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CROSS-CULTURAL DIFFERENCES IN SPEEDING INTENTIONS OF DRIVERS ON URBAN ROAD ENVIRONMENTS IN ASIAN DEVELOPING COUNTRIES

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CHAPTER 1 INTRODUCTION

This chapter describes the problem background, the objectives, the study area, and the literature review of this research.

1.1   Statement of Problem

Speeding problems are among the major contributing causes of road traffic deaths in nearly every nation worldwide. This is especially true for low and middle income countries, which seemingly have more road traffic deaths compared to developed countries. Speed control is the primary measure used for reducing road traffic deaths in most countries (WHO, 2013; WHO, 2015) and these kinds of controls have been implemented worldwide. Such controls include: enactment of national speed limit laws and setting speed limits, according to the function of particular roads and speeding enforcement. The World Health Organisation (WHO) report in the period from 2013 and 2015 found that only 15% of the participating countries, reported good speed enforcement (8 or above on a scale of 0 to 10). Thus, speed enforcement remains weak in many parts of the world (WHO, 2013; WHO, 2015), especially in low and middle income countries like many in the Southeast Asian region. Speeding behavior among drivers/riders is not easy to understand and depends on various factors, including the cultural norm of each country. It is necessary to carefully determine and enforce speed control measures to achieve accident reduction in the control areas. Traffic psychology is a science that is used to explain driver behavior in depth. The Theory of Planned Behavior (TPB) has been used as a frame of reference to explain human behavior, using three important psychological factors, including attitude, subjective norms and perceived behavioral control (Ajzen, 1991).These psychological factors have direct influence on behavior intention. Behavior intention, in turn has a direct influencing effect on driving behavior. Thus, behavior intention is an important psychological factor that determines other aspects of behavior, especially in relation to driving/riding and traffic safety.However, a safety policy that might be effective and successful in one country, may not be achieved in other counties because each country has different variables, such as culture, attitude toward speeding behavior, driving behavior, speed limits, speed control measures and speeding enforcement. The studies discussed above were

conducted in developed countries, but similar studies have seemingly never been attempted in developing countries like Thailand, Cambodia, or Laos. These three countries are considered as developing countries, located in Southeast Asia, and share connecting land borders. They have different cultures, so effective road safety measures used in one country may not be as effective in the other countries. The ASEAN Economic Community (AEC) was put into place in 2016, resulting in more vehicles crossing the international boundaries in-between these countries. This reality will only increase as time goes on and trade between the countries increases. This study will help in understanding drivers'/riders' speeding intentions in urban environments. This research can be useful for the determination as well as implementation of speed control measures and road safety policies for each country.

1.2   Objectives

This research hasthe following objective.

1) To examine and compare the psychological factors influencing driver speeding behavior in 3 developing cities in Southeast Asia,

1.3   Scope of Study

The scope of study is described as below.

1) Data was collected from respondents in urban areas of KhonKaen in Thailand, Vientiane in Laos and Phnom Penh in Cambodia
2) Theory of Planned Behaviour (TPB) was applied to examine the psychological factors influencing driver speeding behavior
3) Structural Equation Models (SEM) was used to examine and explain speeding intentions

1.4   Literature Review

1.4.1   Theory of Planned Behavior

Traffic psychology is a science that is used to explain driver behavior in depth. The Theory of Planned Behavior (TPB) has been used as a frame of reference to explain human behavior, using three important psychological factors, including attitude, subjective norms and perceived behavioral control (Ajzen, 1991). These psychological factors have direct influence on behavior intention. Behavior intention, in turn has a direct influencing effect on driving behavior. Thus, behavior intention is

an important psychological factor that determines other aspects of behavior, especially in relation to driving/riding and traffic safety. The field of traffic safety relates to the psychological factors of behavior intention.

1.4.2 Researches on Speeding Intentions

Many studies concerning speeding intentions have been conducted under the framework of TPB (Cassandra S., et al., 2014; Ching-Fu, C., & Cheng-Wen, C,, 2011; Cristea M., et al., 2013; Dinh, D.D., & Kubota, H., 2013; Elliott, M. A., 2010; Leandro, M., 2012; Mark, A.E., et al., 2005; Warner, W.H. &Åberg, L., 2006; Warner, W.H. &Åberg, L., 2008; Warner, W. H., et al., 2009). However, previous studies focused on behaviors in developed countries and the results were different in regard to the significant factors and the highest factors, depending on the study area or country.

For example, previous studies in Sweden and Turkey found perceived behavioural control (PBC) (Warner, W. H. &Åberg, L., 2008; Warner, W.H., et al., 2009) was the most significant factor and most influential for drivers' speeding intention, but some previous studies in France and Japan found the most significant factor was attitude (AT) (Cristea M., et al., 2013; Dinh, D. D. & Kubota, H., 2013). The results from each of these studies could help to understand what directly influences speeding intentions in each country. Besides, other significant factors in the results can help to determine road safety policies that relate to speeding for each study and each country.

CHAPTER 2 RESEARCH METHODOLOGY

This chapter explains the procedure of research method as displayed in Figure 2.1. The scope of this research is classified into three parts. Each part of the research will be expressed as the following.
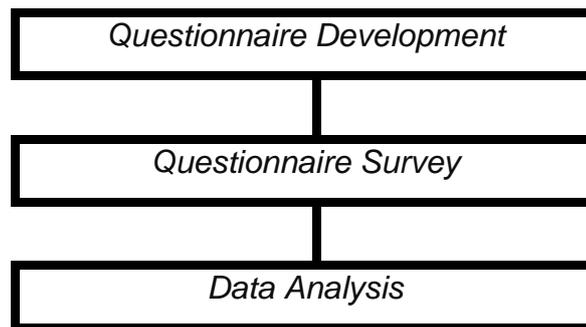
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┌─────────────────────────────────┐
│   Questionnaire Development      │
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Figure 2.1 Research Procedure

2.1   Questionnaire Development

The psychological questions were developed following the principles of the theory of planned behavior (TPB) (Ajzen, I., 2006; Francis, J., et al., 2004). The questionnaire included questions based on the TPB as well as demographic questions (e.g. age, driving experience and average daily travel distance). All questions were measured on a 7-point scale and related to reasons for driving fast (driving faster than other road users) in urban road environments. The questionnaire was first written in English and then translated into Thai, Laos, and Cambodia language by native speakers. Sample questions related to driving/riding are shown below as follows:

Attitude towards the behavior (AT) was measured by four items: "For me driving/riding fast in urban environments would be: …" (bad/good, harmful/beneficial, not acceptable/acceptable and unpleasant/pleasant).

Subjective norm (SN) was measured using four items: "I think people who are important for me (Parent/friend/relative) would (think I should not/think I should,

strongly disagree with me to/strongly agree with me to, be not support me to/be support me to and not allow me to/allow me to) drive/ride fast in urban environments".

Perceived Behavioural Control (PBC) was measured by three items: "How confident are you able to drive at speeds higher than other road users in urban environments" (not very confident/very confident) "For me to drive/ride at speeds higher than other road users in urban environments would be: …" (very difficult/very easy) and "For me, driving fast in urban environment in the next month that depend on my decision." (strongly disagree/strongly agree).

Intention (IN) was measured by three items: "Would you intend to drive/ride at a higher speed than other road users in urban environments?" (definitely not/definitely do) "How often do you think you will drive/ride at speeds higher than other road users in urban environments?" (not at all/very much) and "How likely would you like to drive fast in urban environments in the next month?" (unlikely/likely).

2.2   Questionnaire Survey

Sampling of work areas and students from each country were interviewed through the developed questionnaire. Data was collected from a population of students at university and workers in private companies, which included 184 participants in KhonKaen, Thailand, 199 participants in Vientiane, Laos and 187 participants in Phnom Penh, Cambodia.

2.3   Data Analysis

The first step of analysis, this study examined differences in demographics between three groups by ANOVA test at 5% level of significance. The second step involved factor analysis for finding latent variables within the questionnaire variables. Reliability of latent variables was analyzed by three indices including: Cronbach's (alpha) (α), Construct Reliability (CR) and Average Variance Extracted (AVE). In other words, Cronbach's (alpha) (α) refers to consistent answers from each group's question (e.g. 4 items based on an attitude) which should be closely valued at 1.0 or over 0.7 for an acceptable value. Also, CR and average AVE are representative values of latent variables or unobserved variables and they should be at a value over 0.6 and 0.5, respectively. Next, the relationship between two latent variables, (AT

and SN) and (PBC and IN), were examined by a correlation coefficient. These values presented the direction of trend data between two latent variables. After that, all variables were used to analyze relationship of latent variables that were based on TPB by confirmatory factor analysis (CFA). That is, each latent variable was employed to analyze consistency of each group by analysis in one model and then confirming the independence of each latent variable in the whole model. In this part, the respondents indicated suitable items representative of each latent variable in one model, evaluated against a number of recommended fit statistics and fit indices (Hair, 2010). Then, all variables were analyzed in terms of structural equation modeling (SEM) which is the combination of factor analysis and multiple regression analysis, which was used to analyze the structural relationship between measured variables and latent variables. Overall model fit was examined statistically with the same process previously mentioned. A hypothesis of each model was considered in relation to three factors (AT, SN & PBC) which had a positive relationship with intention (IN) factor. After that, all models were compared with influencing factors related to intention concerning speeding behavior. Finally, factors were examined and compared in relation to the difference of identical TPB's factor in three countries by Critical Ratio tests at 5% level of significance.

CHAPTER 3 RESULTS AND DISCUSSIONS

This chapter presents the results of demographics and model estimation, speeding intention model, difference of identical to TPB in each city and discussions.

3.1 Demographics and Model Estimation

The data collected was from 184 participants (male: 56% and female: 44%) in KhonKaen, Thailand, 199 participants (male: 72% and female: 28%) in Vientiane, Laos and 187 participants (male: 67% and female: 33%) in Phnom Penh, Cambodia. Table 3-1 shows the differences in demographics between the three groups. It can be seen that age, driving experience and average daily travel distance between the three groups were considerably different by 5% level of significance. All respondents were between 18 and 67 years old, with Phnom Penh drivers having the highest age range, followed by KhonKaen drivers and Vientiane drivers, respectively. For driver experience, it was found that the highest average level of experience was found in KhonKaen, whose level of driving experience ranged from between 1-50 years. This was followed by, Phnom Penh drivers, who had between 1-30 years, and Vientiane drivers, who had between 1-18 years of experience. For average daily travel distance, all groups expressed between 5-90 kilometers (km). KhonKaen drivers had the highest average distance, followed by Phnom Penh drivers and Vientiane drivers, respectively.

Table 3-1 Differences in demographics between three countries

Demographics	Mean (SD)		
	KhonKaen (Thailand)	Vientiane (Laos)	Phnom Penh (Cambodia)
Age (year)*	26.43 (8.08)	25.94 (7.46)	28.09 (8.92)
Driving experience (year)*	7.97 (6.35)	4.34 (3.68)	5.29 (4.54)
Average daily travel distance (km/day) *	32.66 (20.67)	21.21 (16.97)	26.51 (18.31)

Remark* : Significant at 5 %level

The results of the reliability and validation estimation are presented in Table 3-2. It shows that all values of reliability and validation had a good rule of internal consistency and rule of thumb suggesting adequate convergence (Hair, 2010).

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Table 3-2 Reliability estimation and construct reliability validation

Factors	KhonKaen (Thailand)			Vientiane (Laos)			Phnom Penh (Cambodia)		
	α	CR	AVE	α	CR	AVE	α	CR	AVE
Attitude (AT)	0.78	0.73	0.66	0.78	0.72	0.66	0.78	0.70	0.64
Subjective Norm (SN)	0.77	0.64	0.53	0.86	0.81	0.68	0.90	0.88	0.76
Perceive Behavior Control (PBC)	0.74	0.62	0.58	0.82	0.76	0.70	0.70	0.57	0.55
Intention (IN)	0.91	0.62	0.75	0.86	0.81	0.67	0.82	0.74	0.61

Remark :α =Cronbach's (alpha), CR =Construct Reliability and AVE =Average Variance Extracted

3.2   Speeding Intention Model

Table 3-3, shows overall fit indices in the structure model and the factors influencing standardized path coefficients for drivers in each city. It also, shows the numbers for recommended statistics and indices fitted for the structural equation model (Hair, 2010). Therefore, the three types of driver models have been fitted between the theoretical constructs and observable constructs. Overall model fit for the three models could pass a number of recommended fit indices (except the p – value of Phnom Penh model).

Table 3-3Fit indices in models and factors influencing with standardized path coefficients

Model fit	Intention to driving fast in urban road environments		
	KhonKaen (Thailand)	Vientiane (Laos)	Phnom Penh (Cambodia)
χ^2	32.638	25.598	62.773
Chi-square/df(< 3.00)	1.112	0.883	2.165
$p–value$ (> 0.05)	0.239	0.647	0.000
GFI (> 0.90)	0.967	0.965	0.935
CFI (> 0.90)	0.995	1.00	0.965
RMSEA (< 0.08)	0.026	0.000	0.079
SRMR (< 0.08)	0.032	0.022	0.041
Factors influencing to intention	Standardized path coefficients		
AT → IN	0.38**	0.06	0.03
SN → IN	0.17	0.23*	0.13
PBC → IN	0.11	0.54***	0.84***

Remark: *Significant at 5 %level, **Significant at 1% level and ***Significant at 0.1 %level
AT refer to attitude toward speed, SN refer to subjective norm and PBC refer to perceived behavioural control

Figures 3-1 to 3-3 show the structural models with standardized path coefficients for the drivers of each city, including KhonKaen (Thailand), Vientiane (Laos) and Phnom Penh (Cambodia). Examination of the differences between the three cities mentioned in this study found that the three models could explain 33%, 47% and 84% for variance of speeding intentions in KhonKaen, Vientiane and Phnom Penh, respectively.

The KhonKaen model found attitude (AT) was the most significantly influencing factor and highest influencing factor for speeding intention in urban road environments, while subjective norm (SN) and perceived behavior control (PBC) were significant influencing factors for the Vientiane model, with PBC being the highest psychological factors. PBC was the only significantly influencing psychological factor for the Phnom Penh model.
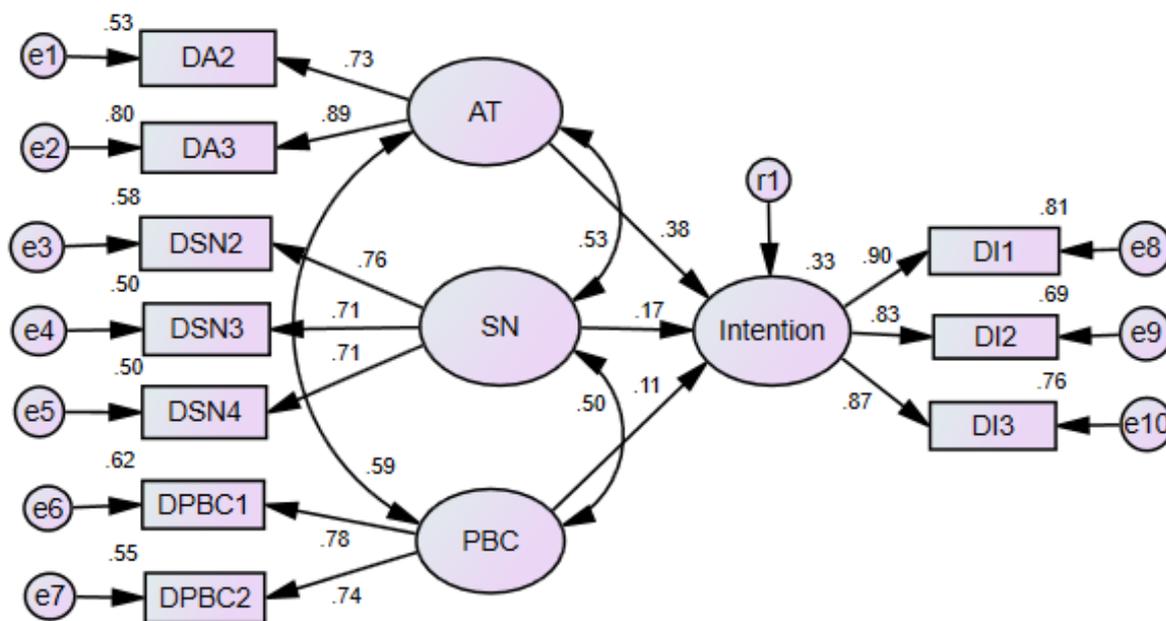

Figure 3-1 Structural model with standardized drivers KhonKaen,Thailand
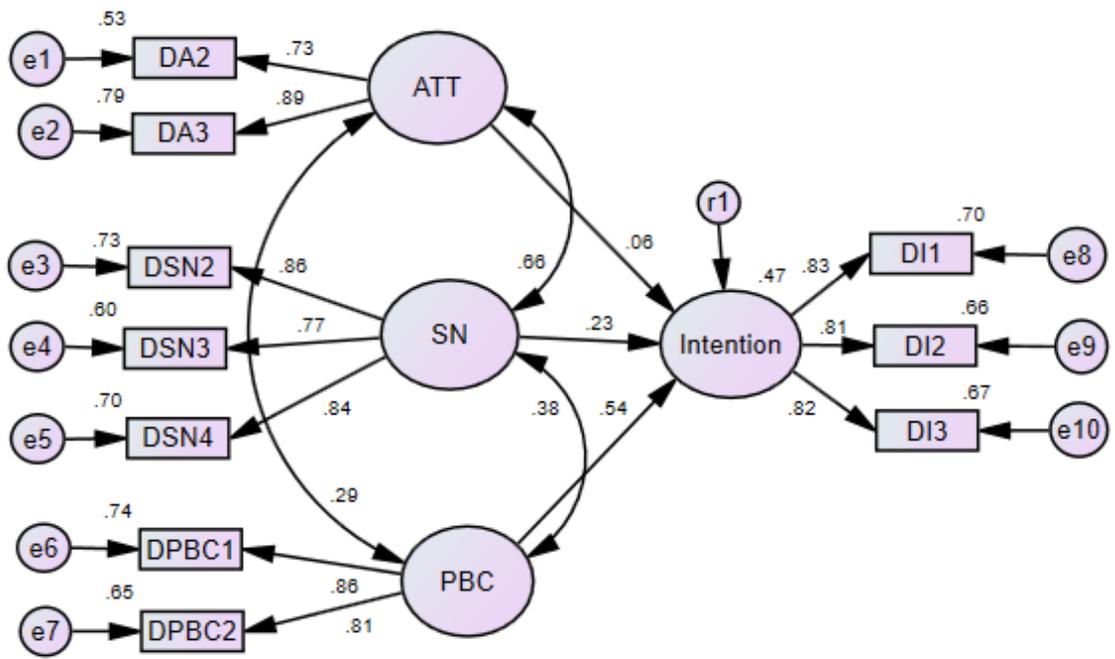
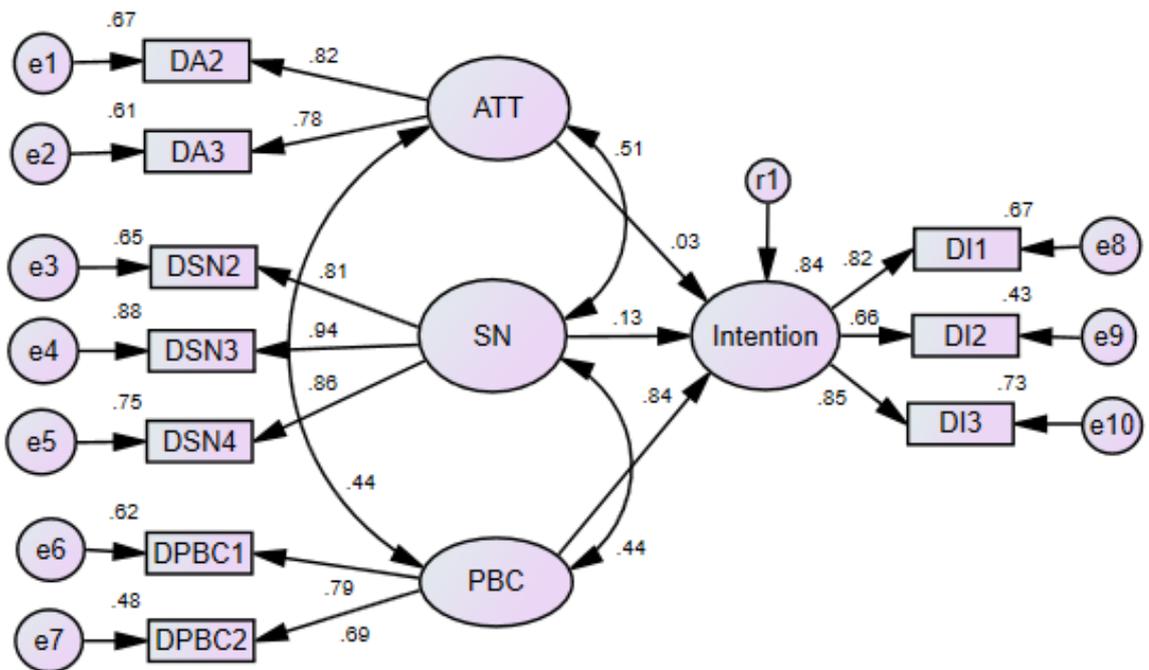Figure 3-2 Structural model with standardized drivers Vientiane,Laos

Figure 3-3 Structural model with standardized drivers Phnom Penh, Cambodia

3.3 Difference of identical to TPB in each city

Table 3-4 found that attitude (AT) for the KhonKaen model was significantly different by 5% between the Vientiane and Phnom Penh models, while the Vientiane and Phnom Penh models were not different from each other for AT. For subjective norm (SN), it was found that there was no significant difference among the three cities, while perceived behavior control (PBC) was significantly different by 5% among the three cities. These results confirm that the psychological factors in each country influence different outcomes, although the psychological factors in each country are identical to TPB factor, especially for AT and PBC.

Table 3-4Difference of identical TPB's factor in three cities

Attitude	Z-score		
	KhonKaen (Thailand)	Vientiane (Laos)	Phnom Penh (Cambodia)
KhonKaen(Thailand)	-	-2.15*	-2.72*
Vientiane (Laos)	-2.15*	-	0.25
Phnom Penh (Cambodia)	-2.72*	0.25	-
Subjective norm	Z-score		
KhonKaen(Thailand)	-	-0.21	-0.56
Vientiane (Laos)	-0.21	-	0.87
Phnom Penh (Cambodia)	-0.56	0.87	-
Perceived behavior control	Z-score		
KhonKaen(Thailand)	-	2.28*	3.54*
Vientiane (Laos)	2.28*	-	-1.98*
Phnom Penh (Cambodia)	3.54*	-1.98*	-

Remark: *Significant at 5 %level

3.4 Discussions

The psychological factors of the three models have differences in significance and the highest influencing factor for speeding intention. It was found that AT in the KhonKaen model was the only significant factor, while the Vientiane model had two psychological factors (SN & PBC) that were significant, with PBC being the most influential factor. For the Phnom Penh model, PBC was the only significant factor and was also the highest influencing factor for speeding intention. This result was consistent with the findings of previous studies on speeding intentions. Those previous studies found that AT was a significant and highest factor influencing and could explain 37% and 47% of variance in speeding intentions (Cristea M., et al., 2013; Dinh, D. D. & Kubota, H., 2013). This study also found AT to be a significant and highly influential factor with ability to explain 33% for the KhonKaen model. However, another study found that PBC was a significant and highly influential factor

as well. That study could explain 70% and 85% of variance for speeding intention (Warner, W. H. &Åberg, L., 2008; Warner, W. H., et al., 2009), while this study also showed PBC was a significant and highly influential factor, and could explain 47% and 84% of variance for the Vientiane model and Phnom Penh model, respectively. The results for each country confirm the psychological factors under the framework of TPB that have different significant factors and the highest factor influencing speed intentions in urban road environments.

CHAPTER 4 CONCLUSIONS

This study found that psychological factors were positively significant for speeding intentions. However, such factors were different and depended on each country. These results confirm the hypothesis that the psychological factors (attitude, subjective norm and perceived behavior control) can explain behavior intention, as stated by the theory of planned behavior (TPB) (Ajzen, I., 1991). The results found that differences in TPB factors influence drivers' intentions. Drivers used high speed in urban road environments and all three cities in the AEC countries researched. From each model, it was found that attitude (AT) was the most significantly influencing factor and highest psychological factor for speeding intention in the KhonKaen model, while subjective norm (SN) and perceived behavior control (PBC) were significant influencing factors for the Vientiane model, with PBC being the highest psychological factors. Finally, PBC was the only significantly influencing psychological factor for speeding intentions in the Phnom Penh model. This may have resulted because of the difference in identical factors when compared with a similar structural model, especially AT for the KhonKaen model and PBC for Phnom Penh model. However, the psychological factors that were significant or influential in one model may be useful for understanding speeding intentions and determinants for suitable speed control measures in other models. According to TPB, behavior can be adapted by changing intentions (Ajzen, I., 1991). Therefore, the findings suggest that changing the driving attitude of KhonKaen concerning "driving fast in an urban environment would be normal and acceptable" should be a part of any future safety policy. For example, explaining the danger of driving at high speed, using appropriate speeds, the necessity of setting speed limits, and safety of vulnerable users in the urban environment should be employed. Meanwhile, the suggested measure for changes in the subjective norms of Vientiane and driver's perceived behavioral control in Vientiane and Phnom Penh should be about the "Influencing people or social pressure", being the subjective norm. The findings in this study suggest that changing the social attitudes in Vientiane about driving fast in the urban environment being socially unacceptable would be beneficial. For example, important people (Parents/friends) should explain the dangerous effects of speeding behavior offenders. Another way is that drivers' perceived behavioral control in Vientiane and Phnom Penh can be changed for "Controlling the speed of drivers in urban road

environments". The findings in this research suggest that changing speed controls and adapting the way of thinking and controlling high speed use in urban road environments of Vientiane and Phnom Penh are the way forward. Measures, such as speed enforcement, police surveillance, and changing the physical features of the roads are among the suggested solutions to reduce drivers' speed. The results of this study should be taken into account to determine appropriate policies for improvement of speeding problems in urban road environments, particularly for the cities mentioned in this study.

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