A REFLECTION OF MOTORIZATION AND PUBLIC TRANSPORT IN JAKARTA METROPOLITAN AREA: LESSONS LEARNED AND FUTURE IMPLICATIONS TOWARDS BETTER TRANSPORTATION DEVELOPMENT IN DEVELOPING COUNTRIES

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Abstract: This article provides a description of the influences of motorization trends on the urban residents’ travel patterns in the Jakarta Metropolitan Area (JMA) in the last decade. The performance of the first year of the Bus Rapid Transit (BRT) system implementation, as a way to suppress the motorization in JMA, is also described. A comprehensive discussion of the existing problems and the possible future implications that can be applied in Indonesia and also in other developing countries are presented.

Key Words: motorization, urban transport, developing countries, sustainable urban-transport policy

1. INTRODUCTION

In the last three decades, motorization and urbanization have been the trend in many metropolitan areas in developing countries. Lack of job opportunities and public facilities outside major cities has initiated rapid urbanization in many metropolitan areas. In Indonesia, the urban population has significantly increased from 22.3 % in 1980 to 42 % in 2000 (Dikun, 2003), and it is estimated that by year 2020 urban population will reach 50% - 60% of the national population (Kusbiantoro, 1998). In 2006, the population density in the capital of Indonesia, Jakarta, is 13,526 inhabitants/ km², which is comparable with several other major cities in the world, like Tokyo with 13,333 inhabitants/ km² and New York with 10,292 inhabitants/ km² (BPS, 2006; Wikipedia, 2006).

In line with the population and economic growth, the number of motor vehicles also shows a rapid growth. For example, the motor vehicle per thousand people in Surabaya, one of the main cities in Indonesia, has increased 455% from 70 in 1976 to 319 in 1998 (GTZ, 2000).
Indeed, it is evidence that motorization is transforming cities and even rural areas of many urban areas in the world and the economic and social benefits are enormous. It provides individual flexible transportation in urban areas and reduced manual labor and improved market access in rural areas, which is heavily needed by developing countries. In the longer term, however, motorization may stifle local development, increase pollution, and create unprecedented safety hazards (Sperling and Clausen, 2002).

The influences of motorization and urbanization, later followed by sub-urbanization in many metropolitan areas, has been of interest to transportation and urban researchers for the last few decades (for example, see Cervero, 1998; Kitamura et al., 2003, etc.). However, most of the studies were based on evidence in developed countries. It is unclear whether the results were also valid in developing countries, since the transportation conditions of both situations are different in many fundamental ways.

Unlike the developed countries, most developing countries do not have a proper mass transportation system to suppress the increase of motorization in urban areas. Moreover, the attitude of society in developing countries is to use automobile ownership as one of the requirements for society acknowledgement. This has encouraged everyone to have their own private car and discouraged them to travel with public transport. Sprawling urban growth with a poor public transport network has also supported the trend of motorization among urban residents in developing countries. The aim of this article is to describe the trends of motorization and public transport performance in the Jakarta Metropolitan Area (JMA), in the last decade. Lessons from the past and the possible future implications that can be applied in other Indonesian cities and also in other developing countries are also discussed.

The next section offers a brief description about the motorization trends in the Jakarta Metropolitan Area (JMA) in the last 15 years. After that, the Bus Rapid Transit (BRT) system that has been recently implemented in JMA, including its first year performance, is described. A comprehensive discussion about the present transportation conditions and problems in Indonesia and possible future implications are provided. The article concludes with a summary section.

2. THE PROGRESS OF MOTORIZATION IN JAKARTA METROPOLITAN AREAS

Metropolitan Jakarta, the capital of the Republic of Indonesia and the largest metropolis in Southeast Asia, is perhaps as diverse as the Indonesian archipelago itself. Various people with different ethnic backgrounds, cultures, dialects, and religions reside in the city. They come from the thousand islands that comprise the archipelago, all seeking and struggling for a better life and prosperity in the city.

Jakarta expanded from 180 square kilometers in 1960 to a fully urbanized megapolis in the 2000s. Today, as a mega-city, Jakarta’s nucleus area has spatially and economically expanded beyond its original fringes and has been integrated with four other proximate cities, namely Tangerang (in the west), Bekasi (in the east), Bogor, and Depok (in the south). The metropolitan area has been called “Jabodetabek” since 1999 (in this paper, we refer to it as the Jakarta Metropolitan Area, JMA). The JMA area encompasses a total land of 6,580 square kilometers, which has a flat configuration with an average elevation of only 5 meters above sea level. The core area of JMA (Jakarta city) itself covered 656 square kilometers and comprised 8.4 million people in 2000. The 5,924 square kilometers beyond Jakarta has an
aggregate population of 13.1 million. The JMA accounts for 10% of Indonesia’s population and 20% of its GDP.

The urbanization beyond the core area has progressed very rapidly. The population growth in the surrounding areas between 1990 and 2000 was 3.7 percent per annum while the growth in the core area was merely 0.2 percent per annum (JICA and BAPPENAS, 2001). The map of JMA is presented in Figure 1.

![Figure 1 Road and railway network pattern in JMA (JICA and BAPPENAS, 2001)](image)

2.1 Car ownership

The number of registered vehicles within the Jakarta metropolitan area (JMA) can be seen in Figure 2. From 1985 to 2002, car ownership increased approximately three times and motorcycle ownership three and a half times. During the Asian Economic Crisis period the number of registrations, especially for motorcycles, suddenly dropped. Presumably this is because during that period many people could not afford to extend their yearly car registration and also many of them either sold their car back to the seller or it was taken by the bank as a debt guarantee. However, since 2001, with the recovery of economic conditions, vehicle registration has resumed its increasing trend.

At household level, the average number of cars owned per 100 households is 20.7 and the average number of cars owned per car-owning household is 1.2 (JICA and BAPPENAS, 2001). The results of a mini household visit survey by JICA and BAPPENAS (2000b) showed that household ownership of a car in Jakarta is positively correlated with the increase of the household monthly income.
2.2 Daily trips and trip length
From 1985 to 2000, the average number of daily trip remained relatively stable. It was 1.69 trips per person per day in 1985 and 1.70 in 2000 (JICA and Dephub, 1985; JICA and BAPPENAS, 2001). The results of the mini household visit survey in JMA (JICA and BAPPENAS, 2000b) showed that students and workers made more out-of-home visits than others (see Figure 3). They made 2.32 and 2.28 visits per person per day, respectively; twice as many as a housewife or retired person.

From 1985 to 2000, the average trip length for work, school and shopping increased significantly (see Figure 4). Trips for work purposes increased from 6.7 km in 1985 to 9.6 km in 2000, while the length for school trips also increased from 2.7 km to 5.5 km. The average length for shopping trips increased from 2.6 km to 4.8 km. Related to household income, a
higher income group is associated with longer average trip length and a higher number of daily trips (due to the brevity of the paper, the table is not shown here).

<table>
<thead>
<tr>
<th>Trip Purpose</th>
<th>1985</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>To work</td>
<td>6.7</td>
<td>9.6</td>
</tr>
<tr>
<td>To school</td>
<td>2.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Shopping</td>
<td>2.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Business</td>
<td>8.1</td>
<td>8.5</td>
</tr>
<tr>
<td>Private</td>
<td>6.6</td>
<td>6.7</td>
</tr>
<tr>
<td>To home</td>
<td>7.3</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4** Change in travel distance between 1985 and 2000 (JICA and Dephub, 1985; JICA and BAPPENAS, 2000b)

For private car trips, from 1985 to 2000, the number of trips by private car increased by 32% (see Table 1). The occupancy rate decreased from 1.96 to 1.75, which shows that, in 2000, people tended to make more solo trips than in 1985. The mode share of private car has decreased by 3.1%. However, this does not mean that people used the car less in 2000, but was solely due to the significant increase of motorcycle user numbers since 1985.

<table>
<thead>
<tr>
<th></th>
<th>1985</th>
<th>2000</th>
<th>Growth Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Private Car Trips</td>
<td>1,411,000</td>
<td>1,868,000</td>
<td>1.32</td>
</tr>
<tr>
<td>Modal Share of Private Car</td>
<td>20.3%</td>
<td>17.2%</td>
<td>-3.1%</td>
</tr>
<tr>
<td>Average Occupancy Rate</td>
<td>1.96</td>
<td>1.75</td>
<td>0.89</td>
</tr>
</tbody>
</table>

**Table 1** Number private car trips and the occupancy rate (JICA and BAPPENAS, 2003; JICA and Dephub, 1985)

### 2.3 Modal composition and choice captivity

The composition of travel mode choice in the JMA region is presented in Table 2. Of all the person trips made by motorized modes, buses make more than 50 percent. Even though the number of buses has decreased due to the economic crisis, the bus is still the most significant mode of transport used by the majority of citizens in the region. Private cars are used by 31 percent of people and a motorcycle by 14 percent of people.

Compared to the modal share in 1985, the share of public transport has decreased slightly from 57 percent to 52 percent. In contrast, the share of private cars has increased from 22.8 percent to 30.8 percent. The share of motorcycle has decreased from 20.2 percent to 14.2 percent. The general trend of modal shift from public transport to private has been observed over the last 15 years (JICA and Dephub, 1985; JICA and BAPPENAS, 2003).

Grouping the mode choices based on income level shows very clear evidence that in Indonesia private cars are mostly used by higher income groups (see Figure 5). Interestingly,
for the lowest income group the share of non-motorized transport is as high as 60 percent. This might also imply that even use of public transport is economically difficult for the lowest income group. Thus they rely heavily on non-motorized modes. Therefore, provision of transport means for the poor is one of the important issues to tackle.

Table 2 Person trips by mode transport in JMA, 2000 (JICA and BAPPENAS, 2001)

<table>
<thead>
<tr>
<th>Description</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All modes</td>
</tr>
<tr>
<td>All modes of transport</td>
<td>100.0 %</td>
</tr>
<tr>
<td>Non-motorized modes of transport</td>
<td>28.8 %</td>
</tr>
<tr>
<td>Motorized modes of transport</td>
<td>71.2 %</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>10.1 %</td>
</tr>
<tr>
<td>Car</td>
<td>22.0 %</td>
</tr>
<tr>
<td>Bus (including AC Express bus)</td>
<td>37.5 %</td>
</tr>
<tr>
<td>Train</td>
<td>1.4 %</td>
</tr>
</tbody>
</table>

Figure 5 Modal shares by household income (JICA and BAPPENAS, 2000b)

2.4 The increasing trend of traffic flows
As the urbanized areas are continuously expanding, the traffic demand of the road network to and from the JMA core area has been and will continue to grow. Fortunately, the incremental rate is decreasing. The 16-hour traffic surveys on cordon lines, as provided in Table 3, show that from 1988 to 1993 the traffic volume increased by 12.6% per annum and from 1993 to 2000 it increased 6% per annum. However, it is still a significant increase and if the government does not try to suppress the increasing traffic volumes immediately, severe traffic congestion in JMA will become worse in the future.

Moreover, contributing to the existing congestion in the JMA area, JICA and BAPPENAS’ study estimates that the total number of commuters from surrounding cities to Jakarta will increase from 762 thousand persons per day in 2000 to about 1.8 million in 2015 (JICA and BAPPENAS, 2001). However, until now, the only connection available between the areas is a road network that is already very congested with kilometers of private cars queuing in peak periods.
Table 3 Traffic volume comparisons in cordon line in JMA, 1988 – 2000

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1988(2)</td>
<td>1993(3)</td>
<td>2000(4)</td>
<td></td>
</tr>
<tr>
<td>Cordon Line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- West Segment</td>
<td>67</td>
<td>142</td>
<td>245</td>
<td>16.3%</td>
</tr>
<tr>
<td>- South Segment</td>
<td>129</td>
<td>185</td>
<td>233</td>
<td>7.4%</td>
</tr>
<tr>
<td>- East Segment</td>
<td>94</td>
<td>196</td>
<td>304</td>
<td>16.0%</td>
</tr>
<tr>
<td>Cordon Line Total</td>
<td>290</td>
<td>523</td>
<td>782</td>
<td>12.6%</td>
</tr>
</tbody>
</table>

(1) 16-hour traffic volume, excluding motorcycle. Unit: per 1,000 vehicles
(2) Source: Jakarta Outer Ring Road Study, DPU (1988)
(3) Source: Arterial Road System Development Study, JICA and DPU (1993)
(4) Source: SITRAMP Transportation Survey, JICA and BAPPENAS (2000a)

2.5 Air Pollution caused by automobiles

With the increase of vehicle trips and degradation of the environmental quality in JMA, air pollution, which was an occasional annoyance in the past, has become a critical threat to the urban people’s health. Table 4 shows the study result by JICA and BAPEDAL (1997) on the air quality in the Jakarta metropolitan area. It is shown that automobiles (both private vehicle and transit) have become the main source of air pollutant emissions for NOx and the second for SOx and TSP (Total Suspended Particulate) pollution.

Table 4 Predicted Pollution Sources in JMA (JICA and BAPEDAL, 1997)

<table>
<thead>
<tr>
<th>Source</th>
<th>NOx</th>
<th>%</th>
<th>SOx</th>
<th>%</th>
<th>TSP</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ton/year</td>
<td></td>
<td>ton/year</td>
<td></td>
<td>ton/year</td>
<td></td>
</tr>
<tr>
<td>Industries</td>
<td>36,832</td>
<td>25.7</td>
<td>42,697</td>
<td>76.3</td>
<td>13,581</td>
<td>57.1</td>
</tr>
<tr>
<td>Households</td>
<td>4,962</td>
<td>3.4</td>
<td>4,220</td>
<td>7.5</td>
<td>642</td>
<td>2.7</td>
</tr>
<tr>
<td>Automobiles</td>
<td>98,738</td>
<td>68.8</td>
<td>8,142</td>
<td>14.6</td>
<td>9,563</td>
<td>40.2</td>
</tr>
<tr>
<td>Ships</td>
<td>1,960</td>
<td>1.4</td>
<td>808</td>
<td>1.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aircraft</td>
<td>1,026</td>
<td>0.7</td>
<td>91</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>143,518</td>
<td>100.0</td>
<td>55,958</td>
<td>100.0</td>
<td>23,786</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The discussions above have shown that the uncontrolled motorization in JMA has significantly affected the quality of the urban resident’s life in all aspects, not only in economic and travel aspects but also in social, psychological, and health aspects. Suppressing the trend for motorization, especially use of private cars, and providing a proper public transport service should become the main priority of the government to stop the degradation of the JMA residents’ quality of life. However, in many cases, economical reasons and the political will of the government become major obstacles in implementing a user and an environmentally friendly transport policy in Indonesia.

The most recent innovation that was successfully implemented in Indonesia was a bus rapid system (BRT) in JMA. This policy was successfully implemented due to an exceptional strong-will of the head of Jakarta’s city government. Although it has only been operating since 2004, it is already considered a success in the JMA and a good example for other cities in Indonesia as well as in other developing countries.

3. BUS RAPID TRANSIT IN JAKARTA
In order to suppress the rapid motorization as well as to reduce the severe traffic congestion and social and environmental impacts, several different policies have been tried in the Jakarta metropolitan area, from traffic restraint policy (i.e. high occupation vehicle policy) to one-way traffic policy. However, since the refinement of the public transport sector has never had enough attention from the government, those policies did not provide any significant positive outcomes. However, in the last four years, there has been strong political support from the head of Jakarta’s city government to create a proper and a cheap public transport system. In the end, they succeeded in implementing a Bus Rapid Transit (BRT) system in the core area of Jakarta city.

BRT is a form of customer-oriented transit (bus) combining stations, vehicles, planning, and intelligent transport system elements into an integrated system with a unique identity (Wright and Fjellstrom, 2002). BRT typically involves bus-way corridors in segregated lanes – either at-grade or grade separated – and modernized bus technology. There have been various BRT systems operated throughout the world, e.g. Bradford, Bogotá, Boston, Adelaide, etc. One of the biggest success examples of BRT system is Bogotá’s TransMilenio system, which went into operation in January 2001. By December 2001, the existing two lines already served over 600,000 passenger trips per day (Wright and Fjellstrom, 2002). This system is considered a suitable system in developing countries because it can be implemented at relatively lower cost and with lower technology compared to other mass rapid transit system. Moreover, it can also be operated without a massive structure construction since it can be operated by using the existing road corridors. However, as a consequence, it will need a dedicated line from the existing road corridor that will suddenly increase the traffic congestion (which is already present) and attract a policy resistant from the road users. For further explanation about the advantages and disadvantages of the system see Wright (2002).

In Jakarta, the first BRT corridor was essentially planned and implemented during the 9-month period from May 2003 until January 2004 (Ernst, 2005). A 12.9 km initial closed-system BRT corridor began operation on January 15, 2004, which starts from Blok M bus terminal and ended at Kota Station (from north to south on the main road corridors) operated by TransJakarta company (see Figure 6). For detailed characteristics of the operated bus see Ernst (2005).

The Jakarta city government provided all the initial construction costs for the infrastructure and the buses. It is considered a sunk cost because they want to support this new public transport system. In the first year of this bus-way operation the comparison between operation - maintenance cost and the revenue showed that at the end of the first year revenue had increased more than costs (BP Trans Jakarta Bus Way, 2005).

In the first year of operation (2004), 15.9 million passengers traveled by this system (approximately 44,000 passengers per day or 3,600 persons/hour/two directions). The average bus way load factor during the week is 91% and during the weekend is 75%, with the highest load factor during the evening peak on weekdays, up to 143% (BP Trans Jakarta Bus Way, 2005).
Figure 6 Map of Jakarta BRT line and other major transportation facilities (adapted from Jakarta Public Transit Users Association Brochure, Ernst, 2005)

Since the system was just initiated two years ago and the Jakarta city government is still completing the whole planned BRT routes, it might be too early to measure the impacts of the BRT system on the transport network performance and travel quality in Jakarta metropolitan area. However, some preliminary studies (i.e. Utama, 2005; Ernst, 2005) reported that the initial performance of the system is very promising. There has been a significant number of mode shift from private car to the BRT and BRT enables the passenger to travel 10 – 20 minutes faster than regular bus users (Utama, 2005). Ernst (2005) reported that, with the trend of passengers shifting from other mode to BRT system, the NOx and PM10 emissions caused by automobiles has decreased by 202 kg and 30 kg per day, respectively (Table 5).

Table 5 Emissions reductions due to modal shift to the Jakarta BRT (Ernst, 2005)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Emissions (g/km)*</th>
<th>Passengers per Vehicle</th>
<th>Daily Pass-km Shifted to BRT</th>
<th>Emissions per day (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nitrogen Oxide</td>
<td>Particulate Matter 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private car</td>
<td>2.7</td>
<td>0.2</td>
<td>1.2</td>
<td>54,900</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>0.07</td>
<td>0.5</td>
<td>1.2</td>
<td>23,500</td>
</tr>
<tr>
<td>Taxi</td>
<td>2.7</td>
<td>0.2</td>
<td>0.5</td>
<td>19,600</td>
</tr>
<tr>
<td>3-wheeled taxi</td>
<td>0.07</td>
<td>0.5</td>
<td>0.5</td>
<td>3,900</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td>101,900</td>
</tr>
<tr>
<td>BRT</td>
<td>13</td>
<td>0.68</td>
<td>65</td>
<td>101,900</td>
</tr>
<tr>
<td>Emission reductions attributable to modal shift</td>
<td></td>
<td></td>
<td></td>
<td>212</td>
</tr>
</tbody>
</table>

*Shah and Nagpal (1997)

Note: This calculation of emissions reductions are based on JICA survey, an average of 49,000 total daily trips on the BRT and an assumed 8-km average BRT trip distance. The average passenger loading assumptions and other explanation can be found in Ernst (2005).

Continuing the development of the BRT corridors through 2004, the local government of Jakarta city constructed the next corridors of the BRT, namely the Pulo Gadung-Harmoni and Kalideres-Harmoni corridors (corridor 2 and 3). These corridors allow movement from west to east and will be combined with the Blok M - Kota corridor which serves the north and south movement, so that a balance of four axes of movement will be reached. Private companies under supervision of the city government have operated these corridors since
January 2006. Besides these corridors, there will be another 12 corridors and feeder lines that will be developed in the Jakarta metropolitan area in the near future (see Figure 7).

Another constructed mass transit system: Monorail
Simultaneously with the development of the BRT system, has been construction of a monorail system in JMA. The monorail route planned to be integrated with the BRT corridors in the future. This advance Mass Rapid Transit (MRT) concept was begun in the 1980s when the traffic congestion reached an unacceptable level; long before the BRT system was considered. In 1996 the government of Indonesia wanted to begin the first stage of a subway system in Jakarta, however the onset of Asian Economic Crisis in 1997 delayed the project. In 1999 this project was revived with the revised basic design study aimed to reduce the capital cost. This project is expected to be the first modern public transport system in Jakarta, able to significantly increase the patronage of public transport that in turn will reduce traffic congestion (JICA, 2000d). The newest projected monorail route in JMA is projected, that in 2015, there will be more than 350,000 passengers using this monorail system per day (JICA, 2000a). Anggrini et al. (2003) stated that a three-car unit is the most suitable configuration with headway 3.5-4.6 minutes in peak period and 6.9-9.1 minutes in the off-peak period.

4. DISCUSSION: PROGRESS SO FAR AND FUTURE IMPLICATIONS

4.1 Reflection from existing conditions

![Figure 7 Future BRT corridors plan up to 2011 (Utama, 2005)](image)
It has been shown that motorization is progressing rapidly in Indonesia and especially in the Jakarta metropolitan area (JMA). Between 1985 and 2000, car ownership, the number of private car trips as well as the travel distance all significantly increased. The poor quality of public transport services has encouraged travelers to shift to private vehicles once they could afford a motorcycle or a private car. It has been shown that the desire to own a car is much higher in developing countries than in developed countries. As a result, severe traffic congestion that spreads over the city areas has become a daily event and the public transport system is only used by captive users. The automobiles also has been become the main pollution sources in JMA.

If the government does not take any serious action, such as increasing the fuel cost by decreasing the fuel subsidy, or introducing transportation demand management and traffic restraints such as road pricing and supporting the improvement of public transportation, the conditions will deteriorate even further. The impact of this situation is not just the loss of time, but also the environmental and social impacts, as providing transportation for the poor is also an important factor in developing countries.

Fortunately, despite huge negative reactions from car users and skeptical politicians, the government of Jakarta city has taken an initiative to encourage and to fund the first BRT system in Indonesia, followed by the development of a monorail project. Implementing a BRT and monorail project in JMA is considered a suitable transportation policy to steer JMA
towards becoming a sustainable city. Although it is still in an early stage, so far the BRT system has given promising benefits in JMA and has encouraged the governments of other cities to implement a similar BRT system in their cities. While, at the same time, the monorail project is still struggling to get financial backing from local or central government.

Generally, the main weakness of the present system in Indonesia is a lack of commitment and political-will in the government to take on and implement a consistent urban transport development policy in Indonesia, which in most cases is an unpopular development policy among car users. The Jakarta city government has succeeded in implementing the BRT system mostly due to a strong and consistent leadership from the local governor that has overcome all the critics and public pressure. However, this is not the case with other cities. There have been many proposals for the improvement of transportation conditions in Indonesian main cities which funded by the World Bank, Asian Development Bank (ADB) and aids or grants from foreign nations or even by local government funds (i.e. UTP (Menkimpraswil, 2002), BMARTS (MRI and TBN, 1995), SUTP (2001), among others). And, unfortunately, only small numbers of them were implemented.

4.2 Future Implications
Learning from the present conditions, there are several suggestions that can be implemented in order to achieve better transportation conditions in Indonesia:

1. Greater commitments from the government in public transport development
It is clear that the trend of motorization has already become a critical issue and suppressing the rapid increase of private cars is a must. However, people have to fulfill their daily mobility needs and the existing public transport facilities are not adequate to fulfill the demand, both in quality and quantity. This fact emphasizes the need for greater attention from government to support a public transportation friendly policy. Public transport service is not a free good, which is not able to play in a pure free market (Dikun, 2003). The intervention of and taking sides by the government is imperative. It is pointless restraining the use of the automobile while there is no acceptable alternative mode. That will only make the drivers find a way around the traffic restraint schemes rather than consider changing their mode.

2. Improvement of the existing public transport conditions
The real problem in developing countries is not the high use of automobiles, but the poor service quality of the public transit system (Senbil et al., 2005). However, as in most developing countries, Indonesia has only very limited resources for developing an acceptable public transport system for the whole community, especially the poor. To cope with this problem studies by GTZ (2001) and UTP (Menkimpraswil, 2002) offer a good solution. These studies encourage the local government to improve their public transport system by empowering and improving the existing system, which in the studies’ context means empowering the bus and paratransit services. The basic idea of this suggestion is that the provision of existing public transport should be improved first, rather than trying to implement a new system that might need higher costs. For example, because the root of the public transport problems in Indonesia is in the management, regulation, supervision and financial sectors, the refinement of the existing public transport management policy has to become the priority. Then, the parties involved in the public transportation provision should show good achievement in the existing service period as a passport for further cooperation and further involvement in this market in the next service period (which will be done under a contract based tendering system). It means that there is some measure that will make the public transport service provider work efficiently and effectively. At this stage, the role and the commitment of the government as a regulator is needed to make sure the market works well and the parties involved gain experience in business and law.
3. **Initiative from government to encourage Transit-oriented Development (TOD)**

To create a sustainable transportation system, integrated land use and transportation planning is essential. To prioritize a Transit-oriented Development (TOD) plan is the only way to suppress the rapid growth of motorization and to create the transit-friendly environment. Calthrope (in Dittmar and Ohland, 2004) defined TOD as a combination of regional planning, city revitalization, suburban renewal, and walkable neighborhoods. The best practices in implementing this approach can also be found Cervero (1998) and Newman and Kenworthy (1999). In Indonesia, it is only Jakarta and Surabaya city governments who already show a commitment to implementing the transit-oriented development planning. Although the level of their success and the comprehensiveness of the planning are questionable, this positive step should be appreciated, encouraged, and supported.

4. **Integrating and funding TOD development with the road charging schemes**

Combining the implementation of TOD and the improvement of facilities and service of public transport with the implementation of road-charging schemes would enable the government to cover the costs of externalities from use of the automobile, finance the public transport service, and also, at the same time, restrain the use of automobile. The best practices, such as in Singapore and London, for example, can be used as an example of how to design and implement successful measures in an urban context, although an in-depth study for implementing it in developing countries context is needed.

5. **Maintain the consistency of commitments, cooperation and coordination between stakeholders**

Since the relationship amongst stakeholders in an urban public transport system is very complicated and inter-dependent, the very basic requirement for all planning and implementation in urban public transport is regulation, to keep all the players on the right track. Vuchic (2005) argues that an overall urban transportation system cannot be coordinated and upgraded until a regulation to coordinate is introduced. However, the regulation becomes just a document if it is not acknowledged by the stakeholders and not accompanied by the appropriate law enforcement. Thus, keeping the commitment and the consistency of government and all stakeholders in implementing the policy and its law enforcement afterwards is a must.

6. **Supervise the government’s decision-making processes**

Supervising the government’s decision-making processes makes sure that the consistency of the government’s transit-oriented development policies is as important as the policy itself. Jakarta city established such an urban transportation board in 2004, which it called the City’s Transportation Board (DTK, Dewan Transportasi Kota). This board consists of 15 members including academics, experts, businessmen, NGO activities, operators, the community, the department of communication, and the police who are responsible for supervising the city government policy in transportation development. However, until now, the board has not worked properly in line with the sustainable transportation visions. Recently, Kompas (2005) reported that this board agreed to build new six inner city toll roads, which does not seem in line with the spirit of TOD. Keeping the board consistently serving the community rather than becoming the city government’s “approval board” is the major challenge.

7. **Develop a unique approach for each developing country, based on their own culture, society, and travel behavior, as well as resources**

Although there have been many transportation policy studies carried out in Indonesia, only a small number of them have incorporated individual travel behaviour factors in their analysis of the proposed policy; a series study like SITRAMP (JICA and BAPPENAS, 2000a, 2000b, 2001, 2003) is an exception. Disregarding travel behaviour analyses in analyzing a feasibility of transport policy can produce a policy that is unacceptable to the community and will never be able to be implemented in the real world. Moreover, developing an appropriate
transportation system based on the local culture and need is one of the most important aspects of a sustainable transportation system. Susilo (2002) demonstrated that a similar road development in two similar rural areas on different islands with different communities in Indonesia can give a very different impact to the local economic conditions. A deep knowledge of the people, as the main actors in urban travel, is an important requirement to planning, developing, and implementing an urban transport policy, since developing countries have unique characteristics that clearly differ from developed countries.

5. SUMMARY

Motorization is progressing rapidly in Indonesia and also in other developing countries. Supported by poor quality of public transport services in Indonesia, motorization has caused severe problems, not only in transportation aspects, but also in environmental, social, and economic aspects. If the stakeholders do not start to cooperate and take any serious action to suppress the motorization, the conditions will deteriorate even further from the present situation. The lesson learned from Indonesia’s context emphasizes the need for clear vision, commitment, consistency, and leadership in creating a sustainable city, which provides a means of mobility for all including a guarantee of the city’s sustainability for the future. The action should be based on and confirmed by the community’s needs and expectations.

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REFERENCES


Jakarta Metropolitan Area Police Office, Traffic Division Unit (2006) Number of registration vehicles in Jakarta Metropolitan Area, undated


Ministry of Public Works (DPU) (1988) Jakarta Outer Ring Road Study, Jakarta


