Intention of Using Bus Rapid Transit (BRT): Comparing the Theory of Planned Behaviour Model between Thai and Japanese Young Adults

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Abstract: Little is known about how background factors influence psychological factors of travel mode choice. This study, therefore, utilisedd the Theory of Planned Behaviour (TPB) to explain the intention of using BRT. A sample of 435 Thai and 230 Japanese students completed the survey questionnaires that measured a series of constructs based on TPB. The results showed that most TPB factors varied across two groups of traveller from different background. The multi-group structural equation model revealed that there were differences between Thai and Japanese intention models. Thai students had intention to use BRT mainly because they perceived social pressure to use the system while Japanese strongly care for the benefit of BRT. The results provide information useful to develop intervention to increase intention of using BRT in Asian developing countries.

Keywords: Bus Rapid Transit, Theory of Planned Behaviour, Direct Measurement, Control Belief Factor, Intention, Multi-Group Structural Equation Model

1. INTRODUCTION

Recent works in mode choice model emphasis the importance of psychological factors affecting decision-making. From the literatures, considering psychological factors leads to a more behaviourally realistic and gave better explanatory power of the behavioural models (e.g. Ben-Akiva, 1997; Chen and Chao, 2011; Chen and Lai, 2011; Long et al., 2010). Various psychological theories were used in travel behavioural researches, for instance, the theory of planned behaviour (TPB), the role of past behaviour and the technology acceptance model (e.g. Bamberg et al., 2010; Chen and Chao, 2011; Donald et al., 2014).

Previous studies have utilisedd the psychological theories to examined travel behaviour within a confined geographical region. Subsets of studies have conducted comparative studies between geographical region within a country and explained the effects of background factors on psychological factors (e.g. predict public transport use intention in two German urban agglomerations with different economic and social-cultural backgrounds (Bamberg, et. al, 2007); explain the effect of rational and habitual factor on motorcyclist's use intention in term of different quality of public transport between Taipei and Kaosiung in Taiwan (Chen and Lai, 2011). Also, Lo et al., (2016) examine the effect of organizational-level and

regional-level among office workers in two Dutch regions and found that most commuters' belief vary between organizational sector and regions, although psychological predictor in the extended TPB similar across contexts. Among the previous researches, very few comparative studies have been conducted across countries to reveal the effects of background factors (Nordfjaern et al., 2016; Van et al., 2014).

This study therefore, aims to determine the influence of TPB factors on traveller intention between Asian developing and Asian developed countries. It is interesting to reveal and compare the influence of TPB factors on intention of using public transport between Thai traveller who growing up in high private vehicles dominated developing country and Japanese traveller who growing up in public transport dominated developed country.

1.1 The Theory of Planned Behaviour

The TPB is widely used and has received good empirical supporting (e.g. Bamberg et al., 2003; Long et al., 2011; Chen and Chao, 2011; Chen and Lai, 2011; Donald et al., 2014; Nordfjaern et al., 2014; Lo et al., 2016; Thorhauge et al., 2016). The meta-analysis of 23 unique datasets revealed that variable derived from TPB displayed large effect on car use intention and behaviour (Gardner and Abraham, 2008). The TPB explains that human behaviour affected via their intention and perceived behavioural control (Ajzen, 2005; 2006). The intention is affected from three factors including attitude towards behaviour, subjective norm and perceived behavioural control.

The influence of the three main theory's factors, however, varies among studies and behaviours. Some studies have found that attitude towards behaviour has a significantly high influence (e.g. Intention to commute by car of two Dutch provinces (Zuid-Holland and Limburg) (Lo et al., 2016); Future mode choice intention of students in six Asian countries (Van et al., 2014); Departure time choice of flexible working time car commuters in Copenhagen (Thorhauge et al., 2016)). There is also evidence that perceived behavioural control and attitude predicted intention to use a bus, and intention affects choice behaviour, both before and after introduction of the bus ticket (Bamberg et al., 2002). Perceived behavioural control has strongly significant effects on behavioural intention towards future sky train usage in Phnom Penh (Long et al., 2011) and intention to use a motorcycle in Taipei and Kaohsiung cities in Taiwan (Chen and Lai, 2011). In addition, Nordfjærn et al. (2014) and Chen and Chao (2011) revealed that the subjective norm was the most influential predictor of intention to switch from private vehicle to public transit.

1.2 The Role of Background Factors in the TPB

According to TPB, the three rational determinants of intention (i.e. attitude towards behaviour, subjective norm and perceived behavioural control) are each based on underlying beliefs including behavioural beliefs, normative beliefs and control beliefs, respectively. These beliefs originate in a variety of sources and individual from different social backgrounds are likely to differ in the beliefs they hold and consequently affects the decision to perform or not perform the behaviour in question (Ajzen, 2005). For the cross-countries study, Van et al. (2014) found that the influence of attitudinal factors on the choice of transport mode varies among six different Asian countries. In the countries in which the intent to use a car was not very high, attitude factors about the car were found to be significant determinants of the behavioural intention to commute by car but were less significant in countries in which the desire to use a car was high (Van et al., 2014). Similarly with Lo et al., (2016), the difference of regions (long-short distance) and four organizational sectors was

associated with commuters attitudinal, normative and control belief in travel mode choice. Both studies, therefore, found background factors such as socio-economic status, nationality, culture, regional infrastructure and quality of existing public transport affect their psychological factors.

1.3 Present Study

This study interest to reveals the psychological factors affecting traveller's intention to use the planned BRT under reasoning. Thai and Japanese university students were selected for this study in order to examine how background factors, which are completely different, influence psychological factors of each traveller groups. We first utilise the TPB to explain and compare the students' psychological factors toward using BRT. Both direct measurement and control belief measurement are discussed. Further, we will test the developed intention models whether the relationships between factors are equal or difference across the two sample groups. This relates to a multi-group analysis that compares an unconstrained model where the path coefficients are set to vary across Thai and Japanese young adults and a constrained model where the path coefficients are set to be equal across groups. It will reveal the role of attitudes toward behaviour, subjective norms, perceived behavioural control, and control belief on students' intentions to use BRT. It is high expectation that in the near future, it should be possible to influence intentions of using BRT by designing an intervention that has significant effects on one or more of the facilitating and preceding factors according to the research findings.

2. METHODOLOGY

2.1 Study Area

In Khon Kaen, Thailand, the Bus Rapid Transit System (BRT) is planned to operate to solve traffic problems in the city. There are five routes of BRT run cover urban area with a red-line connected Khon Kaen University (KKU) with the CBD (Satiennam et al., 2013). In Japan, this study assume the same situation of BRT planned in Khon Kaen city such as specific lanes, uses NGV energy, convenient, standard service and the distance of BRT corridor. The assumed BRT run from the entrance of Nihon University (NU) to Makuhari new city where are a high proportion of travellers similar with Khon Kaen city. The BRT planning location for Khon Kaen city, Thailand and Chiba city, Japan are as shown in figure 1(a) and figure 1 (b), respectively.

2.2 Participants

The study was based on a questionnaire survey conducted among the university students in Thailand and Japan, which were selected to represent the students of developing and developed countries. The surveys were administered at KKU and NU since both universities are a major origin and destination hub of the scenario system. The data survey was done by trained undergraduate students from KKU and NU. We introduced about the planed BRT system before asking the participants to make the easily individual understand. A total of 665 respondents (435 students for KKU, 230 students for NU) were completed a questionnaire survey from March to July 2015. The characteristic of participants were shown in Table 1. As shown in the table, both respondents' age ranged from 18-25 years and gender was almost

male. Most of Japanese students use public transport and non-motorised mode while Thai students rely mainly on private vehicle as expected.
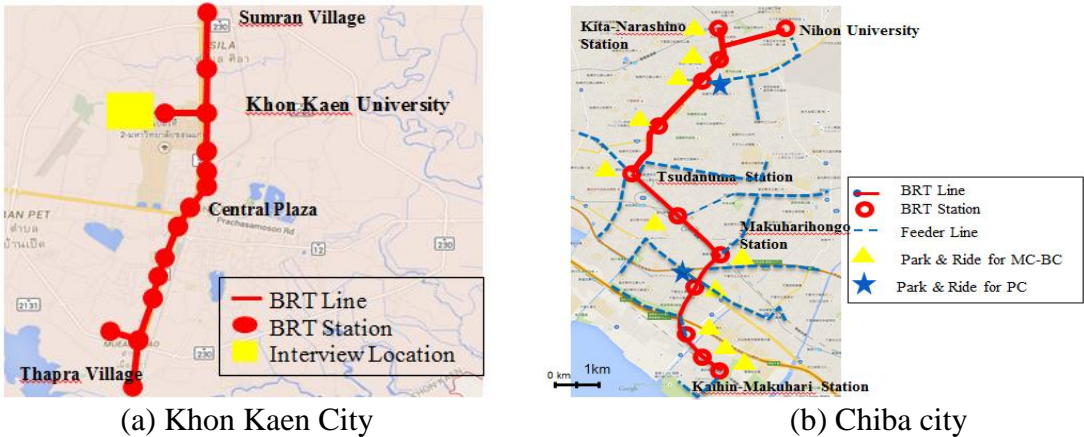

<table>
(a) Khon Kaen City   (b) Chiba city
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Figure 1. Bus Rapid Transit planning in Khon Kaen city and Chiba city

Table 1. The characteristic statistics of participants in Thailand and Japan

Characteristics		Thailand % (N=435)	Japan % (N=230)
Gender	Male	39.5	99.1
	Female	60.5	0.9
Age	18-25	100.0	
Area	Less than 400 m.	19.8	54.0
	More than 400 m.	80.2	46.0
	Car	34.5	3.2
	Motorcycle	39.1	1.4
	Public transport	26.4	
Travel mode	Train	NA	62.0
	Bus	NA	2.3
	Walk	NA	8.8
	Bicycle	NA	22.2

2.3 Design and Procedure

The questionnaire was first written in English, then approved and translated into Thai and Japanese language by native researchers in both countries. The translated questionnaire was then subjected to a process of validation by using "back-translation" method and a pilot study. The final questionnaire contained two sections. The first part asked the respondents' socio-economic and travel information as the results shown in Section 2.1. The second part consisted of questions for psychological measures according to TPB in line with Ajzen (2006) and Francis et al. (2004). The standard direct measurement questions and indirect measurement of perceived behavioural control questions are included in the questionnaire.

2.3.1 TPB direct measurement

The TPB standard direct measurements involved measuring of four constructs; attitude (ATT), subjective norm (SN), perceived behavioural control (PBC) and intention (INT). There were total 10 items for the direct measurement as follow:

Attitude toward BRT was measured by three items: ''For me to use BRT would be: unpleasant/pleasant, unsupported/support and harmful/beneficial."

Subjective norm was measured by two items. This can be assessed by injunctive norm which concerns the perceptions of important people want he/she to use BRT mode: "Most people who are important to me would support my using the BRT" and "Most people who are important to me think that I should not/ should use BRT."

Perceived behavioral control was measured by two items. The first item measured efficacy: "I am confident that if I want to I could take BRT". The second item measured controllability: "For me, to take the BRT would be difficult–easy."

Intention was measured by three items: "My intention to use BRT is weak–strong," "I intend to use BRT: unlikely– likely" and "I will make an effort to use BRT."

All above mentioned items were measured by using a five-point unipolar Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

2.3.2 Indirect measurement of perceived behavioural control

Beside the direct measurement, PBC can be explained indirectly from the control beliefs. To identify the control belief factors of using BRT, a pilot study was carried out with two standard open-ended questions. The questions were "What factors enable you to use BRT?" and "What factors make it difficult or impossible for you to use BRT?" The results of pilot study in Khon Kaen University together with results from literature reviews revealed five control factors including low accessibility to BRT station (CF1), congestion of passengers (CF2), number of baggage (CF3), traffic jams (CF4) and good standard of service with punctuality (CF5).

For each control factor, two questions were used to access the control belief strength (the presence of factors that may encourage or interrupt to use BRT, CBS) and the control belief power (the perceived power of these factors, CBP). Example of questions to measure CF1: "low accessibility to BRT station" are "Accessibility to BRT station is difficult: not agree/agree" (CBS1), and "I …..… to use BRT if accessibility to BRT station is difficult: not more likely/less likely" (CBP1).

Control beliefs strength and control beliefs power are scored in a unipolar scale (1 to 5) and a bipolar scale (-2 to 2), respectively. For each control factor, control belief composites were created by multiplying the two items between their CBS and CBP.

2.4 Statistical Procedures

Descriptive statistic was conducted to describe sample characteristics among two countries and principal components analysis (PCA) using a varimax rotation was used to identify the underlying relationship between measured items and classify them by determining their factor loading into new variables. Cronbach alpha coefficients were reported to confirm the internal consistency of all constructs prior to model estimation. Hair et al. (2006) recommended the good coefficients is between 0.60-0.70, however, those are biased with the number of items in each variable. In order to examine the difference of TPB direct and indirect measurements factors among two sample groups, Multivariate Analysis of Variance (MANOVA) was conducted. All above analysis were processed by IBM® SPSS® Statistics Version 22.0.0.

To model mode choice intention, the Structural Equation Modeling (SEM) was conducted. Multi-group structural equation model (SEM) technique was used to test the intention models across two groups follow the two step procedures by using IBM® SPSS® AMOS 22.0.0. Firstly, this study estimated the measurement model using Confirmatory

Factor Analysis (CFA) to ensure the model had good validity and reliability. Secondly, a structural model was carried out to estimate the causal relationships between factors. A general framework had emerged for comparing the measurement and structural model between Thai and Japanese students. This analysis determined the fit of an unconstrained model, where the path coefficients were set to vary in Thai and Japanese students. The unconstrained model was compared with the constrained model, where the path coefficients were set to be equal across two groups. The various fit indices were used to examine the SEM as follow; the chi-square statistic, the goodness-of-fit index (GFI), the comparative fit index (CFI), the standardized root mean residual (SRMR) and the root mean square of approximation (RMSEA). The good fit to the data of these indices should be equal 0.90 or higher, except for the SRMR and RMSEA should be not exceeding 0.1 and 0.08, respectively (Hair et al., 2006).

3. RESULTS AND DISCUSSIONS

3.1 Psychological Factors

3.1.1 Direct measurement

For the direct measurement items, the PCA results produced four factors according to TPB (i.e., intention, attitude, subjective norm and perceived behavioural control). Table 2 reports the mean score of TPB factors for direct measurement among the two countries. This study found that both Thai and Japanese students had positive attitude toward the BRT. They agreed that using BRT would be pleasant, support and beneficial. For the subjective norm, both groups agreed that people who are important to them will support or encourage them to use BRT and think they should use BRT. In terms of the perceived behavioural control, both strongly agreed that they have self-efficacy and controllability to use BRT. Finally, both of them had intention to use BRT.

Although above results showing the same trend among the two countries, the MANOVA results demonstrated the effect of different countries was significant (Wilks' λ= 0.866, F= 25.505, p<0.001). The results reported that the attitude, subjective norm and intention scores of Thai students were significantly higher than those of Japanese students. However, there was no significant difference in the level of perceived behavioural control between two groups. Since the existing public transport services in Khon Kaen city are quite poor (Satiennam et al., 2013), the BRT, as a new better alternative mode of public transport, seems attractive to the students at this early stage. In contrast, BRT seems not that much attractive to Japanese students since their familiar with better existing public transport system.

In conclusion, the level of travellers' opinions toward public transport was found different across countries due to their background factors, for instance regional infrastructure, cultural background and quality of public transport. This study provides support for the difference in psychological factors toward public transport between regions (e.g. Lo et al., 2016; Chen and Lai, 2011; Bamberg et al., 2007; Van et al., 2014).

3.1.2 Control belief measurement

For each control belief factors, their mean scores and standard deviation of their belief strength, belief power, and belief composite are given in Table 3. For the Thai students, the results reported that they agreed most with "traffic jams" (M= 4.05, SD= 0.85) and estimated

"low accessibility to BRT station" as least frequency (M= 2.81, SD= 1.09). They estimated "standard of service with punctuality" as making it the easiest for them to use BRT (M= 1.09, SD= 0.84) and "number of baggage" as making it the hardest for them to use BRT (M= -0.66, SD= 1.20). Taken together to form the belief composite "standard of service with punctuality" got the highest rating (M= 4.38, SD= 3.52) while "number of baggage" got the lowest (M= -2.55, SD= 4.57).

Table 2. Attitude, Subjective Norm, Perceived Behavioural Control and Intention to use BRT between Thai and Japanese students

Latent variables	No. of Items	Thailand			Japan			F-value
		Mean	SD	α/r	Mean	SD	α/r	
Attitude	3	4.10	0.74	0.760	3.52	0.81	0.550	86.53**
Subjective Norm	2	3.59	0.77	0.733	3.31	0.88	0.590	17.34**
Perceived Behavioral Control	2	4.16	0.70	0.651	4.12	0.83	0.468	0.482
Intention	3	3.71	0.84	0.898	3.52	1.06	0.883	6.34*

- Not relevant; Wilks' λ= 0.866, F= 25.505, p<0.001. **p < .001, * p < .05.

Regarding Japanese students, the results showed that they agreed most with "congestion of passengers" (M= 3.83, SD= 1.07) and estimated "number of baggage" as least frequency (M= 2.77, SD= 1.20). They estimated "standard of service with punctuality" as making it the easiest for them to use BRT (M= 1.30, SD= 0.86) and "low accessibility to BRT station" as making it the hardest for them to use BRT (M= -0.95, SD= 1.12). Taken together "standard of service with punctuality" got the highest rating (M= 4.46, SD= 3.53) while "congestion of passengers" got the lowest (M= -3.13, SD= 4.32).

The influence of different groups was found significant on control belief measurement items between countries (Wilks' λ= 0.605, F= 28.243, p<0.001). Taking into consideration their belief strength scores, Thai students reported more agree with they will meet the following situations when using BRT; "has lot of baggage", "traffic jams", and "standard of service with punctuality". This may indicates that Thai student has higher expectation with their new public transport system. Japanese student, however, reported more agree with the situation that they will meet "congestion of passengers" when using BRT. This may reflect the experience they had with their existing public transit system.

Regarding the belief power items, Japanese student's intention to use BRT were more sensitive with the following situation; "low accessibility to BRT station", "congestion of passengers", and "standard of service with punctuality". Thai student, on the contrary, were more sensitive to "number of baggage".

In overall, control belief composites score revealed that "low accessibility to BRT station" and "congestion of passengers" had significant lower effect on Thai students than those of Japanese students. This indicates that Japanese put more concern on these situations. In contrast, "number of baggage" had more significantly negative score in Thai than Japanese students. This indicates that the influence of baggage more obstruct Thai student to use BRT. This may results from the familiarity of Thai student with the private vehicle since the private vehicles (car and motorcycle) are an affordable and convenient transportation in Khon Kaen city. Thai students, therefore, have the habit of using private vehicles. With their private vehicle, they can easily bring a lot of baggage in their daily life. On the contrary, Japanese students growing up with good public transport system and have the habit of using public

transport and non-motorise modes. Since they always manage their baggage, it seems not to be their control factors compared to Thai students.

Clearly, people growing up in different social environments can acquire different information and skills, information and skills that provide the basis for their beliefs about the obstacles/facilitating circumstance that may prevent/support them from using BRT. The results, in conclude, imply that different contexts and background of traveller such as familiarity with the public transit system, existing infrastructure of public transit, and culture of travelling, influence on their belief and expectations to the use of BRT.

Table 3. Indirect measurement of perceived behavioural control

Items	Belief strength (5=Totally agree; 1=Totally not agree)			Belief power (2=More likely; -2=Not more likely)			Belief composite (-10 to 10)		
	Thailand	Japan	F-value	Thailand	Japan	F-value	Thailand	Japan	F-value
Low accessibility to BRT station	2.81 (1.09)	2.74 (1.19)	0.66	-0.55 (1.07)	-0.95 (1.12)	19.66**	-1.32 (3.46)	-2.50 (3.71)	17.40**
Congestion of passengers	3.03 (1.07)	3.83 (1.07)	83.78**	-0.59 (1.18)	-0.79 (1.03)	4.34**	-1.53 (4.02)	-3.13 (4.32)	22.87**
Number of baggage	3.53 (0.97)	2.77 (1.20)	77.15**	-0.66 (1.20)	-0.05 (1.33)	36.55*	-2.55 (4.57)	0.23 (4.09)	59.51**
Traffic jams	4.05 (0.85)	3.53 (1.08)	45.84**	0.79 (0.97)	0.79 (1.12)	0.003	3.47 (4.14)	3.08 (4.17)	1.29
Standard of service with punctuality	3.88 (0.79)	3.36 (1.17)	46.21**	1.09 (0.84)	1.30 (0.86)	13.99**	4.38 (3.52)	4.46 (3.53)	1.46

- Not relevant; Wilks' λ= 0.605, F= 28.243, **$p < .001$, * $p < .05$.

3.2 SEM of Intention Models

The intention models with standardised path coefficients for direct measurement between Thailand and Japan are displayed in Figures 2. Multi-group analysis showed that the unconstrained model (χ^2= 133.641, df= 58, CFI= 0.973, GFI= 0.963, RMSEA= 0.044, SRMR= 0.032) had better fit than the constrained model where path coefficients were set to be equal across two groups (χ^2= 159.346, df= 67, CFI= 0.967, GFI= 0.956, RMSEA= 0.046, SRMR= 0.039). Moreover, nested model comparisons demonstrated that the unconstrained model could explain the variance for intention of using BRT rather than the constrained model. There were significant differences in path coefficient among two groups in unconstrained model. Thus, the intention model differed across two groups could not be rejected. The intention models, therefore, vary between Thai and Japan students.

Regarding the Thai students, the model accounted for 67 percent of the variance of intention to use BRT. The results showed that attitude, subjective norm and perceived behavioural control were all positively significant effect on intention especially subjective norm. This indicates that according to BRT plan encouragement, students who have more positive attitude to BRT, they are more likely to use BRT. For those whose families or surrounding people encourage them to use BRT as well as students who have easy ability of control and use BRT, they are more intend to use BRT. These results are similar to previous studies in other cities, which found that the intention to use public transit was mainly

influenced by the subjective norm (Chen and Chao, 2011; Nordfjaern et al., 2014). This result also conforms to the nature of Thai culture as a typical collectivist society. People in this culture were more motivated to conform to the norms of a group (Florent Lheureux et al., 2016). Therefore, target interventions to raise intention should be focused on the subjective norm. This psychological factor had the highest weight to intention and the lowest mean score among the TPB factor indicating room for improvement.

For the Japanese students, the model accounted for 56 percent of the variance of intention to use BRT. Attitude and subjective norm were positively significant effect on intention. This findings consistent with the previous study (Van et al., 2014); attitude toward public transport is found to be positively significant to Japanese's intention of using public transport. Unlike the results from Thailand, the perceived behavioural control did not significantly affect to intention. The perceived behavioural control, however, has high correlation with attitude (0.72) and subjective norm (0.62). Having habit to use public transit system, the perceived behavioural control becomes beliefs that underline attitude and subjective norm and thus be decreased affect to intentions.

Comparing among the two models, the intention of using BRT for Thai and Japanese students similarly emphasised on the social pressure and attitude. Further, social pressure was much more sensitive to Thai students than Japanese students. Attitude, however, affect more to Japanese intention to use BRT. Although perceived behavioural control had lowest significant to intention, it had high correlation with other two determinants. So, if students change their perceived control, their intention of using BRT might also be changed. In addition, according to TPB theory, behaviour is not a direct function from only intention but also perceived behavioural control (Ajzen, 2006). The perceived behavioural control can also be served an actual control that measured whether the real situation of BRT will meet their expectation. Therefore, in order to plan the supporting measures to BRT use, it is important to investigate the control belief factor which is an underlying belief of perceived behavioural control as shown in the next model.
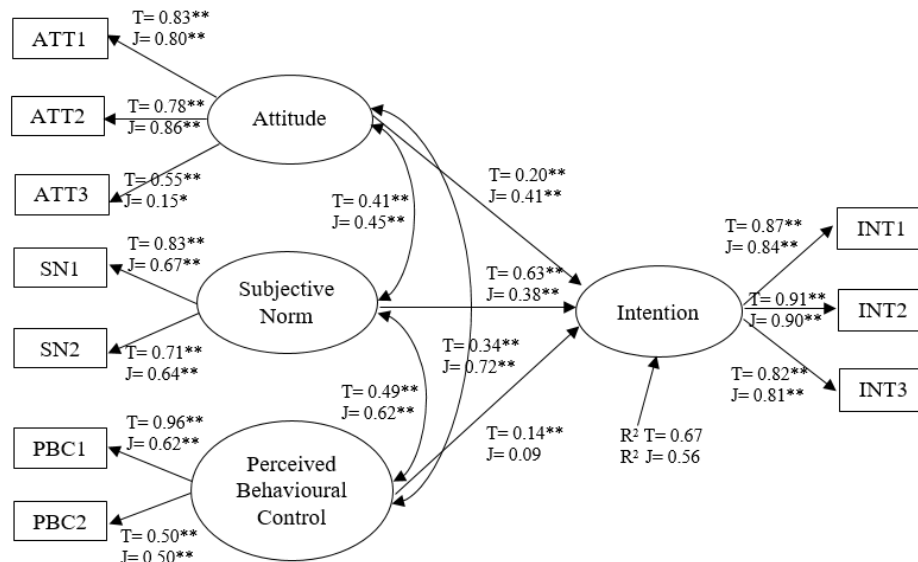

Figure 2. Unconstrained multi-group model of intentions to use BRT explained with the TPB direct measurement model.
** p-value is significant at the 0.01 level, *p-value is significant at the 0.05 level, T= Thailand and J= Japan.

Table 4 reports the outcome of PCA separately for Thai and Japanese students. The primary analysis of PCA found that the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO), which was used to measure the suitability of the information, was 0.61 and 0.53 for Thai and Japanese students, respectively. They were greater than 0.5 and approached 1, therefore, the data are suitable for factor analysis.

The PCA classified the five control belief factors similarly in each group into two variables of psychological factors. The control belief factors were named impeding (IMP) and facilitating circumstance (FAC) of using BRT. The IMP consisted of three factors; low accessibility to BRT station, congestion of passengers and number of baggage. The FAC consisted of two factors; traffic jams and good standard of service with punctuality. Those new constructs were used in subsequent analyses. Further results also showed all psychological factors for Thai had good internal consistency, however, whether most of them for Japanese had lower internal consistency they were rather than 0.5.

Table 4. Dimensionality of TPB indirect factors by exploratory factor analysis

Items		Impeding circumstance	Facilitating circumstance
Low accessibility to BRT station	CF1	0.82 (0.73)	
Congestion of passengers	CF2	0.86 (0.85)	
Number of baggage	CF3	0.78 (0.54)	
Traffic jams	CF4		0.88 (0.83)
Standard of service with punctuality	CF5		0.88 (0.82)
Kaiser-Meyer-Olkin (KMO)		0.61 (0.53)	
Explained Variance		40.67% 31.09%	31.33% 27.66%
Cronbach alpha		0.753 (0.522)	0.708 (0.543)

- Not relevant; Thai are shown above, Japanese are shown in the bracket.

The developed intention models with standardised path coefficients for indirect measurement of perceived behavioural control between Thailand and Japan are displayed in Figures 3. The unconstrained model ($\chi2$= 212.199, df= 62, CFI= 0.936, GFI= 0.939, RMSEA= 0.06, SRMR= 0.07) also had slightly better fit than the constrained model ($\chi2$= 223.162, df= 71, CFI= 0.935, GFI= 0.935, RMSEA= 0.057, SRMR= 0.07). However, nested model comparisons revealed that the constrained model could explain the variance for intention of using BRT more than the unconstrained model and the two groups were not different in the model. The intention model for control belief factors, therefore, did not vary between Thai and Japan regions despite cultural background and habitual behaviour's difference in using public transport.

Indirect measurement model for Thai students could explain 47% of the variance in PBC (direct measures) and 54% of the variance in the intention. Moreover, the results for Japanese students could explain 35% of the variance in PBC (direct measures) and 41% of the variance in the intention.

The results of comparing two models revealed that the facilitating and impeding circumstances had significantly positive effects on PBC, and that PBC had positive effects on

intention. The results also showed that facilitating circumstance had higher effect to PBC than impeding circumstance indicating that "standard of service with punctuality" and "traffic jam" were the main control factors in using BRT in both groups. Further, "congestion of passengers" and "low accessibility to BRT station" were also strong factors obstructing intention to use BRT. The effect of control belief factors influencing on perceived behavioural control and intention can be useful for BRT planning. This suggests that in order to succeed in BRT planning in two countries, the policy for encourage students group to use BRT should focus on designing service quality which not only time saving and reliability, but also comfort on board and accessibility to BRT stations that connected with other modes .
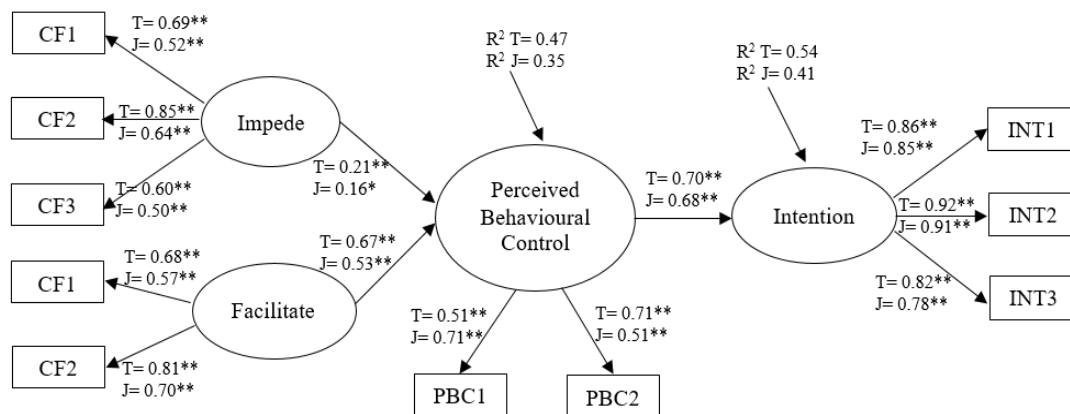

Figure 3. Constrained multi-group model of control beliefs on PBC and INT to use BRT.
** p-value is significant at the 0.01 level, *p-value is significant at the 0.05 level, T= Thailand and J= Japan.

4. CONCLUSIONS

This study utilise the TPB to explain and compare the university students' intention of using BRT in Thailand (where a high proportion of travellers uses private vehicles) and Japan (where a high proportion of travellers uses public transport). A sample of 435 Thai students and 230 Japanese students completed the survey questionnaires that measured a series of constructs based on TPB. Both standard direct measurement and control beliefs measurement were included.

The results showed that most TPB factors varied across two groups of traveller from different background. Although both groups of students had positive attitude, social pressure, perception of control, and intention to use BRT, most of their mean scores were different. Attitude, subjective norm, and intention to use BRT of Thailand student were found higher than those of Japanese student. Control belief scores between countries were also found significantly different.

The multi-group structural equation model also showed that there were difference between the two intention models of Thai and Japanese young adults. Thai students had intention to use BRT mainly because they perceived social pressure to use the system where the Japanese student mainly relies on their own attitude follow by their perceived social pressure to use the system. Clearly, the comparative results indicate that people growing up in different social environments can acquire different information and experience, which provides the basis for their beliefs that underline the determinants of intention to use BRT.

The results in this study provide information useful to develop intervention to increase intention of using BRT in developing countries. The intervention successfully implemented in developed country may not be directly transferred due to the contexts difference. With highest weights and lowest mean score indicating room for improvement, the subjective norm is the first determinants of intention that should be targeted for intervention to increase intention of using BRT. In addition, this study found that students concerned similarly on facilitating circumstances encouraging them to use BRT. Therefore, planning process should focus on (1) designing service quality (not only time saving and reliability but also comfort on board, and accessibility to BRT stations) including high frequency of service, BRT network coverage, appropriate walking and cycling routs accessing to BRT stations, and feeder system; and (2) designing supporting campaigns to promote benefits and image of using BRT for all travellers, as well as friends and families. Further studies for the more explicit measures should identify the normative referents. This will allows gaining a deeper understanding about the important people groups that could be targeted when designing interventions.

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