THE EVALUATION OF SPACE MEAN SPEEDS OF ROAD LINKS SURRONDING NEW DEVELOPMENTS IN JAKARTA

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ABSTRACT

Jakarta is a rapidly growing city. Unlike other capital cities of the world, Jakarta become the centre of almost every important activities in Indonesia. Therefore the function of Jakarta is not only as centre of govennmental and political activities, but also the centre of business, centre of high quality educations, etc. Activities generate transport and traffic demand and therefore any development that potentially generate significant traffic should be supported by traffic impact analysis. This paper will mainly discuss the result of space mean speeds of road links surronding proposed new development in Jakarta. Spot speeds were measured in several road links suronding proposed new developments. Space mean speeds were then calculated from the spot speeds data. In general space mean speeds of road links surrouding proposed new developments in Jakarta were relatively low during the morning and afternoon peak hours. Therefore several measures to improve the traffic performance of the road links before the new developments are in operation should be implemented.

Keywords: Space mean speed, new development, Jakarta

1. INTRODUCTION

Jakarta is a rapidly growing city. Unlike other capital cities of the world, Jakarta become the centre of almost every important activities in Indonesia. Therefore the function of Jakarta is not only as centre of govennmental and political activities, but also the centre of business, centre of high quality educations, etc. Activities generate transport and traffic demand and therefore any development that potentially generate significant traffic should be supported by traffic impact analysis. This paper will mainly discuss the result of space mean speeds of road links surronding proposed new development in Jakarta.

2. PREVIOUS STUDIES

A speed survey conducted for the Phase 1 of Study on Integrated Transportation Master Plan for Jabotabek, SITRAMP by JICA and Bappenas (2000) shows that passenger car travel speeds in Jakarta arterial roads were mainly under 30 km per hour. In several arterial roads, passenger cars travel speeds were under 10 km per hour. This worst passenger cars travel speeds condition were found for example in:

- Bekasi Raya, Daan Mogot and Kyai Tapa roads in the East-West corridors.
- Raya Pasar Minggu, Fatmawati, Cileduk Raya, Mampang Prapatan, Jend. Sudirman in North-South corridors.

Another speed survey was carried out by Office of Coordinating Minister of Economics (2007). It was found that only 40% of travel time was spent for movement since the remaining 60% of travel time was spent in congestion. The result was mean travel speed of about 20 km per hour.

The low performance of the road travel in terms of travel speed was because the travel demand was not proportionally supported by integrated transportation system. With a very high demand of public transport, regular bus transport system will not sufficient. The introduction of Transjakarta Busway as a Bus Rapid Transit (BRT) system was not supported by high commitment of all stakeholders in order to keep the BRT services reliable in terms of bus headway and overall travel time. The devolepment of Mass Rapid Transit (MRT) requires longer time and more significant amount of budget. The first phase of the MRT North-South corridor (Dukuh Atas-Lebak Bulus) is planned to start operation in 2017. To be able to operate the second phase of North-South corridor (Kota-Dukuh Atas) in 2020, the Provincial Goveernment of Jakarta and Japan International Cooperation Agency (JICA) have conducted the prepatory survey in 2009.

In order to achieve satisfactory level of traffic performance, the availability of reliable public transport system should be supported with transport demand management. One of possible measure is electronic road pricing (ERP). According to Lim (2006), in Singapore, the target speeds as the impact of ERP implementation were as follows:

- 45 to 65 km per hours in expressways
- 20 to 30 km per hours in other roads

If the actual speed is under the target speed, the authority will increase the charge, whilst if the actual speed is above the target speed, the authority will reduce the charge.

3. METHODOLOGY OF DATA COLLECTION AND ANALYSIS

Data collection was originally carried out for traffic impact analysis of the development of three following new developments, i.e.:

- A higher education institution building in Dr.Saharjo Road, Tebet, South Jakarta (Figure 1)
- A low cost apartment in the corner of MT Haryono Road and Otista Road, East Jakarta (Figure 2)
- A low cost apartment in Pahlawan Revolusi Road, Pondok Bambum East Jakarta

Traffic count and spot speed observation were conducted in morning (6.00 to 9.00) and afternoon (16.00 to 19.00) peak hours in normal working days. However only the speed data will be evaluated further in this paper since speed is a rather consistent performance indicator of road traffic compare to traffic flow.

Figure 1: A Higher Education Building Development at Dr. Saharjo Road

Figure 2: A Low Cost Apartment Building Development at the Corner of Otista/ MT Haryono Roads

Vehicles were classified into three categories, i.e. light vehicle, heavy vehicle and motorcycle to comply with Indonesia Highway Capacity Manual (IHCM) 1997. In each hour four data of light vehicle speeds, four data of heavy vehicle speeds and four data of motorcycle speeds were recorded. The measured speeds were spot speeds. Spot speeds were measured by dividing travel time (seconds) of 25 meters section with the distance in meters and later on convert them to km per hours by multiplying the original figure with 3.6.

If N is number of speed sample of each vehicle per hour, the spot speeds (μ_i) were then used to calculate the space mean speeds ($\overline{\mu}_s$) of each vehicle type using harmonic mean as described in the following equation:

$$\overline{\mu}_s = \frac{1}{\frac{1}{N}\sum_{i=1}^{N}\frac{1}{\mu_i}} \quad (1)$$

The results were then tabulated and presented as charts in order to be easily understood by the reader of this paper.

4. RESULTS

Figure 3 shows the space mean speeds right in front of the development of higher education building in Dr. Saharjo road. The road is a 7 meters wide two lanes one way road with average effective shoulder width of about 1 meter. It can be seen that in general in the morning peak hours motorcycle (MC) space mean speeds were the highest, followed by light vehicles (LV) and heavy vehicles (HV). However in the afternoon peak hours, the space mean speeds of light vehicles were about the same with the space mean speeds of heavy vehicles. In general afternoon peak hours speeds were significantly lower (about 50%) than morning peak hour speeds. Space mean speeds were under 30 km per hours. These figures confirm the results of the previous studies in Jakarta.

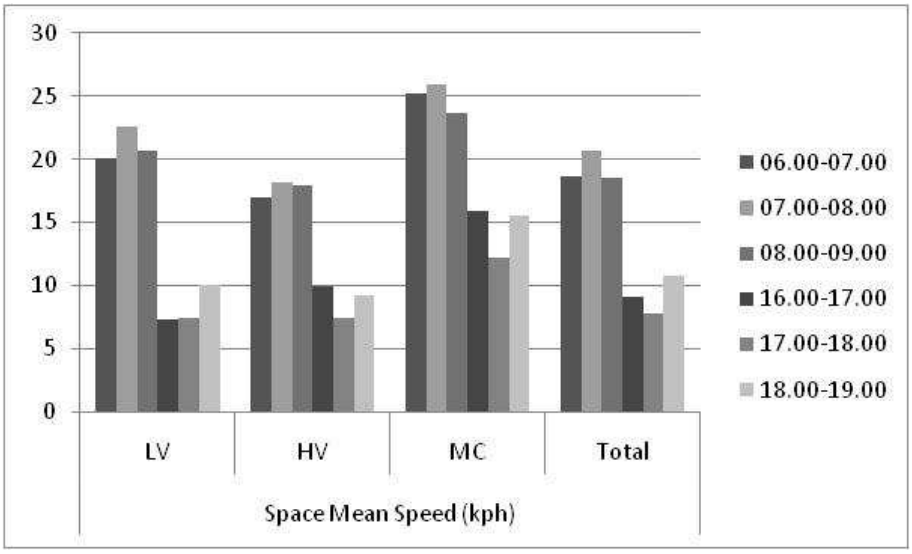

Figure 3: Space Mean Speeds in Front of the Development of a Higher Education Institution at Dr. Saharjo Road

Figure 4 shows the space mean speeds right in front of the development of a low cost apartment in the corner of MT Haryono road and Otista road. The entrance of the apartment will be located at Otista road. This road is a 24 meters wide eight lanes two ways divided road with average effective curb width of about 1 meter. However median lanes were dedicated as busways. It can be seen that in general both in the morning and in the afternoon peak hours motorcycle (MC) space mean speeds were the highest, followed by light vehicles (LV) and heavy vehicles (HV). Space mean speeds for all vehicles were under 30 km per hours. These figures confirm the results of the previous studies in Jakarta. However, space mean speeds for motorcycles were higher than 30 km per hours and even over 40 km per hours in the early morning (06.00-07.00). In wide road such as Otista, motorcycle might be flexibly fill any gap in the road between larger vehicles (Putranto and Kurniawan, 2006).

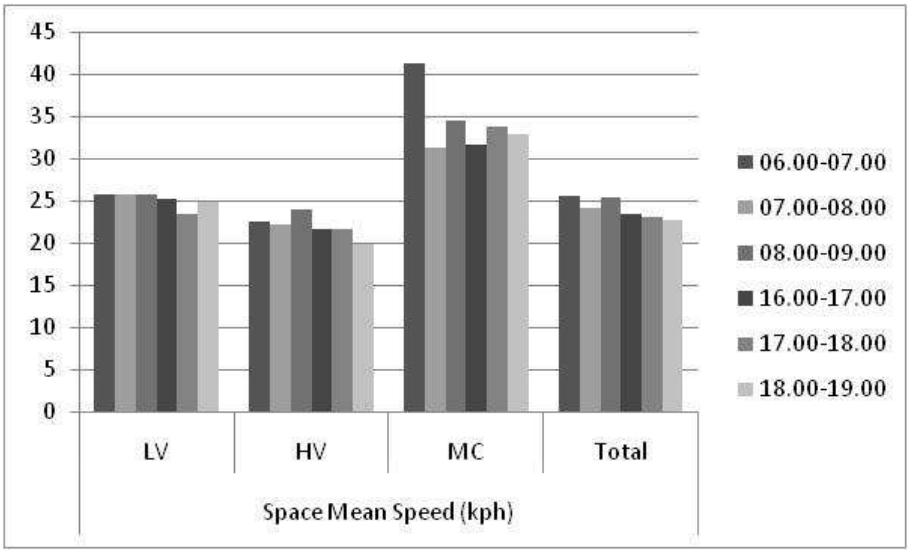

Figure 4: Space Mean Speeds in Front of the Development of a Low Cost Apartment at the Corner of MT Haryono Road and Otista Road

Figures 5 and 6 show the space mean speeds in front of the development of a low cost apartment in the Pahlawan Revolusi road for North-South direction and South-North direction respectively. This road is a 8 meters wide two lanes two ways undivided road with average effective curb width of about 1 meter. It can be seen that in general both in the morning and in the afternoon peak hours motorcycle (MC) space mean speeds were the highest. Space mean speeds of light vehicles (LV) and heavy vehicles (HV) were about the same. Space mean speeds for all vehicles were under 30 km per hours. These figures confirm the results of the previous studies in Jakarta. Space mean speeds for motorcycles were higher than 30 km per hours only in several hours the morning (07.00-09.00) and only for South-North direction.

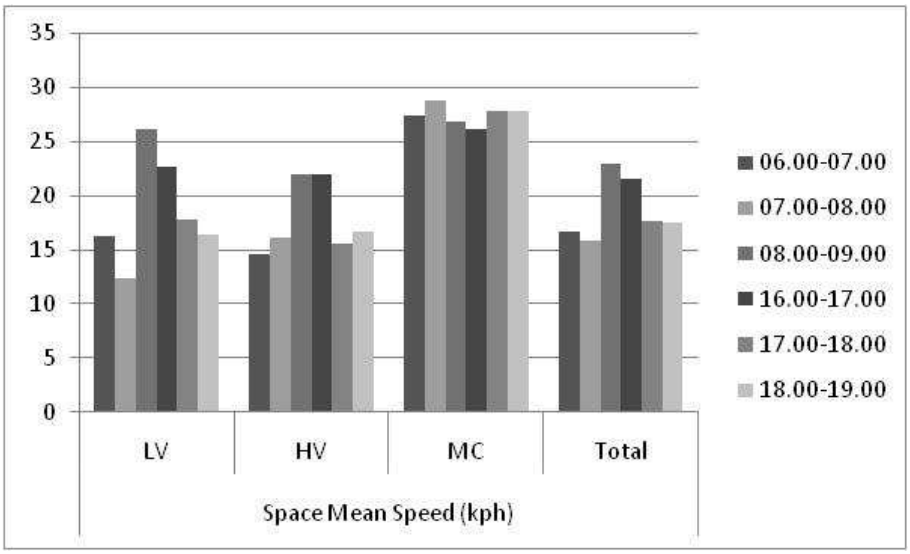

Figure 5: Space Mean Speeds in Front of the Development of a Low Cost Apartment at Pahlawan Revolusi Road (North-South direction)

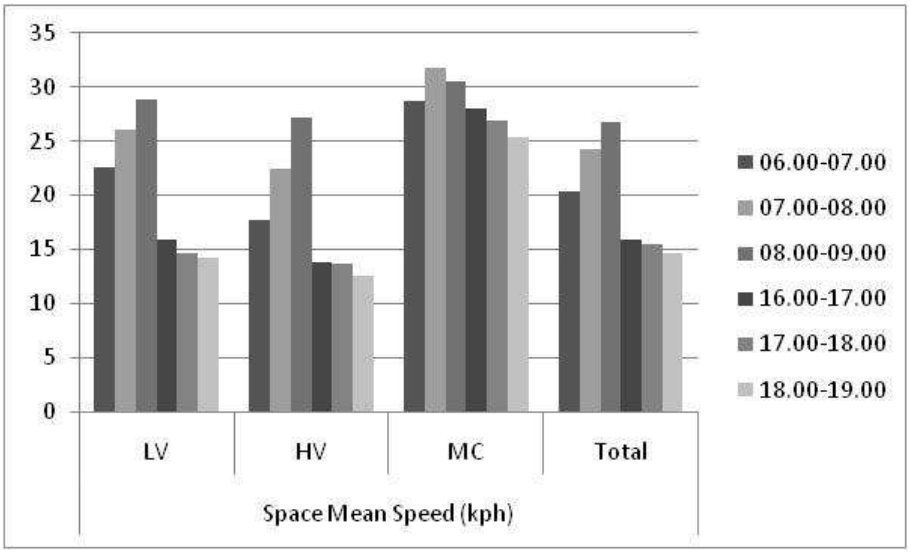

Figure 6: Space Mean Speeds in Front of the Development of a Low Cost Apartment at Pahlawan Revolusi Road (South-North direction)

5. DISCUSSION

Space mean speeds survey in various road types and road locations show that low road performance in terms space mean speeds were found. This is mainly because transportation system that is rely to much on road transport. A study conducted by the Office of Coordinating Minister of Economics (2007) shows that in the main corridors the traffic composition was 60% motorcycles, 32% private passenger cars and the rest was public transport consisting of small, medium and large buses. On the other hand arround 55% of trips were served by public transport mostly by buses (53%) and only 2% by train (SITRAMP Phase 2, JICA and Bappenas, 2004). 64.5% of low income travellers and 52.8% of middle income travellers were using public transport. Some of them recently tried to avoid congestion by shifting their choice of transport mode into motorycle. An observation made by Putranto and Aribowo (2007) in S. Parman Road, Jakarta shows that 50 % of the traffic were motorcycles. This is significantly above the IHCM (1997) default value for city with more than 3 millions inhabitans, i.e. 24%. According to Putranto and Tantama (2009), similar circumstances happened in smaller metropolitan cities such as Bandung (56%-71% of the traffic were motorcycles) and Surabaya (69%-76% of the traffic were motorcycles). These figures were significnaly higher than the IHCM (1997) default value for city with 1 to 3 millions inhabitans, i.e. 32%. Still according to Putranto and Tantama (2009), in Mataram 74%-80% of the traffic were motorcycles, i.e. higher than the IHCM (1997) default value for city with less than 0.5 millions inhabitans, i.e. 45%.

The use of motorcycle might subjectively increase travel speed of the users but would be a burden of the overall traffic (Sunggiardi and Putranto, 2009). Several local governments such as Jakarta, Surabaya and Sragen have introduced motorcycles lanes to reduce unsafe mixed traffic. However such effort might also provide incentive to the use of motorcycle. Therefore encouragement of the use of public transport should be improved. The procurement of buses on Transjakarta Busway of lines 9 and 10 should be speed up. The reliability of the services on the existing 8 lines should be improved and lastly the development of the remaining 5 lines should be speed up. This requires strong commitments of all stakeholders, especially the government. Another development that requires strong commitment is Jakarta Mass Rapid Transit (MRT). Compre to the BRT system, MRT system is more complex to develop and require more funding. This year the basic design of MRT North-South corridor phase 1 (Dukuh Atas-Hotel Indonesia) will be finished. The main product will be a bidding document for construction. International bidding process will take another year (2011). Construction will take 4 to 5 years. The opening of the operation will be on 2017, whilst new president will be elected on 2014. Hopefully there will be no change in the national transport policy, especially regarding the needs of reliable mass rapid transit.

Another measure would be controlling travel demand. ERP would be beneficial but requires installation of various devices on roads and on vehicles. The parking tariff can be increased to reduce inefficient travels in the central business district without the use of complicated technology. However both measures will face strong rejection from private car users. Therefore strong government leadership to carry out these measures should be combined with strong government commitment to provide reliable public transport as an alternative means of travel.

6. CONCLUDING REMARKS

Low performance of road traffic is the result of road oriented transport. Moreover the road is used inefficiently by private transport especially motorcycles (mainly to avoid congestion). Therefore the overall transport system of Jakarta should be improved by promoting public transport, i.e. further development of the BRT and development of MRT and restricting the use of private transport both by road pricing and increasing parking tariff. All of these measures should be carried out comprehensively in order to provide reliable integrated transportation system for Jakarta as one of the prerequisites of an modern international capital city.

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