'ACCESS CHARGING' SCHEME FOR THE OLD QUARTER OF HANOI TO EASE INTERNAL TRAFFIC: STRATEGY AND EFFECTIVENESS FORECASTING METHOD USING SURVEY

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1. Introduction

Increasing urbanization and economic development, esp. in developing countries, have long been causing overload of traffic on urban preservation districts (UPDs) such as historic downtowns cum neighborhoods, leading to rising high rates of traffic congestion and accidents that make negative impact on their commercial activities in return. Moreover, traffic pollutions such as exhausted fuels and noise have brought about serious impact on not only UPDs' living environment but also urban heritages, which are usually preserved here. Therefore, transportation management (TM) strategies in those UPDs have been focused on how to ease their internal traffic and how to maintain a sustainable environment. Good TM strategies for UPDs in developed countries such as "Car-free City" Project (Venice, Bogotá); "Automated Access Control" Project (Rome, from 1989), "Congestion Charge" Project (London, from 2002) and so on ¹ may be adapted and 'localized' by developing counterparts. However, up to now, there have not been many practical methods in forecasting and managing the effectiveness of those strategies before realization.

This paper aims to propose an 'Access Charging' scheme for improving negative transport situations within UPDs in a developing city, taking Hanoi Old Quarter as the case study, and to find out a survey method to forecast and manage its effectiveness. The survey result is supposed to help predicting changes after realization in terms of (1) transportation & environment, (2) commercial operation (business) and (3) socio-cultural issues.

2. Overview of Study Area

The historic center of Hanoi, usually called the Hanoi Old Quarter (HOQ) was established 996 years ago. This 100ha quarter composed by many narrow non-lineal streets of an organic pattern network was the original root of Hanoi city, and thus contains a large range of historical and cultural heritages to be preserved, attracting a large number of tourists. It has also been served as the first CBD of the fundamental capital since then. The characteristics that may make HOQ different from other heritage sites is that this area has been highly populated up to about 20000 households so far, and even getting more populated due to the capital's economic boom, putting it into the list of top dense districts in the world.

3. Transport and environmental problems in Study Area

In terms of transportation, HOQ has been bearing a lot of problems like traffic congestion and accidents, due to: (1) high rate of motorization and the failure of the old-fashioned structure in bearing it, (2) rising numbers of inhabitants, cross-travelers and tourists, (3)



lacking of sufficient parking spaces, and thus, enabling walkway parking that, together with walkway occupation by shop-runners, forces pedestrians to walk on the road-bed causing more accidents. In terms of environment, along with the process of urbanization, this heritage and dense neighborhood has been badly impacted by traffic pollution like emission and noise. Moreover, transportation problems could even affect the heritage sight-seeing activities, causing socio-economic losses. All those problems have led to a pressing task to ease the traffic overload on this old structure as well as to improve the living environment. The most difficult constrain here is the shortage of financial resources to be paid for new construction and improvement of the public transport system, which typically happen in a developing city like Hanoi. Other constrains are the lacking of legislation education and/or law violation of the community, and the community's 'travel habit' by motorbike that may not easily changed. Why is motorcycle really problematic and urgently needs to be limited? Because it is the most convenient, most free-moving plus affordable travel mode by majority up to now (motorcycle is much faster than bicycle, can cover long distances, is better than car to access narrow streets, and especially able to park almost everywhere). Therefore motorcycle population has been sky-rocketing, quickly jamming up the streets and polluting the environment.

4. UPD 'Access Charging' Scheme

In order to solve those transportation problems, this paper propose the 'Access Charging' scheme for UPDs with HOQ as the case. Scheme: Let's assume that a Zone Access Control System (ZACS) are to be established at HOQ periphery, putting it into a "semi-open enclosure" for better preservation (See Figure 1). First, the area is proposed to be car-free, because cars are completely not supported by old narrow streets and also not environment-friendly. Thus, all cars must be parked in designated off-zone parking places. Then, we classify UPD access makers into residents and non-resident, because residents are proposed to be permanently authorized to enter free-of-charge (All of their non-car vehicles (in this case mainly motorcycles) will be registered by their own license numbers and will not be charged at check points). Next, we classify them by travel modes for selected charging, then for post-implementation transport and environment evaluation. Free access vehicles shall be public transport, public service vehicles, disabled persons' vehicles, emergency vehicles and goods delivery vehicles. All pedestrians are free to enter, too. The rest are unauthorized vehicles and will be charged per entry (multi-entry charge may be issued later stages upon future demand) in business hours only (7.00am to 7.00pm daily). Enforcement will be through manual license plate checking (first stage) against a list of registered and authorized valid vehicle numbers (automatically entered into the computer database). In later stages, this may be upgraded to automatic checking depends on financial investment ability. Next, we classify access makers by access purposes (Group 1, 2, 3) for post-implementation economic and social evaluation. At last, we give them all possible choices that they can think of to choose for suitable charging and post-implementation effectiveness evaluation. This scheme is highly expected to reduce traffic and to generate big revenue, which must, by law, be contributed to Governmental Public Transport Investment Fund (GPTIF) to spend on improving public transport system.

In order to forecast the effectiveness of the new scheme, a survey program is proposed. Questionnaire would be delivered to non-resident zone-access makers (defining by asking if they are residents or not). Samples of respondent shall be diverse in age ranges and social groups, so that the result could become typical for

¹ Supplement No. 5, "International Mobility Observatory", MIT 2000



the whole majority. Questions would be designed to classify non-resident respondents into traffic mode groups, then the main purpose of access. After that, several choices would be given for them to choose. Most of the choices (C1,2,3) include one or more charges per entry that an access maker may needs to pay. Except for parking fees (fixed for each mode), other charges are Willingness-to-pay (WTP) based. Therefore, for defining those charges, a WTP based set of questions would be added in the

QUESTIONNAIRE
(Extract - This part is for those who already chose Choice C1)
(Continued)
Question (i). You are not permanently authorized to ride your motorbike into the Zone. However, you are allowed to
ride in if you pay a charge per entry. Would you be willing to pay 5000 VND/entry? (Please circle)
a) Yes. Then please come to the next question.

b) No. Then which choice would you like to choose now? (Please circle) C2 C3 C4 Thank you! Question (1+1). You have accepted to pay 5000 VND/entry to ride in. If the charge would be doubled, would you be willing to pay 10000 VND/entry? (Please circle)

Yes. Then please come to the next question.

d) No. Then which choice would you like to choose now? (Please circle) C2 C3 C4 Thank you! Question (i+2). You have accepted to pay 10000 IND/entry to ride in If the charge would be doubled, would you be willing to pay 20000 IND/entry? (Please circle)

- e) Yes. Then please come to the next question
- e) Yes. Then please come to the next question

f) No. Then which choice would you like to choose now? (Please circle) C2 C3 C4 Thank you! Question (i+3). You have accepted to pay 20000 IND/entry to ride in. If the charge would be doubled, would you be willing to pay 40000 IND/entry? (Please circle)

- g) Yes. Then please finish here. Thank you!
- h) No. Then which choice would you like to choose now? (Please circle) C2 C3 C4 Thank you! (To be continued)

			•			
		_	Phases	Before	After	Remarks
Categories			Categories	Implementation	Implementation	
Transportation and	_		Cars (Res.)	•		
	noi se)		Non-cars (Res.)	••••	•••••	
	um ent (emission,		Authorized Vehicles	•	•	
			Pedestrians (Non-res.)	0 0	00000	up on charging
			Bicycles (Non-res.)	00	00	
	nviro		Motorcycles (Non-res.)	••••	••	up on charging
	Eco-E		Cars (Non-res.)	••		
			Mass Transit	••	••00	up on charging
Commerce,	Financial	Resources	Group 1	•••	• • • •	up on charging
			Group 2	• •	0	up on charging
			Group 3	•••	• • • • •	up on charging
Socio-	cultural	Issues	Group 1	•••	• • • •	up on charging
			Group 3	•••	• • • •	up on charging

Figure 2. Extracted questionnaire sample

Motorized traffic - Level of quantity is ranked relatively from 0 dot (min) to 5 dots (max))
^o Zero Emission traffic - Level of quantity is ranked relatively from 0 dot (min) to 5 dots (max))

Figure 3. Goal achievement evaluation matrix

questionnaire. For instance, those who have already chosen choice C1 (pay a charge per entry to be authorized to ride in) would be asked more as details extracted in Figure 2.This type of WTP questioning may also enable policy-makers later to estimate optimal fares for new designated Zero Emission Vehicles (ZEVs) in choice C3 (like trams or rickshaws which used to widely operated in Hanoi as familiar image in many citizens' memory) that can balance riders' affordable ability with the demand to obtain maximum revenue.

5. Principle for evaluation of survey data

Figure 3 shows relative qualitative evaluation principle of scheme by comparison of results before and after implementation in 3 dimensions. The number of dots indicates quantity of traffic (2 types: motorzied and Zero Emission). This table contains hypothitical values, and is ranked relatively from 0 dot (min) to 5 dots (max). For example, the level of motorcyles' population (non-residents) within HOQ before implementation is very high (5 dots); yet would expected to drop to lower level (2 dots) after implementation due to charging. Likewise, the total number of motorized traffic by all access makers (the table's sum values) is expected to drop from 23 to 12 dots while ZEV traffic is expected to increase from 11 to 25 dots. This is the consequense of car-free policy and of an expected scenario that many would not accept charging, then parked vehicles to walk and/or to take ZEVs (choice C2,C3). Thus it is expected to show very positive outcomes (!) In reality, our future real survey data would be taken for quantifying the real rates of those changes before and after implementation, and thus can predict the effectiveness of the scheme. The level of each charge will affect respective choices and thus make the level of traffic changes before and after realization. Therefore, managing charge levels could control the traffic situation accordingly as we wish.

6. Conclusion and prospects

This paper proposes an 'Access Charging' scheme for improving transport in UPDs in developing cities as well as a survey method to relatively forecast and manage the scheme's effectiveness. It takes Hanoi Old Quarter as the study case. The result could be forecasted and simply managed (by charging system) in terms of transport load and each mode's parking demand, total environmental impact, commercial impact as well as other socio-cultural aspects, and thus can be potentially widely applicable to other developing cities.