

TRANSPORT AND ENVIRONMENT IN HANOI : ATTITUDES AND OPINION TOWARDS ENVIRONMENTAL POLICY MEASURES

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Abstract : Vietnam authorities are more and more faced with increasing environmental issues of motorbike boom in Hanoi and Ho Chi Minh City. The alarming rise in traffic accidents together with air and noise pollution, the emerging traffic congestion on on-peak hours call for an appropriate transport policy during the next years. Results from a household survey in Hanoi highlights perception by the population of these issues and bring some information on acceptability of policy measures favouring a more sustainable transport system. Differences among socio-economic subgroups and among districts of residence for adopting such measures are analyzed and discussed. A more balanced system transport for Hanoi might be achieved both with disincentives for private motorised modes and a more attractive public transport for work and education trips. Non motorised transport is not yet completely phased out and it should be favoured as a complementary mode in residential districts and for short trips.

Key-Words : Hanoi, sustainable transport, environment, attitudes, survey, transport policy

1. INTRODUCTION AND BACKGROUND

Most Southeast Asian cities are growing very rapidly and are expanding in area, the most likely form of growth being the ribbon development along the main roads and general urban sprawl. Motorization is also increasing in the absence of any significant restraints. Hong Kong and Singapore appear as well-known exceptions. Sprawling cities and motorization (motorcycles at first, then cars), have heavy incidence on quality of environment : deterioration of air quality, increasing noise pollution, major traffic congestion on peak-hours, road safety with more and more accidents linked to mixed traffic (motorised-non motorised modes), drivers behaviour, lack of adapted traffic regulation.

A well documented research was recently made on key choices and policies in transport in nine cities on recent decades (Barter, 1999). The SUSTRAN network (Sustainable Transport Action Network for Asia) appears as an international forum for promoting a more sustainable and people-centred urban transport. World Bank orientations and policies seems to follow a similar direction (World Bank, 1996).

With *doi moi* process beginning in the middle of the 80's, steady economic growth and internationalization, Vietnam experience a fast urbanisation. Between 1989 and 1994, Hanoi and Ho Chi Minh City increased their share of the total urban population to 15.9% and 31.0% respectively. The present population of Hanoi metropolitan area is estimated to exceed 4 million against 3 million in 1989. According to the Hanoi Master plan for the Year 2020, the population of the urban core of Hanoi is projected to growth from 1 million in 1990 to nearly

5 million by the year 2000 (UNDP, 2000). For the last 15 years, Ho Chi Minh City and Hanoi transport systems are more and more relying upon private motorized modes meanwhile the bus public transport was deteriorating and unable to meet the needs of a growing population on an extending urbanized area (Orn, Truong, 1995). Consequently, environmental transport issues appear as more and more as a challenge for Hanoi municipality and urban planners (Luu Duc Hai, 1996).

Sustainable transport is a very new concept in Vietnam. The National Institute for Urban and Rural Planning is largely involved by the definition of an urban transport policy on the way towards sustainable transportation (Luu Duc Hai, 1998).

1.1 Hanoi urban transport system dynamics

Hanoi from a bicycle city towards a motorbike city

During the 70's, and the beginning of the 80's cycling was the dominant mode of transport in Hanoi. The collapse of public transport during the same period linked as well as the supply of affordable vehicles by a national bicycle industry explain the development of bicycle fleet and ownership in a flat city where trip distances were usually short. Moreover, streets in Hanoi narrow temporarily because of road maintenance and the somewhat limited spaces did not create great problems for cycling inside the city. Since the 80's, motorcycle ownership increases steadily in Hanoi while bicycle ownership was always growing until 1990 at least (Table 1).

Table 1 Bicycle and motorbike ownership trends in Hanoi

	1970	1980	1985	1990	1998
Bicycles per 1000 persons	461	480	646	770	500 *
Motorbikes per 1000 persons	15	34	49	103	349

Bicycles are not registered since 1975, these figures have been calculated from different estimations

In 2000 motorcycle ownership has been boosted by massive imports of 1,4 million vehicles among them one million from China at prices that are two to four times lower than motorbikes brought from Japan, Thailand or Taiwan. Soaring exports of Chinese motorcycle manufacturers can be largely explained by urban transport policy in China : more than 60 cities ban or limit motorcycle use to curb air pollution and congestion.

Long decline of public transport

In 1987, Hanoi bus transit was still important with 60 bus lines and 40 millions passengers. In the 80's the tram network was progressively suppressed and public transport experienced the well-known vicious circle : lesser ridership leading to increasing financial losses, a lowering of service quality, line cuts and to a less and less attractive public transport. In the same time, bus system was faced with increasing competition of private modes, bicycle ownership first, motorcycle ownership after. In 1992, bus transport companies registered only 3.9 million passengers. The part of public transport decline from 25-30% of all trips in the 71's to 3% in the beginning of the 90's. However we observe a slow improvement in public transport supply during the last decade : 33 bus lines served central districts in 1999 against 17 lines in 1991, In a similar way, modal split in the Jakarta Metropolitan Area changed radically between 1985 and 1995 : the relative proportion of daily trips using public transport decreases from 63 per cent to 24 per cent during the period. In 1995, motorcycles and cars represent respectively 24 per cent and 32 per cent of all motorized trips (Nakamura, Thach, 1995)..

Table 2 Public transport indicators for some Asian cities

City (1999)	% public transport/total trips	Buses/ 1,000 inhabitants
Hanoi	3-5	0,200
Ho Chi Minh City	3-5	0,145
Bangkok	48	1,220
Kuala Lumpur	42	1,343
Singapore	60	2,200

Source : Transport and Environment in Hanoi, MOST Report, 1999

Compared with other Asian cities, Ho Chi Minh City as well as Hanoi have a dramatic backwardness (Table 2). It is the reason why a large debate is occurring at central administration and local governments on the best ways to reduce motorcycle use and develop attractive public transport services.

Side-effects of motorbike dependence

From CRURE research on Urban transport Environment Pollution (CRURE, 2000) we shall mention here only some significant data for 1999. In rush hours, at the main urban crossroads, the concentration of carbon dioxide (CO₂) was overpass critical standards to 9 times, nitrous dioxide (NO₂) to 9-9.5 times, sulfur dioxide (SO₂) to 7-7.5 times. In residential area, the noise level was overpass critical standard from 10-18 dBA. Traffic accidents has been rapidly increased in the recent years (4.5-5% per year). In 1994, per 10,000 vehicles, the number of deaths was 6.28, meanwhile the number of traffic accidents was 27.8. Motorcycle is involved in 72% of traffic accidents in Hanoi.

A research in co-operation programme had been undertaken since 1999 between CRURE and LET on urban transport and environment in Hanoi city

1.2 CRURE-LET household survey

This research is largely based on household surveys in order to bring some insights on mobility behaviour, sensitivity of the population to environmental transport issues, preference or degree acceptance of policy measures to discourage private motorised modes and to improve public transport which remains marginal in the present modal split. Some previous research of transport and studies on Hanoi have been done (CONSTRANS & alii, 1993), (TDSI, 1995), (Godard, Huong, Cusset, 1996), (Godard, Cusset, 1996).

In this paper we shall present some significant results of the first survey realized by CRURE team from October 1999 to February 2000 and we shall discuss some implications for future transport policies. Three districts have been surveyed: Hoan Kiem (155 households), Thanh Xuan (100 households) and Hai Ba Trung (251 households). Only one person was surveyed in each household. The total sample is 506 surveyed household and 508 answering people.

- Hoan Kiem is the central district of Hanoi. All of trading activities and agencies were concentrated in this area. The traffic network is narrow, especially at ancient streets. People are concerned by transport problem because it is difficult to park motorcycles and cars.
- Hai Ba Trung is the most populous district in Hanoi. It has bordering road around city, this have caused environmental pollution for people living near the road. At the same time, there are also some factories, enterprises interjected residential areas.
- Thanh Xuan is a Western new district established in 1997, so that the investment for transport is attached special importance, population is not crowded. A part of population is

urbanised, changing labour structure from agriculture to non-agriculture, people's awareness are not equal, in other words, there is a part of people that have not accessed to new condition of urbanised area in city yet.

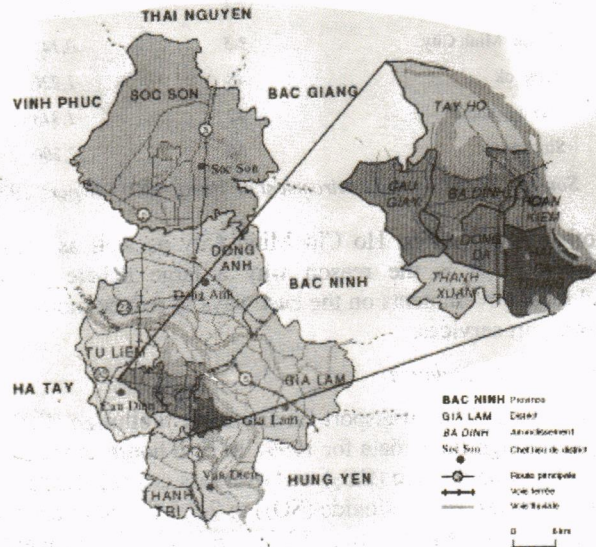


Figure 1 The districts of Hanoi

507 surveyed households for the 3 districts is not a large sample but it keeps a statistical significance in such research as far as the 508 respondents have contrasted characteristics in terms of age, gender and occupation (Table 3).

Table 3 Characteristics of the surveyed sample

	Working	Retired	Unemployed	Housewives	Pupils	Students	Total
Female	68	8	1,5	1,5	3	18	100
Male	70	8	2	-	4	16	100
Total	69	8	1,6	0,8	3,3	17,3	100

This survey brought interesting data on attitudes and opinion of significant categories of people according to gender, age, type of occupation, degree of availability to household vehicles, district of residence. Only 8% of surveyed households have no motorcycle and the rate of ownership is rather high with 155 motorbikes per 100 households but 1,6 car and 89 bicycles. If we consider the total population of the 507 households and the fleet of vehicles, we have 409 motorbikes, 234 bicycles and 4 cars per 1000 persons. These figures are somewhat different of estimates for Hanoi in 1999 : motorcycle ownership is higher and bicycle ownership lesser.

We shall begin by presenting some results about opinion on environmental issues and policies, then we shall emphasis on policy measures for restraint motorbike use and promote public transport.

2. ENVIRONMENTAL ISSUES : FACTS AND PUBLIC PERCEPTIONS

In order to assess the relative place of transport inside environmental concerns of Hanoi population, we asked feelings first on overall issues.(from very important to no important),

then we asked to rank environmental transport problems among them according their relative importance.

2.1 Perception of major environmental issues

2.1.1 Overall environmental issues

Water supply and waste disposal arrive far ahead among environmental issues (Figure 2). Other problems are declared as “very important” by less of 50% of surveyed people. These results are not surprising if we consider the present context in Hanoi. Only 60 per cent of people living in the four inner-city districts and five other peripheral communities of Lu Tiem and Thnah Tri have enough water for their daily needs ; 30 per cent of the city area is served by an obsolete sewage network, 60 per cent of which was built before 1954.

Among environmental issues linked to transport considered as “very important”, traffic congestion comes for air pollution. If we consider now “important” issues, air pollution by motorised vehicles is the first, before all other problems.

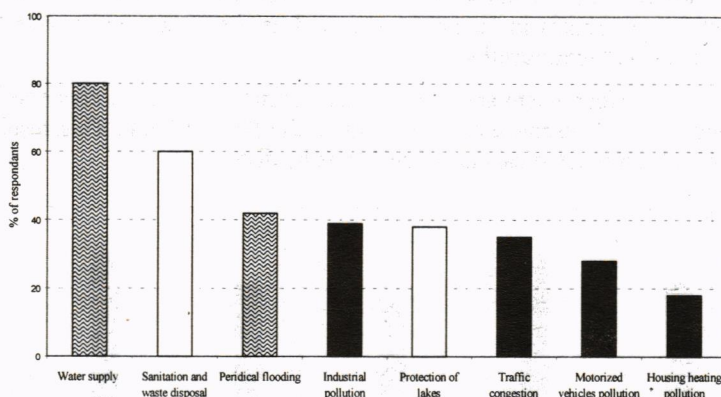


Figure 2 Hanoi environmental issues considered as “very important”

Hanoi population is worried mainly by the more perceptible impacts of urban transport : traffic accidents and traffic congestion. One can explain this ranking for the fact that everybody has a daily experience of these problems. Statistics of accidents are frequently mentioned by media (newspaper or TV) and opportunities to see traffic accidents are likely important. On the other side, everybody is faced with traffic jam during his daily trips, on on-peak hours. Air pollution by motorcycles has some health impacts in term of disease but this impact is more diffuse. Noise of motorcycles in the daily traffic is considered as a “normal” drawback of people motorization and the levels of noise seems to be not too high even if they are beyond the international standards (WHO).

If we consider answers according districts of residence, we observe everywhere a highest concern for water supply and sewage. Hoan Kiem residents seem more worried by periodical flood than other people. Air pollution by motorized vehicles is considered as “very important” by a quarter of less of respondents. Traffic congestion is a major environmental issue for less than 50% of respondents, and lower percentage is observed for Hoan Kiem residents, contrarily as one could expect.

2.1.2 Transport and environmental-linked issues

We asked surveyed people to rank the six transport environmental issues from 1 the most important to 6 the least one. Road accidents are ranked as the first problem by 39% of

respondents, followed by increasing motorised modes (24%) ; congestion (16% of respondents) and motorcycle pollution (14%) appear relatively less important. A very small part of persons consider *lambros* (three-wheeled vehicles) and lorries pollution, (6%) and noise of motorbikes (1%) as the problem number one.

Traffic accidents appears as the most important consequence of increasing ownership and use of motorcycles. Number of traffic accidents climbed from 633 to 2,937 between 1990 and 1997 according to Police statistics and during the same period, the number of injured people increased dramatically : 547 in 1990 and 3,201 in 1997.

Here we shall present some detailed results for three main issues: accidents, congestion and motorcycle pollution. Increasing motorised modes is more a cause present environmental issues than an environmental damage itself.

Sensitivity to accidents is higher among non-motorized vehicle users (Figure 3) but for other issues differences among categories are weak. One can only see that motorcyclists seem a little more worried by traffic congestion and no motorbike users by vehicle pollution. The increasing fleet of motorbikes in Hanoi is perceived as the issue number one by a small proportion of "exclusive" motorcyclists.

Respondents living in Hoan Kiem and Thanh Xuan districts seem more concerned by traffic accidents : about 75% of respondents rank them as the first problem. This result might be explained if we had some statistical data of accidents by district.

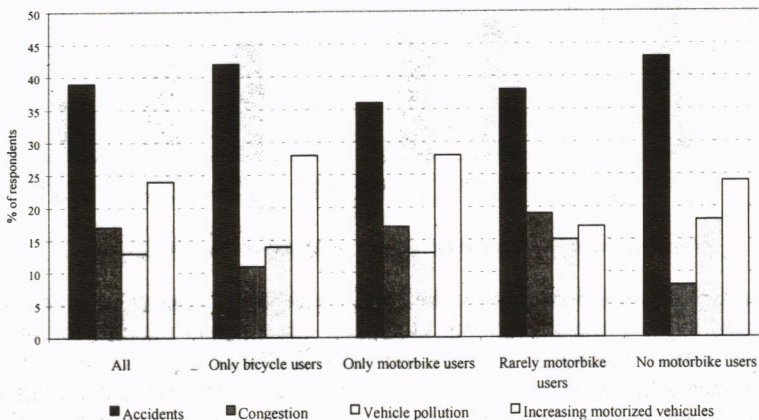


Figure 3 Transport environment issue n°1 according to vehicle use

For the three districts, less than 20% of respondents mention motorcycle air pollution as issue number one. It seems strange to observe that congestion is perceived as a major problem by a small proportion of Hoan Kiem district which knows a heavy traffic

2.3 Opinions on motorized vehicles pollution control

In Hanoi as well as in Ho Chi Minh City, *lambros* have provided passenger public transport and light cargo needs for the 70's between peripheral rural districts and inner city. However these three-wheeled vehicles appeared more and more unsafe with high rates of accidents and sources of air pollution. Hanoi authorities decided few years ago to phase out this transport progressively. Nowadays; licences for operating *lambro* are not longer available and their drivers are banned in 145 main streets of Hanoi. Air pollution control of the increasing motorbike fleet is a bigger challenge for public authorities all the more so since this

externality is not a major issue of Hanoi people because its effects in terms of diseases are indirect. However few respondents disagree or entirely disagree with suggested measure of pollution control (Figure 4).

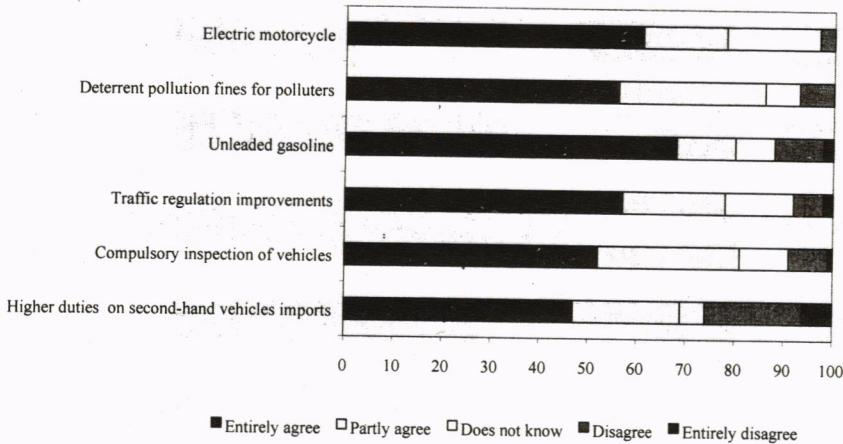


Figure 4 Opinion on measures to curb motorbike air pollution

The larger support concern mainly "positive" measures. Higher duties for limiting imports of second-hand motorcycles are rejected by a significant minority of people. Differences among categories of vehicle users or non users are not very large (Table 4).

Table 4 Part of respondents who entirely agree such control pollution measures (% of respondents)

Type of vehicle user	None vehicle	Exclusive bicycle	Occasional motorbike	Exclusive motorbike	All sample
Compulsory inspection of vehicles	67	51	49	57	52
Deterrent fines	56	56	55	56	55
Electric motorbikes	67	44	61	64	61
Unleaded gasoline	67	53	68	64	68

One can observe that people who never drive bicycle or motorcycle support in a larger extent these measures, if we except unleaded gasoline. An in-depth survey with opened questions would bring more appropriate information the reasons of attitudes towards policy measures.

3. RESTRAINT-BASED MEASURES TO DISCOURAGE MOTORCYCLE USE

In many cities around the world, car-restraint policies have been set up for more than 20 years. Recently, several Chinese municipalities have regulated motorbike use on their areas. In Vietnamese large cities, such policies are being considered but they will be likely inefficient as soon as alternative public services will not be available for daily trips. The survey was an opportunity to test the opinion of people on different measures to discourage motorbike use and ownership.

3.1 A large opposition to restraint-based measures in terms of price or taxes

Generally speaking, a large majority of respondents disagree with such measures. Banning parking on sidewalks encounters rather less opposition but financial measures leading to curb

use or ownership of motorbikes are largely rejected. These results are not surprising if we consider that most households rely on motorcycles for daily meanwhile public transport is not a workable alternative.

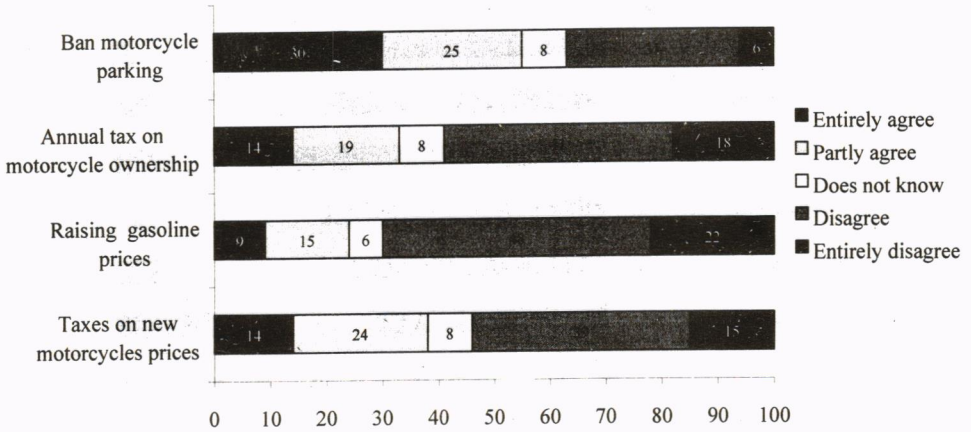


Figure 5 Opinions on restraint measures on motorbike use and ownership (% of respondents)

We observe a higher reluctance towards gasoline price increases Opinion is more about ban of motorbikes on sidewalks. Differences among people can be highlighted when we consider extremes opinion "entirely agree" and "entirely disagree". We shall limit the analysis to two measures : "raising gasoline prices" and "tax on motorcycle ownership" (Figure 5).

We consider first the degree of acceptability to 'gasoline price' measure for curbing motorbike use. One can expect that the acceptability would be higher among people who have a non motorised mobility, in our sample it concerns mainly cyclists. The outcomes of the survey do not confirm this assumption. We selected here people driving everyday a bicycle or a motorcycle with an exclusive use of this vehicle or not (Figure 6).

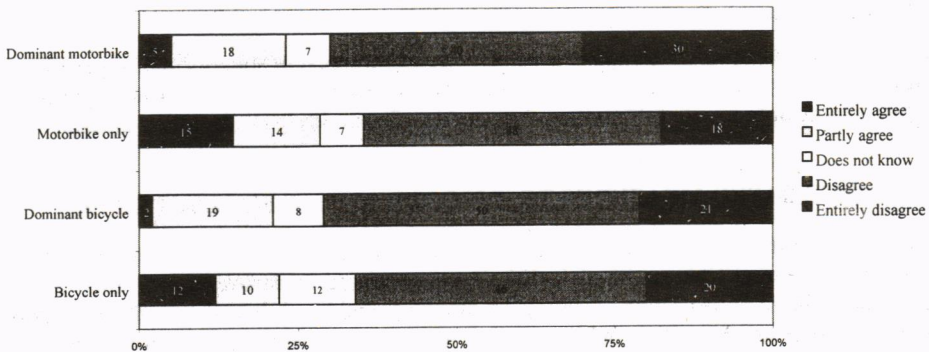


Figure 6 Opinion on gasoline price measure according to daily mobility

Differences among categories of respondents are not very significant (Figure 7). All cyclists and exclusive motorcyclists disapprove entirely this measure in a similar proportion (around

20 per cent). A more detailed analysis integrating gender and type of occupation affords complementary information. In all cases, women disagree entirely with this measure in a highest than men if we except student population. However women who never use a motorbike appear with contrasted opinion.

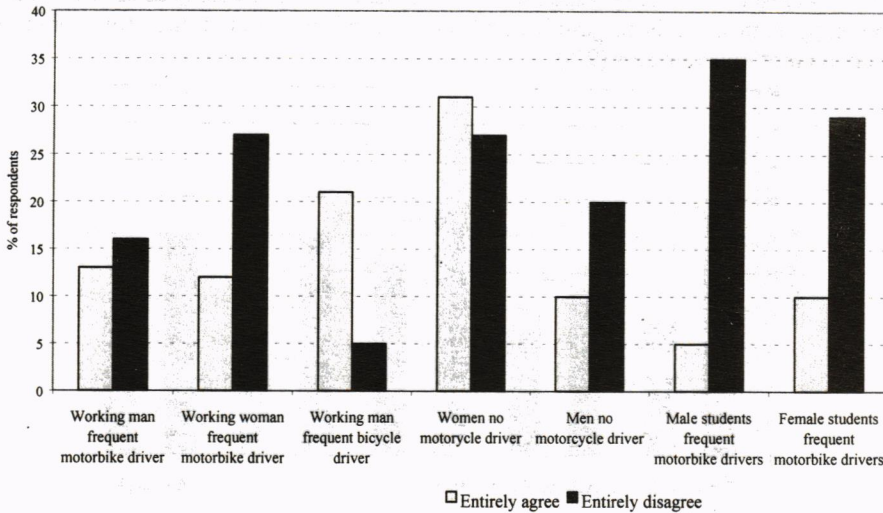


Figure 7: Contrasted opinion on gasoline price measure

Although a largest total support of women who never drive a motorcycle, a very similar proportion of them disagree entirely. Working women with a frequent bicycle use show the lowest proportion (5 per cent) of people in total opposition to this measure.

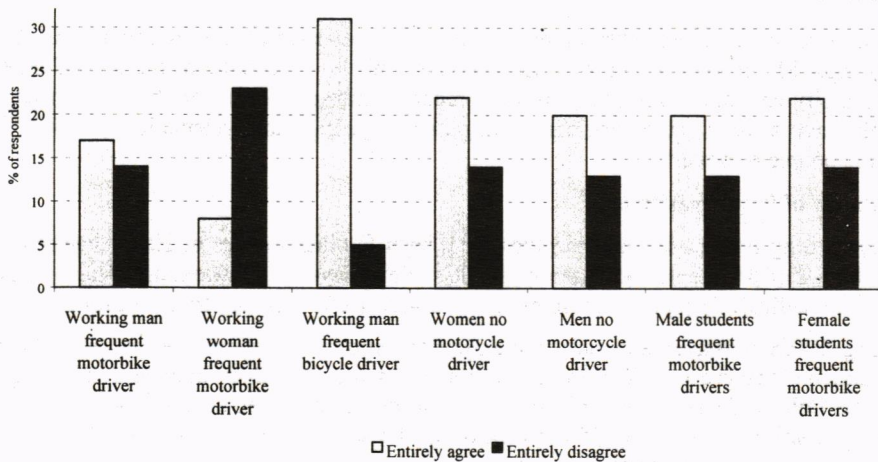


Figure 8 Contrasted opinion on motorbike tax disc on owners

Taxing motorcycle owners encounters a lower rate of reluctance than pricing gasoline. Women either cycle riders or no motorcycle drivers have a higher level of acceptability while working women with a frequent motorcycle use show the highest opposition to this measure (Figure 8)

3.2 "Efficient" measures

On the whole, those who do not agree with a measure consider it as "no efficient". However, a very small minority has a different point of view (Figure 9).

Perceived effectiveness of measures to curb ownership and use of motorbikes is strictly linked to their acceptability. Among respondents who consider such measures as efficient, only few do not support them : raising gasoline prices (16%), raising taxes on motorbike prices (7%), disc tax on motorbike owners (9%).

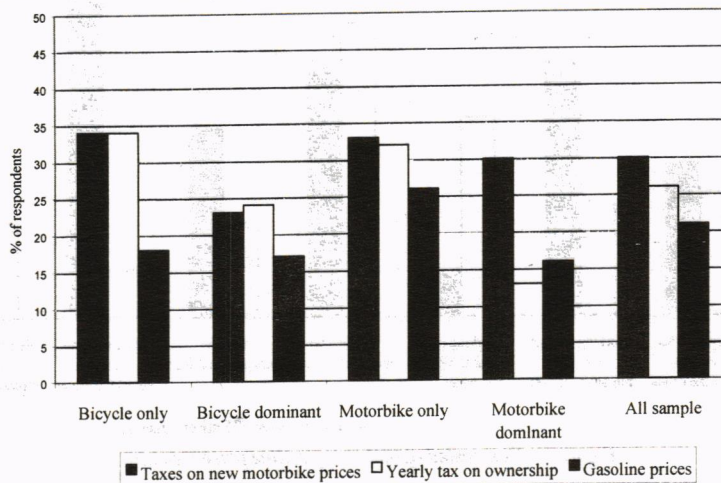


Figure 9 Efficiency of financial measures according daily users of two-wheeled vehicles

4. PROMOTING NON MOTORIZED TRANSPORT

Hanoi, alike other Vietnamese cities, had a long experience of non-motorized transport for daily trips. Motorbikes began to replace bicycles only in the middle of the 80's. Unlike most African city capitals, walk is not an usual mode of transport even for short distances. Asian people have a large preference for cycling and bicycle is not systematically linked to low income people or poverty.

4.1 Image of is still positive

During a long time *cyclos* and bicycles have been familiar images of Hanoi landscape until the take-off of private motorization in the 80's. Nowadays, it is interesting to have some idea about the feeling of people on these modes in a sustainable-oriented transport for the future.

Among different assessments on bicycle included into the questionnaire, we select here only two and we observe people who consider at the same time that "bicycle does not give an obsolete image of Hanoi" and "bicycles will not be very soon replaced by motorcycles". Such positive opinion is shared by 45 per cent of all the sample, 13 per cent who disagree. Other people agree only with one assessment.

If you compare answers among categories of daily vehicle users, differences are somewhat significant between 'exclusive cyclists' and exclusive 'motorcyclists'. Age and gender of surveyed people are not explaining variables because positive attitudes are not increasing as people are older and they are not linked with the gender (Figure 10).

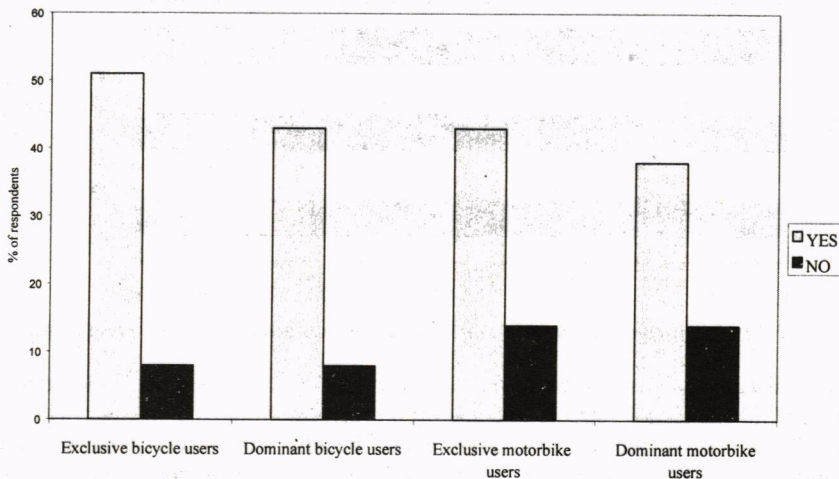


Figure 10 : The future of bicycles in Hanoi according daily uses

4.2 A positive attitude towards non motorised transport measures

We consider here traffic facilities favouring non motorised transport users : pedestrians and cyclists.

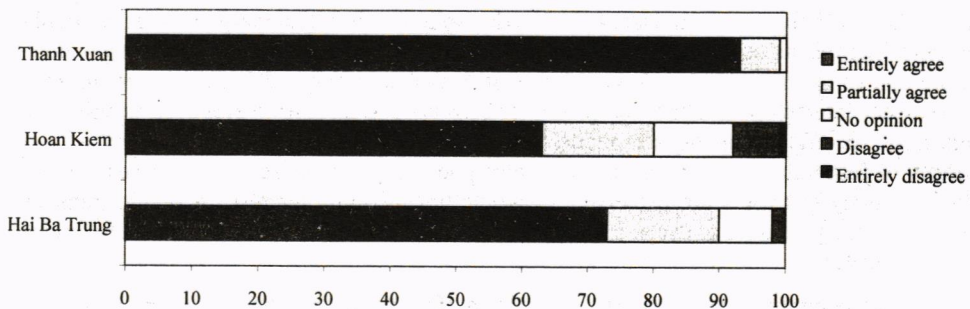


Figure 11 Opinions on pedestrian streets according residence districts (% of respondents)

In the three districts there is observe a large agreement on pedestrian streets although a lesser extent for Hoan Kiem residents. One reason would be that a previous and short experiment in this district has failed; some traders fear a loss of their customers who would be forced to park their vehicles elsewhere. However more and more people seem to agree that some streets of inner city are less attractive for tourists because of motorbike noise and sidewalks invaded by vehicles (Figure 11).

Facilities for non motorized transport are not new in Hanoi city and the answers are very similar according to residence districts.

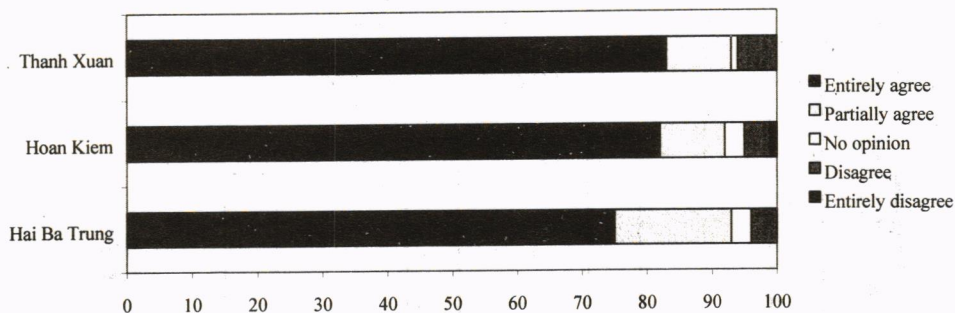


Figure 12 Opinions on reserved lanes for NMV according to residence districts (% of respondents)

Few people disagree with reserved lanes for non motorised vehicles. Such facilities would ease safe cycling in Hanoi streets and motorbike drivers would not be worried by slow vehicles (Figure 12). In fact all road users would benefit from reserved lanes but Hanoi municipality would have to choose streets and avenues where such lanes should be implemented. Favouring cycling in Hanoi implies a real network of lanes for cyclists and not only some streets scattered inside the town.

5. PUBLIC TRANSPORT POLICY

5.1 Perception of Hanoi public transport

Since 1990 available data on Hanoi the modal split confirm the marginal part of public transport. The results of the survey are consistent with this information. 84.7% of respondents declare non using urban bus, 14.5% are occasional users and only 0.8% are frequent users. It is somewhat interesting to know the profile of bus users according to surveyed people. Bus users have specific occupations : pupils, students, small traders are mentioned by a large majority of respondents. Then bus users are also poor people or those without access to any vehicle. Finally bus users are perceived as people having some interest for public transport ridership : a long distance between home and work place as well as a convenient route linking these two places.

A survey on commuters and bus service made in 1993 highlights the results of the present survey (Nakamura, Thach, 1995). Among the reasons of no use of bus, 57 per cent of respondents mentioned "route network and location of bus stops" The conditions for a future use of bus would be high frequency (100% of respondents), route network (88%), fare (75%).

Opinion on public transport service is negative although the survey sample has few bus users. It is a reason why the proportion of people without opinion is rather high for many items. Answers of no bus users and rarely bus users (15% of the sample) are not very different and they are not specified in his paper.

A more or less large agreement is observed on some negative aspects of Hanoi bus transport : bad route network, crowded buses on on-peak hours, poor service for peripheral districts (Figure 13). On the other hand, opinion is divided on the cost of public transport : a majority of people agree with the assessment of motorbike riding more expensive than bus use. In fact if we compare daily transport expenditures between a motorbike user and a bus rider during a month, we can consider that motorbike use is a lot more reasonable. Poor people cannot afford bus services according to almost 50 per cent of the respondents.

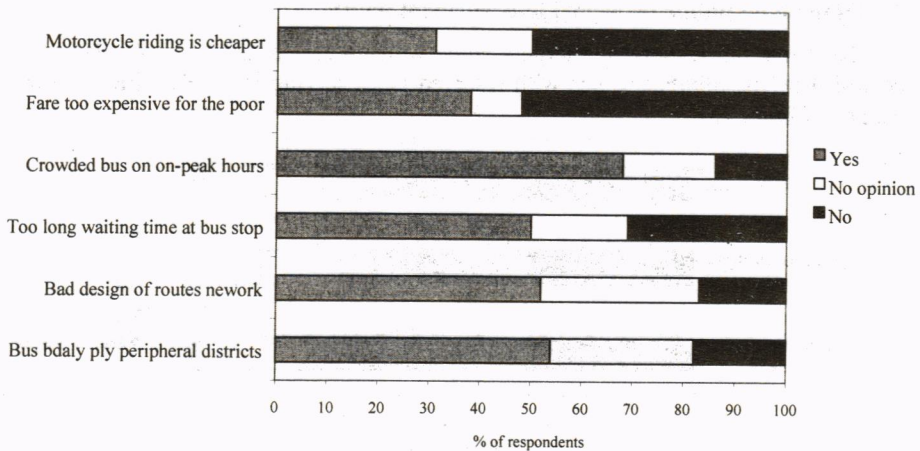


Figure 13 Opinion on Hanoi public bus service

A more detailed analysis is worthwhile for public transport characteristics with an attention to the residence district variable.

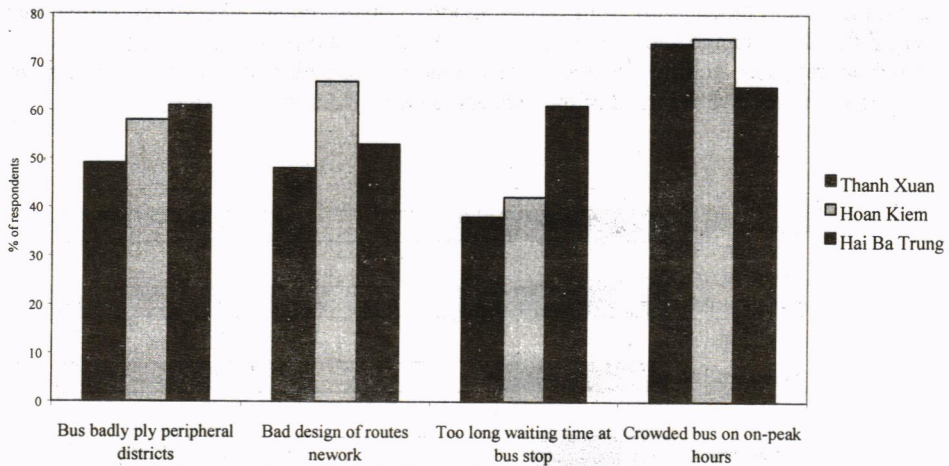


Figure 14 Perceived drawbacks of public transport according district of residence

The more appreciable differences between districts concern only two aspects of bus services (Figure 14). Hoan Kiem residents agree a lot with the bad design of bus route network. One explanation could be provided by a careful analysis of this network. The waiting time at bus stops is more perceived by Hai Ba Trung residents. Here again this feeling should be confirmed by bus users surveys along the different bus routes.

5.2 Opinion on public transport improvement policy

On the whole, all respondents largely agree with suggested measures. As they dwell inside central districts, minibus routes with reserved lanes serving inner Hanoi receive the highest support (Figure 15).

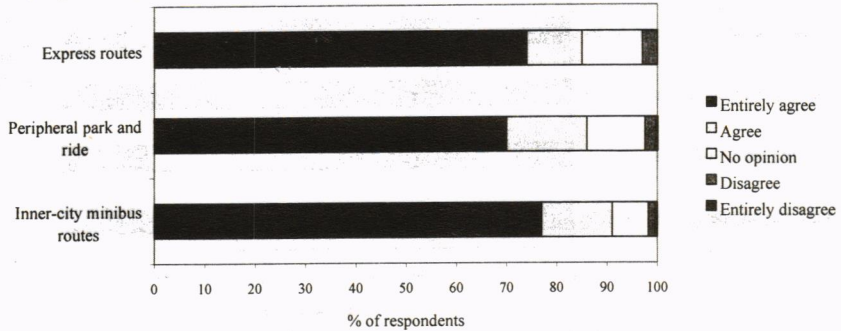


Figure 15 Opinion on bus service improvement

5.3 A problematic modal shift from motorbike to bus

Any public transport-oriented policy aims not only to favour present users but also to encourage some modal shift from private mode to urban transit. Everybody knows that it is very difficult to change a lot trip behaviour. In Western European countries, huge investments in public transport facilities such as underground metro, park and ride, light rail systems did not succeed to reverse the trend of the increasing part of cars in daily trips.

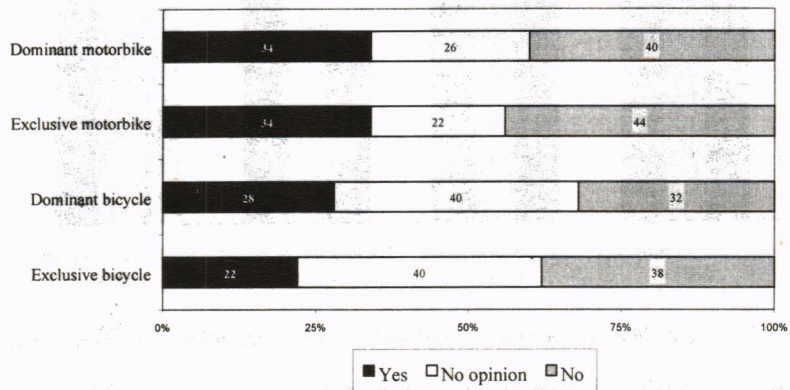


Figure 16 Hanoi people will be reluctant to shift from motorbike to bus

Hanoi people relies upon private modes for three decades and results from our survey shows divergent opinions on the effectiveness of public transport services improvements. We tested the opinions of different categories of people according usual trip behaviour (Figure 16). A common feature among these categories is a significant proportion of people having no clear idea about the reluctance or not for modal shift from private motorised vehicles to public transport. A second similarity is a proportion of 'no' higher than proportion of 'yes' in answers. Among defined categories we observe that occasional users seem more optimistic

on a possible modal shift from motorbike to public transport than no bus users. It is somewhat strange to observe that motorbike users have answer structure different from bicycle users.

6. CONCLUSION

Several Asian cities try to implement a more sustainable transport system with uneven success. Singapore, Seoul or Hong-Kong began several decades ago to restraint private vehicle ownership and use before mass motorization meanwhile they developed an attractive public transport. By contrast, Bangkok and Kuala Lumpur did not achieve such results because private vehicle ownership was rather encouraged by high-capacity express road construction.

In Vietnam motorbike and car restraint policy measures are likely difficult to implement if we consider the failure of the recent attempts during the last years. Reductions of luxury taxes on cars are coherent with different measures to support the market for vehicles assembled in Vietnam. Results of the survey confirm a general reluctance to accept financial measures, irrespective of daily use of private motorised modes. However one can expect a lesser reluctance if people knew that the products of such taxes will be entirely devoted to the improvement of public transport.

In order to maintain a sustainable transport environment in Hanoi, it seems essential to reinstate non motorised vehicles as a viable and desirable transport mode. Contrary to it can be observed in several African capitals, there are not cultural barriers to bicycle use in Vietnamese cities, especially in Hanoi where this mode has been dominant during a long period (Pochet, Cusset, 1999).. Our survey confirm this assessment : a large part of respondents do not consider that bicycle as an obsolete mode and do not fell that motorbike will entirely replace bicycle during the next years. We consider that both Ministry of Transport and Communications and Hanoi People Committee should include non-motorized transport in the Hanoi Transport Master Plan. Bicycle might be considered as an useful complementary mode for short distant trips ; poor people as well as usual bicycle riders should benefit from safety measures by appropriate facilities and a large information to discourage irregular behaviour of these riders.

For the last five years, Vietnamese newspapers and magazines call for a viable public transport. It was estimated that Hanoi would need close to 2,000 public buses running by 2001 to relieve the streets from motorbike congestion. In the same time unrealistic prospects or objectives were advanced for the future modal split in Hanoi with 20 to 30 per cent of daily trips by public transport. A realistic master plan for public transport development implies a set of transport measures coupled with a land use planning lessening the transport demand between the core city of Hanoi and the new peripheral urban developments.

Modal shift from private motorised modes to public transport for cities such as Hanoi, Ho Chi Minh City implies a step by step strategy with a coherent transport planning and land use policy. Lessons from Jakarta, Manila or Kuala Lumpur would be considered before definition of a transit-oriented strategy for Hanoi (Barter, 1999).

A first step could be an improvement of the existing bus transport system with a new design of bus routes in order to attract a new ridership for home-work or work-education trips. Relative low-cost infrastructures as reserved bus ways along "strategic routes" and an attractive fare policy could be a complementary set of measures.

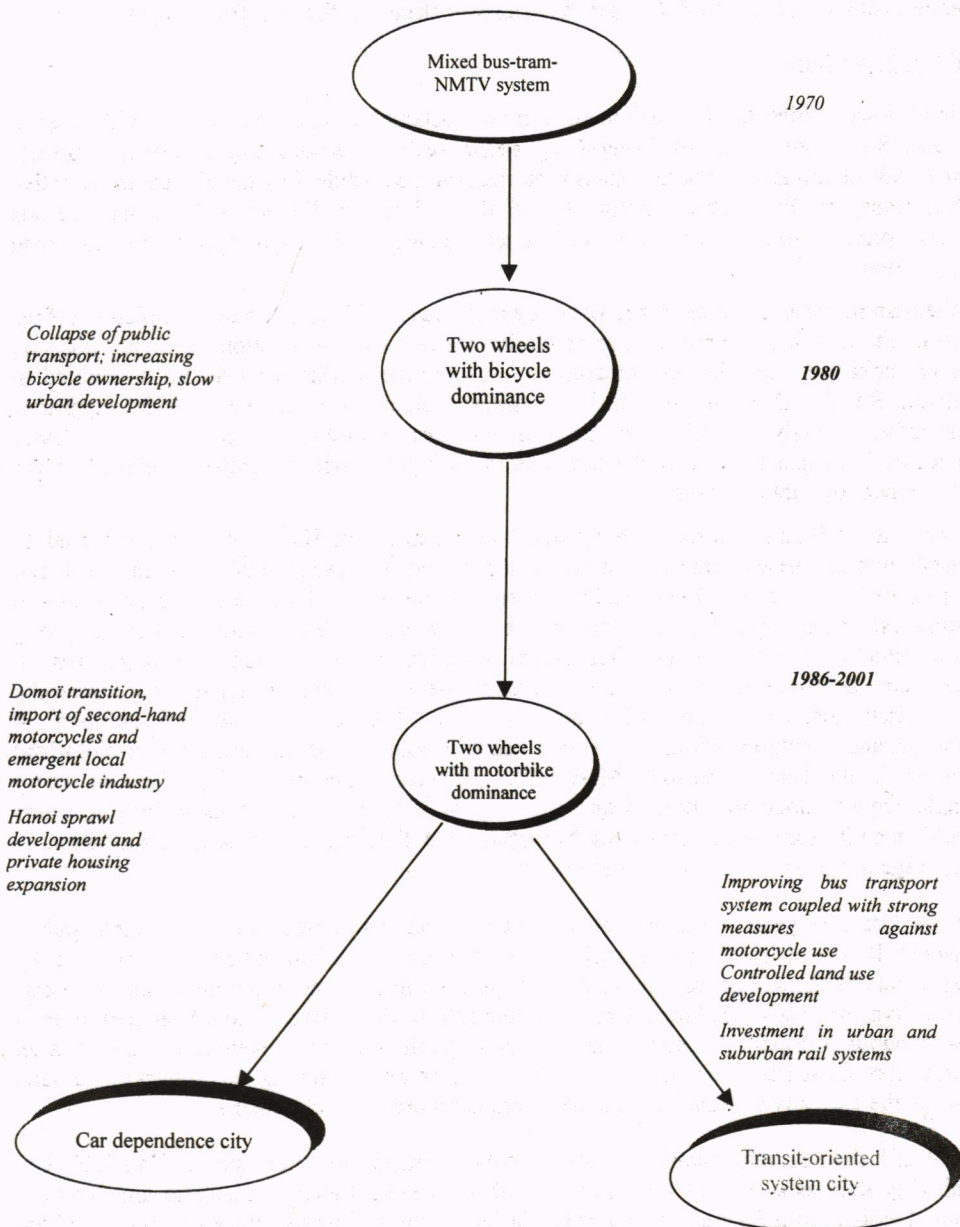


Figure 17 Hanoi transport system dynamics, adapted from P. Barter typologies, (Barter, 1999), revised by Cusset J, 2001

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