IMPLEMENTATION OF BUS RAPID TRANSIT IN HANOI CITY

Tokai University Student Member ONguyen Trong Dung Tokai University Regular Member Yoshitaka Kajita

1. INTRODUCTION

Bus rapid transit (BRT) is a system which described as a "surface subway", BRT systems are not a recent development. It all started in 1970s in several Brazilian cities – especially Curitiba which developed the first role model for BRT systems. Although these initial experiences were highly successful, it was not replicated elsewhere as planners assumed that these systems were unique for conditions of Brazilian cities. In Asia, prior to 2000, the experience of BRTs was very limited in number and scope. However, twenty years later BRT gained momentum with planners in Bogota successfully replicating the system with several innovations. Bogota's success was contagious, and in 2000s BRT systems started operating in Asia. In 2004, the TransJakarta busway was started along through the city center. On 1st July 2004, three BRT corridors total about 37 km were installed as a part of Seoul's reform of its public transport system. On 25th December 2004, the first stage commercial operation of BRT was started in Beijing as a pilot line for 5 km. In Bangkok, the plan for BRT was declared in 2004 by the newly elected governor of Bangkok Metropolitan Administration indicating that the first BRT lines would be opened in October 2005. Since then, BRT systems rapidly advanced. Currently, there are over 80 BRT systems in development in Asia. And since 2005, Vietnam's Government also chose BRT to solve urban transportation problems in big cities as: Hanoi, Da Nang, Ho Chi Minh city. However, BRT is not always successful, it still seems to be difficult to introduce to developing cities. This paper presents about BRT system which is constructing in Hanoi, and issues regarding BRT system implementation.

2. SITUATION OF HANOI

Hanoi is the capital of Vietnam, also a big political, economic center the second largest city of the country, just behind Ho Chi Minh City. Since the city acquired a large part of its surroundings in 2008, Hanoi tripled its size and doubled its population.(Figure 2)



Figure 1: Hanoi with two BRT routes



Hanoi covers the total area of 3,348.5 km²; has a population of 6.45 million people with an average density of 1,926 people/km², distributed over 27 districts (9 urban and 18 rural) and 408 communes (as of 31st December 2008). Now Hanoi must deal with many problems such as: disorderly urbanized city, traffic jam, popular explosion, etc... According to Vietnam register organization, number of motorcycle in Hanoi until the end of 2009 is 3.6 million units

with average 15% annual increasing and private transport mode accounts for over 90% of daily passenger trip. With such growth rates, the total number of cars and motorbikes taken together in Hanoi is expected to reach 2,939,800 units by 2010 and 7,107,720 in 2020, not talking into account the number of car and motorbikes used in Hanoi, but registered in other provinces. According Hanoi Traffic Police Bureau 2010, the number of transportation vehicle especially motorcycle increased rapidly and concentrated in big city such as Ho Chi Minh and Hanoi. For example, in 2000, the total number of motorcycle is nearly





Keywords: Public transport, Vietnam traffic, HanoiBRT, Hanoi Urban Transport, Developing cities Contact address: 4-1-1 Kitakaname, Hiratsuka-shi, Kanagawa 259-1292, Japan, Tel: 0463-58-1211 E-mail: yokaji@tokai-u.jp



800,000 but in 2009, amount of motorcycle increase more than 4 times (nearly 3,600,000). (Figure 5)

Figure 4: Traffic composition on Hanoi urban arterial (Cau Giay – Kim Ma, 7:00 am to 8:00 am)

Figure 5: Vehicles in Hanoi 2000-2009

The city has about 3,974 km of roads, of which 643 km within the 9 old districts (that account for 6.8% of the urban area). Traffic management, congestion are serious problems. Air quality is decreasing due to traffic emission. Public transport, which bus is the only kind of mode, currently accounts for only 10% of total trips. A bus fleet of 726 operating in 43 routes carrying 850 thousands passenger/day. The regular bus services, though provides significant improvement in public transport, has not met the demand and imposed sense of un-safeness to two-wheel vehicle riders and pedestrians. Though rail systems are being planned, costs are high and implementation will take time.

With low cost investments in infrastructure, high capacity, friendly in environment. BRT is expected to be an effective transport solution to reduce construction for big urban areas in Vietnam nowadays. In 2030-2050 master plan and vision, Hanoi will have 8 BRT routes.

3. IMPLEMENTATION IN HANOI

The HanoiBRT is one of the components of Hanoi Urban Transport Development Project which has been approved by Hanoi People's Committee at Decision 1837/QĐ-UBND dated May 10th, 2007. This World Bank funded ODA project is an important step in improving the city's urban transportation network and strengthening public transport project has capacity. The three components: 1) Development of the BRT system; 2) Road Infrastructure and Sustainable Urban Planning; 3) Institutional Development. The Hanoi People's Committee (HPC) will be fully responsible for executing the project (except for a small component of the GEF grant which will be implemented by the Ministry of Construction (MOC) and will be responsible

Table 1: Component of Hanoi Urban Transport Development Project

Component 1. Development of the BRT System A. BRT System, civil works and equipment B. Pedestrian and NMT access at BRT stations C. BRT Consultation, Communications and Media Strategy 2. Road Infrastructure and Sustainable Urban Planning A. Second Ring Road between Cau Giay and Nhat Tan B. Resettlement site CT1 C. Integrated Sustainable Urban Land Development & Transport Panning 3. Institutional Development A. Air Ouality Management B. Traffic Safety C. Public Transport Authority Strengthening & policy development D. National and Regional Replication E. Project Management and results management support

for overall project management and oversight at the city level. The City has a standing Steering Committee (Committee 197) headed by the Vice Chairman of the HPC, which is responsible for infrastructure to facilitate project implementation.(Table 1)

The Bus Rapid Transit Component (BRT) will support the development of 37 km of segregated bus lanes and 9 km of bus priority along the Giang Vo-Lang Ha and Giai Phong-Dai Co Viet corridors (including a city center connection, with bus priority in mixed traffic), the construction of BRT stops, interchange stations, terminals and maintenance facilities, and the acquisition of 130 BRT vehicles. It will also support the establishment of a modern BRT management system, including bus ticketing and financial controls. Lastly, the component will finance the implementation of a public consultation, communications and media strategy for disseminating information on the BRT system.

There are three main modifications made to reflect the overlapping scope of other transport projects. First, an urban rail project is currently under construction along the same alignment as the original BRT plan (Khuat Duy Tien - Nguyen Trai - Ba La), resulting in competing public transport modes rather than complimentary services. This component is therefore adjusted to realign the western section of the BRT corridor (along Le Van Luong extension road - Le Trong Tan) in order to maximize the design capacity of the public transport systems. The route would also be extended to Yen Nghia Bus station as a new corridor. Second, another urban rail line is under implementation along the planned BRT route No.2 (Giai Phong corridor). Therefore, the BRT Line 2 investments, as well as the associated investments for a terminal and interchange at Quang Lai (Giai Phong corridor) will be cancelled. Third, the planned depot at Vinh Quynh will be relocated, with a new depot at Yen Nghia. The permanent depot will be financed by counterpart funds after site plans at Yen Nghia are finalized. In the meantime, a temporary depot will be set up at the existing Yen Nghia site for initial stages of the BRT operation. In addition, a BRT terminal will also be set up at the Yen Nghia site.

Bin ar Kim MS Nu trace (2) Tu and Cong (1) Nu House Data Nu

Figure 6: The first HanoiBRT routes



Note: Station number is shown in Figure 6 Figure 7: Nguyen Tuan station(No.16)

The first BRT line in Hanoi will connect from Kim Ma station to Yen Nghia station with the total length of 14 km, 23 stops included two stations. At this time, the exclusive lane was competed, the priority traffic light, the vehicle, bus station and control center are under construction.(Figure 6)

BRT stations will be located along BRT busways to provide passenger access and egress to/from the system. Three main station types are to be included: 1) Terminal; 2) Interchange stations to facilitate transfers with feeder buses; 3) Regular stations. Regular BRT Stations will have high-level platforms (about 0.7m above the carriageway) which will be covered against the rain and linked by ramps at gradients convenient for all passengers, including elderly and handicapped persons. Most stations located in the center of the road will be linked with the sidewalks via signalized crosswalks; at five such stations, pedestrian overpasses will be provided.

For Hanoi, BRT is recommended to have a "Closed System". "Closed Systems" have typically 60 passenger capacity buses working as "feeder" or "inter district" buses and trunk line buses (90 passengers or more) buses are only for service in the busway. The main advantage of the "Closed System" is a "clean" operation of large buses in the busway. The less difficulty in management and control required for the operation of BRT will be useful. The management of fleets and revenue, and also payment for companies' service will be easier in a closed system.

High-floor buses will be selected to operate with high platform stations. The seat arrangement will be a mixture pattern (sit and stand), have support systems to people with disability. The bus will be designed modern and attractive, with its color representing the line route and style representing local and cultural uniqueness of Hanoi, as green and blue. The ticket system will use "smart card" technology, the cost of the smart cards is compensated by the low cost of maintaining the readers. And the feeder system uses existing bus system that will be ticket collectors stationed on the buses. Passengers can buy tickets at the station or from the ticket collectors on board. For two initial Hanoi BRT lines it is be recommended to operate with a radio frequency based system. If in the future, as need arises to implement a better and more sophisticated system, the management agency may decide to change for a high technology system. At that time, given today's advances in communications and control technology, could be less expensive than today's systems.

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Figure 8: Bus Technology

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4. EVALUATION

4.1. Evaluation of Hanoi BRT project

The establishment of BRT system in Hanoi City will contribute to improving the level of public transportation management and service and to ensuring the priority policy in public transport development. BRT system will also

significantly contribute to reducing number of individual vehicles such as motorbikes and small passenger automobiles by offering the city's residents an efficient, convenient and inexpensive transportation means. When BRT system in service, together with improvement of other elements in the city's public transportation system, in the long term, it is estimated that 30%-50% of motorbike and 5%-10 % of car owner drivers are expected to opt to switch to public transport for their regular and daily transportation needs. The reduced motor vehicles on the roads, together with the reduced traffic jam and improved motor vehicle driving efficiency, will significantly reduce air emissions from motor vehicles and help improve ambient air quality in Hanoi. The streets will be improved along the BRT route, including better roads and pavements which are uncluttered and safe for walking. But from experience in Asia developing cities, we think that the BRT system is not feasible due to a limitation in existing road space.

For example: 1) BRT, Kunming (China)-The First BRT system in the People's Republic of China: Although Kunming increased transport capacity and improved its bus service level dramatically through BRT development, there are still some problems with the current system. During peak hours the busway becomes very congested and bus speeds drop significantly. In addition, a large numbers of buses are less than fully occupied and the bus numbers should be adjusted accordingly. Private motorists occupying the bus lanes are also a problem; 2) Transjakarta, Jakarta (Indonesia)-The first BRT system in South Asia (opened in 2004) increase in Traffic Congestion in Mixed Traffic Lanes: The closed bus lane was converted from an existing mixed traffic lane without regulatory controls. As a result, even after new buses were put into service on the new bus lane, almost all the buses originally running along the corridor continued to operate in the mixed traffic lanes; 3) In Thailand's BRT project, the traffic police authority is reluctant to donate existing lanes for exclusive bus lane construction since they are afraid that it will cause even more critical traffic congestion than the current situation.

4.2. Recommendations

To expand BRT system in Hanoi, should consider carefully some issues as: 1) The road spaces for busway construction: Most roads in Hanoi are narrow (about 6-12m wide) or have only a few existing lanes. If use 7m width for BRT way, the existing street will have only 40% width for other vehicles, traffic density will increase, critical traffic congested, especially during peak hours (Figure 9); 2) Insufficiency of introduction of BRT system to the public: people in Vietnam still do not understand clearly the concepts and features of the BRT system, some people (particularly, ones with private vehicles) have negative attitudes for the fact that it may cause more congestion along the busway.



Figure 9: Typical cross section D-D – Son Tay

Beside, staff indiscipline (bus drivers, ticket collectors) is also cause to delay the traffic; 3) Long-term planning: The BRT system alone is inadequate and almost impossible to implement successfully; appropriate strategies to support BRT system development are necessary.

5. CONCLUSIONS

Overall, the development of BRT system in Hanoi can contribute to solving multi-dimensional transport related problems, such as traffic congestions, road accidents, pollution and noise and air, global warming and climate change, as well as to alleviate the problems of social inequality, in a concrete and sustainable manner.

However, Hanoi still has several problems in operation and the most common problem is the lack of the BRT system capacity. Many studies and guidelines on BRT systems have been developed and proposed based on successful BRT experiences in various cities. They may not be applied directly, unless proper modifications and enhancements are done accordingly based on specific backgrounds, conditions and characteristics of each Asian developing city. Therefore, further feasibility studies are required before actual BRT implementation can occur.

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