

Examination of Road Pricing System in Jakarta City

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1. Introduction

Asian metropolitans such as Jakarta, Manila and Bangkok have been suffering heavy traffic congestion especially during this last decade. As traffic congestion has often been considered as a gap between supply and demand, and a "more road" policy has frequently been applied in an attempt to close this gap. Providing infrastructure alone, however, cannot catch up rapid increasing of urban traffic demand by limited government financial and institutional capabilities. On other hand, traffic demand management has been focused as an effective manner to utilize limited infrastructure. However, as supply of infrastructure in Asian cities is still definitely shorting, efforts to improve facilities should be continue for future. The simplistic "more infrastructure facilities" policy must be promoted in coordinate with effective traffic demand management measure. In this paper, co-operation and coordination between infrastructure development and demand management has been examined and proposed.

2. Traffic Condition of Jakarta City

1) Traffic Condition of Jakarta

Jakarta has 8.36 million populations and 20.96 million populations as Metropolitan area including its surrounding satellites Bogor, Tangerang and Bekasi. Activities of these people cause trip by 1.7 trip rate per person every

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day. Surrounding three cities is now growing as dormitory towns of Jakarta. Total traffic between Jakarta and surrounding three cities has increased by almost six percent per annum from 523 thousand vehicles (1993) to 782 thousand (2000). In terms of mode composition, private car represent the largest component of the traffic stream accounting for more than half of the share (51%), followed, in that order, by motorcycle (31 percent), trucks (10 %) and buses (8%). Car ownership of Jakarta area is shown in Table 2. Number of registered passenger vehicles is increasing 10 percent per annual.

2) Traffic Problems

a) Road provisions

Jakarta's road provision Jakarta is only 0.68 m per capita,

whereas in contrast European cities which are at an higher average of 2.3 m and North American are on average even higher 6.8 m, but on the other hand Hong Kong has only 0.3 m Manila and Bangkok both has the same amount of 0.6 m.

b) Signaling System

Road traffic is basically managed by signaling system. However, the existing traffic signal system has the following drawbacks;

- Signal timing is not responded to real time traffic demand,
- Operation and maintenance cost for communication is expensive,
- Hardware maintenance work is minimal level,
- Updating of signal timing is not sufficient and has not been modified, and
- Number of traffic signals is in shortage in surrounding area.

c) Difficult Application of One-way System One-way system restricts the flow direction to one direction. It increases capacity of road section as well as intersection, and it simplifies the movement at an intersection. How-

Table -2 Vehicle Ownership in DKI Jakarta

	1994	1995	1996	1997	1998
Motorcycles	1,344	1,540	1,775	2,055	2,086
Passenger Cars	753	849	967	1,095	1,104
Buses	293	310	310	311	311
Truck	293	320	344	380	382
Total	2,683	3,021	3,397	3,842	3,884

Table-1 Modal Share in Jakarta and surrounding cities (2000)

Year	Location	Rail	Bus	M-Cycle	Car	Other	Total
2000	DKI Jakarta	1.0	49.7	19.3	26.0	4.0	100.0
	Tangerang	0.3	60.9	26.7	11.2	0.9	100.0
	Depok	16.7	51.7	22.7	7.8	1.0	100.0
	Bekasi	3.5	60.0	24.0	11.8	0.7	100.0
	Total	3.4	53.6	21.8	18.6	2.5	100.0

ever, as major road volumes are limited in Jakarta, it is difficult apply for this measures.

d) Right-turn Prohibition and U-turn Problem

On almost all major roads, right-turn is not allowed, thus, vehicles, which want to turn to the right must turn 3 times to left or make U-turn on the road. However 3 time left turn is not practical in Jakarta due to little presence of suitable roads to turn left. Vehicles, therefore, are forced to use U-turn openings of median strip. Since U-turn maneuver heavily disturbs traffic flows, interval of U-turn openings is set generally at long distance and long queue of waiting vehicles is observed at every U-turn opening.

e) Poor traffic enforcement

Poor driver behavior is one of the main traffic problems in Indonesia, which reduces traffic capacity of intersections and links.

1. Corridor Level Traffic Demand Management

(Phase I: "3-in-1" Scheme)

1.1. Initial Demand Management

Traffic Demand Management should be implemented in the area wide level when it is applied for a city. However, in case of Jakarta, considering about urgency of solving bottleneck and legal back ground, a corridor level management are selected for the first stage as "3-in-1" and Road Pricing Phase I. "3-in-1" scheme is applied to Jl. Thamrin, Jl. Sudirman and a part of Jl. Gatot Subroto

from 6; 30a.m. to 10:00 a.m. on Monday through Fridays. During the restricted time, only vehicles with three or more passengers are allowed to enter the restricted road sections. Taxi and public bus are exempted from the restriction. Traffic police does enforcement through surveillance and offenders are apprehended on the spot.

1) Selection of the System

To solve the traffic congestion in the central area, following three alternatives have been proposed as the traffic demand management scheme:

- Road Pricing
- Odd-Even Plate Number
- "3-in-1" Scheme

"3-in-1" is physical restriction based on the number of passengers in a car. The main reasons for selection of this scheme are as follows;

- low implementation cost
- short implementation period

Beside these items, following items are also examined;

- Area/section to be charged;
- Number of passenger to be restricted;

According to the survey before implementation, 80% of passenger car was with less than 2 person in a car (1 person:47%, 2 person:33%, more than 3 persons:20%). For operation, Signboard, Social Campaign such as newspaper, television and propaganda on street had been implemented.

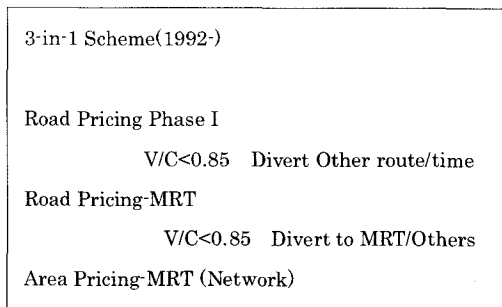


Figure. 1 Jakarta Model (Time Basis)

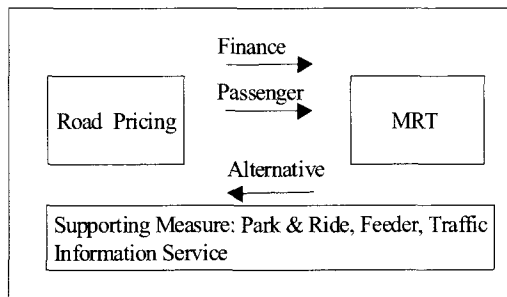


Figure.2 Jakarta Model (Structure Basis)

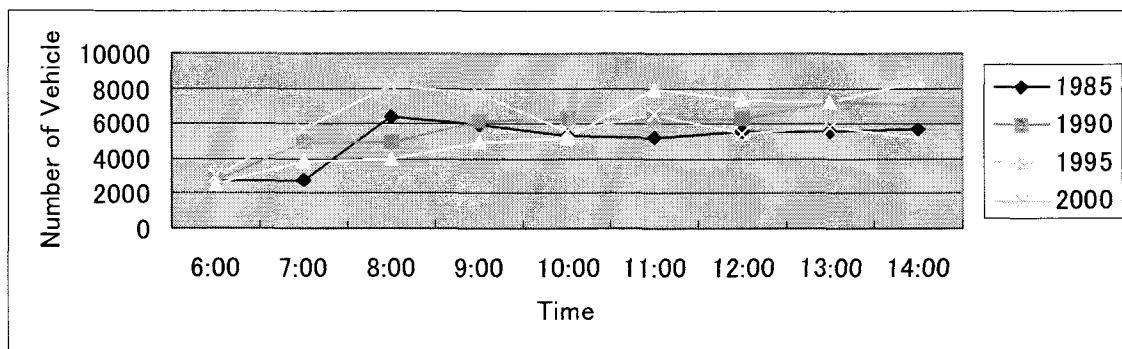


Figure 3 Before and After “3-in-1”

2) Effect of the “3-in-1” Scheme

The scheme is generally observed and the measure is effective in reducing the number of vehicles entering the restricted zone resulting in a smooth traffic flow during the restricted time. The scheme has effect reducing 40-50% traffic in peak hours (7:00-9:00) by before and after traffic count survey (Figure 3, 4). Traffic volume before (1990) and after (1995 and 2000) are shown in Figure 2.

3.2 Road Pricing Scheme

1) Limit of “3-in-1” Scheme

a) Repercussion to other corridor

The vehicles bypassing the restricted streets crowd the streets running parallel to the restricted streets, consequently traffic demand on the parallel streets increases during the restricted hours and it decreases travel speed significantly. Therefore it is in question that merely traffic restrictions on one road could achieve efficiency for a whole network.

b) Increasing of Traffic Demand

The traffic demand volume has been increased more than 44% compared 1994, and the scheme is getting less effective.

Table 3 The corridor traffic

	Vehicle	PCU	V/C
1990	125,000	113,000	0.65
1994	184,000	167,000	0.85
2000	259,000	226,000	1.10

c) Jockey problem Furthermore temporary passengers called “jockey” are waiting just outside of the restricted zone to satisfy the requirement of the number of passengers for normally Rp.2, 000. This practice reduces the effect of the traffic restraint policy by disturbing achievement of one objective of reducing vehicular traffic on the restricted roads.

d) Inflexibility and Lack of Revenue

Other drawbacks of 3-in-1 are inflexibility and lack of revenue. The current requirement of minimum three

Table 4 Willingness to pay for Pricing (if no congestion), 1997

	Rp.2000(\$1)	Rp.4000(\$2)	Rp.6000(\$3)
Pay the charge	81%	33%	17%
Use public mode	5%	12%	16%
Use other road	8%	45%	59%
Other	2%	6%	5%
No answer	4%	4%	4%

passengers cannot be raised for stricter restriction nor eased for more lenient restriction. The former is too restrictive and the latter nor eased for more lenient restriction. The former is too restrictive and the latter is too generous in Jakarta where use of a driver for a private car is common. Unlike congestion charging or road pricing, there is no revenue to the City Government, while enforcement incurs cost to the traffic police.

3.2 Road Pricing Scheme Phase I

a) Revenue and Coordination MRT

To strengthen enforcement and traffic management, it is necessary to develop alternative mode or measure(s). In order to support traffic of Metropolitan area like Jakarta, it is necessary to improve quality of public transport. Considering this matter within limited Government financial capability and the necessity of stricter restriction management method, a road pricing scheme should be implement.

b) Phasing Scheme

Road pricing scheme is designed to introduce divided into two phased.

Road Pricing Phase I : Corridor Level

Target of phase I scheme is to reduce morning and evening peak hours within road capacity level by pricing control. Alternative mode of transport will be introduced by executive bus services while MRT system is prepared. Simplified automatic collection system will be introduced. As a Phase II, area level road pricing are planned. After executive alternative mode of transport (MRT and feeder service), CBD area will be charged full time during the day.

c) Charging fare and revenue

Basic charging price will be set at RP.3, 500 level for peak hours only for passenger vehicles. The price are tentatively fixed considering inflation from 1997 when the study implemented although, the exchange rate become one forth compared to an initial plan of road pricing in 1997. Before MRT operation (2002-2007), the revenue 66 billion Rupiah (USD 7 million) will be just enough for repayment of road pricing facilities, executive service bus and traffic information system while the revenue will increase 122 billion Rupiah (USD 12 million) and 241 billion (USD 25 million) in 2001 prices for the years 2008 and 2015, respectively.

4. Conclusion

In Jakarta, initial traffic demand management method has been introduced since 1992 and has to be improved. The paper examined effect and limitation of the scheme. The paper also examined the measure to step up from "3-in-1" to road pricing in connection with development of alternative mode MRT. This way of approach will be support enhancement of traffic policy in developing countries.

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