Perceived Service Quality and Its Influence on Bike Sharing System Usage: Case Study from Shanghai

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In recent years, bike sharing systems have been set up in numerous cities around the world to provide rental bikes to citizens and travellers as an alternative to taking short-distance car trips. In Min Hang District, Shanghai, such a system has started operation since March, 2009. Based on data from 87 respondents on their experience and comments on using the system, this study employs an ordinal logistic regression model to examine the impacts of service item perception on general satisfaction degree. It was found that sufficient bikes and proper operation time are the most influential service related factors, while vehicle ownership is that among the individual characteristics. A user giving positive comment on shared bikes availability and system operation time, and owning fewer vehicles tends to express a high general satisfaction degree towards the service. Then, confused by the fact that reported high satisfaction degree accompanying with low use frequency, a cross-tabulation technique is applied to explore the reason. The possible explanation to such a phenomenon is that bike sharing service in Min Hang, Shanghai provides only an alternative, and people's mode choice is strongly affected by the specific decision context. The findings of this research will be helpful for government administrations and the system operator to improve the service as a whole, thus attracting more users.

Key Words: *Travel Behavior, Bike Sharing System, Service Quality, Ordinal Logistic Regression*

1.INTRODUCTION

Bike sharing is a non-motorized transportation service, typically structured to provide users point-to-point transportation for short distance trips (0.5-3 miles). It provides users the ability to pick up a bicycle at any self-serve bike sharing station in the network and return it to any other bike sharing station (including the origin). A bike sharing station is

the structure that holds the automated customer kiosk, and the docks that dispense the bicycles. A station can hold a minimum of one bicycle and up to a maximum number of bicycles by adding more dock platforms. The dock is the most basic component within a bike sharing station. The dock is a mechanism that retains a bicycle in an upright, locked position until released by the user. Customer kiosk is an electronic terminal which provides bicycle rental instructions, payment equipment (e.g., credit card device), and all other means necessary for the rental of bicycles.

Fig.1 Station facilities of a typical bike sharing system

The idea of bike sharing was first proposed in Europe in 1965. Since then, such schemes have seen a dramatic increase globally. According to Shaeen et al.(2011), there were more than 135 programs operating in an estimated 160 cities in Europe, Asia, North and South America, with more than 235,000 shared bicycles, as of March 2011. The idea has experienced three generation of development after its proposition according to the different bike management and tracking technologies.

China was once called Kingdom of Bicycles for its heavy reliance on bikes for mobility in 1970s. Chinese citizen relied on bicycles because of their relative low income and the country's compact urban development at that time. Over the past decades, however, bicycle use has gradually declined because of rapid motorization and longer trip distance caused by economic improvement, as well as the deterioration of cycling environment.

Facing with the severe urban traffic congestion and other secondary problems by too much car usage, urban management authorities have started a campaign to promote non-motorized transport usage in many Chinese cities, and bicycle would definitely be one of the alternatives. However, due to theft and maintenance concerns, it has been difficult to persuade more citizens to buy and use their private bicycles. From this perspective, bike sharing scheme has superiority and it also makes it possible for the travellers to conduct single bicycle trips.

To the authors' best knowledge, the first bike sharing scheme in China dated back to 2005 in Beijing, but experienced a quite slow development, and didn't get too much attention. As for the acknowledged most successful scheme in China, Hang Zhou operated a system with 2,962 stations and 69,750 bicycles in service up to December 2012. The pressure from traffic congestion as well as the success of Hang Zhou scheme has encouraged many Chinese mayors to start their own bike sharing trial. Fig.2 and 3 depict the spatial and temporal development of bike sharing schemes in China.

Fig. 2 Bike sharing schemes spread east and central China (Source: *http://www.publicbike.net/*)

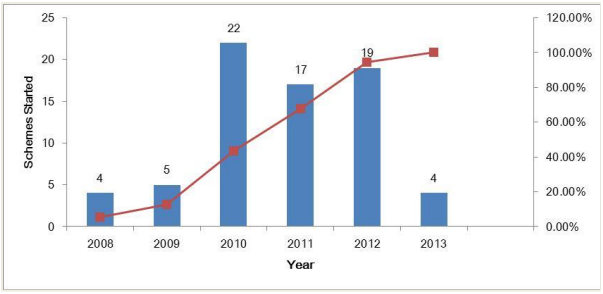

Fig.3 Rapid increase in bike sharing schemes has been seen in the past five years in China (Source: *http://www.publicbike.net/*)

In March 2009, the Shanghai Forever Co., Ltd, a well-known bicycle manufacturer in China, launched bike sharing scheme in Min Hang District, Shanghai. This system first consisted of 6,000 bicycles, 170 stations, covering three towns and one sub-district with a population of 7.4 million. Min Hang district government funds the scheme with an objective to promote public welfare by providing a solution to the last 1 km of metro based trips. According to the five year contract between the government and service provider, Shanghai Forever Co., Ltd was authorized to manage the system independently, including bicycle and docking station production and maintenance, as well as advertisement management. The government would provide a total amount of 78.361 million RMB yuan subsidies and would be responsible for the cost of the employees during the contract period. The operator would also take 70% of the advertisement profit. As of December 2012, the service has expanded to 7 towns, 4 sub-districts and 1 industrial park with a registered population of 2.4 million, with 19,100 bicycles, 593 stations and 21,461 docking studs in operation 24h a day. According to the latest development plan submitted to the government, another 1,000 bicycles would be implemented before 2015.

The Min Hang Public Bicycle service is classified as a third generation bike sharing program, as it introduces smart cards, automated check-in and check-out, and distinguishable bicycles and docking stations. Forever Co., Ltd also developed lots of patents for its shared bike and operating system. They designed dedicated component and made adjustable design for people of different stature. Innovative mechanical locks are equipped on the shared bicycles, which works with a four digits password sent via text messages. They also invented the separated digital lock stud system to manage their shared bikes; each of them works independently, which means easy for expansion and has its own backup power.

As for membership application, every local resident in Min Hang district could use their resident ID card to apply for the bike sharing system membership and got a specific card with 100 original credits in it. Each trip shorter than two hours will get one credit reward with an upper limit of two credits per card day. Credits will be reduced when the trip is longer than 2 hours, and the detailed credit system could be found in Table 1. When there are no credits in the card, the users have to pay 100 RMB yuan for applying a new membership card.

Table 1 Credit system of Min Hang bike sharing scheme, Shanghai

Trip Length (hours)	≤2	2-4	4-12	12-24	≥24
Credit (points)	+1(upper limit 2 per card day)	-10	-30	-50	-100

According to a survey conducted by Tang et al. in 2009, the most frequent customers of Shanghai bike sharing scheme is the white collar workers between 20 and 39 years old, with a monthly income between 2,000 and 4,000 RMB yuan. They use the service mainly for commuting purpose (go to work or back home, 18.35% and 54.59% respectively), followed by shopping trips (15.60%). As for why they choose

such a service, it turns out that economic factor (free of charge) is still most determinant.

According to annual performance evaluation report by local government in 2011, a total amount of 25,334,291 usages have been achieved, i.e., every bicycle is used for 3.65 times per day on average. As for membership, as of December of 2011, there are 234,757 member cards in total, but 24,150 of them didn't have any usage record in the past whole year; only 14,908 card holders use the service for more than 500 times, and 76,310 card holders use the system for 101-500 times, which take the largest proportion.

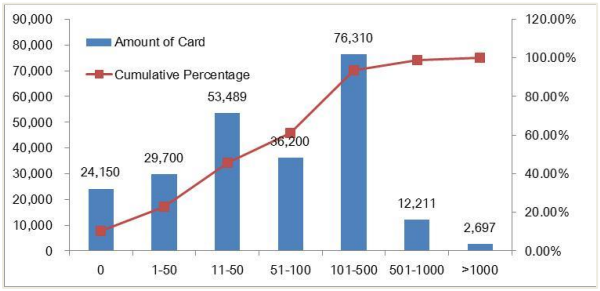

Fig.3 Membership and use frequency category

Except for the huge amount of rarely used cards, there are two more challenging problems for Min Hang bike sharing scheme. The first is the sustainability. As it has been seen as a public welfare service and has been free of charge, local government has to keep providing a huge amount of subsidy to the operator, which turns to be a burden of the public finance, especially when there is not much profit from advertisement. From a long term perspective, the system may not be sustainable enough. To overcome the problem, both the government and the operator are designing a monetary membership system, just like those used in other schemes home and abroad. Secondly, as the result of rhythm of urban movement, the shared bicycle traffic also show obvious tide phenomenon, which make it difficult to find a bicycle or a docking stud, the latter of which is more disastrous. The operator now implement 10 carriers to balance the bicycles among docking stations, however, they seem never meet the bicycle redistribution demand.

2.THE SURVEY

The present study is to improve understanding on service items and dimensions of bike sharing schemes and to identify to what extent they influence the usage. To obtain the necessary data, a questionnaire based survey is conducted. When deciding the items included, the researchers first analysed the common procedure of using the system, and selected the most concerned items from the user's perspective. Then, a draft item list was distributed among the users and some bike sharing researchers in Chinese institutions. Their feedback and comments helped improve the questionnaire in the second round. In the finally distributed questionnaire, a total number of 17 different service items (see Table 2) are included. The targeted respondents were expected to provide their perceived quality on each item with scores on a 5 point Likert scale (Strongly disagree-Strongly agree). Besides the scheme service items, questions on their most frequently conducted trip characteristics (e.g., Land use of origin and destination, trip purpose, travel distance and time etc.), a general satisfaction degree and necessary individual socio-demographic factors were also included.

Table 2 Service items in final questionnaire

No.	Items	Abbr.
1	It's near from my origin to the station.	O2SDistance
2	It's near from the station to my destination.	S2DDistance
3	I can easily find a station.	EasyFindStation
4	Bikes are always available.	BikeAlwaysAvailable
5	It's easy to operate the lending and returning facilities.	EasyStationFacilities
6	Generally, bikes are in good condition.	BikeInGoodCondition
7	The bikes are labour saving.	BikeLabourSaving
8	The bikes rarely break down on the way.	BikeNotBreakOnWay
9	Locks are reliable.	ReliableLocks
10	Dockings at stations are always available.	DockingAlwaysAvailable
11	Raincoats are provided at stations on rainy days.	RaincoatsProvided
12	The operators would make in time feedback to complaints.	ComplaintsFeedback
13	It's good for the service to be free.	FreeOfCharge
14	It's convenient to apply for a membership.	MembershipApplication
15	The operators would respond timely to incidence.	IncidenceResponse
16	There is corresponding bike route network in the service area.	BikeRouteNetwork
17	It's good for the system to be operated 24h a day.	OperationTime

The questionnaire was distributed among the shared bike users in Min Hang, Shanghai in May, 2011. Totally, more than 150 users were invited to join the survey, but many refused. In the end, we got 101 respondents and it turned out 87 responses were valid. The analyses below are based on these 87 responses.

The author would like to claim that as item 11 (RaincoatsProvided) and 16 (BikeRouteNetwork) were included to obtain data one users' desire for improvement on these two aspects, as such service does not exist in present scheme, so our analyses here would be based on the other 15 items only.

3.DATA ANALYSES

(1) Descriptive statistics

A descriptive analysis on characteristics of the respondents has been conducted (see Table 3) and the results seem correspond well with findings in Tang et al (2009).

Table 3 Respondents individual characteristics

Characteristics	Group	Frequency	Cumulative percentage (%)
Gender	F	31	35.63
	M	56	100
Age	<18	4	4.6
	18-30	31	40.2
	30-45	31	75.9
	45-55	14	92.0
	>55	7	100.0
Income(Monthly, RMB *yuan*)	<1,000	8	9.2
	1,000-3,000	22	34.5
	3,000-5,000	19	56.3
	5,000-7,000	20	79.3
	>7,000	18	100.0

As for the purpose for their most frequent trips, the finding of the present study is a different with that of Tang et al (2009). As indicated in Fig. 4, the respondents reported most their trips are for non-commuting purpose such as shopping or entertainment.

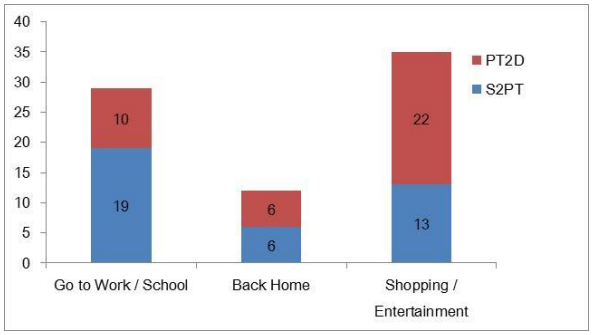

Fig.4 Reported purpose for the most frequent trips

The concerned variables of this study, general satisfaction degree and usage, are also examined to obtain a general profile, as can be seen in Table 4 and 5.

From the two tables, it could be easily seen that almost 90% of the respondents gave positive comments (satisfied or very satisfied) on the Min Hang Bike Sharing Scheme, though less than 30% of the respondents are frequent users (more than 9 times a week). So it seems such a service acts as an alternative only for people in the service area. The respondents should agree with the idea that poor service is better than no service at all. A detailed study on impacts of service quality on satisfaction degree and usage is conducted in the following parts.

Table 4 Reported general satisfaction degree

Satisfaction		Frequency	Percentage (%)	Cumulative Percentage (%)
Level	1 (very unsatisfied)	0	0.0	0.0
	2 (unsatisfied)	4	4.6	4.6
	3 (no comment)	5	5.7	10.3
	4 (satisfied)	66	75.9	86.2
	5 (very satisfied)	12	13.8	100.0
Total		87	100.0	

Table 5 Reported weekly usage

Weekly Usage		Frequency	Percentage (%)	Cumulative Percentage (%)
Level	1 (1-4 times)	34	39.1	39.1
	2 (5-8 times)	29	33.3	72.4
	3 (9-12 times)	10	11.5	83.9
	4 (12+ times)	14	16.1	100.0
Total		87	100.0	

(2) Item service quality perception and general satisfaction degree

To identify the impacts of perceived item service quality on general satisfaction degree, the authors believe it would help to check the 9 non-positive comments on scheme service in Table 4. For comparison, the mean values of each item for positive comments are also calculated (see Table 6). The cells with a grey shadow highlights the most different commented item with the positive group for each respondent. When study Table 6 in much details, Respondent 21 is the most attractive, as he gave positive comments to almost all the service items, but reported un-satisfaction to the service as a whole. His individual characteristic may provide a reasonable explanation. As can be seen, he has a monthly income between 5,000 to 7,000 RMB yuan, and gets three vehicles (1 private car, 1

electric bicycle and 1 normal bicycle) at home, which both ensure his affordability or accessibility to other mode choice. And the born disadvantage of bike sharing service (e.g., trouble in finding/ waiting for available bike and docking, etc.) should also leave him a bad impression and keep him from frequent using such service. Similar matters could be found for Respondent 64, who has an electric bicycle and a normal bicycle at home. The difference between Respondent 21 and 64 is that the latter gave many negative comments to the service items before he finally gave the neutral comment on the general satisfaction and use the service more frequently.

It could also be found in Table 6 that even in the same general satisfaction degree group, different comments on service items do exist, thus it makes sense to test whether the scores on each item significantly vary across satisfaction groups or not. Kruskal-Wallis tests with a significance level of 0.05 were executed to conduct the job. The results turned out that null hypothesis for O2SDistance, EasyFindStation, BikeAlwaysAvailable, EasyStationFacilities, DockingAlwaysAvailable and OperationTime were rejected, i.e., the perception of users on the previous 6 service items do distribute differently across the general satisfaction group.

Then a bivariate correlation analysis is conducted among the service items and general satisfaction degree. Due to the ordinal nature of the data, Kendall's tau-b is used to measure their correlation, as indicated in Table 7. The results revealed the most related service items with general satisfaction degree comment.

According to the Kruskal-Wallis test and correlation analysis results examined, an ordinal logistic regression is conducted with the potential statistical significant items on general satisfaction degree.

The initial model was specified to include all the correlated items and after revision of several rounds, the results turned out that BikesAlwaysAvailable and OperationTime have the most influential impacts on general satisfaction degree, with VehiclesAvailableCount as the most significant individual factor. Detailed estimating results could be found in Table 8.

Table 8 Ordinal Logistic regression results

Variables in the Equation		Initial Model		Final Model	
		Estimates	Sig.	Estimates	Sig.
Intercepts	2 (Unsatisfied)	13.291	0.002	5.743	0.007
	3 (No Comments)	14.418	0.001	6.814	0.002
	4 (Satisfied)	20.843	0.000	11.892	0.000
Service Items					
O2SDistance		0.777	0.349	--	--
S2DDistance		-0.926	0.193	--	--
EasyFindStation		0.350	0.421	--	--
BikeAlwaysAvailable		0.766	0.028	0.706	0.011
EasyStationFacilities		0.283	0.548	--	--
BikeNotBreakOnWay		0.616	0.156	--	--
DockingAlwaysAvailable		0.220	0.519	--	--
ReliableLocks		0.292	0.397	--	--
OperationTime		0.482	0.223	0.690	0.014
Individual Characteristics					
Gender	=1(Male)	0.995	0.193	--	--
	=2(Female)	0*	--	--	--
Age	=1(<18)	-2.320	0.379	--	--
	=2(18-30)	1.114	0.404	--	--
	=3(30-45)	2.065	0.145	--	--
	=4(45-55)	1.812	0.218	--	--
	=5(>55)	0*	--	--	--
Monthly Income	=1(<1000 yuan)	3.017	0.105	--	--
	=2(1000-3000 yuan)	-0.673	0.499	--	--
	=3(3000-5000 yuan)	-0.722	0.479	--	--
	=4(5000-7000 yuan)	-1.207	0.221	--	--
	=5(>7000yuan)	0*	--	--	--
VehicleAvailableCount	=0	5.656	0.004	4.429	0.004
	=1	4.915	0.010	4.228	0.004
	=2	4.813	0.028	3.860	0.024
	=3	0*	--	0*	--
Model Fit					
Sample Size		87		87	
-2 Log Likelihood (intercept only)		137.211		96.153	
-2 Log Likelihood (final)		96.137		73.932	

**This parameter is set to zero because it is redundant.*

Table 6 Detailed information of the non-positive general satisfaction degree comments

Item	Mean for Very/Satisfied	No Comment					Unsatisfied			
		Respondent ID					Respondent ID			
		18	51	64	75	79	7	17	21	57
1 O2SDistance	4.49	5	5	4	4	4	3	4	5	4
2 S2Ddistance	4.44	5	5	3	4	5	3	4	5	4
3 EasyFindStation	4.05	3	4	3	2	3	3	4	5	4
4 BikeAlwaysAvailable	3.62	3	3	2	1	3	2	3	4	4
5 EasyStationFacilities	4.18	3	3	2	4	3	2	5	4	4
6 BikeInGoodCondition	3.79	4	2	3	1	5	5	4	4	4
7 BikeLabourSaving	3.82	4	1	3	4	5	5	3	4	2
8 BikeNotBreakOnWay	4.32	5	4	3	4	3	5	4	4	4
9 ReliableLocks	3.55	3	4	3	5	3	5	2	4	2
10 DockingAlwaysAvailable	3.72	5	2	3	1	4	4	2	3	4
12 ComplaintsFeedback	3.72	4	4	3	3	3	5	4	4	4
13 FreeOfCharge	4.35	5	4	4	5	5	1	3	5	4
14 MembershipApplication	3.78	5	5	1	4	3	4	4	5	4
15 IncidenceResponse	3.65	5	3	2	4	4	3	3	5	3
17 OperationTime	4.41	5	5	2	1	4	3	4	5	4
Average	3.88	4	3.41	2.65	3	3.53	3.35	3.59	4.35	3.53
Gender	--	F	M	M	M	F	F	M	M	M
Age	--	55+	18-30	30-45	30-45	30-45	45-55	18-30	18-30	18-30
Monthly Income (RMB *yuan*)	--	1,000-3,000	1,000-3,000	5,000-7,000	1,000-3,000	1,000-3,000	5,000-7,000	3,000-5,000	5,000-7,000	5,000-7,000
Vehicles Available	--	0	0	2	1	0	0	0	3	1
Weekly Usage (times/week)	--	1-4	5-8	5-8	12+	9-12	1-4	5-8	1-4	1-4

Table 7 Bivariate correlation among service items and general satisfaction degree

	1	2	3	4	5	6	7	8	9	10	12	13	14	15	17	18
1 O2SDistance	1															
2 S2DDistance	.770**	1														
3 EasyFindStation	.423**	.360**	1													
4 BikeAlwaysAvailable	.200*	.201*	.399**	1												
5 EaseStationFacilities	.393**	.425**	.393**	.383**	1											
6 BikeinGoodCondition	.157	.178	.322**	.329**	.265**	1										
7 BikeLaborSaving	.128	274**	.364**	.217*	.232*	.428**	1									
8 BikeNotBreakOnWay	.245*	.235*	.258**	.129	.285**	.325**	.266**	1								
9 ParkingAlwaysAvailable	.355**	.240*	.326**	.365**	.315**	.381**	.337**	.187*	1							
10 LocksSafeReliable	.285**	.181	.327**	.238**	.328**	.203*	.222*	.227*	.155	1						
12 ComplaintsFeedback	.228*	.095	.198*	.130	.206*	.159	.077	.178	.179*	.294**	1					
13 FreeOfCharge	.259**	.312**	.222*	.070	.261**	.035	.054	.086	.112	.055	.131	1				
14MembershipApplication	.177	.165	.131	.098	.194*	.059	.127	.290**	.118	.177	.342**	.298**	1			
15 IncidenceResponse	.308**	.185	.202*	.204*	.254**	.263**	.225*	.311**	.249**	.400**	.506**	.220*	.318**	1		
17 OperationTime	.429**	.304**	.246**	.121	.364**	.138	.069	.371**	.286**	.278**	.102	.373**	.203*	.348**	1	
18 Satisfaction	.281**	.202*	.230*	.288**	.286**	.137	.137	.225*	.221*	.219*	.030	.113	.051	.142	.322**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

From Table 8, we could conclude that bike sharing scheme users with a higher score on Bike Always Available and Operation Time tend to express a general satisfaction at a higher level.

As for the impacts of Vehicles Available at Home, the estimated coefficients illustrate the tendency that users with more vehicles at home give a relative negative evaluation to such a service. This may due to that they are not as captive as people with fewer choices (vehicles), thus may demand more on the service.

The operators should notice that the most significant factors contributing to higher general satisfaction degree is user's perception on bike availability and operation time, thus more effort should be devoted ensure service quality of these two items if a higher satisfaction degree is desired.

(3) Satisfaction and Use Frequency

A correlation analysis is first conducted among the general satisfaction degree, use frequency and other 6 individual characteristic variables, as can be seen in Table 9.

Table 9 Correlation among individual characteristics, general satisfaction degree and use frequency

	Gender	Age	Education	Job	MonthlyIncome	TransAvaCount	Satisfication	Frequency
Gender	1.000							
Age	0.053	1.000						
Education	0.006	-0.068	1.000					
Job	-0.049	-0.119	-.189*	1.000				
MonthlyIncome	0.073	0.119	.414**	-.238**	1.000			
TransAvaCount	0.071	0.090	-0.032	0.008	0.158	1.000		
Satisfication	-0.002	-0.042	-0.037	0.153	-0.077	-0.112	1.000	
Frequency	-0.117	0.089	-.215*	-0.015	-.218*	0.021	0.019	1.000

From the correlation analysis results, it is obvious that use frequency correlated poorly with general satisfaction and individual characteristics except for the MonthlyIncome variable. The negative sign for correlation coefficient between frequency and MonthlyIncome corresponds with our expectation, as a stronger affordability may alternate people's focus from service price to more quality related items. The poor correlation may due to two reasons. The first is whatever a respondent's satisfaction degree is, the service is just ready for him/her to use, like normal public transport, and for many of them, it's not a bad choice, so they may rely on specific context to decide to use the service or not. The other reason is our really small sample size, which may hide the relationship.

However, the authors still tried to obtain any qualitative findings on the respondents' usage by employing cross tabulation techniques on the relationship between use frequency and general satisfaction as well as Vehicles ownership.

Table 10 Cross-table between general satisfaction degree and service use frequency

			Frequency				Total
			1	2	3	4	
Satisfaction	1	Count	0	0	0	0	0
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%
	2	Count	3	1	0	0	4
		% of Total	3.4%	1.1%	0.0%	0.0%	4.6%
	3	Count	1	2	1	1	5
		% of Total	1.1%	2.3%	1.1%	1.1%	5.7%
	4	Count	25	22	8	11	66
		% of Total	28.7%	25.3%	9.2%	12.6%	75.9%
	5	Count	5	4	1	2	12
		% of Total	5.7%	4.6%	1.1%	2.3%	13.8%
Total		Count	34	29	10	14	87
		% of Total	39.1%	33.3%	11.5%	16.1%	100.0%

It' interesting to see there are 5 respondents reporting high satisfaction level but low use frequency, and their individual characteristics are listed below.

Table 11 Detailed information of the 5 respondents with high satisfaction but low use frequency

Respondent ID	Gender	Age	MonthlyIncome	Vehicles Available	Most Frequent Trip Purpose
26	Male	18-30	3,000-5,000	0	Shopping/Entertainment(S2D)
40	Male	30-45	1,000-3,000	0	Back Home (S2PT)
67	Male	45-55	3,000-5,000	1 private car	Others
74	Male	18-30	7,000+	1 private car	Go to Work(S2D)
80	Female	30-45	5,000-7,000	0	Back Home (S2PT)

The characteristics of the 5 respondents do vary, but it still provides some information on Trip Purpose. Only Respondent 74 reported his trip to work by shared bike, while the other 4 respondents conducted less time-constrained activities with such service. The reason may due to the bike availability and the consequent unreliability.

As for the Vehicles Available at Home, it turned out that respondents with 1 vehicle at home are the most frequent users of the service.

A detailed examination with the data shows, of all the 48 respondents with 1 vehicle at home, 22 for private car, 16 for bicycle, 8 for electric bicycle, and 2 for motorcycle. Respondents from private car only family evenly use the service for different purposes. Respondents from bicycle only family show a relative centralized distribution, as trips of going to work/school and shopping/entertainment both take a percentage of 37.5%.

Table 12 Cross-table between vehicles available at home and service use frequency

			Frequency				Total
			1	2	3	4	
VehilcesAvaCount	0	Count	13	8	3	6	30
		% of Total	14.9%	9.2%	3.4%	6.9%	34.5%
	1	Count	18	18	5	7	48
		% of Total	20.7%	20.7%	5.7%	8.0%	55.2%
	2	Count	2	3	1	1	7
		% of Total	2.3%	3.4%	1.1%	1.1%	8.0%
	3	Count	1	0	1	0	2
		% of Total	1.1%	0.0%	1.1%	0.0%	2.3%
Total		Count	34	29	10	14	87
		% of Total	39.1%	33.3%	11.5%	16.1%	100.0%

4.CONCLUSIONS

The present study first make an introduction to the concept of bike sharing and the scheme operated in Shanghai from 2009. Then with data on service perception and individual information collected via a questionnaire based survey, analysis on the relationship between service items and general satisfaction degree is conducted. The results showed that whether there are enough bikes to borrow and a proper operation hour have most significant impacts on general satisfaction degree. In fact, such a result confirmed a promising research topic, i.e., the rebalancing problem of bike sharing system, which has both theoretical and practical significance, and has attracted many related studies recently. Another finding is the statistically non-significant relationship between satisfaction and actual use frequency in Shanghai scheme. As discussed in previous paragraphs, this may originate from the fact that most users are easily satisfied with existence of more alternatives, but when facing particular situation, their choice does depend on the specific context.

Encouraged by central government, more and more cities in China are considering introducing bike sharing scheme to meet the last mile demand of public transport and short range trips, however, it should be noted that a successful scheme is not just building stations, buying and distributing bicycles. What matters is to identify and meet the real demand of potential users. To some extent, just as Tang et al.(2009) pointed out, it might help if the bike sharing scheme could integrate seamlessly with mass public transport and increase the utility to use public transport as a whole.

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