

STUDY ON MIXED TRAFFIC IN VIETNAM AND PROPOSED SOLUTIONS

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Abstract: Traffic mixed in a high level is one special feature of transport in Vietnam. The paper highlights this topic in the whole Vietnam and especially in the capital Hanoi. From the proposed solutions, ITS-technologies would be important.

Key Words: Mixed traffic, two- and four wheeled vehicles, urban public transport, road transport

1. INTRODUCTION

With a high degree of mixed traffic, the passenger/cargo flow in the main cities as Hanoi, Ho Chi Minh City (HCMC), Danang, Haiphong etc. has following special features:

- The main area of traffic growth has been the rapid increase on motorcycle use. These have replaced the bicycle as the main mode of transport. These two -wheel vehicles are most suitable for the users in the cities, which are not conveniently accessible to larger vehicles.
- The proportion of four or more wheeled vehicles is currently low, but growing very rapidly.
- Public transport is very poor with few routes and no effective urban rail system. That is why the vast majority of trip makers use private transport modes.

In this paper the situation of mixed traffic in Vietnam will be presented, mainly with data from Hanoi, HCMC and some data from other cities.

2. GENERAL FEATURES ON ROAD TRANSPORTATION

The transportation demand mostly focus on 2 big cities, Hanoi and HCMC and the neighboring areas. In most of the investigative stations, the truck accounts for 50% of 4-wheel transport means. The portions of car and bus correlatively account for 20 and 30%.

2.1. The road status

- Vietnam road has been improving in quality.
- Road network is relatively synchronous with ferry and bridge.
- Having the policy on mobilization of finance resources for road construction and maintenance such as: road fee collection or BOT etc.
- Stipulating regulations and road standards.

2.2. The present passenger transportation

- 0,6 million passenger turns per day in 1999.
- Railway and Airline transportation reach 2 peak points, one of them in the range of 800 km to 1.000 km and the other in the range of 1.600 km to 1.800 km.
- In the years of 1992-1999, inter-province passenger transportation increases 2,1 times compared with the overall National transportation.

2.3. Road transportation

- The transportation focus on big cities and neighboring areas.
- The portion of 4-wheel vehicle is not very high in the highway.
- Traffic safety is now a big problem.

Table 1: The length of road according to the management authority and pavement type

Management authority	Length	Concrete	Asphalt concrete	Asphalt	Macadam	Hilly soil	Unit: km
							Soil
National highway	15.121	72	3.950	5.138	1.492	3.707	762
Provincial highway	17.449	22	668	3.948	3.041	4.874	4.896
District highway	36.372	-	53	3.558	4.976	12.956	14.829
Urban road	3.211	-	1.246	1.965	-	-	-
Sub total	72.153	94	5.917	14.609	9.509	21.537	20.487
Dedicated road	5.451	NA	NA	NA	NA	NA	NA
Commune road	46.910	NA	NA	NA	NA	NA	NA
Village road	84.545	NA	NA	NA	NA	NA	NA
Total	209.059	NA	NA	NA	NA	NA	NA

Remark: 50% length of National highway is managed by Local Authorities

Table 2: The quantity of registered vehicle in Vietnam according to the vehicle types

Type of vehicle	Years								Annual growth (%)
	1989	1990	1991	1992	1993	1994	1995	1996	
Car	45.604	56.128	67.451	95.221	67.366	106.320	118.015	132.765	16,5
Bus	31.239	32.318	34.305	37.911	34.305	42.566	60.356	66.453	11,4
Truck	138.910	163.284	201.849	161.004	201.332	174.412	186.796	201.368	5,4
Total	215.753	251.730	303.605	294.176	303.003	323.298	365.167	400.586	9,2

Source: Vietnam Road Administration

2.4. Existing situation: Continuously and strongly decreasing of urban public transport.

During the year of 70s and 80s, the public transport in Hanoi and Ho Chi Minh City assumed about 25-30% of transport demand. In Hanoi only, there were about 60 bus lines, some lines of tram, which annually transported 100 mills of passengers. In Ho Chi Minh City, public transport played a certain role in meeting traffic demand of the people.

However, after 1986 especially since beginning of 90s, the rate of public transport has been continuously strongly decreased. While the urban population grows day by day and the traffic demand increases, then, the number of bus lines has been reduced remarkably. At present, there are only 12 bus lines and the tramlines were ceased from operation long time ago. The annual transported passengers are only about 10 mills. Accounting 2-5% of traffic demand of the city's people. In Ho Chi Minh City, the situation is the same. The public transport rate is decreased so low that it plays almost any remarkable role in passenger transport of the city (only about 3-5%). In Hai Phong and Da Nang cities, the traffic demand is not so urgent, however, the public transport rate is smaller.

The urban passenger transport assumed by road transport means and mainly by two wheel vehicles.

Although there are a very convenient canal network in Ho Chi Minh City and a railway network linking Hanoi and Ho Chi Minh City, the passenger transport in the cities is many assumed by road transport means. The railway going in to cities centers is the national one linking the provinces, that it doesn't play any role in inner-city transport. The tram in Hanoi, as mentioned before, was ceased from operation long time ago; the rolled-bus also stopped its operation in the early 90s. The transport models going into city are not inter connected with each other, so that the passenger meet many difficulty in transit transport. Apart from small amount of buses, taxi and *Xe lam* (a kind of passenger/cargo taxi), there is not any other public transport model, which can assume a great transport volume of the cities of 1-4.5 mill population as Hanoi and Ho Chi Minh city.

According to the survey results carried out in 1996 in Hanoi and Ho Chi Minh City, the distribution of transport volume of transport model is show as follows:

Table 3: Distribution of passenger transport among the transport models (by %)

Model	Hanoi		HCM city	
	Vehicle (%)	Passenger	Vehicle (%)	Passenger
Bicycle	35	29	20	16
Motorcycle	59	58	76	74
Car	4	8	2	4
Truck	1	1	1	2
Bus	1	1	1	4
Total	100	100	100	100

Source: Final report on urban transport management study in 1996

It is shown that the decreasing of public passenger transport leads to the remarkable increasing of number of two wheels vehicles such as bicycle, motorcycle. These transport means takes a dominated position in the traffic of the big cities in Vietnam. They take up to 94-96 % of public transport volume in Hanoi and Ho Chi Minh City.

The increase in two wheel vehicle, especially motorcycle in big cities of Vietnam up to 13-15%/year and together with the weakness in traffic management make traffic jam in big cities worse and worse, especially at the rush hours. The mixing of vehicle flows with different speeds is the reason of lowering speed of 4 wheels vehicles. At some main traffic corridors leading to Airport or at North east-South west, South east of corridors of Ho Chi Minh City,

the vehicle can run at speed of 10-15 km/h at rush hours, sometime only 10 km/h. If there are no signs of improvement of public transport, the number of motorcycle will be increased steadily together with improved living standard of the people. Then, the occurrence of traffic jam often is an unavailable problem in Hanoi and Ho Chi Minh City in very near future.

The number of small cars is small, however the development trend is increased

Although the growth rate is more than 10%/year, the number of small car per 1000 people in the big cities in Vietnam is still much lower in comparison with some cities with the same size and importance in the region. However, it is a great concern that the growth rate of this kind of car has been continuously increased during some passing years. According to the experiences of some countries in the region, when the GDP/person increases, the growth rate of this kind of car is higher than of GDP (it is estimated from 1.2 to 1.6 times of GDP).

3. TRAFFIC CONDITIONS IN HANOI

The traffic condition in Hanoi is typical for major cities in Vietnam. That is why it is studied more in details.

3.1 Registered Vehicles

3.1.1 Bicycle and Motorcycles

The break-down data for motorcycles based on the engine capacity from 1987 to 1995 is set out for the total existing and annually registered motorcycles as per the registration records of the Hanoi Police Department. The registered bicycles are estimated figures. The total motorcycles in 1995 were 462,000. In 1994 the motorcycles were 390,000 and the bicycles was 790,000.

At the beginning of the 1990's a decrease in the number of registered motorcycles occurred due to governmental regulations regarding the imports of used motorcycles. However, the number of motorcycles is increasing rapidly with the annual growth rate of 18.5% between 1994 and 1995, and there is some decrease in the number of bicycles. With the economic growth in Vietnam and the convenience of the private means of transport, the transition from the bicycle mode to the more popular motorcycles has been the predominant cause of the decreasing the number of bicycles and increasing the number of motorcycles. In 1994, the estimated numbers of bicycles, however, still composed about double of the total motorcycles in the city in 1994. Now, the situation is more dramatic with above 1000 newly registered motorcycle per day in only Hanoi and the number of bicycle is approximately equal that of motorcycles.

A sharp increase in the number of larger-sized motorcycle (70-150 cc), with simultaneous decrease in the annual registration of small motorcycles (50 cc), is clearly noticed during the last few years.

3.1.2 Motor Cars

Motorcar registration data for each category of car was also obtained from the Hanoi Police Department for the years 1986-1995, including the number of deregistered due to movement

to another area. The number of existing cars in 1995 was 47,251. The annual growth rate between 1994 and 1995 was 10.7%. The passenger car ownership including van and others, which may be taxis, in 1995 was 11.5/1,000 inhabitants when the residents in all the study area is applied as a denominator, and 24.8/1,000 inhabitants when the population only in the urban area is applied.

About the car ownership in Hanoi, it is remarkable that in 1988, there was only one private truck in Hanoi. But after that the trend of private ownership increased at a moderate up to 1992, which can be considered as a turning point for higher rates of private ownership of cars up to now.

3.2. Existing road network

3.2.1. Summary of road network

Inner city: In Hanoi, there are about 311 roads and streets, 102 by – streets, in which there are 40 streets having over 1400 meter long of each and the remains have average length of 500m. There are about 580 traffic knots (279-fork section and 282 cross-inter sections, 17 five legs intersections, one six legs intersection and one 7 legs intersection. All intersections are at grade ones (except positions where bridges cross red river). Most of the streets are narrow: 88% of roads with the widths from 7-11m. In Hanoi, there are 115 traffic knots need to be controlled have been traffic lights. At present, 35 traffic knots have been controlled by traffic light mode in France, 21 other signal systems and one traffic management center with control capacity of 250 traffic knots. The streets are paved by asphalt concrete or by cement concrete; however, the quality is low. Road density is about 5.41 km/km², a low one.

Many streets are overloaded due to high density of motorcycle and bicycles. At present, about 87% of travel demand is met by motorcycle and bicycle, only 3% by bus and cars. At rush hours, the streets because more overloaded, the traffic management forces have been fully mobilized to deal with traffic congestion risk.

Although Hanoi's transport infrastructure has been changed in many aspects, the investment in rehabilitation of transport infrastructure has not met the travel and transport demand yet.

In suburbs: In all districts, there are highway crossing. However, the highway capacity can not meet the requirement on the other hand, it is lack of approach roads, thus, the traffic and transport among the areas meet many differently and traffic volume is concentrated in intercity. Due to low road quality, the number of traffic accidents is very high. The inter district and inter commune roads is 2207 km long totally, but low quality. Most of them are sand-gravel and earth-roads.

In general, Hanoi's transport system is short of number and low quality, overloaded at present. In future, if there is no policy on road transport development, such as improvement or new construction of infrastructure and integrated policy on use of transport means, then the press and traffic demand will be more heightened and the service capacity will be lower, the management office will be always put in emergency condition.

3.2.2. Traffic conditions

As mentioned before, due to composition rate of transport is not rationale, especially followed by motorcycle the growth, it is required development of many aspects such as parking place

and organization and traffic control of motorized vehicles and non-motorized ones. Numerous people drive motorcycle. Many of them are short of knowledge of traffic law. In general, from the traveling on the road to requirement of parking place, the motorcycle causes many obstacles for other traffic components. In addition, the occupation of the pavement, streets and law violation always creates traffic jam traffic accident potential in many position in Hanoi, even in positions, where there is good facilities. For example, at many traffic knots equipped with traffic control lights, the traffic police are still needed because the traffic law violation often happens. Expectably at any place, at any hour, there is sometime situation of zigzag driving of motorcycle drivers a no less rate of motorcycle takes part in traffic with not having meet technical requirement but they are still allowed to transported not only over size cargo but also passengers such as motorcycle are used to transport many over-size TV-boxes, cigarette boxes of marketing people etc... They cause many difficulties for traffic and occupy a large space and holder the view of other people.

It can be said that there is a not small number of people who always violate traffic law in one or other aspects, such as driving on wrong lane, over speeding, turning direction without signal etc. Or the pedestrian can cross the road at any place. In addition, there are many vendors causing disorder on the streets.

- At present, traffic flow regulation, traffic design and management are not suitable in many places, even wrong. With their reasons, it is very different to overcome the situation if only strengthening traffic police force.

It is clear that the solution of combination of construction improvement of diffractive and improvement of traffic management, control have brought may results.

3.2.3 Parking area

The authority in charge of the parking areas in urban Hanoi is the Footpath Management Unit (FMU). This unit supervises at present a total of 48 parking areas with the total space of 9,341 m² designated for 366 vehicles with an average of 15.5 m²/vehicle. The FMU standard area for each car in the parking area is 5 m². Most of traffic areas have limited capacity for just a few numbers of vehicles. The FMU is also supervising also 33 parking areas designated for taxis with the total capacity of 327 vehicles. Parking fee is collected at most of the parking areas but the total revenue may just cover the operating cost.

The parking area rate considering the total district population is about 0.01-0.4 m²/person and occupies about 0.05% of the total area of urban Hanoi on average. Dong Da district has the lowest present area for public parking, however, as it is planned to develop a parking area for about 500 vehicles in the district, it may have a highest rate in the near future. Other districts have also low rates of parking area at present without firm parking planning for the future.

For bicycles and motorcycles, which compose the dominant modes of transport in Hanoi at present, the parking areas are those occupying some parts of pedestrian's sidewalks, which cause serious problem regarding to the safety of pedestrians.

Given the anticipated increase in the number of vehicles and motorization demand, the shortage in the parking space is expected to become one of the serious problems faced by the road network in the city. Many development projects and urban centers are planned to be implemented in Hanoi during the next few years, such project will generate high volumes of vehicular traffic which will require more supply of off-street parking space which should be

provided according to a comprehensive management plan taking in to consideration the preservation of the city's environment

4. PROPOSED TREATMENTS

4.1. Development of public transport in Vietnam

According to the forecast, the population in Hanoi will be 3-4 mill by the year 2000 and in Ho Chi Minh City up to 7-8 mill respectively. The transport volume will be 1-2 bill. passengers/year. With such great demand, the development of urban public transport in Vietnam is a solution of great tactical and strategically significance for a long term. The motorization is a natural matter of the economic development. It is high time to take any action before it becomes too late. However, an attractive and efficient public transport system needs to be developed gradually. In the year 1994-1995 the government set up a very high target aiming to development of a public transport system to meet 40% of passenger transport demand by the year 2000. After some time of trying many efforts with less efficiency, a moderate target has been set out. It is the target set out by Vietnamese government to improve the public transport rate from 2-5% at present to 10% by the year 2000, about 30% by the year 2010 and higher after the year 2010.

However, all targets will remain a dream only if without any concrete effective measure to be taken. Especially, in the condition of that the purchase of private transport means becomes a habit of the people, the public transport management must be attractive enough to change the habit from "self-go" to "go together" of the people. The following orientations can be considered:

4.1.1. For short term and middle term

For middle and short terms, the bus is the main mean of public transport in big cities in Vietnam. That is why, the development of a public transport network in short term and middle term must be attractive that the market share can be regained and improved in the future.

+ *To reconstruct the bus transport network in Hanoi and Ho Chi Minh City*

To achieve the above-mentioned targets, it is necessary to work out a public transport project in Hanoi and Ho Chi Minh City. In Hanoi, a public transport project consisting of 60 lines has been set up. In Ho Chi Minh City, the concerning authorities have paid great attention to the development of the public transport too. Some feasibility studies, calling for investment from domestic and abroad sources have been made. The Vietnamese government has decided to solve a strategic problem consisting of two basic principles:

1. *To consider public transport one of central problems of strategically transport development master plan.*

2. *To control the development and use of private transport means*

In order to meet the requirement, the problems mentioned above should be solved and they are critical ones in the development of the public transport network. A series of solution of public transport and constraint of private transport means is still open for the policy makers.

In the development of public transport, the requirement of passenger should be guaranteed. All efforts should be made for a better service and benefit of public transport in comparison to private transport means of motorcycle, bicycle. They will include increasing the convenience, better service, reducing the distance between bus-stop, bus station and max. reducing the distance of walking to bus-stop, long waiting time. The organization of public transport should be based on the exact investigation results of potential market demand, classification of serving objectives for offering an adequate service. For example, beside the provision of public transport service with low price, low or middle service quality for the great part of population having low income, it is necessary to consider an other service with better service quality, and of course with higher price for people with high income. However, it must be more convenient and effective to attract the people traveling by their own cars. Once, this part of market is bigger, it is an opportunity to make adjustment in all lines, as well as ticket price and to encourage the private bidding in providing transport service. However, it is more urgent for the cities in Vietnam to attract more people using public transport service more often and becomes their daily habit. Therefore, the subsidy of the government at the first stage is acceptable solution to make the daily travel by public transport service as a habit of the people. But for long term, the subsidy should be reduced and cancelled. Otherwise, it encourages an inefficient business only. Thus, when then condition allows, the provision of public transport service should be tendered and contract should be signed with the suppliers. It is necessary to combine the operation of different kinds of buses of different sizes and quality and their owners. For a healthy competition, it is necessary to regulate the service quality and price.

The technical matter is not the most important one in organization of the public transport in Vietnam, but the management and finance. According to the experiences of many countries in the world, the management, operation of the bus in urban public transport in the conditions of economic market should not be constrained within state owned companies. The participation of the joint venture, co-operatives in Ho Chi Minh City is encouraged. It helps in reducing remarkable the financial load of government. A relationship between public-private in public transport management should be encouraged in both Hanoi and Ho Chi Minh City.

On the other hand, the public transport should be promoted by giving priority in infrastructure utilization such as there are special lanes for bus only and reserve lanes where it is possible; or reserve streets for bus operation only as well as to build more new roads, bus stops, bus stations and work out other treatment activities, traffic management.

+ The measures of control, constraint of boom of bicycle, motorcycle and private cars

A second problem needs to be taken in consideration is that it is impossible to attract more people traveling by their bicycle, motorcycle to use public transport means if without preparation and application of constraint measures. The efforts should be strictly enough to control the allowable number of cars traveling on road. This problem is not a simple one, when there is pressure from the car manufacturers (at present there are 14 joint ventures assembling car in Vietnam of different firms) with many ways of advertisement for car selling as well as the ambition of a car ownership of a part of population with high income.

At present, the motorcycle number /1000 people is too high in Hanoi and Ho Chi Minh City. According to the statistical data, there are 350-400 motorcycles/ 1000 people in Hanoi and in Ho Chi Minh City. In the coming time, when the bus network is not developed in the whole city, the motorcycle will take a remarkable position in the next years. However, it should be controlled to keep at the same level as at present and reduced in the time of 5 years to the

level of 200-250 motorcycles /1000 people. The constraint measures include both material and financial measures to control parking and street serving for parking; to limit the parking on the pavement of bicycle, motorcycle which hinder pedestrian from walking; to increase fees and to forbid parking of small car. These measures need to be considered in combination with other prioritized measures for public transport as mentioned above. These constraint measures will be applied widely for motorcycle and private car such as increasing of import tax, fuel tax, registration fee, parking fee etc.

4.1.2. Orientation of long term

By the year 2010, Hanoi and Ho Chi Minh city will become biggest population areas of Vietnam with population up to 3-7 million. For such high-populated cities, the public transport cannot count upon the bus only. According to statistics, the Bus can assume only the transport corridors with passenger density of about 8-10000 passengers/ hour/direction. It is forecast that many road-lines in Hanoi and Ho Chi Minh City the passenger density will exceed 20-30,000 passengers/hour/direction by the year 2010 and after. For such lines with high passenger density, it is needed to build the inner-city railway with high transport capacity; elevation railway or subway network for assuming a main part of passenger transport. The construction of such inner-city railway network is very expensive and takes a long time. It is necessary to conduct a careful survey on market potential, the feasibility in term of economic, technical, financial, and institutional aspects.

4.2. Improvement traffic conditions in the urban intersections

Although now more and more intersections in Hanoi and Ho Chi Minh City are being equipped with traffic light systems connected to a control center, the traffic at numerous intersections in these cities are manually controlled. The local authorities are trying to build traffic isles there (see Photos in the annex). But it seems that the traffic light system is more effective. In the practice, the traffic in the intersections with traffic light but without central isle shows more smoothly.

5. CONCLUSIONS

Solutions of mixed traffic control in cities of Vietnam form an urgent demand at present time. Its pressure is greater and greater toward the boom of urban population growth and achievement in the fields of socio-economic development. The short term and long term solutions for solving this problem is a demand of great strategically significance. It helps the cities of Vietnam in limiting and avoiding a transportation crisis in near future before it becomes too late. With high expectations, ITS-technologies can contribute to meet this demand.

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