

Feasibility Analysis of Mobility Management in Hanoi and Ho Chi Minh City, Vietnam

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Abstract: In recent years, Southeast Asian cities have been experiencing an increase in traffic problems due to the rapid progress of motorization. We considered mobility management (MM) strategies as a possible solution to this problem. Analysis of survey data on behavioral changes showed that MM strategies could be successfully implemented in Vietnam. We also found that effective communication with the public regarding future policy changes is likely to yield positive behavioral changes.

Keywords: feasibility, mobility management, motivational information, travel behavior change

1. INTRODUCTION

1.1 Background

In recent years, use of personal mobility devices, such as private cars and motorcycles, has rapidly increased worldwide. This causes and exacerbates various problems, including traffic congestion, air pollution, traffic accident rates, and obesity and adult disease rates. Furthermore, this trend places increased strain on infrastructure and public health services. Hard measures to mitigate these social problems, such as expanding and improving transportation infrastructure together with increased spending on public health services, are effective but expensive. Mobility management (MM) is an alternative transportation policy approach that encourages voluntary conversion from excessive automobile use to more sustainable transportation means. MM aims to change travel behaviors using communication from car use to sustainable transportation modes^[1], and there are three types of measures in mobility management. That is “communication-based MM”, “Transportation maintenance and operation improvement MM”, and “experimental MM”. This approach has been attracting attention in Australia and Europe since the mid-1990s. The application of MM has also been growing in Japan since 2000, where it is considered a priority. In Japan, a MM program in Yamato, Kanagawa, in which participants were provided pedometers in addition to leaflets and town guides, succeeded in decreasing their car use and increasing their physical activity^[2]. MM has been widely advocated as a possible solution to congestion in Europe, America, and Japan, and is seen as a complementary measure to road and public transport improvements while also serving as a preventative public health solution. Meanwhile, in ASEAN countries, growth in transportation infrastructure is failing to keep pace with the growing number of automobiles. As a result, there is concern that environmental burdens and

socio-economic losses will increase. Therefore, we must identify measures to guide civilians familiar with personal mobility (e.g. cars and motorcycles) towards public transportation. Although the Japan International Cooperation Agency supports the establishment of a transport master plan for ASEAN cities and the development of public transport infrastructure, there are no plans to implement soft traffic measures such as MM.

1.2 Purpose

This study focuses on Vietnamese citizens living in Hanoi and Ho Chi Minh City and has three main objectives:

- (Objective 1) Determine the traffic situation of Hanoi and Ho Chi Minh City, Vietnam, and create new motivational information through qualitative surveys;
- (Objective 2) Assess the stage model of self-regulated behavioral changebehavioral*¹ in Vietnamese citizen through quantitative surveys, and compare the results between Hanoi and Ho Chi Minh City;
- (Objective 3) Identify effective motivational information for changes to citizens' travel behavior through quantitative surveys and compare the results between Hanoi and Ho Chi Minh City.

1.3 Position of the Study

In this research, we collected information for MM promotion using two complementary methods: a qualitative survey by interview and a quantitative survey by questionnaire. In the interview survey, we investigated the differences in beliefs between developed and developing countries. At the same time, we attempted to gather useful information for future questionnaire surveys and MM implementation. In the questionnaire survey, we examined the feasibility of delivering MM with effective motivational information in developing countries.

The goal of this research was to examine the feasibility of implementing MM measures in ASEAN cities while also establishing the optimum method for their delivery.

2. PREVIOUS RESEARCH

2.1 Study on MM in Developed Countries

Fujii^[3] summarized the literature related to delivering to MM in Japan. The first example of MM in Japan was based on a model that had previously been implemented in Adelaide, Australia, in 1998. This experimental MM project was implemented as a pilot test in Sapporo, Japan, with the support of the Hokkaido Development Bureau in 2000. Examples of MM in developed countries such as Australia and Japan are too numerous to mention individually. However, to our knowledge, MM has yet to be implemented in developing countries such as Vietnam.

2.2 Study on Traffic Policy in Southeast Asia

Kitajima^[4] conducted research to clarify the problems in designing and implementing transit-oriented development (TOD) in Bangkok, Thailand. First, he extracted six elements that make up TOD: proximity to public transportation, mixed use land, dense development,

multimodal environments, public space, and walking environments. Second, the current status of TOD assessed from these six viewpoints. Finally, a case study for two stations was performed using an on-site survey to better understand the actual state of TOD from the viewpoint of the six aforementioned elements. From these analyses, problems hindering the realization of TOD in Bangkok were identified. Besides this survey, there are many studies on the implementation of hard measures as solutions to traffic problems in developing countries. Nakamura et al. Created three scenarios: early railway development, mature railway development, no railway development, and simulated which scenario suppresses motorization more^[5]. Yao et al. focused on paratransit as a low carbon transport system in developing Asia, and examined the environmental performance and the possibility of utilization^[6]. Nakamura et al. Examined appropriate design policies for low carbon transport systems in developing Asia^[7]. However, to our knowledge, there are no soft policies, especially those studying approaches using communication-based measures such as MM.

2.3 Study on Motivational Information for Mobility Management

The basis of Japan’s MM policy is to provide the public with free motivational information to reduce traffic levels and encourage more sustainable choices. This includes information on environmental damage, traffic accident rates, child discipline^{*2}, travel costs, and so on. Such information is often distributed in the form of booklets, which contain a variety of information; however, it is unclear whether these measures have been effective.

Suzuki^[8] reported that domestic MM has delivered positive results, such as reduced automobile usage and increased public transportation use. However, it is also necessary to factor in changes to human behavioral patterns. Therefore, Fujimoto et al.^[9] compared the effects of MM motivational information based on a scale of the change in mentality to quantitatively estimate which motivational information is effective for different individuals. They divided individuals into an “easy-moved group” (i.e. those readily motivated by motivational information) and a “hard-moved group” (i.e. those unwilling to make changes regardless of the information presented to them). The hard-moved group often had a high body mass index (BMI) and low subjective wellbeing^{*3}. The results also indicated that it was counterproductive to provide motivational information on health to people with a high BMI.

3. QUALITATIVE EVALUATION OF INTERVIEW SURVEY

3.1 Outline

We conducted a set of interviews lasting 15–30 min to survey the commuting habits of four corporate staff and three university students who live in Ho Chi Minh City. Table 3-1 shows the characteristics of the participants together with an outline of the interview implementation.

Table 3-1 Outline of interviewee and interview implementation overview

	Staff A	Staff B	Staff C	Staff D	Student E	Student F	Student G
Gender	female	female	male	female	male	male	male
Age	27	27	29	24	20	20	20
Commuting	Bus	Bus	Bicycle	Bus	On foot	Bus	On foot

3.2 Question Items

Table 3-2 shows the questions presented to the participants together with the response format. The interview comprised both structured and non-structured interview ^{*4}.

Table 3-2 Questionnaires for the interview survey

Topic	question
Basis	Age, Gender, Height, Weight, Family component, Possession of Car, Possession of motorcycle, Distance to the nearest bus stop, Transportation for commuting
Consciousness about motorcycle	Are you satisfied with the current motorcycle traffic?*/Do you think driving a motorcycle is "scary"?*/Have you had an accident while riding a motorcycle?*/ Do you know families and friends who caused an accident while riding a motorcycle?*/ The motorcycle inflow of the central city of Ho Chi Minh will be banned entirely by 2030. Do you know this?*/Are you for or against the influx regulation?*

*five point scale and ask comments

**yes/no and ask comments

3.3 Interview Results

3.3.1. Knowledge of motorcycle accidents caused by an acquaintance

When asked whether they knew at least one acquaintance who had caused an accident while riding a motorcycle (Q2.4), all seven respondents responded affirmatively. Table 3-3 provides the details of these accidents.

Table 3-3 Comments on motorcycle accidents by acquaintances

Staff A Woman 27years old	A junior male acquaintance drove drunk, and stopped the motorcycle in the middle of the road. He was hospitalized after being run over by motorcycles and cars.
Staff C Man 29years old	My friend was drove drunk when he collided with another motorcycle. The other party was injured, and their motorcycle broke.
Staff D woman 24years old	In the second grade of middle school, a classmate's mother collided with the track on the opposite lane. She died instantly at the young age of 34.
Student E Man 20years old	Many of my friends have had collisions with other motorcycles. However, at the moment, no friends have been injured badly enough to be hospitalized.
Student F Man 20years old	My mother's foot touched the muffler on the motorcycle after parking and she fell down because it was too hot.
Student G man 20years old	A friend who was driving a motorcycle braked suddenly on a highway. He collided with the following car; he broke his leg and was hospitalized.

These responses suggest that many people who live in Ho Chi Minh City know someone who caused an accident while riding a motorcycle. Severe accidents that based on the results of interview survey might represent a motivational strategy to trigger behavioral changes.

Furthermore, we were able to gather information on different types of motorcycle accidents, such as the case relayed by staff D that caused a young mother's death (see Table 3-3). A summary of such events could be used in motivational literature, with the goal of reducing motorcycle use.

3.3.2. Knowledge and opinion of future motorcycle use restrictions in urban areas

There is a plan to prohibit motorcycling in urban areas of Ho Chi Minh City by 2030 ^[10]. We asked the participants whether they knew about this plan (Q2.5), and asked them to quantify how much they agree with it on a five-point scale (Q2.6). The results are shown in Figure 3-1.

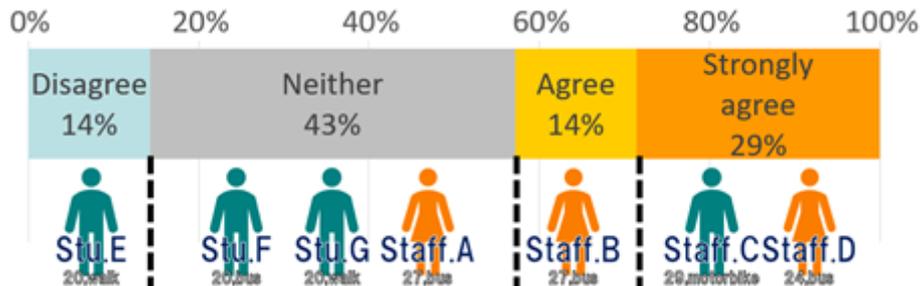


Figure 3-1 Opinion on motorcycle influx regulation in Ho Chi Minh City.

From the responses, we identified differences between those who were aware of the plan (Group A) and those who were unaware of the plan (Group B), as shown in Figure. 3-2. In Figure. 3-2, the horizontal axis represents whether the opinion is driven by social or selfish motives, and the vertical axis represents approval or disapproval to the plan.

The more informed respondents in Group A agreed with the inflow control and recognized the potential positive social changes and infrastructure improvements of this regulation. The less informed respondents of Group B were opposed to the inflow control for selfish reasons, such as not being able to ride their motorcycle. Therefore, Group A were considered to be more effective for promoting targeted behavioral changes than Group B. This finding underscores the need to ensure that the public is correctly informed on future plans.

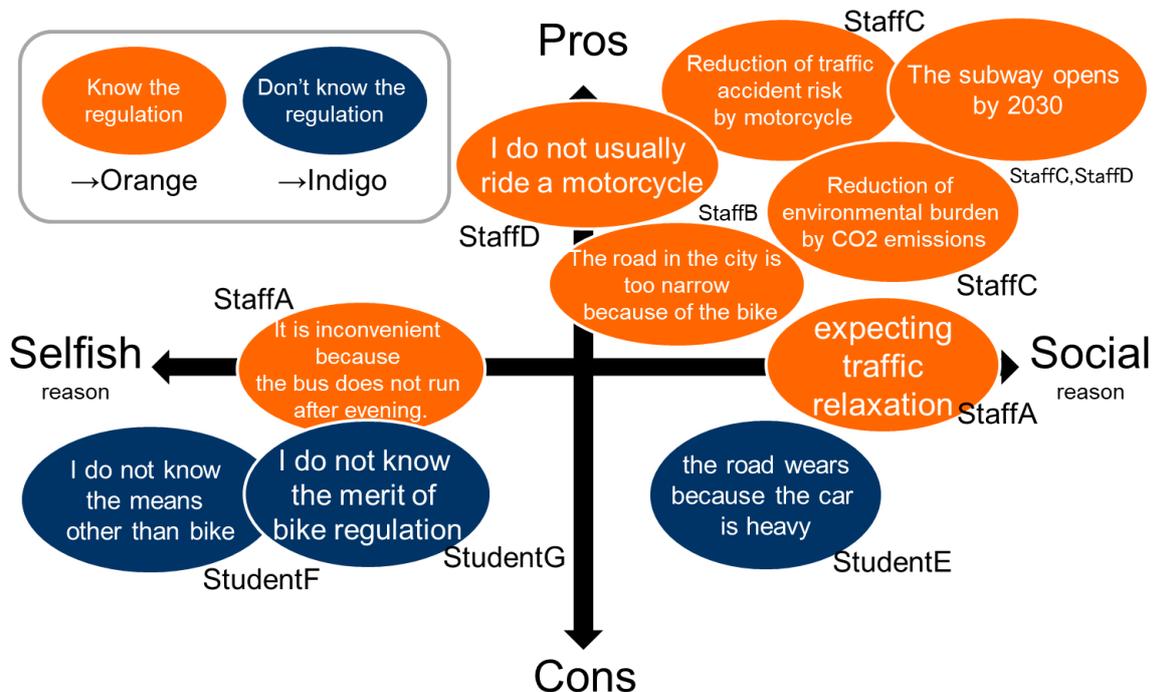


Figure 3-2 Matrix of approval/disapproval (vertical axis) of the future motorcycle inflow regulation plan in Ho Chi Minh City and motivations for the opinion (horizontal axis).

4. QUANTITATIVE ANALYSIS OF THE QUESTIONNAIRE SURVEY OF UNIVERSITY STUDENTS IN VIETNAM AND COMPARISON BETWEEN CITIES

4.1 Outline

We conducted a survey using questionnaires to measure the feasibility of MM and to verify valid motivational information for university students in Ho Chi Minh City. There are two reasons for choosing university students. The first is that as university students have less experience riding a motorcycle and have weak habits of it, the possibility of behavioral change of them would be high. Another reason is that since university students have a guaranteed academic background, it is advantageous for surveys because they can answer questionnaires smoothly and they can properly evaluate motivational information. A summary of the survey is shown in Table 4-1. To acquire as many answers as possible, we distributed both physical and web-based questionnaires.

Table 4-1 Overview of the Ho Chi Minh City survey

Method	Paper	Online
Period	December 5, 2018 to January 7, 2019	
Target	University students living in Ho Chi Minh City	
Area	Ho Chi Minh City University of Technology Ho Chi Minh City University of Transportation Ho Chi Minh City University of Architecture	Ho Chi Minh City University of Technology
Sample size	176	54

In this survey, we used the question items from a survey in Hanoi during the previous year^[9]. Since university students were also subject to a survey in Hanoi, we compared the results between Hanoi and Ho Chi Minh City. A summary of the survey in Hanoi is shown in Table 4-2.

Table 4-2 Overview of Hanoi City survey

Method	paper
Period	September 18, 2017 to September 25, 2017
Target	University student living in Hanoi
Area	Hanoi Medical University
Sample size	141

4.2 Question Items

The questions included in the surveys distributed to residents of Hanoi and Ho Chi Minh City were fairly simple and easy to answer. The contents are shown in Table 4-3. In this table, Behavioral intention is a psychological factor in the form of “I think I will do this,” or “I intend to do this”, Fishbein & Ajzen (1975)^[11]. Habit is a psychological factor that means “goal-directed automaticity” in implementing the relevant behavior, Verplanken & Aarts (1999)^[11]. Attitude refers to psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor, Eagly & Chaiken (1993)^[11].

Table 4-3 Contents of questionnaire in Hanoi and Ho Chi Minh City

Topic	question
Basis	Age, Gender, Height, Weight, Family component, Possession of Car, Possession of motorcycle, Distance to the nearest bus stop, Transportation for commuting
Psychological index	Attitude and behavioral intentions of transportation*/Habits of transportation*/Subjective Well-being*/behavior change stages**/Evaluation on MM motivation information*

*five point scale and ask comments
**single answer

Table 4-4 Descriptive statistics on each city

		HCMC		Hanoi	
		n	%	n	%
gender	man	154	74%	63	49%
	woman	54	26%	65	51%
age	Under 19 years old	41	19%	114	87%
	20 - 24 years old	139	64%	16	12%
	25 - 29 years old	36	17%	1	1%
family component	Household of two	155	74%	97	77%
	Household of three	30	14%	25	20%
	live with friends	17	8%	1	1%
	Single Mother or father	1	0%	2	2%
	Living alone	3	1%	0	0%
	married couple	2	1%	0	0%
Possession of car license	Has	38	19%	14	11%
	Does not have	165	81%	113	89%
Possession of car	Has	10	5%	0	0%
	Does not have	193	95%	127	100%
Possession of Motorcycle license	Has	187	90%	74	58%
	Does not have	20	10%	53	42%
Possession of Motorcycle	Has	168	81%	36	28%
	Do not have	39	19%	91	72%
Distance to the nearest bus stop	<200m	78	35%	41	31%
	200m-400m	18	8%	14	11%
	400m-600m	30	14%	30	23%
	600m-800m	4	2%	10	8%
	800m-1000m	11	5%	12	9%
	>1000m	8	4%	4	3%
	not know the nearest bus stop	71	32%	20	15%

4.4 Analysis of Travel Behavior Change Stage

4.4.1 Travel behavior change stage

The travel behavior change stage is a scale defined by Bamberg ^[12]. It is divided into six stages that relate to the frequency of car or motorcycle use, and desire to refrain from using these vehicles (Table 4-5). Understanding the behavior change stage of residents in developing countries can be used as a criterion for “determining whether mobility management can be applied” ^[13].

Table 4-5 List of behavior change stage

Stage	List of Behavior Change Stages		
	Own Bicycle	Intention to Hesitate Bicycle	Behavior Change
1	Have	Not	Not at All
2	Have	Hesitate	Can't do it right now
3	Have	Hesitate	Don't know the way
4	Have	Hesitate	Know the way but Don't do it
5	Have	Hesitate	Know the way and do it
6	Not		

Dependence of Bike

High

Low

4.4.2 Comparison of behavior change stages in two cities

To measure and compare the possibility of behavioral changes in the two surveyed cities, we conducted a cross-tabulation of the behavior change stages. Furthermore, the chi-square test was performed to check for difference in the results from the two cities. The results are shown in Figure. 4-1.

Respondents in stages 2–5 were defined as having changeable behavior. In this case, 76.4% and 41.9% of respondents in Ho Chi Minh City and Hanoi, respectively, exhibited changeable behavior. The chi-square test showed a difference between the two cities with a significance probability of 1%. Based on a residual analysis, significant differences were found between the two cities for stages 1, 2, 3, and 6.

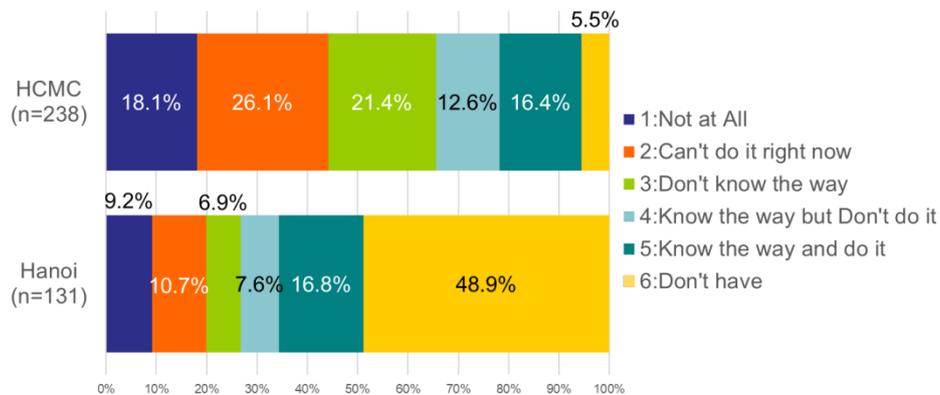


Figure 4-1 Distribution of respondents' travel behavior change stage in Ho Chi Minh City (HCMC) and Hanoi.

In addition, we examined the factors that have affected the possibility of behavioral change using binomial logistic regression analysis. First, the respondents were classified into the following three categories: "Stage 1 (strongly dependent on motorcycles, less likely to change behavior)", "Stages 2 to 5 (relatively weak motorcycles habit and there is a possibility of behavioral change)" "Stage 6 (not using a motorcycle)". Next, stage 6 which is a non-motorcycle user was excluded and we set the choice of "stage 1" and "stage 2-5" as the dependent variable. And we selected factors that are likely to be related to dependent variable and set them as independent variable.

Table 4-6 Estimate determinants of behavior change

	odds ratio	significance probability		odds ratio	significance probability
Age	1.11	0.082 *	Age	0.632	0.595
Gender			Gender		
male	1		male	1	
female	1.37	0.584	female	1.022	0.989
Have own motorcycle license			Have own motorcycle license		
Yes	0.00	0.999	Yes	0.062	0.205
No	1		No	1	
Have own motorcycle			Have own motorcycle		
Yes	1.14	0.854	Yes	0.024	0.072 *
No	1		No	1	
Behavioral intention			Behavioral intention		
to reduce frequency of motorcycle	0.89	0.532	to reduce frequency of motorcycle	4.124	0.097 *
to increase frequency of bus	1.21	0.33	to increase frequency of bus	2.187	0.136
Attitude			Attitude		
motorbike commuting	0.67	0.076 *	motorbike commuting	0.062	0.013 **
car commuting	1.58	0.02 **	car commuting	0.788	0.682
bus commuting	1.28	0.217	bus commuting	0.925	0.912
bicycle commuting	0.94	0.788	bicycle commuting	0.519	0.289
commuting on foot	0.86	0.454	commuting on foot	0.685	0.509
BMI	0.94	0.43	BMI	1.939	0.098 *
Habit			Habit		
motorbike	1.08	0.53	motorbike	1.544	0.184
walking	2.30	0.014 **	walking	5.276	0.033 **
Subjective well-being	0.72	0.195	Subjective well-being	0.225	0.164

Forced entry method
 Hosmer-Lemeshow test, p = 0.261
 percentage of correct classifications: 87.1%
 objective variable : Stage2,3,4,5=1 · Stage1=0
 ***, p<0.01, **, p<0.05, *, p<0.1

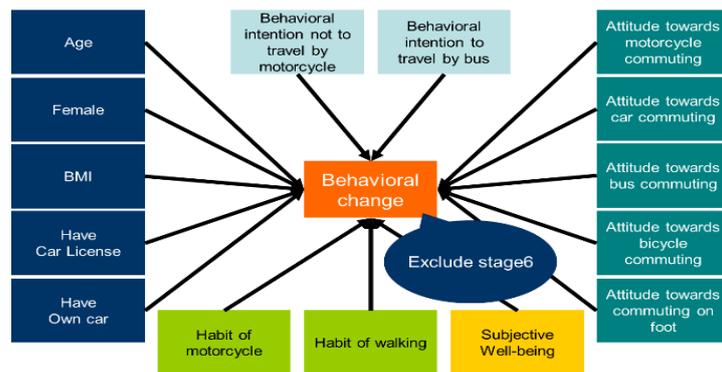


Figure 4-2 Testing model

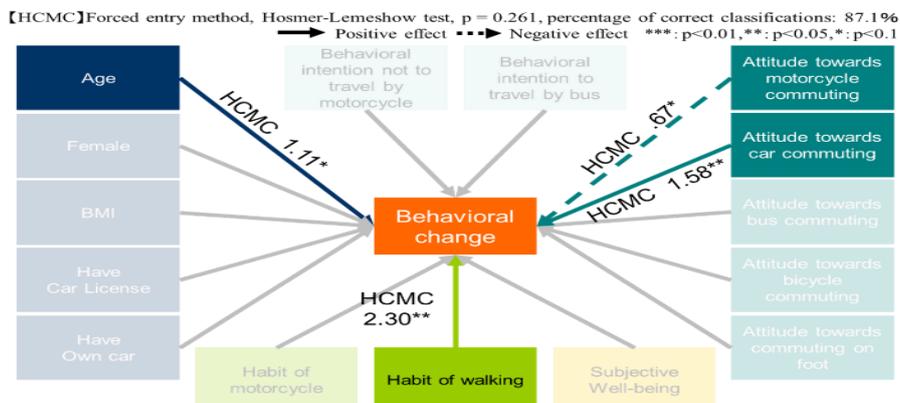


Figure 4-3 Estimate determinants of behavior change in HCMC

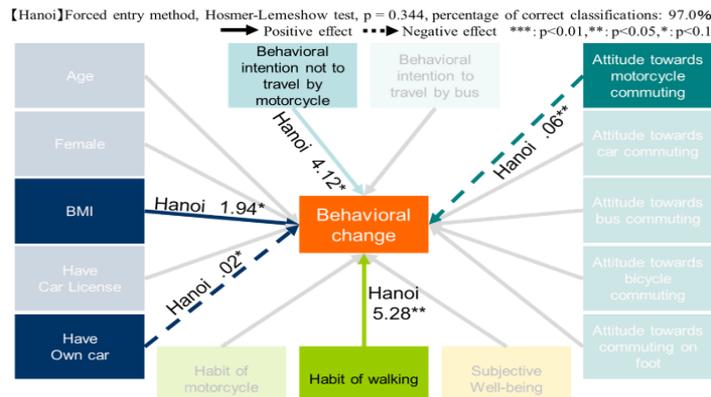


Figure 4-4 Estimate determinants of behavior change in Hanoi

The results are presented in Table 4-6 and Figure 4-2,4-3,4-4. According to the analysis, in Ho Chi Minh City, a higher possibility of behavioral change was associated with a higher age. In Addition, people who enjoyed commuting by car were more likely to change their behavior, possibly because cars are seen as an alternative to motorcycles. In Hanoi, people who thought about refraining from using motorcycles often or those with a high BMI were found to have a high possibility of behavioral change. Conversely, those who owned a car had a lower possibility of behavioral change. There are also two factors that show the same relation in two cities. Both cities are less likely to change behavior if they like motorcycles, and more likely to change if they like traveling on foot.

4.5 Analysis of Motivational Information

4.5.1 Description of motivational information

In the questionnaire, we provided eight samples of motivational information. This included the same motivational information presented in the Hanoi survey, as well as some additional information produced for this survey. Table 4-7 describes the motivational information and Figure. 4-5 to 4-12 show the contents.

Table 4-7 Description of motivational information.

Topic	Presentation format	Details of the information
Cost	Graph	Difference between the total cost of a motorcycle ride and public transport
Risk of traffic accident	Graph	Percentage of motorcycle accidents of all traffic death accidents
Tragedy of traffic accident	Written description and image	Bereaved families feel sorrow and anger
Calories consumption	Graph	Difference in consumption energy between motorcycle travel and public transport
BMI	Graph	Difference in BMI between students who travel by motorcycle versus bus

Fashionable lifestyle	Written description and image	Riding bus can be fashionable and comfortable
Loss by air pollution	Graph	Air pollution caused by exhaust gas causes death and diseases, including asthma
Time loss	Written description and image	Every day, 51 minutes are spent in traffic jams and finding parking

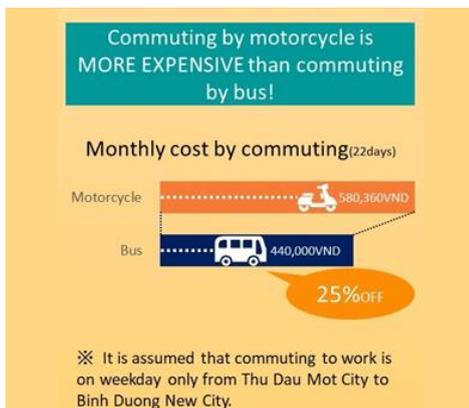


Figure 4-5 cost

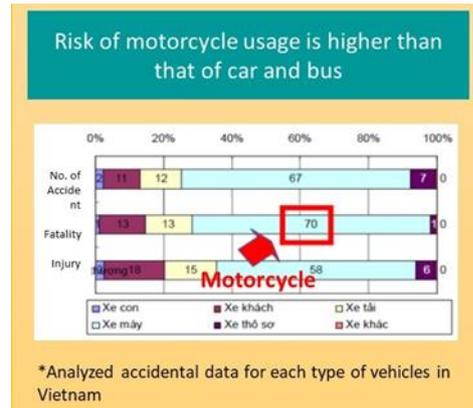


Figure 4-6 risk of traffic accident

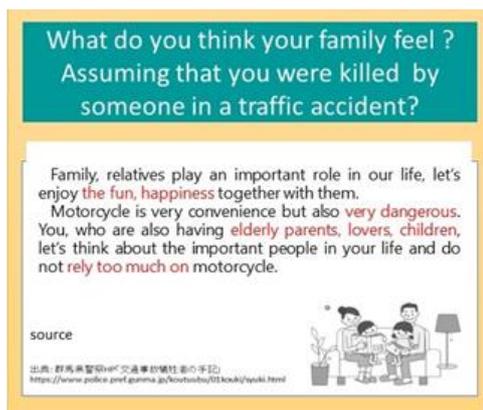


Figure 4-7 Tragedy of traffic accident

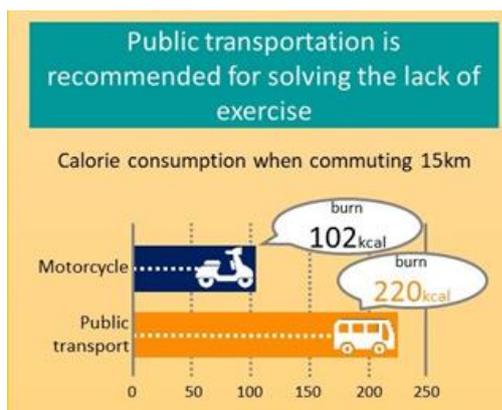


Figure 4-8 Calories consumption

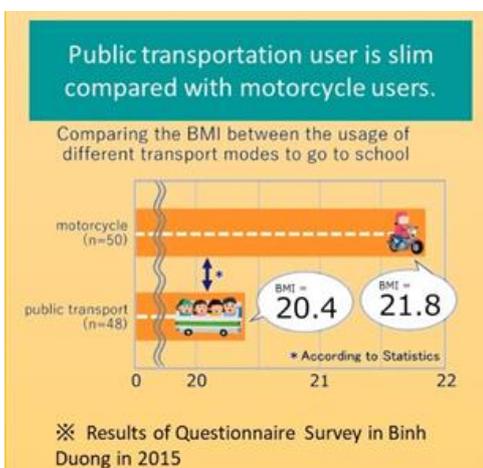


Figure 4-9 BMI



Figure 4-10 Fashionable lifestyle

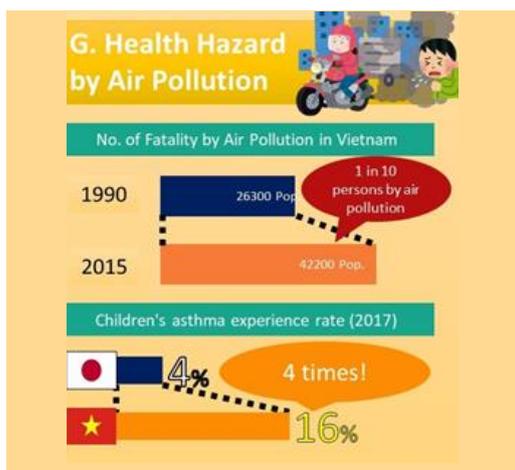


Figure 4-11 Health hazards



Figure 4-12 Time loss

4.5.2 Comparison of the effects of motivational information

Next, we compared the reaction to different types of motivational information by considering three aspects: understanding of motivational information, change in mentality, and behavioral intention.

First, we analyzed the average value of understanding of motivational information by one-way analysis of variance (ANOVA) for multiple comparisons. The results are shown in Figure. 4-13 and 4-14. In both cities, tragedy of traffic accident and motivational information on cost was relatively high. In contrast, motivational information related on BMI had the lowest average understanding of motivational information score.

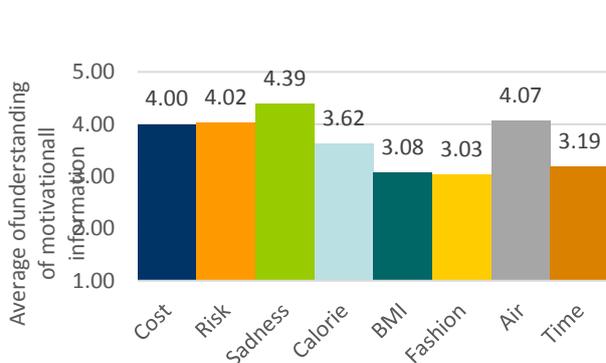


Figure 4-13 Understanding of motivational information in Chi Minh City.

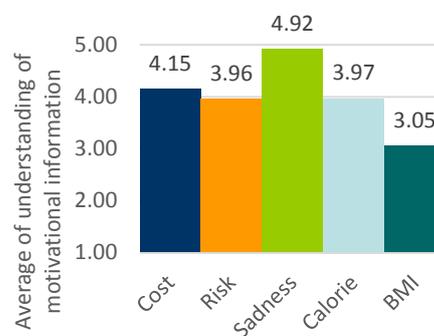


Figure 4-14 Understanding of motivational information in Hanoi.

We then analyzed the average change in mentality by one-way ANOVA for multiple comparisons. The results are shown in Figure 4-14 and 4-15. In Ho Chi Minh City, motivational information on traffic tragedy accident was high; however, in Hanoi, motivational information related on BMI had the highest score in terms of change in mentality. In addition, the evaluation of motivational information related on cost declined compared with the understanding of motivational information. Since citizens are familiar with cost-related motivational information; it was not effective on changing people's mind..

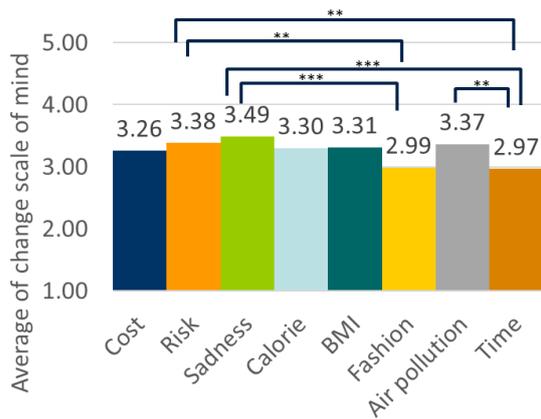


Figure 4-15 Change in mentality in Ho Chi Minh City.

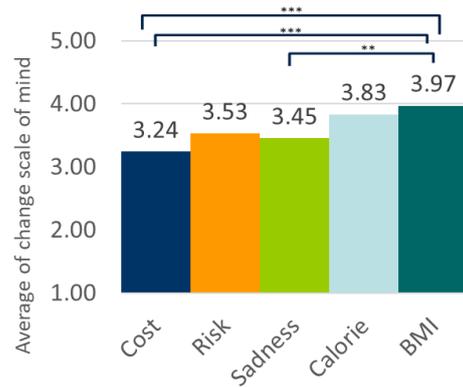


Figure 4-16 Change in mentality in Hanoi

Finally, we analysed the average behavioral intention by one-way ANOVA with multiple comparisons. The results are shown in Figure. 4-17 and 4-18. There were no significant differences between motivational information. In Ho Chi Minh City, the overall of average score declined compared to previous questions, suggesting that residents are reluctant to refrain from traveling via motorcycle. Although there were no significant differences, motivational information related to information on accidents that caused “tragedy of traffic accident” had relatively high scores in both cities.

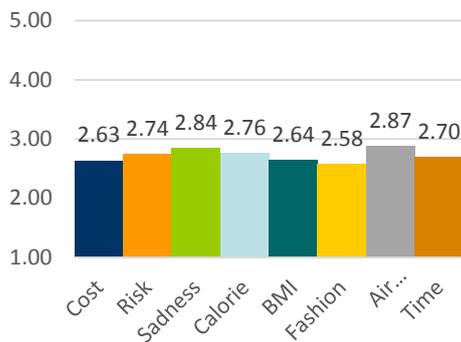


Figure 4-17 Behavioral intention in Ho Chi Minh City

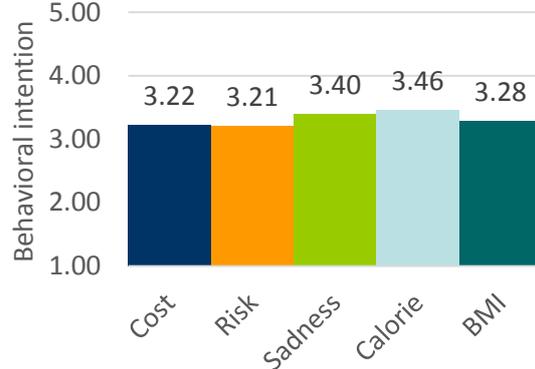


Figure 4-18 Behavioral intention in Hanoi

4.5.3 Comparison of motivational information between Japan and Vietnam

The table4-8 lists the top three motivational information for which the average of behavioral intentions was high.by using the survey results in Japan described in chapter 2.3 and the survey results in this research. In Japan, the first place was the risk of accident, the second place was tragedy of traffic accident, and the third place was the Damage of air pollution.

Table 4-8 Effective motivational information in Japan and Vietnam

		1 st .	2 nd .	3 rd .	Interviewee
Japan	Tokyo Metropolitan	Risk of accident	Tragedy of traffic accident	Loss by air pollution	General people
Vietnam	Hanoi	Calorie	Tragedy of	BMI	University

		consumption	traffic accident		student
	HCMC	Loss by air pollution	Tragedy of traffic accident	Calorie consumption	University student

5. CONCLUSION

The responses to qualitative and quantitative surveys were used to assess the feasibility of MM in Vietnam. The qualitative survey revealed a correlation between the understanding of motivational information of future motorcycle inflow control to Ho Chi Minh City and an appreciation for positive social, economic, and environmental benefits. This suggests that it is beneficial for citizens to be well informed of future plans. We also found that specific details of traffic accidents could be used to create descriptive information to encourage citizens to consider alternative means of transport. The quantitative survey showed that 182 out of 238 college students in Ho Chi Minh City and 55 out of 131 college students in Hanoi have a possibility to change their travel behavior, namely categorized into stage 2-5.

As a result of comparing each motivational information, it became clear that the motivational information on tragedy of traffic accident is the most useful motivational information in Ho Chi Minh City. And in interview surveys, we collected episodes of motorcycle accidents caused by acquaintances from all respondents, and those specific episodes can be useful motivational information. There is a possibility that the information obtained in the interview survey can be effective motivational information.

In addition, it is clear from the interview survey that those who agree with the regulation of motorcycle influx into the Ho Chi Minh City expressed social reasons. Based on that, it is considered that it is necessary for citizens to be aware of the social significance of inflow regulation. On the other hand, among motivational information focused on social significance, motivational information related to social loss due to traffic congestion was low in recognition. Informing about social loss due to traffic congestion may facilitate understanding of inflow regulation and thus promoting the use of public transport.

While motivational information on tragedy of traffic accident and air pollution were effective in both Japan and Vietnam, the motivational information on calories consumption and BMI is supported in two cities in Vietnam, but not very effective in Japan. The reason is considered to be that Vietnamese people are concerned more about health than Japanese people do. Thus, it is expected that there is an association between national character and valid motivational information. In the future, national character needs to be taken into consideration when conducting similar questionnaire in other countries.

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NOTES

*1. The stage model of self-regulated behavioral change is a psychometric scale to

determine the frequency of motorcycle use and how much you want to withhold motorcycle at the current time, Bamberg (2013).

- *2. There is a research result that concludes children grown up in cars will grow up with arrogance, XU *et al.*(2017).
- *3. Subjective well-being (SWB) is defined as 'a person's cognitive and affective evaluations of his or her life', Diener(2007).
- *4. Structured interview is an interview method in which a question item and a question sentence are fixed, and non-structured interview is an interview method in which a question is roughly fixed, and questions are asked in more detail according to an answer.

REFERENCES

- Diener, E., Oishi, S., & Lucas, R. E. (2002). Subjective well-being: The science of happiness and life satisfaction. In C.R. Snyder & S.J. Lopez (Ed.), *Handbook of Positive Psychology*. Oxford and New York : Oxford University Press.
- Fujii, S. : prescription for social dilemma~Psychology for urban problems, traffic problems and environmental problems~, p.263-p.270(*in Japanese*)
- Fujii, S.(2006). Development of "Mobility Management" in Japan,*IATSS Review*, 31(4) , 278-285 (*in Japanese*)
- Fujii, S., Taniguchi, A. (2006). Determinants of the effectiveness of travel feedback programs: a review of 347 communicative mobility management measures for changing travel behaviour in Japan. *Transp. Policy*, 348(13), 339-348.
- Fujimoto, S., Taniguchi, A., Taniguchi, M., Fujii, S. (2016) Measuring motivational effects in mobility management, *Committee of Infrastructure Planning and Management*, 72(5), I 1321-I 1330,(*in Japanese*)
- JETRO (2017): Motorbikes to central Hanoi were banned <https://www.jetro.go.jp/biznews/2017/10/0e38c8e9749f0c40.html>(*in Japanese*)
- Kitajima, R.,Kidokoro, T.,Seta, F. (1994) Current Status of Public Transport Center Development in Bangkok, *Journal of the City Planning Institute of Japan*, Vol.50, No.3, 568-573 Econometric SoftwareLIMDEP. Econometric Software Inc., New York and Sydney. (*in Japanese*)
- Nakamura, T., Kato, H., Hayashi, Y. (2012) Future prediction of motorization considering the time of the railway develop in Asian developing countries, *Committee of Infrastructure Planning and Management*, 68(5), 823-830(*in Japanese*)
- Nakamura, T., Hayashi, Y., Nakamura, F., Fukuda, A. Nakado, K. (2015) Diagnosis of low carbon traffic and treatment method using QOL in Asian developing countries, *Committee of Infrastructure Planning and Management*, 71, (5), I337-I346(*in Japanese*)
- N. K., and Y. S. Lincoln(eds.),2000, *Handbook of Qualitative Research*(2nd edition) , Thousand Oaks, CA: Sage.
- Sasaki, H.; Sen Fujimoto; Taniguchi, A.; Nakahara, S. (2017).Mobility Management for Health Promotion in 367Cooperation with Local Government Urban Transport Planning and Public Health Departments. *J. 368 Transp. Heal.* 5, S90.
- Sebastian Bamberg (2013) Changing environmentally harmful behaviors: A stage model of self-regulated behavior change, *Journal of Environmental Psychology* 34, 151-159
- Shibata, R., Taniguchi, A., Nakahara, S., Lan Nguyen (2018) Mobility Management Feasibility Study Analysis in Hanoi, *Committee of Infrastructure Planning and*

Management, 76(5), I 1321-I 1330(*in Japanese*)

Suzuki, H., Taniguchi, A., Taniguchi, M., Fujii, S. (2006) Meta-analysis on attitude and behavior change focused on domestic TFP case, *Committee of Infrastructure Planning and Management*, 62, 574-585(*in Japanese*)

XIN XU, Ayako TANIGUCHI (2017). : The Transition of Japanese Children's Travel Behavior and its influence : Based on living environments in Childhood and Spiritual Vulgarity of the Masses in adulthood, *INFRASTRUCTURE PLANNING REVIEW*, Vol.55

Yao, K., Ito, K., Sawayama, A., Kato, H., Hayashi, Y. (2015) Eco-friendly traffic policy utilizing paratransit in Asian developing countries, *Committee of Infrastructure Planning and Management*, 65(5), I337-I346(*in Japanese*)