PSYCHOLOGICAL DETERMINANTS OF INTENTION TO USE BUS IN HO CHI MINH CITY*

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1. Introduction

Downward trends in use of urban public transport are now occurring not only in developed countries but also in many developing countries. In developing countries, typically bus is the backbone of public transport (PT) and the main transportation option of many low income people. However, high economic growth, followed by rapid motorization, has led to increase of private mode use which would consequently cause a remarkable drop in patronage of PT. Imbalance between the modes can be seen in many cities. For example in Ho Chi Minh City (HCMC) of Vietnam, only 5% of trips are carried by bus whereas almost all of the remains are by motorcycles (MC). Solution to such a severe situation should be necessarily a combination of not only 'hard' measures, i.e. improving quality of bus service but also 'soft' measures such as Mobility Management (MM), which applies Travel Feedback Programs for travel behavior change[5]. In fact, Van and Fujii[8], after investigating the psychological structure of people in HCMC, concluded that MM is potential in HCMC for inducing behavioral change. Taking HCMC as a case study, in this paper we aimed to investigate the effect of psychological factors of bus use to MC users' behavioral intentions to use bus. This could be considered as an important step toward developing MM measures to change behavior of MC users in HCMC toward using bus.

For PT, quality of service is an important factor to PT use. Furthermore, transportation quality is acknowledged to consist of two parts: the objective aspect, i.e. the performance measures, and the psychological aspect or service measures, i.e. how customers perceive the service[7]. Looking HCMC's bus service from objective perspective, statistic figures[6] show that the bus service, the only PT mode in HCMC, has been heavily invested since 2002. Buses have been present in 24 corridors and spreading to many smaller roadways. Within the inner districts, i.e. the area that questionnaires in this study were distributed, most accesses to bus stop are at walking distances of 15-20 minutes. This implies that there are few cases that it is impossible to find a bus stop nearby. About ticket, bus fares are separated by routes, thus this disconnection possibly makes bus transfer more costly and less convenient. Besides, although most of buses are equipped with air conditioner, it is observed that not many of them have the air conditioners turned on while running. Moreover, as mentioned, due to the imbalance between the modes, movement of buses is mostly impeded by MCs during peak hours.

Regarding psychological aspects of bus service, Van and Fujii[8] when investigating the images of bus and other travel modes in HCMC found that the bus service in HCMC was evaluated neutrally in all three aspects of symbolic-affective, instrumental, and social orderliness. As stated in the purpose of the study, to formulate MM strategies that can influence MC users in HCMC to change to use bus, it is important to have sufficient knowledge of the relationship between behavioral intention to use bus and psychological factors related to bus service. Among such psychological factors, perceived quality of bus service could be considered important since it would reflect whether the service is attractive to tentative customers. In fact, researches on similar issues regarding quality of transit service perceived by bus users have enlightened this. For example, Eboli and Mazzulla[1] found that perceived quality attributes of bus service had impact on customer's satisfaction. Besides perceived quality of service, researches on PT

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by Frimand et al.[2] found that frequency of negative critical incidents had significant impacts on user satisfaction with PT service. Furthermore, Fujii[3] also demonstrated that problem awareness, moral obligation were important antecedents for pro-environmental behavioral intention. Given this background, this study hypothesized that for MC users in HCMC, perceived quality of bus service, problem awareness and moral obligation would have positive effects on their intentions to use bus, while negative critical incidents would have negative effect on such intentions.

2. Methodology

A mail-back survey, targeted at motorbike users, was implemented in 2007 by mailing questionnaire to 1000 households which were randomly chosen from the city's phone list and evenly distributed over the city. A total of 285 responses were returned, however, after excluding unusable ones, we got a sample of 282 people whose mean age was 40.9 (SD = 12.2), percentage of male was 49.6%. Bicycle ownership rate, MC ownership rate, and car ownership rate were 24.8%, 87.2% and 1.8%, respectively. These socio-demographic statistics of the sample are quite similar to those of the city as a whole, so this sample was considered representative of the population of HCMC.

In the questionnaire, we selected the most relevant questions to obtain the following information: (i) *attitudinal factors toward bus service*; (ii) *frequency of negative critical incidents*; (iii) *problem awareness*; (iv) *moral obligation*; and (v) *behavioral intention of using bus*. The answers were on 5-point scales ranging from -2 to 2 (see Table 1).

Table 1: Perceptions about bus service in HCMC

Item name	Question (scale)
+Perceived quality of bus service	
Comfort	How do you think about the comfort of bus ride in HCMC? (uncomfortable-comfortable)
Convenience	How do you think about the convenience to use bus for your trips? (inconvenient-convenient)
Speed	How do you think about the speed of bus service in HCMC? (slow-fast)
Punctuality	How do you think about the punctuality of the arrival of buses in HCMC? (irregular-punctual)
Security	How do you think about the on board security when riding on a bus? (unsafe-safe)
Courtesy	How do you think about the courtesy of bus staff?(rude-courteous)
Time_cost	Do you think it would cost much time and effort if you use bus? (not at all-yes, strongly)
Money_cost	Do you think it would cost much money if you use bus? (not at all-yes, strongly)
Overall_Q	How do you think (or know) about overall quality of bus service? (bad-good)
+ Frequency of negative critical incidents	
Incident1	Have you ever experienced the trouble that bus is overcrowded when you are on board? (never-regularly)
Incident2	Have you ever experienced the trouble that driver does not completely stop for get on/off? (never- regularly)
Incident3	Have you ever experienced the trouble that someone or you are picked pocket on bus? (never- regularly)
Incident4	Have you ever experienced the trouble when traveling with rude co-passenger on bus? (never- regularly)
+ Attitudes toward other aspects of using bus, Problem awareness, Moral obligation, and Behavioral intention	
Poorness	Do you think that it is considered poor if you use bus? (not at all-yes, strongly)
Interaction	Do you dislike traveling with those you don't know well? (not at all-yes, strongly)
P_Aware1	Do you think that using bus would help reduce air pollution for HCMC? (not at all-yes, strongly)
P_Aware2	Do you think that using bus would help mitigate traffic congestion for HCMC? (not at all-yes, strongly)
MO1	Do you think you should be voluntary to use bus for better traffic in the city? (not at all-yes, strongly)
MO2	Do you think that residents in HCMC should use bus more? (not at all-yes, strongly)
Intention	Will you use bus instead of bike in the future for most of your trips? (no, I won't-yes, I will)

3/ Results

A principle component analysis (PCA) using varimax rotation was performed on all perceptions (excluding behavioral intention) to determine principle components that could summarize the judgments about various aspects of bus use. The result of the PCA identified four main factors, accounting for 48.3% of the total variance (see Table 2).

Factor 1 accounted for 21.2% of the total variance. This factor expresses "moralistic concerns" regarding bus use because two perceptions of problem awareness and two perceptions of moral obligation had high loadings on this factor. Factor 2 made up 10.6% of the total variance. Perceptions loading high on this factor were frequency of negative incidents and discourtesy of bus staff, thus this factor was referred as negative impression. Factor 3 accounted for 9.4% of the variance and describes quality of service, since all of the perceptions having high loadings on this factor were attributes of quality of bus service. Factor 4 explained for 7.1% of the variance. The perceptions

regarding social interaction and poorness loaded high on this factor, so factor 4 can be interpreted as sociality of bus. Based on the results of PCA, four new variables, i.e. factor scores, were calculated using regression method.

Table 2: Rotated factor loadings of perceptions about bus service by PCA

	Name of components			
Perception	Moralistic concerns	Negative impression	Quality of service	Sociality
P_Aware2	.798			
P_Aware1	.780			
MO2	.746			
MO1	.710			
Security				
Incident4		.727		
Incident3		.631		
Incident2		.629		
Incident1		.576		
Courtesy		-.476		
Convenience				
Time_cost			-.672	
Speed			.636	
Comfort			.557	
Money_cost			-.531	
Overall_Q		-.439	.512	
Punctuality			.428	
Poorness				.777
Interaction				.704
Variance	21.2	10.6	9.4	7.1

Note: Only factor loadings | ≥0.4 | are noted.

Table 3: Regression analysis of behavioral intention to use bus

	r	B	β	t	p
Constant *	-	-0.46	-	-2.25	0.025
Moralistic concerns ***	0.566	0.54	0.56	11.93	0.001
Negative impression	-0.075	-0.05	-0.05	-1.02	0.308
Quality of service***	0.290	0.27	0.28	6.04	0.001
Sociality	-0.039	-0.03	-0.03	-0.71	0.476
Age**	0.265	0.01	0.14	2.84	0.005
Gender, dummy**	-0.018	-0.24	-0.12	-2.59	0.009
MC ownership	-0.035	0.07	0.02	0.48	0.631
Bicycle ownership	0.087	-0.03	-0.01	-0.30	0.768
Adj. $R^2 = 0.422$, $F(8, 281) = 26.70$, $p < 0.001$					

Note: *p < .05; ** p < .01, *** p < .001

Using the psychological variables, newly generated by PCA, we conducted a regression analysis taking behavioral intention to use bus as dependent variables. In additional to hypothesized psychological variables, *Age*, *Gender* (male = 1), *MC ownership* and *Bicycle ownership* (owning = 1) were also included to test the effect of socioeconomic factors. The resulted regression model, presented in Table 3, had a rather high value of adjusted R square indicating that 42.2% of behavioral intention to use bus of MC users could be explained by the independent variables.

As seen in Table 3, the coefficient of quality of service was significant at $p< 0.001$, this result supported one part of our hypothesis that intention to use bus would increase with perceived quality of bus service. Additionally, our hypothesis regarding problem awareness and moral obligation also held true in this sample. Specifically, the factor of moralistic concerns was found to be significant to behavioral intention to use bus. This finding means that being aware of contribution of bus use to mitigation of air pollution and traffic congestion as well as understanding that one should act in the interest of the collective would make MC users more likely change to use bus. In addition, as shown via coefficients, the influence of the factor moralistic concerns was much stronger than that of quality of service and was the strongest variable in affecting behavioral intention in this model. These results imply that MM measure to enhance people‘s awareness about benefits of bus use on improving the current traffic and environment situation in HCMC would be effective to make people shift to use bus.

However, as Table 3 shows, there was no significant effect of negative impression on intention to use bus. Since the factor of negative impression in this study mainly constituted by frequency of negative incidents, it can be said that the result of this study, using the sample of MC users in HCMC, did not conform to the findings by Frimand et al.[2)]. Sociality also did not significantly influence to behavioral intention implying that perceptions such as poorness or social interaction related to bus use would not lessen people’s intentions to change to use bus. Besides, Table 3 also shows that *Age* was positively significant to behavioral intention to use bus, that is, the respondents of older ages had more intention to use bus than the younger respondents did. Meanwhile, *Gender* had negative and significant effects on behavioral intention. This significance means that female were more likely to intend to use bus than male. Finally, not as expected, the *MC ownership* and *Bicycle ownership* did not yield any effect on behavioral intention to use bus.

4/ Discussion

This study examined the effect of various psychological factors of MC users on their intentions to use bus in HCMC. Judgments of respondents about various aspects of bus service were summarized by PCA into four factors, namely moralistic concerns, negative impression, quality of service, sociality. Regression of behavioral intention on four psychological factors showed that moralistic concerns and perceived quality of service were determinants of behavioral intention to use bus.

The result indicates that our hypothesis about the positive influence of perceived quality of service on behavioral intention was confirmed in the condition of HCMC where the target of the survey was the majority of MC users. Thus, efforts to make bus service in HCMC more attractive to MC users would consequently increase patronage for the bus. As previous study found, non PT users tend to have "negative" beliefs on the PT[4]. If MC users in HCMC had so negative perception about quality of bus service, as implied by the data, precise information on the "objective" perspective of quality of bus service may improve its "perceived" quality and may strengthen behavioral intention to use bus. Further studies are necessary for confirming this theoretical potential of providing objective information.

Next, the result of regression analysis also supported another hypothesized relation between problem awareness, moral obligation and behavioral intention. That is, the factor of moralistic concerns was found to be the largest coefficient significantly influencing the intention to use bus. This result is in accordance with the results by Fujii[3] that problem awareness, moral obligation were important antecedents for pro-environmental behavioral intention and behavior. For HCMC, the significance of the factor of moralistic concerns indicates that communicative MM measure is quite potential to convince people to use bus. Accordingly, it is suggested that increasing behavioral intention to use bus in HCMC can be obtained by enhancing the public's awareness of benefits of using bus toward improving environment and mobility for the society. Increasing behavioral intention can also be achieved by making people feel 'morally responsible' to cooperate to solve the current very bad traffic situation. This would be a very important mission to not only transportation planners but the public as well.

Last but not least, the regression model in this study had the variance explanation of 42.2%. This implies that there are still other important determinants to behavioral intention to use bus. We also examined the factor of negative critical incidents as suggested by Friman et al.[2] as well as other socioeconomic factors such as vehicle ownership, but the results were not as expected. Perhaps, inclusion of other psychological factors such as perceived behavioral control or social norms as suggested in Ajzen's Theory of Planned Behavior could increase the variance explanation as well as perfect our knowledge about psychological characteristics of using bus in HCMC. Such shortages in this study should be explored in follow-up researches.

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