros in the underground street. These data once again confirm the inconvenient traffic and unreasonable design of underground streets.

4.4. Regression Analysis

In order to study the factors that influence the willingness of tourists to visit again and recommend Diyi Underground Street, regression analysis is used in the study. Taking the willingness of tourists to visit again and recommend friends to the underground street as dependent variables and taking various dimensions or specific items as independent variables, a multiple linear regression model was established. Using t-test, the original hypothesis is that there is no significant difference in the degree of attention paid to a certain dimension or specific indicators among tourists, while the alternative hypothesis is that there is a significant difference in the degree of attention paid to a certain dimension or specific indicators among tourists. Significance level is 1%, 5% and 10%, that is, when P is lower than the significance level, the original hypothesis can be rejected, and the alternative hypothesis accepted. In order to determine the direction and degree of correlation among the factors, correlation analysis was conducted among the regression analysis.

4.4.1. Influence of Different Dimensions on the Willingness of Tourists

Table 8. *Influence of Different Dimensions on the Willingness of Tourists.*

Dimension		Willingness	D1	D2	D3	D4	D5	D6
Willingness of coming again and recommendation	Correlation coefficient	1	.164*	.183**	.318**	.304**	.364**	-.019
	P		.015	.006	.000	.000	.000	.776

*. At the 0.05 level, the correlation is significant.
**. At the 0.01 level, the correlation is significant.
D1= Environment; D2=Decoration; D3=Commercial form; D4=Public facilities; D5=Traffic; D6=Other

From Table 8, it can be seen that the willingness of tourists to visit again and recommend the underground street is positively correlated with their attention to underground streets' environment, decoration, commercial form, public facilities and traffic (P values are 0.015, 0.006, 0.000, 0.000, 0.000, 0.000 respectively). That is to say, tourists pay more attention to environment, decoration, commercial form, public facilities and traffic. The stronger the willingness to visit again and recommend the underground street, indicating that the improvement of the underground street in environment, decoration, commercial form, public facilities, traffic and other dimension will also help to improve the willingness of tourists to visit again and recommend. Among them, the positive correlation between tourists' willingness and the degree of attention to traffic is the strongest, with a correlation coefficient of 0.364; followed by commercial form and public facilities, with correlation coefficients of 0.318 and 0.304 respectively; the correlation between tourists' willingness and decoration and environment is low, with correlation coefficients of 0.183 and 0.164 respectively. The willingness of tourists to visit again and recommend underground streets has no significant relationship with their attention to other dimension ($P > 0.10$).

Table 9. *Regression Analysis of Factors Affecting Tourists' Willingness.*

Model		Coefficient	Standard error	t	P	Adjusted R party	F
Willingness of coming again and recommendation	(constant)	-.009	.293	-.029	.977	0.267	14.272 (0.000)
	T-environment	.100	.058	1.724	.086		
	T-decoration	.094	.045	2.075	.039		
	T-Commercial form	.187	.051	3.627	.000		
	T-public facilities	.320	.079	4.056	.000		
	T-traffic	.303	.063	4.829	.000		
	T-other	.006	.045	.138	.891		

* T=Tourist

Table 9 shows that the adjusted R^2 of the model is 26.7%, which indicates that the regression line of tourists' willingness-dimensions fits the observed values well. The F value of the model is 14.272 and P.=0.000<0.01, indicating that the model is significant.

In the regression results, the regression coefficients of environmental dimension were 0.100>0, t =1.724, P=0.086<0.10, which showed that the degree of attention to the environment had a significant positive impact on tourists' willingness to visit again and recommend the underground street to others at the level of 10%. With other conditions unchanged, the degree of attention to the environment increased by 1 unit, and the degree of attention to the environment increased by 1 unit. The tourists' willingness of coming again and recommendation will increase 0.100 units.

The regression coefficient of decoration dimension is 0.094, t=2.075, P=0.039<0.05. It shows that the degree of attention to decoration has a significant positive impact on tourists' willingness to visit again and recommend the underground street at the level of 5% significance. When other conditions remain unchanged, the degree of attention to decoration increases by 1 unit, and the tourists' willingness of coming again and recommendation for Diyi Underground Street will increase by 0.094 units.

The regression coefficient of commercial form dimension is 0.187, t =3.627, P=0.000<0.10, which shows that the degree of attention to commercial form has a significant positive impact on tourists' willingness to visit again and recommend the underground street at the level of 1% significance. With other conditions unchanged, the degree of attention to commercial form increases by 1 unit, and the tourists' willingness of coming again and recommendation for Diyi Underground Street will increase by 0.187 units.

The regression coefficient of public facilities dimension is 0.320, t=4.056, P=0.000<0.01. It shows that the degree of attention to facilities has a significant positive impact on tourists' willingness to visit again and recommend underground streets at the level of 1% significance. When other conditions remain unchanged, the degree of attention to facilities increases by 1 unit, and the tourists' willingness of coming again and recommendation for Diyi Underground Street will increase by 0.320 units.

The regression coefficient of traffic dimension is 0.303, t=4.829, P=0.000<0.01. It shows that the degree of attention to traffic has a significant positive impact on tourists' willingness to visit again and recommend underground streets at the level of 1% significance. When other conditions remain unchanged, the degree of attention to traffic increases by 1 unit, and the tourists' willingness of coming again and recommendation for Diyi Underground Street will increase by 0.303 units. Because the value of T corresponds to P>0.10, other dimension has no significant influence on tourists' willingness to visit again and recommend the underground street.

To sum up, a model can be set up, as shown in formula (1).

$$Y = -0.009 + 0.100X_1 + 0.094X_2 + 0.187X_3 + 0.320X_4 + 0.303X_5 \quad (1)$$

Among them, X1-X5 indicates that tourists attach importance to the environment, decoration, commercial form, public facilities and traffic. It can be seen that the degree of attention to public facilities, traffic and commercial form has the greatest impact on tourists' willingness to visit again and recommend the underground street, while the environment and decoration are relatively small. For tourists, the transformation of the underground street should focus on facilities, formats and traffic problems.

4.4.2. Influence of Environment Dimension on the Willingness of Tourists

Table 10. *Influence of Environment Dimension on the Willingness of Tourists.*

Model		Coefficient	Standard error	t	P
Willingness of coming again and recommendation	(constant)	1.548	.164	9.435	.000
	Air quality	.078	.056	1.378	.170
	Space	.161	.065	2.493	.013
	Day lighting	.135	.070	1.922	.056
	Noise	.001	.071	.010	.992
	Ventilation	.095	.051	1.854	.065
	Temperature	-.054	.071	-.758	.449
	Humidity	-.045	.048	-.922	.358
	Hygiene	-.082	.074	-1.100	.272

Furthermore, among the specific indicators of environment dimension, space, day lighting and ventilation have significant effects on tourists' willingness to visit again and recommend the underground street (t value is 2.493, 1.922, 1.854, corresponding P value is less than 0.05), while air quality, noise and other indicators have no significant impact on willingness. Because the regression coefficients of space, day lighting and ventilation are all greater than 0, it shows that attention to space, lighting and ventilation has a significant positive impact on tourists' willingness to visit again and recommend the underground street. The regression coefficients of the three indexes were 0.161, 0.135 and 0.095 respectively. It is obvious that space has the greatest influence on willingness, followed by day lighting and ventilation. Therefore, tourists also have a high demand for underground street space, as well as lighting and ventilation.

4.4.3. Influence of Decoration Dimension on the Willingness of Tourists

Table 11. *Influence of Decoration Dimension on the Willingness of Tourists.*

Model		Coefficient	Standard error	t	P
Willingness of coming again and recommendation	(constant)	1.582	.141	11.224	.000
	Decoration style	.172	.054	3.194	.002
	Decorating material	-.043	.070	-.612	.541
	Decoration technology	.048	.066	.734	.464
	Lighting decoration	.077	.054	1.431	.154
	Floor covering	-.035	.051	-.689	.492
	Ceiling decoration	-.072	.046	-1.553	.122
	Wall decoration	.005	.061	.087	.931
	Shop decoration	.083	.050	1.660	.098
	Public landscape	-.073	.072	-1.014	.312
	Color matching	.102	.053	1.910	.057

Among the specific indicators of decoration dimension, decoration style, shop decoration and color collocation have significant effects on tourists' willingness to visit again and recommend the underground street (t value is 3.194, 1.660, 1.910, corresponding P value is less than 0.05), while the other indicators have no significant impact on tourists' willingness. The regression coefficient of decoration style, shop decoration and color matching are more than 0, which show that the three indicators have significant positive impact on willingness. Among them, the regression coefficients of the three indicators are 0.172, 0.083 and 0.102 respectively, indicating that decoration style has the greatest impact on willingness, followed by store decoration and color matching. Therefore, tourists also believe that the decoration of underground streets should focus on changing the overall decoration style, color matching and shop decoration.

4.4.4. Influence of Commercial Form Dimension on the Willingness of Tourists

Table 12. *Influence of Commercial Form Dimension on the Willingness of Tourists.*

Model		Coefficient	Standard error	t	P
Willingness of coming again and recommendation	(constant)	1.224	.143	8.578	.000
	Brand clothing store	.100	.060	1.655	.099
	Accessories store	-.046	.051	-.903	.368
	Digital appliance store	-.039	.056	-.696	.487
	Book store	.027	.054	.509	.611
	Fast food restaurant	.169	.078	2.166	.031
	Snack Bar	.130	.057	2.301	.022
	Coffee shop/ Teahouse	-.052	.055	-.954	.341
	Bar	.016	.064	.256	.798
	Drugstore	.072	.054	1.327	.186
	Convenient store	.150	.061	2.448	.015
	Household goods store	-.001	.061	-.022	.983
	Mother and baby shop	-.005	.054	-.094	.925
	Children's playground	-.033	.056	-.593	.554
	Beauty salon	-.048	.057	-.833	.406
	Ballroom / Kara OK hall	.021	.062	.333	.739
	Cinema	1.224	.143	8.578	.000

Among the specific indicators of commercial form dimension, fast-food restaurants, snack shops, convenient stores and cinemas have significant impact on tourists' willingness to visit again and recommend the underground street (t value corresponding to P value is less than 0.10), while the other indicators have no significant impact on willingness. The regression coefficients of fast food restaurants, snack shops, convenient stores, cinemas and brand clothing stores are all greater than 0, which shows that these indicators have significant positive impact on

willingness. This confirms to some extent that tourists prefer underground streets to "business".

4.4.5. Influence of Public Facilities Dimension on the Willingness of Tourists

Table 13. *Influence of Public Facilities Dimension on the Willingness of Tourists.*

Model		coefficient	Standard error	t	P
Willingness of coming again and recommendation	(constant)	1.244	.175	7.099	.000
	Toilet	.104	.072	1.450	.148
	Bank ATM	-.019	.047	-.415	.678
	Rest table and chair	.142	.064	2.223	.027
	Communication facilities	.162	.074	2.177	.031
	Elevator	-.037	.049	-.745	.457
	Guide sign	-.003	.062	-.050	.960

Among the specific indicators of public facilities dimension, rest tables and chairs and communication facilities have significant impact on tourists' willingness to return and recommend the underground street (t value is 2.223, 2.177, corresponding P value is less than 0.10), while the other facility indicators have no significant impact on the willingness. The regression coefficients of rest tables and chairs and communication facilities are all greater than 0, which indicates that both rest tables and chairs and communication facilities have significant positive effects on willingness. Tourists also hope that the underground street will have rest tables and chairs for recreation. At the same time, the street needs to improve communication facilities to meet the demands of tourists for communication conditions.

4.4.6. Influence of Traffic Dimension on the Willingness of Tourists

Table 14. *Influence of Traffic Dimension on the Willingness of Tourists.*

Model		Coefficient	Standard error	t	P
Willingness of coming again and recommendation	(constant)	1.332	.130	10.270	.000
	Connecting with subway	.214	.077	2.764	.006
	Connecting with bus stop	.133	.061	2.160	.032
	Connecting with department sore	.056	.067	.840	.402
	Connecting with office building	-.049	.055	-.890	.375
	Connecting with parking lots	.089	.048	1.840	.067

Among the specific indicators of traffic dimension, the connection with subway, bus stop and parking lot has a significant positive impact on tourists' willingness to visit again and recommend the underground street (t value is 2.764, 2.160, 1.840, corresponding P value is less than 0.05), while the other indicators have no significant impact on willingness. Tourists hope that in addition to the subway, underground streets will connect with bus stops and parking lots to create a good traffic environment.

5. Conclusion and Discussion

5.1. Conclusion

This study shows that tourists' willingness to revisit is indeed closely related to underground street planning. Environment, decoration, commercial form, public facilities, traffic and other dimensions involved in the planning and design of underground street have a significant impact on tourists' willingness to revisit.

5.2. Discussion

The results of the above-mentioned survey for tourists reflect two problems: one is the common and differentiated demands of residents, which are the instincts and external appearances of people's perception; the other is the insufficiency of underground street recreation resources and the shortcomings of existing planning and design. So, how to face this perception difference and meet the recreational demands for tourists? Academic research on urban recreational behavior has begun to involve the differences in the use and perception of urban public recreational space among different social and economic status groups, different demographic characteristics, different ethnic and cultural backgrounds, different community residents and foreign tourists. For example, Erkip (1997) studied the differences in the demand and use behavior of park recreation places among different social and economic status, family status and age groups [27]; Yilmaz, et al. (2007) studied the influencing factors of user characteristics of urban parks (such as gender, income, marital status, education level, etc.) [28]. Meer (2008) studied the types and quantities of recreational activities of the elderly in different communities [29]. Then, how should we face this difference and meet the recreational demands of tourists in the process of underground street planning? Firstly, developers should study the perceptual image of the tourists, deconstruct, capture and sort out the implicit elements of the tourists' thoughts and moods, feelings and emotions, expectations and beliefs, and integrate and refine the planner's own planning and design knowledge through perceptual interaction and image coupling. It matches the tourists' perceptual knowledge. For planners and designers, the planning and design of a plan or image representation is a subjective individual behavior, which mostly depends on the

taste of the planner rather than the tendency of the tourist, which makes it difficult for people to perceive the planning semantics such as the intention, use and grammatical expression of the plan; at the same time, the tourist is opposite to each other. The emotion of the case is also a very complex cognitive process. There are many intricate factors that will affect its perception mechanism, which to a certain extent increases the difficulty of the tourists' perception of the scheme.

However, the rapid transformation of social and economic form and the continuous renewal of people's life concept make the former production-oriented seller's market form rapidly change into the user-oriented buyer's market form. In this context, when planning layout and design plans, urban planners should also shift their attention from the concept and value of planners to the recreational perception image including self-image, cultural image, social image and ecological image. Therefore, in order to enhance the scientific and attractive, a good design plan should not only meet the expected goals, meet the norms and technical requirements, but also meet the physical and psychological needs of recreation. In order to predict the success of the scheme and to control and optimize its effectiveness, planners must make the subjective and objective demands of the tourists explicit.

In the future, the city will become a city shared by residents and tourists. Underground street is an important carrier of urban tourism development and will increasingly become a necessary place for tourists to travel to a city. Underground street is the symbol of the city's tourism image and a beautiful business card in the city. Scenic spots are one of its major trends. In underground streets, tourist inquiry centers or tourist centers have become the necessary institutions for scenic spots, which has become more common in Japan, the United States and some European countries. In addition, it is no longer rare that tourist reception and service facilities such as travel agencies and hotels appear in underground streets. Underground streets will also develop together with other tourist attractions, share urban tourist resources and witness the development of urban tourism.

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