

LEVEL OF ACCEPTANCE OF THE TDM IMPLEMENTATION IN INDONESIAN CITIES

PRADONO

Associate Professor

Regional and City Infrastructure System
Research Group

Institute of Technology Bandung

Labtek IX A 5th Floor

Ganesha 10 Bandung 40132 Indonesia

Phone: +62-22-2504735 ext 3611

Fax: +62-22-2501263

Email: pradono@pl.itb.ac.id

Shanty Yulianti RACHMAT

Researcher

Regional and City Infrastructure System
Research Group

Institute of Technology Bandung

Labtek IX A 5th Floor

Ganesha 10 Bandung 40132 Indonesia

Phone: +62-22-2504735 ext 3611

Fax: +62-22-2501263

Email: shanti@pl.itb.ac.id

Nathalia Diana PITALOKA

Researcher

Regional and City Infrastructure System
Research Group

Institute of Technology Bandung

Labtek IX A 5th Floor

Ganesha 10 Bandung 40132 Indonesia

Phone: +62-22-2504735 ext 3611

Fax: +62-22-2501263

Email: natalia@pl.itb.ac.id

Abstract: Research on Transport Demand Management (TDM) has been conducted many times, such as the application of TDM strategy and the selection of TDM strategy which includes the selection of TDM strategy suitable for Indonesian cities. However, the research and discussion on the willingness of the road users and Indonesian urban population to change their habits and accept the impact of the application of the TDM strategy, has not been conducted. This paper aimed to understanding public acceptance by assessing the characteristics of road users/public and their willingness in determining the suitable TDM strategy for Indonesian cities. The method used in this research is the analysis on the data from primary survey in order to understand the characteristics of road users and the preference of road users and public. The result of the research shows that most road users are willing to implement the TDM strategy that was offered. The level of acceptance will be high if the TDM strategy takes into account the socio economic characteristic of the road users that will implement the strategy, takes into account the trip pattern of the road users that will implement the strategy and pays attention to the level of transportation service which can compete with the level of private vehicle service.

Key Words: *acceptance level, implementation, Transport Demand Management*

1. INTRODUCTION

The increase in the use of private vehicle is continuing where the popularity of motor vehicle is difficult to be beaten by other mode of transportations in terms of safety and comfort. The high level use of motor vehicle has caused various transportation problems, such as transportation that consumes 97% of non-renewable fuel, air and sound pollution, and various congestions, accidents and high consumption of land y transportation sector followed by the emergence of urban sprawl (Black, 2000). In the end, the emergence of these problems does not support the sustainable condition of transportation development when the use of motor vehicle is disturbing the environment, including the use of non-renewable resources.

To deal with those transportation problems and also to support the concept of sustainability, an approach which is continuous, sustainable and is not jeopardizing the future generation is needed. This is supported by Eriksson, et.al (2006) which stated that long-term transportation sustainability can be achieved if household reduces the use of private cars, by conducting shorter trips, combining single trip on a series of trips, conducting trip with other people in carpool, or using a more environmental friendly mode of transportation such as public transportation, riding bicycle or walking. An approach which is an innovation in transportation sector where the problem of the increase in the number of motor vehicle is handled more sustainably is the concept of Transport Demand Management (TDM).

Like examples of TDM mentioned above, some strategies have been implemented or are tried to be initiated in various developed countries and also developing countries, including Indonesia. Some examples are mass transportation (bus way in Jakarta), Single Occupant Vehicle in Jakarta (3 in 1), and simple form of road pricing (toll way).

Research on Transport Demand Management has been conducted many times, such as the application of TDM strategy and the selection of TDM strategy which includes the selection of TDM strategy suitable for Indonesian cities. However, the research and discussion on the willingness of the road users and the public to change their habits and accept the impact of the application of the TDM strategy are conducted only in developed countries such as Sweden (Eriksson, 2006) and United Kingdom (Thorpe, 2000). In reality, the level of public and road user acceptance is also influenced by local condition. This kind of research hasn't been found in developing countries, especially in Indonesia.

As a consequence, a research is needed to understand public acceptance by assessing the characteristics of road users/public and their willingness in determining the suitable TDM strategy for Indonesian cities. Assessment was conducted in Bandung and Jakarta by conducting survey on the preferences of public level of acceptance. The indicators of this level of public acceptance are extracted from literature study which discussed public acceptance. This research is intended to support the implementation of TDM.

In the next part, this paper will discuss literature review on TDM and indicators used to understand the level of public acceptance on the implementation of TDM strategy, followed by the method of data collection and analytical method used in this research. Then, general description on the implementation of TDM strategy that will be tested to the public in Bandung and Jakarta will be discussed briefly. After that, an analysis on the level of public acceptance on the implementation of TDM strategy will be discussed. Finally, the paper will end with conclusions and recommendations for further.

2. TRANSPORT DEMAND MANAGEMENT (TDM)

In this section, the definition of TDM and the types of indicators of public acceptance toward TDM implementation that exists in various cities in the world, will be discussed.

2.1 The Definition of Transport Demand Management (TDM)

TDM terminology has been translated into various versions although the goals and objectives mentioned in various literatures are the same. According to the Washington Department of

Transport (2000), TDM is a terminology applied on strategies oriented toward the reduction and modification of demand (use) on transportation system. The focus of TDM is more on the reduction or change on trip demand rather than an increase in transportation supply, by increasing efficiency in transportation system. Most TDM strategies are intended to modify trip behavior by using parameter which indicates reduction in number of trips, change in trip time, or accommodate trip with fewer vehicle trips. According to Litman (1999), TDM is a series of varied strategies intended to enhance trip choice and encourage traveler to use the best choice for them. TDM helps the formation of a more balance transportation system and the reduction of the dependency on private vehicle. TDM is also defined as an umbrella terminology used to describe variety of actions to reduce or modify demand on transportation service and facility (Gifford and Stalebrink, 2001). In addition, Meyer (1999) stated that TDM is a series of actions intended to influence trip behavior with the purpose to be able to use alternative choice of mobility and to reduce congestion. Furthermore, Fergusson (1997) also stated that TDM is a terminology used to describe various techniques referring to the modification or trip behavior.

Based on the definition of TDM from various experts above, it is concluded that the range of TDM includes trip behavior engineering as the representation of demand on transportation system, not engineering on transportation supply. TDM is an element of diverse 'strategy/action' which can be used as mobility choice by the traveler. TDM is also a planning element for the input of transportation sector policy.

2.2 Taxonomy of Transport Demand Management (TDM)

The classification of TDM strategy by some experts mentioned above shows that there is no standard reference for the basis of classifying TDM strategy in a certain category. There's a possibility that the classification is based on the understanding and perspective of the experts on the correlation between the type of TDM strategy and the existing transportation problem, and adjusted with the characteristic and problems in the area where the strategy is implemented and the purpose of the formulation of the TDM strategy (referring to local context).

As a consequence, for transportation problems in Indonesian cities, SIWK (2007) formulated a TDM strategy classification which is called taxonomy of TDM strategy. This taxonomy is the result of hybridization process of various types of TDM strategy stated by transportation experts (Litman, 1999; Ferguson, 2000; Meyer, 1999). The classification consists of soft strategy approach and hard strategy approach. Soft strategy approach consists of management/institution, regulation, and information; whereas, hard strategy approach consists of pricing and tax, land use and modes.

2.3 Level of Acceptance of the TDM Implementation

According to Eriksson, et.al (2006), the level of public acceptance is very influential on the success or failure of the TDM implementation. A case study conducted in Sweden shows that the level of acceptance is very significant in influencing the success of TDM strategy when the public acceptance is closely related to the "beliefs" of the public which consists of problem awareness (aware of a problem), individual norms, and willingness to reduce the use of private vehicles. Therefore, public "moral" consideration becomes important in the development of the TDM strategy implementation policy. Another study conducted by Thorpe, et.al (2000) also shows the importance of "public acceptance" on the success of TDM strategy implementation.

In this research, TDM strategy that was tested for its acceptance is the TDM strategy that belongs to Hard Strategy Approach (SIWK, 2007), i.e. modes (public transport and substitution). The strategy is certainly related to the use of alternative mode. Selecting a transport mode is not a random process, rather it is influenced by various factors attached to the transportation mode which is offered (service attribute), among others: speed, comfort, pleasure/taste, cost, reliability, travel distance, age of the travelers, socio economic status, and purpose of travel.

There are some factors that influence the selection of intercity passenger transportation mode. Bruton (1970) in Warpani (2002) and Tamin (2000) stated that those factors are characteristic of the trip (e.g. distance and time when the trip is conducted, destination), characteristic of the travelers (e.g. vehicle ownership, level of income, and social status) and characteristic of transportation system (e.g. connectivity, duration of trip, cost, and comfort). There is only a little difference where Tamin (2000) added with the characteristic of the city (i.e. distance from the city center and population density) as factors that influence the choice of trip mode.

3. METHODS

There are several methods of data collection that were conducted in this research which included literature study and primary survey. Literature study was conducted to understand the types of indicators of public acceptance toward the TDM implementation such as implementation in various cities in the world. This literature study included journals, reference books, and seminar proceedings.

Primary survey, on the other hand, was conducted to understand the characteristics of road users and the preference of road users and the public. This primary survey was conducted by distributing questionnaire to the public that became the target in the implementation of the TDM strategy who was asked about their socio economic characteristics (gender, level of education, type of occupation, income, and vehicle ownership), their movement patterns (trip destination, mode used, frequency of trip, trip duration, and trip distance), their perceptions (agree or disagree) on the implementation of TDM strategy, and their willingness to implement the TDM strategy. In the table 1, the number of questionnaire and the distribution for each TDM strategies is shown.

The method of analysis conducted in this study was descriptive analysis on primary surveys (questionnaires). Those data are processed using the program SPSS (Statistical Program for Social Science) version 15.0. The program is useful in showing the frequency and the average number of such data. By delivering the analysis, this study can answer the question on how many percent of respondent who is willing to accept the TDM strategy. In addition to this analysis, the relation of socio-economic and trip pattern to the level of acceptance is also shown. Furthermore, analysis gives the illustration about what factors are contributed to that acceptance level.

Table 1 Number of questionnaire

	TDM strategy	Number of questionnaire	Questionnaire's distribution
Public transport	Busway Kalideres – Harmoni corridor *	50 private vehicle user	Mall, Hotel, College and Station along Kalideres – Harmoni corridor
		50 busway user	Shelter along Kalideres-Harmoni corridor
	Busway Blok M – Kota corridor *	100 private vehicle user	Mall, Hotel, College and Station along Blok M - Kota corridor
		100 busway user	Shelter along Blok M – Kota corridor
	Buslane *	64 public transport user 64 bus passenger	Conducting survey in public transportations and buses which pass Jl. Soekarno Hatta
		64 private vehicle user	Household surround Jl. Soekarno Hatta
	Shuttle service **	115 shuttle service user which has private car or vehicle	X-Trans dan Baraya Travel
Substitution	Carpooling student *	269 junior and senior high school students	SMPN 5, SMPN 2, SMP St. Angela, SMUN 5, SMUN 3, SMU St. Angela
	Carsharing worker **	121 workers	Household in Kecamatan Margahayu
	Campus transport **	115 students	ITB, UNIKOM, UNPAD, UNISBA

Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)

** Primary survey

4. TDM STRATEGY IMPLEMENTATION IN JAKARTA AND BANDUNG

This chapter will explain the result of analysis on the level of acceptance of TDM strategy tested in Jakarta and Bandung. The TDM strategy tested for its level of acceptance is the one belongs to Hard Strategy Approach (SIWK, 2007), i.e. modes (public transport and substitution).

4.1 Public Transport

4.1.1 Busway

Inspired by the success story of Curitiba, Quito, and Bogota, the provincial government of Jakarta took initiative to develop BRT (Bus Rapid Transit) or known today as busway or Trans Jakarta bus. Then, the government of Jakarta issued a Governor of Jakarta Decree No. 94 year 2004 on the Operation of Trans Jakarta busway on Blok M-Kota corridor in the province of Jakarta.

Busway is operated by the government of Jakarta with the purpose of reducing the use of private vehicle. This operation is in line with the TDM policy, i.e. a transportation policy whose approach is taken from the demand side rather than the supply side. Busway is an economical product where people should pay to get the ticket. Since initially a comfortable busway was operated with the hope that private vehicle users would be willing to change to this public transportation, the government should take into account an alternative that private vehicle users are not willing to sacrifice economically if they do not get benefit equal to the money they spend.

Pratiwi (2006), therefore, conducted a research to evaluate the operation of busway in Kalideres-Harmoni corridor. Land-use characteristic in the study area is dominated by

residential area (51%) which is located in the outskirts of western Jakarta. Toward the center, the land use changes into trade and service, with a proportion of 34% of total land-use in Daan Mogot Street segment. The rest is industrial area, offices and education (universities). From the trip side, the mode widely used in the morning and afternoon is private motorcycle and car. This domination of private vehicles moves from the west to the east in the morning, and the opposite direction in the afternoon.

Torani (2007) also conducted a research to evaluate the operation of busway Blok M-Kota corridor as a solution for transportation problem which supports the TDM policy. Blok M-Kota corridor connects residential area in the southern part of Jakarta with the city center. Main lanes of this corridor are part of Cilandak-Blok M-Kota corridor which begins in R.S. Fatmawati Street and ends in Pintu Besar Selatan Street. Jenderal Soedirman Street, the main north-south corridor, is the busiest road segment with the busiest traffic volume, almost 215,000 vehicles pass this street every day.

4.1.2 Buslane

Congestion in Soekarno-Hatta Street is mostly caused by high number of low-capacity vehicle, especially private vehicle. The number of private vehicle in Soekarno-Hatta Street amounts to 82.7% of the total vehicles pass the street. Some experts stated that the high use of private vehicle in Bandung is caused by less than appropriate public transportation service.

With the condition of public transportation service dominated by “angkutan kota” (city transport) which has low level of service, it is difficult to attract alternative users to use public transportation. For a city as big as Bandung, public transportation service should ideally be dominated by Mass Public Transport System (SAUM), such as busway, buslane or monorail that are capable of attracting alternative users as many as possible to avoid road overburden.

Mass public transport that was planned to be implemented by the government of Bandung at the end of 2006 was buslane mode with Soekarno-Hatta Street as its pilot corridor. Therefore, Ekaputri (2006) conducted a research to assess the characteristic of traveler's demand in Soekarno-Hatta Street in Bandung on the plan of developing buslane mode and find out which service should be prioritized in the operation of Trans Metro Bandung.

4.1.3 Shuttle Service

The number of Bandung-Jakarta trips and vice versa keeps increasing and this can describe the strong correlation between the two cities. Based on the recapitulation of 1996-1999 data, Bandung-Jakarta trip reached 9 million people annually with growth rate of 8% annually. In addition, the opening of Cipularang Toll Road in 2005 has increased the rate of Jakarta-Bandung mobility, and vice versa. Previously it took 4 hours to get to Jakarta through Purwakarta and Cikampek Toll road, or 5 hours through Cianjur-Puncak-Bogor route, but with the presence of Cipularang Toll Road, it takes only ± 2 hours. Umbou (2006) in his study stated that this will increase vehicle traffic between Jakarta-Bandung and vice versa by 40.70%. The study also shows that the traffic is dominated by private vehicle, and only 50% of which have high occupancy rate, i.e. social and tourism travel; whereas the other 50% are business, work, and education trips where the passenger of the vehicle is the driver, so it is not efficient.

The existing infrastructure development has created a new opportunity for transportation business in Bandung-Jakarta corridor. Selection of travel mode is not only limited to train and

intercity bus, but also a new alternative mode, i.e. “travel”, which goes through Cipularang Toll Road. One factor that makes this mode a favorite is the services it provides can be door to door service or shuttle service with several point of departures and arrivals to facilitate the users.

From the capacity point of view, this travel mode (shuttle service) has a lower High Occupancy Vehicle (HOV) level than other transportation modes such as train, airplane, or intercity bus which also serve Bandung-Jakarta corridor. This is due to the characteristic of this “travel” mode of transportation which is using vehicles with the capacity of 7-14 passengers. However, the advantages of this travel mode which other modes do not have such as time, comfort, and services, which tend to be similar to that of private vehicles, are expected to be an alternative that can attract private vehicle user especially private car which is Single occupancy Vehicle, in an effort to reduce congestion problem. This became the basis to conduct a study to find out the opportunity of making this travel mode (shuttle service) as the primary choice especially for choice market group of people.

4.2 Substitution

4.2.1 Voluntary Carpooling for students who are private car user

School quality in Indonesia is not the same. As a consequence, school selection is not based on the closest distance from the house, but rather it is based on the students’ preferences or schools that are favored by students and the students’ scores. It is possible for students who live in the northern part of the city attend the school in the southern part of the city, and vice versa. This certainly will increase the number of trips.

In the city of Bandung, particularly in Sumur Bandung district, the site of the municipal government, leading and favorite schools are clustered in a location close to each other, i.e. SMUN (State High School) 3, SMUN 5, SMPN (State Junior High School) 2, SMPN 5, and St. Angela’s Junior High School and High School are located around Kalimantan and Sumatera Streets. Students of those schools are relatively well-off in terms of owning private vehicle. The clustering of these favorite schools has caused the piling up of vehicles at the same location at the beginning and end of the school day.

To solve this kind of transportation problem, carpooling as a TDM strategy with the purpose of reducing the number of vehicle by increasing private vehicle occupancy is expected to be able to lessen transportation problem in Bandung particularly with the students’ trip. Therefore, Kusumawardhani (2007) tried to calculate the potency of the application of voluntary carpooling for students in those schools.

4.2.2 Carsharing in the Fringe Area of Bandung

In urban area, especially in large cities, the cause of congestion especially in road segments assumed to be the entrance to the city center during rush hours in the morning and in the afternoon is high commuting using private vehicle (90% of the trips are using private vehicle). The majority of the trips are for working. People in the fringe area who work in the city center generally use private vehicles because there is no appropriate public transport. However, the use of private vehicle is not efficient because car is only occupied by 1-2 persons. In addition, there are plenty of people who are using motor cycle. The growth of this motor cycle use is quite significant, seen from the monthly sale of new motor cycle that reached thousands unit.

One effort that can be done to reduce the use of motor vehicle is through car sharing. Car

sharing is a clustering of workers/riders in a car to work place with destination and schedule that have been agreed upon together. Car sharing is one of TDM strategies that can be applied to reduce congestion in large cities. This car sharing activity is generally conducted by people who work in the city center, but reside in the fringe area of the city. The selection of car sharing is based on the thought that working trips contribute in large proportion to congestion as a result of the use of private vehicle by people in the fringe area of the city. If this working trips using private vehicle can be reduced, the level of congestion in certain points can also be reduced.

One fringe area of Bandung which has high commuting level is settlement areas located in the southern part of Bandung. Administratively, those settlement areas are located in Margahayu District, Bandung Regency. Kopo-Soreang Road is the main access of the residential areas in Margahayu District. The high commuting level can be shown by congestion as a result of high traffic flow to Bandung during rush hours in the morning, and the opposite direction in the afternoon. Therefore, it is important to conduct a research on the willingness of conducting car sharing for people in Margahayu District who are using private vehicles to go to the work place.

4.2.3 Campus Transport

Rapid growth of higher education has resulted in the growth of students' trips. As a consequence, the application of Transport Demand Management concept is needed to reduce transport demand of the students. The application of TDM in campuses in the USA is known as the concept of Campus Transport Management. The objective of transportation management in campus area is to enhance efficiency of the transportation system and to reduce transportation problems such as traffic congestion, parking cost, and environmental impact. Therefore, to support the vision of Bandung as a service city, particularly higher education, a research on transportation management in campus area in Bandung is needed.

Higher education facilities that are clustered in an area in Coblong District encouraged the municipal government to establish the area as the education area (Spatial Plan of Bandung, 2013). However, there has been no detail explanation regarding an integrated transportation system to support student activities in the area. Government policy hasn't been able to respond to the demand of student transportation because there is no data that illustrates transportation demand as a result of the increase of activities in the higher education area. So far, the government's responses are only providing transportation facilities such as parking space and public transportation service.

Furthermore, inefficient public transportation system increases the use of private vehicle. Public transportation system seems to be designed to serve group of people who do not have choice in using the transportation or do not own private vehicle, i.e. captive group, rather than group of people who own private vehicle or who have choice, whether or not they are going to use public vehicle or private vehicle. Therefore, it is important to conduct a research which tried to offer alternative public transport which represents characteristic that should be possessed by public transport to respond to the demand of passengers in the form of student transportation as an application of the Campus Transport Management (CTM) concept.

4.3 Socio Economic Characteristic of the Road User

Socio economic characteristic consists of gender, level of education, type of occupation, income, and vehicle ownership. Based on a survey of road users potential to implement TDM

strategy, their socio economic characteristics are as follows.

The table shows that the majority of road user is male, although the difference with the number of female road user is not significant. Most road users have high level of education, can be seen that most road user are high school of university graduates. In terms of type of occupation, most of the road users are private sector employees and have income of Rp. 1,000,000 – Rp. 3,000,000. In addition, most road users own private vehicle, and some even own more than one private vehicle. This certainly influences their perception and level of acceptance on the implementation of TDM strategy, since most of road user is non-captive group.

Table 2 Socio economic characteristic of the road user

TDM strategy	Gender	Level of education	Type of occupation	Income	Vehicle ownership	
Public transport	Busway Kalideres – Harmoni corridor *	60% male		38% private sector employee	40% > Rp. 2.500.000	44% own car
	Busway Blok M – Kota corridor *	57% male	44% high school/equal graduates	38% private sector employees	27% Rp 1.500.000 – 3.000.000	36% own motorcycle
	Buslane *			36,5% private sector employees	56,25% < Rp 750.000	46,5% own car
	Shuttle service **	59,8% male	63,6% university graduate	36,4% private sector employees	33,6% Rp 1.000.000 – 2.000.000	88% own car
	Student carpooling *	51,3% female		Students		43,9% own car
Substitution	Workers carsharing **	78% male	43,8% high school graduates	49,59% private sector employees	58,68% Rp 1.500.000 – 3.500.000	47,11% own car and motor cycle
	Campus transportation **	78% male		University students	45% Rp 1.000.000 – 2.000.000	41,75% own car and motor cycle

Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)

** Primary survey

5. ANALYSIS ON THE LEVEL OF ACCEPTANCE OF THE TDM STRATEGY IMPLEMENTATION

Analysis on the level of acceptance of the TDM strategy implementation was conducted after the analysis on the trip pattern of the road users, the perception of the road users on the TDM strategy implementation which has been implemented or has just been planned, and the level of acceptance of the road users on the TDM strategy implementation.

5.1 Trip pattern

Trip pattern identified in this analysis are purpose of trip, mode used, frequency of trip, travel time and distance. This becomes important to see their intensity and dependency on trip. The

survey shows, however, that not all variable can be identified.

The table below shows that the majority of road users conduct the trips for work and study reasons. The majority of them uses private vehicle as their mode of transportation. The reason for the road users using private vehicle is that it is practical and flexible; whereas road users who are using motorcycle is because it is more economical. In terms of frequency of conducting the trip, the majority conduct the trip 5 days in a week which is in line with the purpose of the trip to work and study conducted on working days. Only intercity vehicle users (Bandung-Jakarta) have uncertain frequency of trip.

Table 3 Trip pattern of the road user

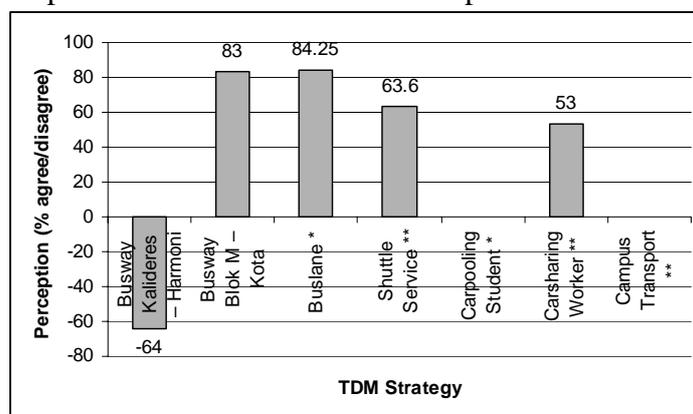
TDM strategy	Purpose of trip	Mode used	Frequency of trip	Duration of trip	Distance of trip
Public transport	Busway Kalideres – Harmoni corridor *	80% work	50% daily		
	Busway Blok M – Kota corridor *	27% work			
	Buslane *	44.5% work			
	Shuttle cervice **	54.5% residents		45.8% uncertain	
Substitution	Carpooling student *	Study	61,9% use private vehicle	46.1% 15-30 minutes	
	Carsharing worker **	Work	59% motor cycle		
	Campus transport **	Study	Car	42% 5 days a week	43% 15-30 minutes

Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)
 ** Primary survey

5.2 Perception

This part shows the perception of road users on the TDM strategy implementation.

Figure 1 Perception of the road users on the implementation of TDM strategy



Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)
 ** Primary survey

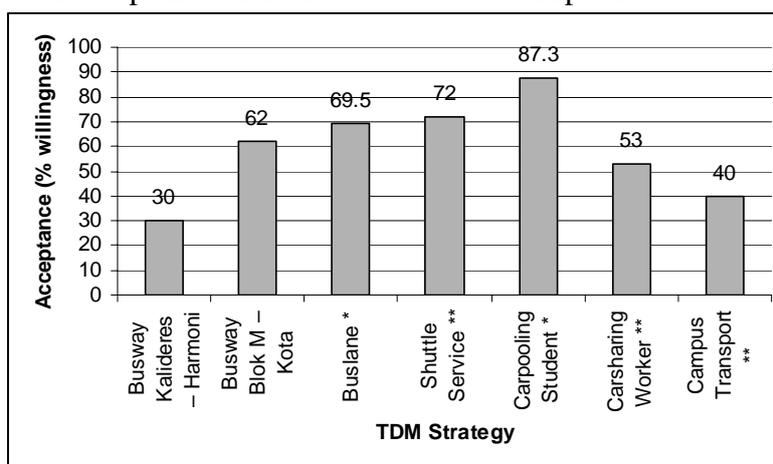
The majority of the road users agree with the implementation, although they might be unwilling to implement the strategy. Road users who disagree with the TDM implementation

are certainly unwilling to implement the strategy. The road users who agree with the implementation of the TDM strategy argue that the application of the TDM strategy has the prospect of reducing traffic problems in Bandung and Jakarta. On the other hand, road users who disagree with the implementation argue that if the TDM strategy is implemented, it might not be accepted by road users. In addition, they also argue that the TDM strategy will not be able to reduce traffic problem, but only add new problem to the existing problems.

5.3 Level of Acceptance

Level of acceptance is how many road users are willing to implement TDM strategy in conducting trips.

Figure 2 Level of acceptance of the road users on the implementation of TDM strategy



Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)
 ** Primary survey

The level of acceptance is then related to the socio economic characteristic of the road users. The figure shows that the majority of road users (more than 50%) are willing to implement TDM strategy while conducting the trips.

Based on crosstab analysis, the level of acceptance of road users to be willing to implement TDM strategy are type of occupation and purpose of trip, level of income and vehicle ownership. However, there are some TDM strategies such as carpooling which although its level of acceptance is high the implementation is constrained with the problem of mismatch on how to return home and the level of vehicle occupancy, and also campus transport whose level of acceptance depends of the service level.

Table 4 Correlation Level of acceptance of the road users on the implementation of TDM strategy with socio economic characteristic

TDM strategy	Correlation with socio economic characteristic	Level of acceptance
Public transport	Busway Kalideres - Harmoni corridor *	30% willing
	Busway Blok M - Kota corridor *	62% willing
	Buslane *	69.25%

TDM strategy	Correlation with socio economic characteristic	Level of acceptance
		willing
Shuttle service **	Related to gender, status of occupation, trip origin, mode often used to conduct Bandung-Jakarta trip, main reason for using travel, level of income, and comfort level of the travel.	72% willing
Carpooling student *	No correlation, more related to physical condition such as how to get home, vehicle occupancy level and residential location.	87.3% willing
Substitution		
Carsharing worker **	Related to type of occupation, level of income, vehicle ownership	53% willing
Campus transport **	No correlation, more related to service level of the campus transport	40% willing

Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)
 ** Primary survey

5.4 Factors that Influences the Level of Acceptance

In this part, variables of services that influence the willingness or unwillingness to implement TDM strategy will be observed.

Table 5 Factors that influence the level of acceptance of road users on the implementation of the TDM strategy

TDM strategy	Reasons for willing	Reasons for unwilling
Public transport		
Busway Kalideres – Harmoni corridor *	Speed, security, and comfort	Flexibility and comfort
Busway Blok M – Kota corridor *	Speed and comfort	Flexibility, security, and comfort
Buslane *	Security, safety, tariff affordability, and punctuality	
Shuttle service **	Comfort and accessibility	
Substitution		
Carpooling student *		
Carsharing workers **	Practicality	Flexibility and comfort
Campus transport **		Flexibility

Source: * Pratiwi (2006), Ekaputri (2006), Torani (2007), Kusumawardhani (2007)
 ** Primary survey

The reasons for the majority of road users who are willing to implement TDM strategy are generally speed, comfort, and punctuality. The majority of road users are private sectors employees and student whose purposes of trips are work and study. This certainly needs fast, comfortable and punctual mode such as busway and shuttle service. Another TDM strategy such as buslane is expected to have characteristic of service which is fast, comfortable and punctual. The reasons of road users who are unwilling to implement TDM strategy is that using private vehicle is more flexible.

6. CONCLUSION

Conclusion that can be drawn from this research on the level of acceptance of the implementation of TDM strategy is as follows. The majority of road users are willing to implement TDM strategy, i.e.:

- 62% for busway Blok M-Kota corridor, Jakarta
- 69.25% for buslane on Soekarno-Hatta Street, Bandung
- 72% for shuttle service Bandung-Jakarta
- 87.3% for carpooling of favorite schools' students in Bandung
- 53% for carsharing of workers in the fringe area of Bandung

The conclusion of this study is the basic knowledge in making decisions related to transportation planning and policy. If the government plans to implement TDM strategies in solving traffic problems, the majority of road users are willing to implement it. But of course, the high level of acceptance of the TDM strategy implementation requires other considerations as follows.

Level of acceptance of the TDM strategy implementation will be high if the TDM strategy take into consideration the socio economic characteristic of the road users who are expected to implement the TDM strategy. Socio economic background of the road users strongly influences their willingness to implement TDM strategy. Based on this research, the socio economic characteristic that always influences the level of acceptance of the TDM strategy implementation are type of occupation and level of income. Type of occupation influences level of service which should be provided by the transport offered in the TDM strategy. In terms of the level of income, service level of the transport offered should be in accordance with the economic class of the road users.

In addition, TDM strategy needs to take into consideration the trip pattern of the road users who are expected to implement the TDM strategy. Transport service of TDM strategy should be in accordance with the trip pattern of the road users such as trip frequency and time when conducting the trip, so that it is expected that the transport service can meet the needs of the road users.

In terms of service, the TDM strategy that will be developed should pay attention to level of transport service which can compete with the service level of private vehicle. The advantages of private vehicle are its high flexibility and comfort levels. The advantages of private motorcycle are its high flexibility and affordable transportation cost. If the service offered in the TDM strategy is not too different from the one in the private vehicle, the road users will be willing to implement the TDM strategy.

Furthermore, the TDM strategy that will be developed should be combined with soft strategy such as regulation and information. The TDM strategy offered in this research is hard strategy TDM. A regulation that can support the success of the TDM implementation is government subsidy for public transport or incentive for employees who are conducting car sharing. Also needed is suitable and innovative information on the background of TDM strategy implementation, level of service offered in the TDM strategy, and advantage/benefit that can be obtained in implementing the TDM strategy. This is intended to attract road users to be willing to implement TDM strategy.

In addition to be combined with soft strategy TDM, TDM strategy can also be combined with another hard strategy. To attract private vehicle users to use public transport (busway, buslane) soft strategy is combined with pricing and tax strategy (e.g. increase in motor vehicle tax, increase in parking tariff in certain areas, etc.) and land use regulation to benefit road users if they change to public transport (busway, buslane, etc.)

6. FURTHER RESEARCH

This research can be developed to conducting various researches on TDM. An example of a research that can be conducted is a research on the level of effectiveness of the implementation of soft strategy TDM (regulation and information). As proven in the research, the level of acceptance of the hard strategy TDM (public transport and substitution) is high. Therefore, if this hard TDM strategy will be formalized into a regulation, how effective the strategy can reduce traffic volume should be recognized. An example of the formalized TDM strategy is the policy of school district. Therefore, a research should be conducted to understand how the policy, if it is implemented, will have an influence on traffic volume.

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REFERENCES

- Black, Wiliam R (2000) Socio-economic barriers to sustainable transport, **Journal of Transport Geography** 8, p. 141-147
- Ekaputri, Aida (2006) **Kajian Karakteristik Permintaan Pelaku Pergerakan terhadap Rencana Pengembangan Moda Buslane (Studi Kasus: Jalan Soekarno-Hatta Kota Bandung)**, Program Studi Perencanaan Wilayah dan Kota, Institut Teknologi Bandung
- Eriksson, Louise (2006) Acceptability of Travel Demand Management Measures: The Importance of Problem Awareness, Personal Norm, Freedom, and Fairness, **Journal of Environmental Psychology** 26, pp. 15-26
- Ferguson, Erik (1997) Privatization as Choice Probability, Policy Process and Program Putcome: The Case of Transportation Management Associations, **Transpn Res-A Vol 31, No 5**, p. 353-364
- Ferguson, Erik (2000) **Travel Demand Management and Public Policy**, Ashgate Publishing, Vermont-USA
- Gifford, Jonathan L.dan Odd J. Stalebrink (2001). Transportation Demand Management. **Handbooks in Transport - Handbook 3: Transport Systems and Traffic Control**. edited by Kenneth Button and David Hensher. Elsevier Science Ltd. pp. 199-208.
- Kusumawardhani, Luki (2007) **Potensi Voluntary Carpooling berdasarkan Preferensi Pelajar Pengguna Mobil Pribadi**, Program Studi Perencanaan Wilayah dan Kota, Institut Teknologi Bandung
- Litman, Todd (1999) **Guide to Calculating Transportation Demand Managemet Benefits**, Victoria Transport Policy Institute, p. 1-20

- Meyer, Michael (1999) Demand Management as an Element of Transportation Policy: Using Carrots and Sticks to Influence Travel Behavior, **Transportation Research Part A 33**, p. 575-599
- Pratiwi, Annisa Dian (2006) **Kajian Preferensi dan Potensi Perpindahan Pengguna Kendaraan Pribadi ke Moda Busway**, Program Studi Perencanaan Wilayah dan Kota, Institut Teknologi Bandung
- SIWK (2007) **Relevansi Aplikasi Spektrum Transport Demand Management (TDM) pada Permasalahan Transportasi Perkotaan, Studi Kasus Kota-kota di Indonesia**. Lembaga Penelitian dan Pengabdian pada Masyarakat. Institut Teknologi Bandung.
- Bappeda Kota Bandung (2004) , **Spatial Plan of Bandung 2004-2013**
- Tamin, Ofyar Z. (2000) **Perencanaan dan Pemodelan Transportasi**, Bandung: Penerbit ITB
- Thorpe, Neil (2000) Public Attitudes to TDM Measures: A Comparative Study, **Transport Policy 7**, 243-257
- Torani, Nina (2007) **Evaluasi Pengoperasian Angkutan Busway ditinjau dari Persepsi Pengguna di Koridor Blok M-Kota**, Program Studi Perencanaan Wilayah dan Kota, Institut Teknologi Bandung
- Umbou, Laode Muhammad Idul (2006) **Identifikasi Perjalanan Pengguna Tol Cipularang**. Program Studi Perencanaan Wilayah dan Kota, Institut Teknologi Bandung.
- Warpani, S. P. (2002) **Pengelolaan Lalulintas dan Angkutan Jalan**. Bandung: Penerbit ITB, pp 32-33
- Washington State Department of Transportation (2000) **TDM Guide for Planners: Including Transport Demand Management Strategies in Planning Process**, USA