Research Paper

The Study of Willingness to Pay for Bicycle Hire Services At Tourist Attractions in Thailand

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ARTICLE INFORMATION

ABSTRACT

Bicycles offer non-motorized transport that not only reduces energy consumption and pollution but also offers health benefits. However, most Thai people do not use bicycles. This study investigates the willingness to pay (WTP) for bicycle hire at tourist attractions in Thailand, which can inform strategies that encourage more Thai people to use bicycles. Data analysis considered socio-economic factors, such as gender, age, and level of education, average household income per month, type of tourist attraction, frequency of bicycle use, and type of bicycle. The analyses included the independent sample t-test and analysis of variance F-test. The samples for the analysis comprise 704 Thai tourists. From the results, it was found that WTP for bicycle hire between respondents' gender for the age groups lower than 18 years and between 30–44 years was different. For type of bicycle, the differences were at statistical significance 0.05. The group having WTP for bicycle hire at a confidence level of 95% shared the same level of education, Average household income per month, frequency of bicycle use, and type of tourist attraction were not different. Government sectors or involved organizations can use this study to inform guidelines around suitable bicycle hire for target groups.

1. Introduction

Bicycle use is non-motorized transportation. It can efficiently reduce using energy and even save it more than other types of transportation. This is considered as guidelines for sustainable development which benefits both individuals and society. For individuals, it is the door-to-door activity for health which decreases traveling expenses. In terms of society, energy conservation saves infrastructure costs, reduces noise pollution and pollution to environment (Litman, 2004; Rietveld, 2001).

Over the next 15 years, Thailand is predicted to release as much as 225.33 million tons of carbon dioxide from the transport sector alone (Ratanavaraha and Jomnonkwao, 2015); CO_2 is considered the main cause of global warming (Aßmann and Sieber, 2005; Ceylan, Ceylan, Haldenbilen, and Baskan, 2008; Meyer,

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Leimbach, and Jaeger, 2007). The promotion of bicycle use is one of the key strategies for encouraging sustainable transport within the country (Thailand Transport Portal, 2015). From a health perspective, cycling can reduce the risk of diseases and improve mental well-being (Toker and Biron, 2012). The study of bicycle hire services at tourist attractions is therefore relevant to the aforementioned strategy. Furthermore, cycling is an attractive of travelling. According to Weston et al. (2012), the availability of bicycle use services in Europe was unique and was thus attracting tourists. This suggests that greater attention should be given to tourist groups' bicycle hire needs to increase bicycle users in the future.

In 2013, the number of tourists in Thailand totaled 36,867,385: 22,971,395 Thai tourists and 13,895,990 foreign tourists. It can be seen that the proportion of Thai tourists was quite high (62.31%) as compared with foreign tourists, and this trend has continued. Domestic tourist numbers increased by 11.03% in 2013 as more Thai people turned to travel within the country. In this study, Thai tourists comprise the target group.

Improving the service standard to satisfy tourists requires the expenditure of work operation. Furthermore, the cost of investment in facilities is high. Accordingly, from the past, the manufacturers have not attached the importance to it (Jomnonkwao, Siridhara, and Ratanavaraha, 2015). The government sector has to determine the policy to develop service standard. This study has recognized the importance of giving tourists services. Thus, the availability of hiring bicycle spots in tourist attractions has been studied by considering the expenditure of operation or willingness to pay appropriately. No previous studies have specifically examined consumers' needs or willingness to pay (WTP) for bicycle hire. Most WTP studies have focused on public transport (Drevs, Tscheulin, Lindenmeier, and Renner, 2014). Those studies investigated the effects of the government's financial support on WTP for public transport system services using regression analysis to analyze passengers' attitudes and behaviors. The WTP for hybrid cars in Turkey was studied using the ordered probit model (Erdem, Şentürk, and Şimşek, 2010). The variables considered were income, gender, and level of education, global warming concern, and number of cars, importance of cars, and risks and attitudes toward alternative energy.

This study analyzed the value of WTP for bicycle use at tourist attractions between socio-economic groups using the independent sample t-test and analysis of variance (ANOVA) F-test to comprehend the WTP for

determining suitable bicycle hire services for the target groups.

2.   Methods

2.1 Participants and data collection

The samples in this study comprised Thai tourists traveling within the country. Random sampling was applied as per the method by (Yamane, 1973) to select the samples. According to a statistical record, there were 54,652,216 Thai tourists in 2014 (National Statistical Office, 2014). In accordance with Yamane's calculation, 385 samples were required; therefore, 704 samples were selected by face-to-face interviews for this analysis.

Data were collected using a questionnaire divided into three parts: socio-economic, bicycle use behavior, and WTP for bicycle hire. The variables were gender, age, level of education, average household income, type of tourist attraction (mountains, sea, culture, history, and urban), frequency of bicycle use (users, nonusers), and types of bicycles (bicycles for common work, bicycles for sport racing, and bicycles for exercising) With regard to WTP for bicycle hire, an open-ended question was asked about the acceptable maximum bicycle hire per day (USD/day).

2.2 Analysis

The difference of WTP for bicycle hire between socio-economic groups was calculated using the independent sample t-test to test the difference of means between the two groups. For the comparison of means of more than two groups, ANOVA was statistically applied by F-test, which is an overall test to check if there was difference of at least one unidentified pair; thus, post hoc test using multiple comparisons were used to compare the differences between each pair.

3.   Results

In this study, there were 704 samples divided into 290 males (41.2%) and 414 females (58.80%). The majority of samples (62.6%) were aged 18–29 years followed by 30–44 years (21.3%). The majority of samples held a Bachelor's degree (50.7%) and 32.1% had average household income 30,000–59,999 baht per month (USD 838–1676). Mountain tourist attractions were the most popular (52.4%), as shown in **Table 1.**

Table 1. Respondents' demographics

Item	Percentage
Gender	
Male	41.2
Female	58.8
Age	
<18 years	10.5
18-29 years	62.6
30-44 years	21.3
45+	5.5
Level of Education	
Lower than Bachelor's degree	36.9
Bachelor's degree	50.7
Higher than Bachelor's degree	12.4
Average monthly income per household (bath)	
<5,000(USD 139.70)	1.14
5,000-9,999 (USD 139.70–279.37)	7.10
10,000-14,999(USD 279.40 –419.08)	9.38
15,000-24,999 (USD 419.11–698.49)	16.48
25,000-29,999 (USD 698.51–838.19)	2.98
30,000-59,999(USD 838.22–1,676.41)	32.10
60,000-99,999(USD 1,676.44–2,794.04)	13.92
100,000 (USD 2,794.07)	16.90
Tourist attractions	
Mountains	52.4
Sea	30.8
Cultural attractions	6.4
History	6.0
Urban	4.4

Note: 1 USD = 35.79 Bath (August 25, 2015)

3.1 Average maximum WTP for bicycle hire

Table 2 shows the values of average minimum and maximum WTP for bicycle hire. The table presents means at 95% confidence intervals (CI) for each group as follows: (1) for WTP for bicycle hire between genders, the average maximum WTP of males (USD 3.02/day; 95% CI = USD 2.63/day, USD 3.42/day) is greater than that of females (USD 1.88/day; 95% CI = USD 1.67/day, USD 2.09/day); (2) for age, in the group of 30–44 years, the highest average maximum WTP equaled USD 2.92/day (95% CI = USD 2.40/day, USD 3.41/day) followed by that of the age range between 18–29 years (USD 2.24/day; 95% CI = USD 1.98/day, USD 2.50/day); (3) for the level of education higher than a bachelor's degree, the average maximum WTP was high (USD 2.58/day; 95% CI = USD 2.11/day, USD 3.06/day), followed by that of samples with a bachelor's degree (USD 2.51/day; 95% CI = USD 2.21/day, USD 2.82/day); (4) for average monthly family income, the group having income between 60,000–99,999 baht (USD 2.81/day; 95% CI = USD 2.27/day, USD 3.36/day) was giving the most average maximum WTP while the least average maximum WTP group was the one having income less than 5,000 baht (USD 1.60/day; 95% CI = USD 0.73/day, USD 2.47/day); (5) mountainous tourist attractions have the most average maximum WTP (USD 2.57/day; 95% CI = USD 1.71/day, USD 2.39/day), followed by cultural tourist attractions (USD 2.34/day; 95% CI = USD 1.65/day, USD 3.02/day); (6) average maximum WTP of bicycle users (USD 2.51/day; 95% CI = USD 2.13/day, USD 2.88/day) is higher than that of bicycle nonusers (USD 2.24/day; 95% CI = USD 1.99/day, USD 2.49/day); and (7) regarding types of bicycles, bicycles for sport racing having the highest average maximum WTP value (USD 3.30/day; 95% CI = USD 2.71/day, USD 3.89/day), followed by bicycles for exercising (USD 2.41/day; 95% CI = USD 2.05/day, USD 2.77/day), and bicycles for common work (USD 1.83/day; 95% CI = USD 1.60/day, USD 2.06/day).

The maximum and minimum values of average maximum WTP for bicycle hire are shown in Table 2. When considering the maximum hire price in each group, it was found that males are willing to pay the maximum bicycle hire more than females. Similarly, groups aged 18–29 years, with a Bachelor's degree, average household income per month 30000–59,999 baht (USD 838–1676), and mountain tourist attractions expected the WTP groups paying the maximum bicycle hire (USD 27.94/day). In terms of the minimum WTP for bicycle hire, it was found that every group equally accepted the minimum bicycle hire as USD 0.27/day.

Table 2. Average maximum WTP for bicycle hire.

	Mean (USD/day)	95% confidence interval		Minimum	Maximum
		Lower bound	Upper bound		
Gender					
Male	3.03	2.63	3.42	0.28	27.94
Female	1.89	1.68	2.09	0.28	25.15
Age					
<18 years	1.76	1.20	2.34	0.28	13.97
18-29 years	2.24	1.99	2.50	0.28	27.94
30-44 years	2.91	2.40	3.41	0.28	25.15
45+	2.62	1.98	3.26	0.28	11.18
Level of education					
Below Bachelor's degree	2.06	1.72	2.40	0.28	25.15
Bachelor's degree	2.52	2.22	2.82	0.28	27.94
Higher than Bachelor's degree	2.59	2.11	3.07	0.28	13.97
Average monthly income per household (bath)					
<5,000 (USD 139.70)	1.61	0.73	2.48	0.56	2.79
5,000-9,999 (USD 139.70-279.37)	2.26	1.41	3.11	0.28	13.97
10,000-14,999 (USD 279.40 - 419.08)	1.69	1.09	2.29	0.28	13.97
15,000-24,999 (USD 419.11-698.49)	1.94	1.48	2.40	0.28	13.97
25,000-29,999 (USD 698.51-838.19)	2.01	1.35	2.66	0.56	5.59
30,000-59,999 (USD 838.22-1,676.41)	2.44	2.02	2.85	0.28	27.94
60,000-99,999 (USD 1,676.44-2,794.04)	2.82	2.27	3.36	0.28	13.97
100,000 (USD 2,794.07)	2.76	2.27	3.24	0.28	19.56
Type of tourist attraction					
Mountains	2.58	2.24	2.92	0.28	27.94
Sea	2.16	1.89	2.43	0.28	13.97
Cultural	2.34	1.65	3.03	0.28	13.97
Historic	1.72	1.21	2.23	0.28	8.38
Urban	1.97	1.42	2.52	0.28	5.59
frequency of bicycle use					
Bicycle users	2.51	2.14	2.89	0.28	13.97
Bicycle nonusers	2.25	1.99	2.50	0.28	27.94
Types of bicycle					
Bicycles for common work	1.83	1.60	2.06	0.28	27.94
Bicycles for sports racing	3.31	2.72	3.89	0.28	25.15
Bicycles for exercising	2.41	2.06	2.77	0.28	13.97

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3.2 Comparison of difference of average maximum WTP for bicycle hire among socio-economic groups

The different results of average maximum WTP for bicycle hire of two groups (gender and bicycle use) were tested using the independent sample t-test. The main hypothesis was that the average maximum WTP of the two groups was equal. Before hypothesis testing, the values of variance for the two populations were tested. In the case of more than two groups similar to this study, the comparison between groups including age, level of education, average household income per month, type of tourist attraction, and type of bicycle were analyzed by one-way ANOVA. However, before that, the Levene test was applied to test whether or not the dependent values of every group were different.

From Table 3, the variance test using Levene's test found that gender had a p-value less than 0.05, and thus,

the main hypothesis is rejected. In other words, males and females had tendency for different variance scores at a statistical significance 0.05 and the t-test statistic (t = 5.044) had p-value less than 0.05. The difference in average maximum WTP for bicycle hire was statistically significant. Males (USD 3.02/day) had WTP values higher than females (USD 1.88/day). For bicycle use, it was found that the value of the Levene statistic equaled 0.792 (p > 0.05); thus, the hypothesis was accepted, implying that bicycle users and nonusers did not have different variance at significance 0.05. Regarding the test comparing average maximum WTP, it was found that the value t = 1.153 (p > 0.05). In other words, the average maximum WTP for bicycle hire of bicycle users and bicycle nonusers was USD 2.51/day and USD 2.24/day, respectively, at significance 0.05.

Table 3. Independent sample T-Test

	Levene's test for equality of variances		T-test for equality of means			average maximum For bicycle hire between different groups
	Levene statistic	p-value	t	df	p-value	
Gender	27.226	<0.001**	5.044	447.45	<0.001**	Yes
frequency of bicycle use	0.792	0.374	1.153	684	0.249	No

** Significant at 95% confident

Table 4. ANOVA Test

	Levene's test for equality of variances		F-test[a]		Welch Test[b]		average maximum WTP for bicycle hire between different groups
	Levene statistic	p-value	F	p-value	Welch	p-value	
Age	1.374	0.250[a]	3.427	0.017**	3.694	0.021**	Yes
Level of education	1.476	0.229[a]	2.415	0.090	2.526	0.082	No
Average household income	0.871	0.529[a]	1.803	0.084	2.484	0.022**	No
Type of tourist attraction	4.237	0.002[b]	1.554	0.185	2.293	0.063	No
Types of bicycle	21.718	<0.001[b]	16.980	<0.001**	12.287	<0.001**	Yes

[a]Accepted H_0: the value of covariance of WTP for bicycle hire of every group having equal values. The statistics used was F-test

[b]Reject H_0 : the value of covariance of WTP for bicycle hire at least two different groups .

 The statistics used was Welch

** Significant at 95% confident

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From **Table 4**, ANOVA using Levene's test indicates the variance. It was found that neither age, level of education, nor average household income (p-value < 0.05) impacted the variance; thus, the F-test was used. Regarding tourist attraction and type of bicycle, it was found that the variance values were different; thus, the Welch test was used, which found that age (F = 3.427) had a p-value less than 0.05. It was concluded that at least two age groups had different average maximum WTP. Similarly, for the types of bicycles, it was found that there was at least one pair (Welch = 12.287) with a different average maximum WTP at statistical significance 0.05. The groups showing no statistically different average maximum WTP for bicycle hire were

level of education, (F = 2.415), average household income (F = 1.803), and type of tourist attraction (Welch = 2.293).

Table 5 presents results of the post hoc test using multiple comparisons between two groups: age and type of bicycle. After testing both groups for different average maximum WTP, the test showed the following results: regarding the age group, those who were younger than 18 years and those who were between 30 – 44 years gave importance to the average maximum WTP at significant differences 0.05; regarding the type of bicycle, it was found that bicycles for common work, sport racing, and exercising had different average maximum WTP values for each pair at significance 0.05.

Table 5. Post hoc multiple comparisons

	Mean difference			
Types of bicycle	1) Bicycles for common work	2) Bicycles for sport racing	3) Bicycles for exercising	
1) Bicycles for common work	-	-1.47*	-0.58*	
2) Bicycles for sport racing	1.47*	-	0.89*	
3) Bicycles for exercising	0.58*	-0.89*	-	
Age	1)<18 years	2) 18-29 years	30-44 years	45+
1)<18 years	-	-0.47	-1.13*	-0.85
2) 18-29 years	0.47	-	-0.66	-0.37
3) 30-44 years	-1.13*	0.66	-	0.28
4) 45+	0.85	0.37	-0.28	-

*The mean difference is significant at the 0.05 level

4. Discussion and conclusion

This study aimed to investigate the value of WTP for domestic tourist bicycle hire at tourist attractions in Thailand. It compared WTP values between socio-economic groups using the independent sample t-test and one-way ANOVA. The statistics used were the F-test. The samples comprised 7 0 4 Thai tourists nationwide. The factors considered were gender, age, level of education, average household income, types of tourist attractions, frequency of bicycle use, and type of bicycle.

This study found that the value of WTP for bicycle hire was different between males and females at significance 0.05. In other words, gender influenced the average maximum WTP for bicycle hire. For males, bicycle hire had an average maximum WTP of USD 3.02/day, which was greater than for females (USD

1.88/day). The WTP between age groups was also different. Those under 18 years gave more importance to the average maximum WTP, which was different from those who were 30–44 years, with an average maximum WTP of USD 2.24/day and USD 2.92/day, respectively. This is similar to the findings of Schniederjans and Starkey (2014), which showed age to have an influence on average WTP for green freight transportation. Furthermore, it was found that the type of bicycle had an influence on the average maximum WTP. Each pair of types of bicycle uses (common work practice, sport racing, and exercising) was different at significance 0.05. In other words, tourists' WTP for bicycle hire was different based on the type of bicycle: USD 3.30/day for sport racing, USD 2.41/day for exercising, and USD 1.83/day for common work practice.

The average maximum WTP for bicycle hire was not statistically different among the education level and

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average household income did not influence the average maximum WTP. According to economic theory, the lower income group was expected to have lower WTP than that of the higher income group (Rienstra, Rietveld, and Verhoef, 1999; Schade and Schlag, 2003). However, in this study, it was found that income did not have influence on WTP or price determination in terms of statistical significance. This is similar to the findings of Rienstra et al. (1999), in which there was no difference in WTP between bicycle users and nonusers. This is similar also to the study by Drevs et al. (2014), who found no difference between public transport system users and nonusers regarding WTP for public subsidies. Furthermore, the average maximum WTP for bicycle hire can be determined as a single rate to benchmark among other tourist attractions.

The results of this study are limited by its focus on only Thai tourists within Thailand. Further research could consider foreign tourists and seasonality effects on WTP for bicycle hire.

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References

Aßmann, D., andSieber, N. 2005. Transport in developing countries: Renewable energy versus energy reduction? Transport Reviews, **25**(6), 719-738.

Ceylan, H., Ceylan, H., Haldenbilen, S., andBaskan, O. 2008. Transport energy modeling with meta-heuristic harmony search algorithm, an application to Turkey. Energy Policy, **36**(7), 2527-2535.

Drevs, F., Tscheulin, D. K., Lindenmeier, J., andRenner, S. 2014. Crowding-in or crowding out: An empirical analysis on the effect of subsidies on individual willingness-to-pay for public transportation. Transportation Research Part A: Policy and Practice, **59**(0), 250-261.

Erdem, C., Şentürk, İ., andŞimşek, T. 2010. Identifying the factors affecting the willingness to pay for fuel-efficient vehicles in Turkey: A case of hybrids. Energy Policy, **38**(6),

3038-3043.

Jomnonkwao, S., Siridhara, S., andRatanavaraha, V. 2015. Awareness status of sightseeing bus entrepreneurs: A case study in rural areas of Thailand. Lowland Technology International, **17**(1), 47-52.

Litman, T. 2004. Quantifying the benefits of nonmotorized transportation for achieving mobility management objectives.

Meyer, I., Leimbach, M., andJaeger, C. C. 2007. International passenger transport and climate change: A sector analysis in car demand and associated emissions from 2000 to 2050. Energy Policy, **35**(12), 6332-6345.

National Statistical Office. 2014. The 2014 Survey on Travel Behavior of the Thais

Ratanavaraha, V., andJomnonkwao, S. 2015. Trends in Thailand CO_2 emissions in the transportation sector and Policy Mitigation. Transport Policy, **41**(0), 136-146.

Rienstra, S. A., Rietveld, P., andVerhoef, E. T. 1999. The social support for policy measures in passenger transport. A statistical analysis for the Netherlands. Transportation Research Part D: Transport and Environment, **4**(3), 181-200.

Rietveld, P. 2001. Biking and walking: the position of non-motorised transport modes in transport systems.

Schade, J., andSchlag, B. 2003. Acceptability of urban transport pricing strategies. Transportation Research Part F: Traffic Psychology and Behaviour, **6**(1), 45-61.

Schniederjans, D. G., andStarkey, C. M. 2014. Intention and willingness to pay for green freight transportation: An empirical examination. Transportation Research Part D: Transport and Environment, **31**, 116-125.

Thailand Transport Portal. Draft Strategy Plan of Thailand Transport Portal 2011-2015: Thailand Transport Portal.Retrieved from http://www.mot.go.th/file_ upload/2558//Draf_mot_plan2554-2558.pdf, 2015.

Toker, S., andBiron, M. 2012. Job burnout and depression: unraveling their temporal relationship and considering the role of physical activity. J Appl Psychol, **97**(3), 699-710.

Weston, R., Davies, N., Lumsdom, L., McGrath, P., Peeters, P., andEjgelaar, E. 2012. The European cycle route network Eurovelo: Challenges and opportunities for sustainable tourism). Brussels,Belgium, P. D. B. Directorate General for Internal Policies.

Yamane, T. 1973. Statistics: An Introductory Analysis. Third edition. Newyork : Harper and Row Publication.