

Master Thesis

Transit Oriented Development  
Based on Bus Rapid Transit  
Supported by Public Private Partnership:  
Lesson from Curitiba and Bogota for Jakarta



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## Abstract

*Every big city all around the world faces the traffic congestion problem. Facing urban congestion can not only be done by transportations side but also must consider the land use with its trip generation. The strong linkage between urban mobility and land use make the Transit Oriented Development (TOD) as an advance concept to integrate both to shaping urban growth and effective urban transportation. TOD concept use public transport or Transit system as based for urban transportation system and urban growth management. The choice of transit mode is depend on the city characteristics. Besides it advantage of low development cost, flexibility and high possibility to be self finance operated (without subsidy), the BRT system have advantages related to the TOD concept which have higher impact to the city land use growth rather than rail system because bus system can have shorter distance between one station to the other rather than rail system.*

*The main handicap especially for developing countries to integrated develop TOD based on BRT is limited government capital to implement the concept. Public private partnership (PPP) can be used as one solution to support that concept implementation. Because governments focus to all of the capital for the nation's transit systems but do not focus on real estate and settlement development, most of all TOD require the public/private partnerships scheme. The PPP is one of the critical aspects in BRT and became one of the characteristic of BRT system. The PPP is required in order to achieve self-finance and free subsidy operation.*

*Jakarta has been started implemented BRT since 2004, and have positive impact to the dependency to the private car usage and give citizen better public transportation service. To improve the performance of their BRT and integrated them with TOD, Jakarta can learn from Curitiba and Bogota. The implementation of TOD and BRT in Curitiba and Bogota is two of the best TOD and BRT implementation in the world which a lot of countries around the world used their implementation to be adopted. The similarity of Curitiba and Bogota with Jakarta as fast growth city in developing country give many advantages to be used as lesson learn cases.*

*There area several important aspects that elaborated in this study related to the TOD based on BRT supported by PPP such as: integration transit with urban spatial planning (which consist of busway integration in Master plan, metropolitan issue, involvement non public sector); BRT implementation (which consist of extension coverage area, institutional and BRT organization, feeder system, pedestrian facility, and parking facility; Public Private Partnership and the role of Government.*

*From elaborating three cities, it can be concluded that the key factors in integrating TOD based on BRT supported by PPP are: the first, strong political will and leadership, the second; supported by comprehensive master plan, the third; supported by good institutional frame work and coordination, the fourth; involving related stakeholders, the last; supported by good partnership between public and private sector which encourage private business to participated more.*

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# Chapter 1

## Introduction

### *1.1. Background*

Every big city all around the world faces the problem of traffic congestion. Valverde (2005) argue that when the demand for travel in an urban system exceeds the system capacity, travel times increase significantly which is having consequence of waste of productive time. Urban Mobility Report in 2004, stated that in 2002 congestion in 85 urban areas in USA generates 3.5 billions total hours of delay and extend the travel time in peak hour for 37% with respect to the free-flow travel time (Schrank and Lomax, 2004). Furthermore, according to the same publication, the cost of congestion in those American cities was estimated about \$63.2 billions dollar for 2002.

Facing urban congestion can not only be done by transportations side but also must consider the land use with its trip generation. The strong linkage between urban mobility and land use make the Transit Oriented Development as an advance concept to integrate both to shaping urban growth and effective urban transportation. The improvement of mass public transit must be integrated with the urban development, because with the integration of transit and urban development like focused in Transit Oriented Development (TOD) both of them will synchronize develops. The transit development without integration with land use can be done but with low effectivity in dealing with efficient urban mobility, congestion and private car dependency.

The increasing car ownership in developing world as a consequence of increasing their income per capita is the key contributing factors to the congestion in almost every big city in developing countries. Besides reducing productivity times, congestion has other negative impact such as environment consequences and high cost of natural (non-renewable) resources consumption. In USA in 2002 the estimated of fuel that wasted because of congestion is about 5.7 billions of gallons (Schrank and Lomax, in Valverde, 2005). The wasted fuel is a big problem related to the more limited fuel supply in the long term.

The improvement of mass public transportation is one solution to face the urban congestion because the adequate public transportation support the switching trip from private car/vehicle to public transportation which reducing the vehicle number in the urban transportation system. In developing country which fast car ownership growth rate, the condition become worst because the public transportation can not cope all the transportation need in term of quality and quantity. People in certain developing country still using their private car although face worst congestion because they do not have other adequate choices from public transportation.

The choice of adequate mass public transportation system in developing countries plays an important role in facing the congestion and supports all of their citizen necessity of public transportation. Basically there are several mass transportation mode are available such as train, metro, subway, tram, or bus. The development subway is the best solution because of its mass capacity, effective, low labor, and lees pollutant besides it is not consume space because it located underground. But the development of subway needs huge investment that very hard to fulfill for developing countries. Furthermore, with the high investment cost will influence the higher price of service which can be not affordable for their citizen.

There are a lot of mass transit system that can be used such as heavy train, light train, metro, subway and bus. The development of heavy train according to Valverde (2005) is out of reach for most developing countries because of its extremely high capital costs compare with light rail and bus systems. Furthermore, Valverde argue the advantages of BRT from Light Rail Transit (LRT) are: Lower capital cost, flexibility (can be changed and expanded when needed), no request special facilities (can use roadways, no need railway), more suitable for dispersed land use (can server a greater rider catchments area), several routes can converge onto one busway (reducing transfer need), Used more by people who are transit dependent, so bus service improvement provide greater equity benefits.

The bus service system with the concept of Bus Rapid Transit shown as one solution that succeeds to manage not only public transportation but also the urban transportation as whole like in several developing countries such as Brazil, Columbia, and others. According to Leal and Bertini (2004) a lot of urban areas in developing countries have try to overcome the problem of how to upgrade and improve existing public transportation services with a low cost. As Leal and Bertini argue:

*Developing countries with high transit-dependent populations and limited financial resources have increasingly attempted the use of BRT systems because of their low costs and relatively fast implementation times.... (Leal and Bertini, 2004)*

Many of lack that almost occurred in BRT planning and implementation can be face by implementing the Public-Private Partnership in BRT system. The clear example is the unnecessary of municipal funds used to purchase buses. With implement PPP, the funds for buy buses can be come from private sector. The other clear example is the role of PPP in facing the lack of funding for full implementation of BRT system. The other challenge is by implemented BRT with PPP, it is possible to operate the public transportation without government subsidy or in the other word it can be done by self financing.

In order to improve its public transportation, Jakarta metropolitan has implemented BRT concept that calls busway in 2004. From several studies it can be said that the implementation of busway have significant influence to the reduction of private car usage. Curitiba and Bogota as two of the most succeeds city that implemented BRT combine with PPP can be use as study case. Those two cities are chosen because they can implement the BRT integrated with TOD concept and supported by PPP that succeed to make the

operation of urban public transportation integrated with land use, self financing operation that lead to reduce the public transportation dependency to the limited government budget.

Jakarta can learn from their success of integrating public transit with urban spatial development that support by partnership between private and public. Furthermore the implementation of PPP in busway is hoped to be self financing so that the local governments do not need to subsidy its operation. And in the long term the integrated between transit system and land use can be support each other integratedlly.

## ***1.2 Research Motivations***

It is predicted that in next ten years Jakarta metropolitan will face worsen congestion if the transportation following its growth without adequate improvement in public transportation. The public transportation is potential to be use as a based for urban development that lead to less congestion, efficient and effective of infrastructure investment and decrease dependency to the private car ownership which consume high non renewable resources. Bus Rapid Transportation as one type of public transportation concept can be use in Jakarta and other cities in Indonesia. This concept has been started in Jakarta when they implemented Busway since 2004.

Step by step the service coverage of Jakarta busway has been extended. One of the barriers to extend the BRT system is the high dependency to the limited local government budget. The concept of Public-Private Partnership not only can be used as one alternative solution to support the local government in extending but also in operating the BRT system. With the good PPP implementation BRT system can be done without local government subsidy.

Before adopt certain concept it is need to be studied how the concept is implemented in certain country so that we can learn and make improvement of the concept related to the existing condition in certain area. The Curitiba and Bogota BRT system which supported by Public-private partnership can be used as example. Jakarta Metropolitan can learn from success of two city's public transportation system in managing PPP in Jakarta Busway's system. Because there are several cities in Indonesia such as Bandung, Yogyakarta and Surabaya that will be implemented BRT, it is hoped this research will give them important consideration in forming the adequate BRT system that can move toward self financing operation.

In the long term the integration between public transportation and urban land use is very important to the sustainability of effective and efficient public transit system. The implementations of Transit Oriented Development which integrated with BRT system and improving Public private partnership will depend on the role of government in synchronize those concept in one integrated policy.

### ***1.3 Research Questions***

This research aims at addressing the main question “**what can Jakarta learn from Curitiba and Bogota related to the implementation of Transit Oriented Development based on Bus Rapid Transit system which supported by Public-Private Partnership**”. That main question is derived into some sub-questions as follows:

1. What are the concepts and implementation of Transit Oriented Development?
2. What are the concepts and implementation of Bus Rapid Transit?
3. What are the concepts, principles of Public-Private Partnership and its application in BRT system
4. How to synchronize TOD based on BRT system that supported by PPP and what should the government do? (which is doing by elaborating Curitiba and Bogota case as study case)
5. How is the existing Jakarta Metropolitan public transportation condition and what can be got as lesson in implementing the concept of integration of TOD with BRT system supported by PPP in Curitiba and Bogota in Jakarta case and what are the preconditions that necessary to be prepared?

### ***1.4 Research Objectives***

The objective of this study is to elaborate the concept and implementation of Transit Oriented Development based on BRT which supported by public-private partnership by examining its implementation in Curitiba and Bogota as successful implementation to be applied in Jakarta. With this kind of study, it will be describe about what are the keys factor that significant in managing Transit Oriented Development based on Bus Rapid Transit supported by PPP and if it will be applied in Jakarta, what are the preconditions that must be exist and need to be prepared.

### ***1.5 Research Methodology***

#### **1.5.1 Data and Information**

The first step of this study is elaborating the concepts and principles of Transit Oriented Development and its relation to the BRT system and how the public private partnership can be used to support them.

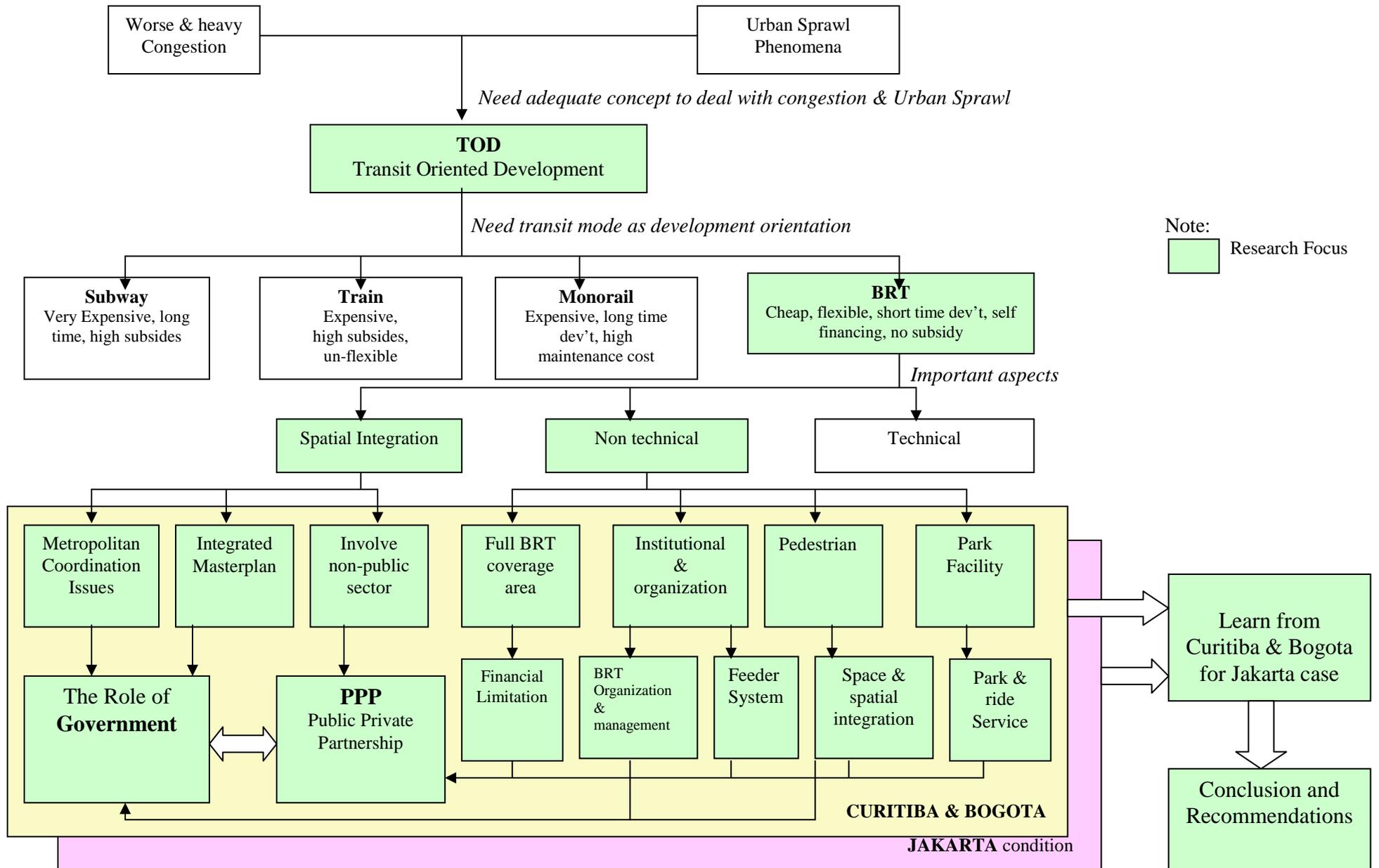
After elaborating the principles and concepts of PPP, TOD and its implementation in public transportation, this study will examine its implementation in Curitiba and Bogota as case study and elaborating the Jakarta’s condition. The data and information of Curitiba, Bogota and Jakarta related to the implementation of TOD, BRT and PPP can be shown as follow:

- General description of study case area
- Transit integration with urban spatial planning
- Implementation of BRT system
- Public private partnership implementation
- The role of Government

From elaboration condition in each city, it can be analyzed the similarities and the differences between each cities. From this analysis, there are many positive aspects from Curitiba and Bogota cases which can be use as lesson learn for Jakarta. By elaborating the good implementation in Curitiba and Bogota, and compare with the Jakarta conditions, it can be used as based recommendation for Jakarta case. There are some possibility of adopting good concept from Curitiba and Bogota, some can be implemented, some can be implemented with fulfill some preconditions and some can not be implemented because of different condition and other reasons. Some possibilities will be elaborated in the last part of the research.

## 1.5.2 Research Framework

### Frame of Thought



## ***1.6. The Report Structure***

### **Chapter I Introduction**

This chapter discusses the background and the significance of this research. In addition, it also gives explanation about the research questions and the research objectives. Those research questions and objectives will be the main guidance in doing and writing this research. This part also describe about research methodology which clarifies how to do this research. The data sources and collecting will be presented in this chapter. Briefly, the contents of the first chapter can be describing as follows:

- Background
- Research Motivations
- Research Question
- Research Objectives
- Research Methodology
- Research Structure

### **Chapter II Theoretical Review**

This chapter consists of elaboration of related concept of the research. The contents of this chapter are:

- The Transit Oriented Development concepts
- The concept of Bus Rapid Transportation (BRT)
- The concepts, and principles of Public-Private Partnership
- The Issues of extension of BRT and government role

### **Chapter III The Integration of Transit Oriented Developments and Bus Rapid Transit supported by Public Private Partnership in Curitiba and Bogota**

This chapter is reviewing the implementation of BRT in Curitiba and Bogota. The implementation will be elaborated as follows:

- Curitiba and Bogota Transit integration with Urban Spatial Planning
  - Busway Integration in Master Plan
  - Metropolitan Coordination Issues
  - Involvement non public sector
- Curitiba and Bogota BRT
  - BRT Implementation
  - Extension Coverage Area
  - Institutional and Organization of BRT
  - Feeder System
  - Pedestrian

- Parking Facility
- Public Private Partnership
- The Role of Government

#### **ChapterIV Jakarta Conditions and what can be learned from Curitiba and Bogota**

This chapter is reviewing the integration between transportation and land use, public transportation condition and busway implementation in Jakarta. The existing condition busway implementation and what Jakarta can learn from Curitiba and Bogota will be elaborated as follows. :

- Jakarta's Transit integration with Urban Spatial Planning
  - Busway Integration in Jakarta Master Plan
  - Metropolitan Coordination Issues
  - Involvement non public sector
- Jakarta BRT
  - BRT Implementation
  - Extension Coverage Area
  - Institutional and Organization of BRT
  - Feeder System
  - Pedestrian
  - Parking Facility
- Public Private Partnership
- The Role of Government
- What Jakarta can learn from Curitiba and Bogota

#### **Chapter V Conclusions and Recommendations**

This chapter consists of two sub-parts, which are the conclusion guided by the research questions and objectives and the recommendation considering the possibility of integrating TOD based on BRT which supported by PPP for Jakarta case.

## Chapter 2

### Theoretical Review

#### *2.1 The Concept of Transit Oriented Development (TOD)*

According to Stead (2003) the current guidance of planning policy on transport recognizes that the integration of transport and land-use planning has a determining function in delivering the government's integrated transport strategy, dropping the need to travel, and improving safety, accessibility, quality of environmental, and the life quality.

Furthermore Stead stated that planning policy guidance identifies a range of ways in which land-use planning and transport policies can complement each other. Related to the issues of implication of land-use and transport, Stead comment that there are two fundamental issue, the first is transport policy is not integrated with land-use planning but only reactive to it and try to respond the consequences of previous planning decisions which made without adequate integration with transport, and the second is there is lack of real interdisciplinary team working between departments responsible for land-use planning and transport policy (Stead, 2003).

If we talk about the integration between land-use and transit in urban development, we consider about Transit Oriented Development (TOD) concept. There are a lot of TOD definitions available, the California Department of Transportation (Caltrans) uses the following of the definition of TOD, as:

*“...moderate to higher-density development, located within an easy walk of a major transit stop, generally with a mix of residential, employment and shopping opportunities”...it is “designed for pedestrians without excluding the auto” and can be achieved through either “new construction or redevelopment of one or more buildings whose design and orientation facilitate transit use” (Parker, McKeever, Arrington and Smith-Heimer, 2002).*

According to Lund, Cervero, and Willson (2004) TODs are intended to boost transit ridership, enlarge walking and biking, and reduce the share of private car trips. Furthermore Lund, et all state that the design and mix use as feature of TOD may decrease both work and non work automobile trips and change to use transit mode.

TOD implementation give opportunity to alter the development patterns, back to infill location and restructure the infrastructure development pattern, reshape the settlement pattern, improve the city air quality, offer alternative transportation options which lead to lowering the traffic congestion (Stainback and Simril, 2001). A review of TOD definitions by Todd, Barth, Eichler, Daganzo, and Shaheen (2006) has revealed some common similarities among most TOD descriptions (Cervero, 2002) which include:

- Mixed-use development,

- Development that is close to and well served by transit, and
- Development that is conducive to transit ridership.

The other basic principles which stated by Gilat and Sussman, 2003 are called “Three D’s”, which are consists of: Density of citizens and job close to the transit stations; Diversity of land uses (residential, commercial) near stations; Design, i.e the elements of urban design that support the integration between transit’s stations and surrounding area which improve accessibility for pedestrian and bicyclist.

The concept was emerging in developed country, but Gilat and Sussman (2003) argue that because of car ownership in developing countries is lower than developed country so the importance of TOD was higher. Furthermore Gilat and Sussman argue that in the growing city in developing country, poor people very depend on the public transportation and they spent a greater percentage of their income on transportation than people with high income.

Because the TOD concept emerges in developed countries, so there is a question whether TOD can be implemented successfully in developing country. Related to that question, Gilat and Sussman (2003) argue that The Curitiba can answer that developing country can coordinate transportation and land use planning on a citywide level? Furthermore Gilat and Sussman explain that Curitiba has a strict zoning code that concentrates growth along transit corridors and prohibits high densities elsewhere, and this code is enforced (Gilat and Sussman , 2003).

The reducing private car usage with an associated increase in transit ridership is the ultimate transportation objective relative to a TOD (Todd, Barth, Eichler, Daganzo and Shaheen, 2006). Furthermore Todd et al argue that several previous studies indicates that citizen who live in the area close to the transit stations are five to six times more likely to commute using transit than other citizen in a region.

According to Gilat and Sussmen, 2003, there are several basic conditions for TOD concept implementation such as:

- An extensive transit system that covers a large part of the city
- Government organization with planning and taxation powers concentrated above the level of the single town (i.e. at the metropolitan or regional level)
- Government incentives to developers
- Most importantly, a strong local economy and real estate market

The successful of Curitiba in integrating BRT with their land-use by population concentration along corridors/main lines which served by high capacity transit (BRT) shows obviously that if those well managed and combined, the magnitude of impact to the city circumstance and quality of live is very huge. Related to the success of integrating land-use planning and transport policies, Stead (2003) said that it is depend on tackling the obstacles to coordination between existing professions and institutional/department.

The success of TOD is significantly depend on how well the community design promotes transit use and this indicates that an overall transit system must be integrated effectively between mass transit services (e.g., bus, bus rapid transit, train, subway, shuttle) and convenient feeder options (e.g., bike access, taxi, low-speed vehicles, personal vehicle parking, etc.) (Todd, Barth, Eichler, Daganzo, and Shaheen, 2006)

## ***2.2 The BRT as Public Transportation***

### **2.2.1 The Emerging of BRT System (historical review)**

The emerging of BRT concept was beginning in US cities in the late 1950's. At that time, transportation agencies were searching for innovative system to implement high-quality with low-cost transit service. In the 1957 as result of their searching, they reporting study "Report on Bus Rapid Transit between Concord and Oakland-San Francisco", the California Public Utilities Commission investigated high-speed bus operations for commuter travel to Oakland and San Francisco from Concord, a San Francisco suburb (Miller and Buckley, 2000). In their proposal, they propose to develop "modern" high-speed bus service which in that proposal consists of improvement such as park and ride lots, improved amenities, pedestrian friendly designs and other improvement in to high quality transit service.

In 1963, John Crain presented "The Rapid Transit Bus Concept" encourage transportation planners to develop a new transit services which mimic the high performance, door-to-door service offered by private car, while remaining within the economic reach of most cities (Miller and Buckley, 2000). Furthermore Crain states "combine(s) the best features of rail rapid transit and conventional bus operations by retaining the flexibility of one while obtaining some of the speed and capacity of the other" and he describes the use of exclusive lane use and preferential traffic controls for the rapid bus concept (Miller and Buckley, 2000). All of these concepts have been incorporated into what we today know as Bus Rapid Transit.

The concept of Bus Rapid Transit for developing country was emerging in 1974 in Curitiba Brazil. The successes of Curitiba in managing better urban public transportation lead other countries to adopt this concept in to their urban transportation system. Most of the countries which adopted this concept was developing country, because a lot of developing countries searching adequate concept to improve their urban public transportation with low budget to be implemented. This concept were adopted by several cities in south America such as Porto Alegre (Barzil) in 1977, Sao Puolo (Brazil) in 1979, Recife in 1982, Capinas in 1985, Quito Trole (Equador) in 1995, Bogota (Colombia) in 2000 and Leon (Mexico) in 2003.

The concept of BRT not only implemented in developing country's cities in South America but also in developing countries in Asia such as Kunming, Taipei, several Japanese cities, Beijing, Jakarta and even in developed country's cities such as

Detroit, San Francisco, Ottawa, etc. Recently there are a lot of cities around the world which will implement BRT concept such as Bangkok, Delhi and Seoul. Furthermore the integration of BRT implementation with spatial planning improves the efficiency of urban transportation as a whole like obviously seen in Curitiba.

### 2.2.2 BRT Comparison with other Types of Urban Public Transportation

In the fast growing cities in developing world where faced the problem of how to improve and upgrade the existing transit services with low cost, the Bus Rapid Transit is one effective alternative to be chosen rather than other transit mode. Leal and Bertini argue:

*The mission of Bus Rapid Transit (BRT) is to combine the flexibility and low implementation cost of bus service with the comfort, efficiency, cost-effectiveness, land use influence and versatility of light rail transit (LRT)....*  
(Leal and Bertini, 2004)

Various BRT projects around the world, especially in developing countries, have indicated that BRT concept is an effective alternative to improve public transportation services with low cost for construction and operation. What are the best alternative between LRT and BRT to be implemented in urban public transportation is still debatable nowadays. Each have own advantages and weaknesses such as describe by Litman, 2004 in “Evaluating Public Transit Benefits and Costs: Best Practices Guidebook” which summarized advantage of each one that can be describe as follow:

Advantages of Bus/BRT	Advantages of LRT:
<ul style="list-style-type: none"> <li>• <b>Flexibility.</b> Bus routes can change and expand when needed. For example, routes can change if a roadway is closed, or if destinations or demand changes.</li> <li>• <b>Requires no special facilities.</b> Buses can use existing roadways, and general traffic lanes can be converted into a busway.</li> <li>• <b>More suitable for dispersed land use, and so can serve a greater rider catchment area.</b></li> <li>• <b>Several routes can converge onto one busway, reducing the need for transfers.</b> For example, buses that start at several suburban communities can all use a busway to a city center.</li> <li>• <b>Lower capital costs.</b></li> <li>• <b>Used more by people who are transit dependent, so bus service improvements provide greater equity benefits</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Greater demand.</b> Rail tends to attract more discretionary riders than buses.</li> <li>• <b>Greater comfort,</b> Including larger seats with more legroom, more space per-passenger, and smother and quieter ride.</li> <li>• <b>More voter support for rail than for bus improvements.</b></li> <li>• <b>Greater maximum capacity.</b> Rail requires less space and is more cost effective on high volume routes.</li> <li>• <b>Greater travel speed and reliability,</b> Where rail transit is grade separated.</li> <li>• <b>More positive land use impacts.</b> Rail tends to be a catalyst for more accessible development patterns.</li> <li>• <b>Increased property values near transit stations.</b></li> <li>• <b>Less air and noise pollution,</b> particularly when electric powered.</li> <li>• <b>Rails stations tend to be more pleasant than bus stations,</b> so rail is more appropriate where many transit vehicles congregate.</li> </ul>

Sources: “Evaluating Public Transit Benefits and Costs: Best Practices Guidebook” (2004)

From table above about advantages of BRT and LRT, it can be seen that there are more advantages of LRT than BRT, but the main barriers in developing countries are lack of capital ability to develop LRT, or even it can be done it will be need subsidizes from local government to keep the LRT operated, besides the big question about its affordability. Monica T. Leal and Bertini argue that the cost of a BRT project is considered to be approximately one-third of a LRT project, which is a cost that affordable for developing countries. The cost comparison among several urban mass transits can be seen as follow:

Table 2.1  
Development Cost of Transit Mode

Transit Mode	Cost ( US \$ Million/km )
Metro	50 – 320
Elevated Rail	50 -100
Urban Rail	25 – 50
Light Rail (LRT)	15 – 30
Tram	5- 15
Bus (BRT)	0.5 - 10

Source: Lloyd Wright in Sustainable Urban Transport Program GTZ (2005)

From comparison several transit modes, it can be seen obviously that the cost of BRT can be one third or even until one tenth of the LRT’s cost. According to Valverde, (2005) heavy rail is out of reach for most developing countries because of its tremendously high capital costs compare with light rail and bus systems. Karl Fjellstrom (2004) said that the implementation of BRT system can be 10 to 100 times cheaper than a rail system. Furthermore he said that:

*“It provides metro level service at almost 1% of the cost. It can be planned and implemented in just three years. What is important is to think about bus lanes, operations, management, and infrastructure all at the same time. Bogota spent US\$ 6 million just on planning. On the other hand, Brisbane did not plan their system well and ended up spending US\$ 11.2 million on redesigning just one BRT station,”.... ( Karl Fjellstrom, 2004)*

According to Levinson, Zimmerman, and Clinger, 2003, Based on input from transit agencies which have implemented the BRT systems, the main reasons to choose BRT were not only because of its lower development costs and higher operating flexibility (compared with rail transit) but also it can be an integral component of the city’s structure, and it can play role as a catalyst for redevelopment. Furthermore Levinson et al, mention that from a study in Ottawa in 1976, conclude that BRT system could be built for only a half of capital cost of light transit, and 20% cheaper in operating system and even in Boston, the selection of BRT is because of its operational and service benefit rather than its cost advantages solely.

Because of the advantages of BRT in improving service quality in a cost-effective manner its have been built all around the world both in developing and developed world. According to Levinson, Zimmerman, and Clinger, 2003 with its operational

flexibility, and can be built quickly, incrementally, and economically; the BRT get its popularity in United States and was supported by Federal Transit Administration (FTA).

Besides cost comparative advantages, the BRT implementation can be prepared in the shorter time rather than LRT system. As brief comparison from preparation until operation, Bogota can implement BRT (phase 1 and 2, for about 7 lines, and 53 mile) for only about 130 months, but LRT in Washington DC it is need more than 30 years (5 lines, 103 miles) (Menckhoff, 2005)

### BRT Definition

Related to the focus of this research about BRT system, it is important to elaborate some related aspects before moving further. First of all it is need to examine what is the definition of BRT. The definition of BRT according to Leal and Bertini is: ***“a public transit mode that uses buses to provide a light rail quality of service. BRT combines the flexibility and low cost of bus service with the comfort, efficiency, cost effectiveness and versatility of LRT”***. Levison *et al*, 2003 state in BRT Implementation Guidelines that Bus Rapid Transit defined as: ***“A flexible, rubber-tired form of rapid transit that combines stations, vehicles, services, running ways, and ITS elements into an integrated system with a strong identity”***.

Furthermore Levison et al, (2003) write that principally people can define BRT as a system which have quality of light transit but using buses as vehicles. Leal and Bertini argued that when these characteristics are fulfilled, one can consider a BRT system as versatile, flexible and comfortable as LRT systems.

On the other hand, Lloyd Wright in Bus Rapid Transit: A Global Review (2005) stated that the BRT is ***“a mass transit system that mimics the rapidity and performance of metros but utilizes buses rather than rail vehicles”***.

According to Levinson, Zimmerman, and Clinger, 2003 in the relation with market and environment, they said that:

*“The BRT applications are designed to be appropriate to the market they serve and their physical surroundings and can be incrementally implemented in a variety of environments”. In brief, BRT is an integrated system of facilities, services and amenities that collectively improve the speed, reliability, and identity of bus transit”* (Levinson, Zimmerman, and Clinger, 2003 pg 4).

### BRT characteristics

Bus Rapid Transit (BRT) is one kind of public transportation which have flexible characteristic of rapid transit that combines sophisticated bus technologies with advance and innovative bus operations supported by management techniques into an integrated system (Hardy and Cronin, 2003). Furthermore Hardy and Cronin said that

the service of BRT system provide enhanced transportation services that approach the capability of light rail rapid transit systems which spend higher cost.

There are several specific characteristics of BRT which distinguish it with other public transportation systems and ordinary bus systems. According to Lloyd Wright (2005), the characteristics of full BRT systems are: Segregated, median busways with median stations, Pre-board fare collection and fare verification, restricted operator access (closed system),

Free transfers between corridors, competitively bid concessions, high frequency service and low station dwell times, clean bus technologies and modal integration.

Leal and Bertini state that a BRT system includes the following characteristics:

- Exclusive right of way
- Rapid boarding and alighting
- Clean, secure, and comfortable stations and terminals
- Fast and efficient fare collection, (including fare less zones, collection at stations or onboard vehicles).
- Effective regulations for bus operators
- Use of Intelligent Transportation Systems
- Transit priority at signalized intersections
- Integration with other modes of transportation
- Adequate marketing
- Good customer service

To be operated efficiently, BRT systems necessary to consider about minimum population which will be serviced. According to Levinson, Zimmerman, and Clinger, 2003 the most of BRT systems are found and effective in cities that have population more than 700,000 inhabitants.

### **2.1.3 Elements of BRT**

Levinson et al, (2003) describe that principally BRT as a system which have quality of light transit but using buses as vehicles have some basic components such as:

- Running way
- Stations
- Vehicles
- Fare Collection
- Intelligent Transportation Systems
- Service and Operating Plans

Every element is important and influence one to another in supporting goal achievement in BRT system. The description of each element will be elaborated as follows:

### Running way

Related to the characteristic of Bus Rapid Transit that use its own line of way, the running way is very important in BRT system. Valverde (2005) argue that BRT's running ways are the most critical component in determining the reliability and speed of BRT and often spend the biggest cost share in the development of BRT system. Furthermore, Valverde write that there are three primary characteristics of running ways such as degree of segregation, running way marking, and lateral guidance.

### Stations

Station is important because in this place the passenger entry and exit from the bus. It is necessary that the station can distinguish the BRT service system from other public transportation system. According to Valverde (2005), in stations the interaction with other part of the system taking place and noted that the fare collection and boarding level are two important aspects in stations and terminals.

### Vehicles

Because the bus or vehicle as the main means that carrying the passenger, the role of bus or vehicles is very important in BRT system especially related to the passenger impression to the BRT system. Level of service of BRT influence significantly the rate of occupancy and furthermore influence the BRT performance as a whole. The capacity of the vehicle is important especially in peak hour and in several dense lines. Valverde (2005) argue that higher vehicles capacity with bigger doors will decrease dwelling times and articulated bus can be use to decrease operational costs by take more passengers in one vehicle.

### Fare Collection

According to Valverde (2005), there are several kinds of fare collection system such as:

- Pay on-board system
- Conductor-validated system
- Barrier Enforced Fare Payment system
- Barrier-Free or Proof-of-Payment system

### Intelligent Transportation Systems

Valverde (2005) argue that Intelligent Transportation Systems (ITS) includes a variety of advanced technologies related to the collecting, processing, and disseminating real-time data from vehicle and roadway sensors. Furthermore Valverde stated that in BRT there are several possible applications of ITS, such as:

- Vehicle Prioritization
- Assist and Automation Technology
- Operations Management
- Passenger Information

### Service and Operating Plans

Service and operating Plan include adequate marketing and good customer service. In order to operating the BRT with the good performance, a good service and operation plan is very crucial. Valverde (2005) argue that BRT service needs to be comfortable, reliable, easy-to understand, frequent, direct, operationally efficient, and above all, and very important is rapid. Furthermore Valverde classified the main characteristics of a service and operations plan as follow:

- Route Length and Structure
- Service Span
- Service Frequency
- Station Spacing

### ***2.3 Public-Private Partnership in TOD and BRT system***

According to Quium (2003), governments all around the world tends to turned to the private sector to increase their resources, improve efficiency and sustainable development in many sector and fields, including for transport infrastructure and services. Furthermore, Quium said that inline with the trend in other sector; recently the involvement of private sector in transport field became very common in Asia Pacific region.

Basically the idea of Public-Private Partnerships (PPP) is to use private economic interests to provide services that were traditionally done by public authorities (Pelug, 2002). Furthermore Pelug stated that in PPP, private corporation role not only as contractors, but as actors with specific interests and initiatives.

There are some critics to the PPP implementation because of shifting from public to private sector provision. Respond to that issue, Shaw (2005) argue that there are three basic reasons for undertaking PPP in public services that can be identified (Browne, Nemoto, Visser and Whiteing, 2003) as:

- **Efficiency** – To make a better use of resources by efficient operational, market related incentives and competition,
- **Integration** – The effective partnerships is a way of integrating the public and private sector and often bring the benefit to private sector as experience to involved in areas which traditionally done by public sector management,
- **Accountability** – This is generally achieved through a regulatory process, a pre-identified monitoring and review process and using of incentives and disincentives to encourage particular goals in delivery a strong mechanism of public accountability.

### 2.3.1 The concept and principles of PPP

Levinsona, Garciab, and Carlsona (2002) said that the implementation of PPPs are moving to the forefront because of governments lack of financial resources and, in some cases, lack of knowledge to deal with the public demand for better services. According to the National Council for Public Private Partnerships (2002):

*“The confluence of rising infrastructure needs and social demands, combined with tight governmental budgets and public resistance to additional tax increases, has made it essential for public authorities to turn to the innovative qualities and access to operating capital possessed by the private sector in order to fulfill responsibilities.”... (National Council for Public Private Partnerships in Levinsona, et al 2002).*

Furthermore, Levinsona et al (2002) stated that there are two basic questions which must be answered before the partnership is initialized: (1) Does the partnership add efficiency in use of limited resources (?), and (2) will the public be better served by the partnership (?). Related to the risk of PPPs projects, both partners will have risk; the private participant will face the risk of their money and their time, and on the other hand the public sector risks overcharging by the private partners, being forced into a bad position for negotiation, and also the declining benefits over time is potential to be occurred .

The other fundamental aspect of the PPPs is to combine two different objectives from two components of partnership; the public with welfare oriented and private sector with profit oriented). Related to this issue, Levinsona et all comment that:

*“Those objectives, while not entirely coincident, may not be totally mutually exclusive. The successful Public Private Partnerships should both increase the quality and quantity of the public service and allow the private business to make a profit. The government agency entering a partnership hopes to achieve value for money through shorter construction periods, streamlined contracts and a simplified procurement process. Through PPPs, any combination of public and private investment is possible, the idea being that for every unit of public money put into a project, private money would also be injected.”... (Levinsona, et al 2002)*

According to Fiszbein, Ariel; Lowden, Pamela (1999), the term Partnership in PPP have meaning as:

*“... joint initiatives of the public sector in conjunction with the private, for-profit and non-for-profit sectors, also referred to as the government, business, and civic sectors. Within these partnerships, each of the actors contributes resources (financial; human; technical; and intangible, such as information or political support) and participates in the decision making process.” ..... (Fiszbein, Ariel; Lowden, Pamela, 1999)*

Arboleda and Villar (1996) stated that partnerships are characterized by some criteria such as:

1. a common objective
2. active partners
3. interdependent contributions

There is a lot of debate why we should do something using partnership approach. To answer the question about why choose a partnership-based approach, Pelug (2002) said that there is a multitude of reasons supporting a partnership approach such as:

- partnerships bring new resources to poverty-reduction initiatives
- possibility for synergies through different social actors working together in a complementary fashion
- increase in productivity with the available resources
- a number of forms of asset generation exist that relate essentially to areas of human and social capacity building, creating the conditions to bring about multiplier effects
- a potential to generate self-sustaining patterns of change, thus the whole can be greater than the sum of the parts

### **Typology of PPP**

According to Pelug (2002) the type of PPP can be classified based on the investments contribution and the risks that each participant faced. There are three major groups of PPP that can be identified such as:

#### **1. Concession type PPPs**

In this kind of PPPs, especially in a pure concession, the private partner takes the investment fully (100%). Instead of sharing the risks of project, private and public parties divide the identified risks by agreement in contractual arrangements concerning risks, responsibilities and financing. For example the government faces the political risks and the private party bears on the commercial and construction risks.

#### **2. Joint venture type PPPs**

In this kind of PPPs there is joint commitment of the public and private sectors throughout the project life-cycle. In the project done by this kind of partnership, the participation of private sector in terms of investment is not full but lower than 100%. The private sector and public share the responsibility, risk and financing as shareholders in a jointly set up public enterprise. The share of risk and profit usually proportionally with their share in project investment.

#### **3. Hybrid forms of PPPs**

This type of PPPs is not fit with two previous forms of PPP. These types of PPPs can be named as hybrid form of PPPs. In this kind of PPPs, the project is divided in many project components. The role of control of public or government is control the overall project and public or government play role as a linking pin between several project subcomponents. For this kind of type, minimally there are

several sub components which are put on the private market as separate concessions or design-built contracts. Recently, hybrid form of PPP seems to have a wider use in relatively complex projects and distinguishable sub-components.

The other type classification of PPP is come from USGAO who classified the PPPs type (USGAO 1999) as:

- Build-Own-Operate (BOO)  
The private business builds and operates a public facility and retains legal ownership
- Build-Operate-Transfer (BOT)  
The private business builds and operates the public facility for a significant time period. At the end of the time period, the facility ownership transfers to the public
- Buy-Build-Operate (BBO)  
The government sells the facility to the private business. The private business refurbishes and operates the facility
- Design-Build-Operate (DBO)  
A single contract is awarded to a private business which designs, builds, and operates the public facility, but the public retains legal ownership
- Build-Develop-Operate (BDO)  
The private business buys the public facility, refurbishes it with its own resources, and then operates it through a government contract.

### **2.3.2 PPP in TOD**

Because governments focus to all of the capital for the nation's transit systems but do not focus on real estate and settlement development, most of all TODs require the public/private partnerships scheme. Both public and private partner share role in developing the urban area where the public partner making plan, design, construct and operate transit system and the private taking role in financing and developing settlement and commercial area. The involvement of private partner in constructing the master plan will benefited the more efficient plan and the supported in implementation of the plan.

The role of public private partnership in Transit Oriented Development is important. The existence of PPP is determining the success of TOD implementation. Related to the determining role of PPP in TOD, Stainback and Simril argue:

*“... successfully realizing the full potential of TODs in reshaping the urban core of our nation's cities depends on the primary public and private partners' ability to structure genuine public/private partnerships...”*  
(Stainback and Simril, 2001).

Both public and private will get benefit from TOD implementation. Public sector will reshape urban form toward more effective urban growth pattern which will encourage efficient infrastructure development and urban mobility which will encourage improvement of urban quality of live. Private sector will have opportunity to develop settlement and other economic activity more certain caused by clear and mixed use concept. The certainty is important for private sector in their investment scheme. According to Stainback and Simril (2001) from the private perspective, TOD provide opportunity to influence public sector investment, build quality mixed-use development projects, and capture potential future value created by exposure the transit system.

Furthermore Stainback and Simril (2001) write there are many advantages of PPP implementation in TOD from both public and private sector such as:

- ❖ From the public partners' perspective TOD provides an opportunity to:
  - Conserve land/reduce urban sprawl
  - Optimize the Use of Existing Infrastructure
  - Improve the Quality of Life for Residents
  - Create an Intermodal Transportation Hub
  - Leverage Private Sector Investment
- ❖ From the Developer's Perspective TOD provide an opportunity
  - Leverage Public Sector Investment
  - Provide an Enhanced Market for Sustainable Development
  - Reduce Land Use and Density Regulations
  - Appropriately Manage Pre-development Risks

The implementation of PPP in TOD give more balance role between public and private sector in city development. Furthermore Stainback and Bibril (2001) argue that public-private partnerships have proven a successful manner in structuring finance and developing plans which balancing public sectors public policy objectives while preserve market driven approach, which is crucial in achieving the required financial returns by debt and a key element to a successful partnership.

### **2.3.3 PPP in BRT System**

The implementation of PPP is very important aspects in managing effective BRT system. Several studies about BRT conclude that PPP is one of the important element of BRT which determining the success of BRT system. In this research the focus is not about the implementation of PPP in operating the BRT, but wider to the related aspects that can support BRT system, such as integration city development, park and ride services, and other possibility of partnership that can support the BRT system more integrated.

The PPP implementation in BRT began in 70's in several US cities. According to Henke (2002) several American bus transit agencies employed partnership such as: Denver's Regional Transportation District (RTD), the San Diego Metropolitan Transit Development Board (MTDB), and Community Transit (CT) in Snohomish County, WA. Furthermore Henke said that the reason why they implemented bus system with PPP are: firstly to reduce operating cost both existing and new services as well, secondly to deal with the explosive growth of demand-response service, thirdly to get more flexibility that make the public sector become focus to achieve the most efficient movement and let the operational issues to the private partners (Henke 2002). Related the role of PPP in BRT Targa, 2003 said that the success of BRT system in Bogota because of TransMilano can develop a good PPP in their BRT system.

### **2.3.4 The concept of integration Land-use and Transit (TOD) in BRT System**

Besides the integration between The BRT trunk and land-use planning, which focus to the higher density near the main line of BRT service and tend to decrease for the are far away from BRT line, Levinson, Zimmerman, and Clinger (2003) state that in choosing location of BRT's station must integrated with land use to and it may be need to addressing issue of building orientations, building setback and connections to stations.

Related to the connection between TOD and BRT system, Gilat and Sussman (2003) said that Tokyo after World War II, and Curitiba, Brazil in the 1970s and 80s implementing TOD on a system-wide scale and it can significantly improve the transit attractiveness, since it greatly increases the possibility to the origins and destinations that are accessible by a combination of transit and walking. Furthermore Gilat and Sussman argue that the combination of dense, mixed land uses near stations and pedestrian-friendly station areas on a system-wide scale gives people who live near transit a much larger choice of destinations.

According to Cervero (2002), the most significant operational advantage of bus service in TOD is the hierarchy of services which can be offered, because the bus not only can operate a number of services type on generic road infrastructure but also it can change capacity responsively and alter single vehicles and operator between services.

According to Gilat and Sussman , (2003) Those conditions also present opportunities for TOD and other methods of coordinated transportation and land use planning and BRT is one kind of mass transit system which can be use in TOD. Furthermore, Gilat and Sussman stated that through good and proper planning and investment scheme, the form of rapidly growing cities can be design to be transit oriented

The integration between bus system and urban spatial is significant factor in determining the success of BRT system, especially in the long term. The success of Curitiba's BRT can not be separated with supported of its urban spatial planning. According to Yabe and Nakamura, 2005, Curitiba's BRT system was build in stages as an integral part of an general master plan which basic objectives included radial expansion of the urban area along five structural axes, integrating land use and transport, and protecting the traditional city center.

The relation between BRT as urban transport and urban land use is inter-dependency; each is influenced and affected by others. Transportation system changes will influence the overall transportation system and its surrounding land uses both in the short-term and long-term (Miller and Buckley, 2000). Furthermore Miller and Buckley summarizes that there are several issues related to the BRT system and land use such as:

- Integrating BRT projects into the metropolitan planning process
- Coordinating BRT project with local planning agencies' land use
- Lack of empirical evidence on the effects of BRT on land use
- Gaining community support for transit oriented development
- Concerns of potential developers over BRT's lack of permanence as compared to rail

## ***2.4 The Issue of Extension in implementation integrated TOD and BRT using PPP scheme and the role of Government***

### **2.4.1. The extension of BRT system and the roles of PPP**

Beside the institutional aspects, the other major obstacle for developing countries is the high cost of infrastructure and even developed city faced this barrier in obtaining financing to support TOD to. According to Gilat and Sussman (2003) in the city in developing country, the situation is often worse; some cities spend a huge of money on single rail line but fail in attracting adequate ridership because it can not reach enough people and destinations. Furthermore Gilat and Sussman (2003) argue that lees-expensive technologies like the BRT system have a better potency in developing an extensive and affordable transit system. And the implement of less-expensive technologies such as BRT by encourage the PPP, the investment dependency to public sector will reduce and in the other hand private sector can be participated actively.

The effectively of BRT system is depend on the coverage area of this system, the more it services cover all city area the more effective the system is. Although the implementation of BRT is need lees investment if compared with LRT, but still in developing country it is not easy to allocate the investment needed to built the full BRT covering all the city area. The partnership of BRT operation can be extending with the expansion of this system to have the larger service cover area. According to Wright, 2005 two of seven common errors in BRT are: only few corridors in first

phase and lack of funding for infrastructure to build the full BRT which need at least 80 million/km.

There are a lot of BRT expansions that can be done by PPP to solved the limited local government budget one solution is by implemented PPP and to avoid those common errors in BRT development. Although the BRT is one of the public service which traditionally provide by government, but BRT system is available to be done through the PPP scheme, like it done by Curitiba and Bogota. If the demand for expansion of full BRT had been studied and resulted in the conclusion that it will benefit for both, public and private, this expansion can be done by PPP. The development of new line can be done by BOT or by other scheme of PPP, the additional buses can be done by operator, the development of station building and fare collection can be done by partnership with private sector.

There several supported complemented service in BRT system which can very helpful to the success of BRT implementation. The integration between BRT system and other public transportation system is one significant complemented service. Because it is not easy to cover all of the city area, so the integrated with feeder system is significant to support the mode changing with other public transportation. The success of BRT can be judge by the number of the ridership of its bus services. According to Sislak (1999) the ridership of BRT is depend entirely on feeder bus and park and ride services.

Related to the feeder system, Adam and Fleming, 2005 said that the success of bus based transit systems such as Curitiba's and Ottawa's, all offer train-like trunk services on reserved corridors, along with buses which operate as feeder services in local communities, then join the transit corridor for express travel to a minimize the number of major stops. To make the BRT system more integrated, the partnership with other feeder bus system and integrated with other public mode transportation such as conventional bus service, taxi, and train and even with airport for airplane mode are very important.

And related to the park and ride facility, Levinson, Zimmerman, and Clinger (2003) state that Park and ride service should complement, not undercut BRT because adequate parking is necessary at stations along high-speed transit ways in outlying areas. Furthermore Levinson, Zimmerman, and Clinger argue that it may be desirable to limit city center parking space for employees, especially in the area where major BRT investments are in service or planned.

UK is the first country that implemented car bus-based park and ride services which began around 1970 with experiments in Oxford, Leicester and Nottingham (Parkhurst, 2000). Park and ride services can be very helpful for supporting commuter activity, because to cover all of the big settlement area by BRT or its feeder system in very hard to do. With this kind of facility, people who live far away from BRT and its feeder system can use their car and park their car in park and ride facility before they use bus transit services.

## 2.4.2 The Role of Government

Gilat and Sussman (2003) state that although the opportunities of integrated TOD with in BRT system are great, there are some serious obstacles to TOD in the developing countries, most of them are related to the institutional aspects. Furthermore Gilat and Sussman (2003) writes that the planning institutions in the developed world are less developed and have fewer resources than their counterparts, and it usually cannot afford to get much of data and information which is required to support the adequate planning process. It is important to improve the Interdisciplinary planning and metropolitan planning which are often in the poor developed. The corruption, cronyism and poor enforcement of zoning code exist; make the barrier to implemented TOD became higher (Gilat and Sussman, 2003).

According to Todd, Barth, Eichler, Daganzo, and Shaheen (2006) TOD development is a complex process which typically involving a multitude of stakeholders, such as: transit service provider and management, private developers, environmental groups, alternative transportation advocates, residential developers, private retailers, and private transportation service providers. Furthermore, Todd et al argue that most involved and interest agree that TODs can yield many benefits, including increases in transit ridership and profits to public and private partners. Related to the involvement of multitude stakeholders, the role of government in managing all involved stake holder is significant in synchronizes the TOD, PPP and BRT.

In BRT as public transport system, the role of government in implementing BRT is very determining. In almost BRT system, the role of political power or political leadership in government is needed to implement this concept. Related to the role of political leader, the key elements of the success of BRT in Bogota is government support that consists of clear political will from key decision makers and supported allocation of resources. In construct the BRT system, there are always the support from leader of government or political leader like occurred in Curitiba from Jaime Lerner as major of the Curitiba, in Bogota from Enrique Penalosa as major of Bogota and in Jakarta from Sutiyoso as Governor of Jakarta. The role of government not only important in developing this concept but also in extend this system, and make the adequate integration with other related aspect such as urban land-use, feeder system, park and ride etc.

Decision making stakeholders are involved in variety of way in every stage in BRTs implementing process which will affect the specific deployment path a particular bus rapid transit system will make (Miller, Yin, Balvanyos and Ceder, 2004). Furthermore Miller et al argue that the decision-maker is by definition major players in the political arena which govern the local jurisdictions and the commitment to BRT by every major player is crucial importance to the BRTs success.

According to Gutierrez (2005), PPPs transit system need more sophisticated public policy and management, rather than traditional transit systems. Furthermore he argues that the role of government is very important because how a weak, resource-constrained local government can deal with a demanding private sector. Gutierrez also highlighted that the political and institutional credibility is crucial, and he suggest some recommendations such as:

- Overall governmental strategy: the “City vision”
- A comprehensive investment strategy/framework
- Clear policies on transportation, urban development, and taxation
- A strong and effective regulatory body – independent and accountable to (and respected by) the public

## ***2.5 Conclusions***

Transit Oriented Development is a concept which integrated mass transportation system with urban development. With this concept, the integration and synergy of transit and urban development used as basic consideration in managing urban growth. One of the most important aspects which have to be fulfilled to implement TOD concept is the existence of extensive transit system that covers a large part of the city. Transit Oriented development can uses one of several kind of transit mode as their “backbone”.

Bus Rapid Transit has several advantage compared with other rapid transit mode such as subway, metro, rail, light rail, and mono rail. All of the advantages have described in the previous part, but I think there are several advantages of busway which is important but not included in their statement. The first, if related to the Transit Oriented Development concept, Bus Rapid Transit more suitable rather than rail transit, because BRT can have stations or shelter shorter rather than train which have limited station because it need long distance between one station to the other. With the shorter station distance, the interaction of BRT with urban development is higher than train. The second, related to the effort to push private car usage to public transportation usage, when private car stuck in the bad congestion, they can see obviously that the BRT with their own line can move without impacted by congestion which will encourage them to use BRT service.

There are a lot of public private partnership in integration and implemented transit development. The other kind of public-private partnership which interesting to be done especially when government has a certain planning and they faced the limited budget, the local government can give incentive to private sector which participated in implementation of the plan with tax reduction and permit dispensation. This kind of partnership is suitable especially for developing countries which they have a lot of nice plan but they don't have enough financial resources to implement that plan.

To implemented TOD based on BRT supported by PPP the role of government is crucial. It is needed more sophisticated public policy and management, rather than traditional transit systems. The government must play as “leader” to organize and coordinate all related stakeholders, and support by produce excellent regulation. The capable, credible and respected by public government officer is significant to deal with the role of ‘leader” above.

## **Chapter 3**

### **The Integration of Transit Oriented Developments and Bus Rapid Transit supported by Public Private Partnership in Curitiba and Bogota**

The implementation of TOD based on BRT which supported by PPP in Curitiba and Bogota can be said as two success cases which some countries try to learn from their experiences. In this chapter there will be an exploration of how those two cities develop their planning frame work to make a good integration between transportation which encourages public transit with their urban land use. Those two countries not only succeed in managed TOD and BRT but also they can encourage the private participation which will benefit the public sector because of less dependency to the public budget capability because of non subsidized public transport operation.

It is interesting to see how the concept emerge and develop from time to time, from it first implemented in Curitiba and after about two decades it implemented in Bogota. There are some improvements when it done in Bogota, because they can learn from Curitiba and make some improvement besides the adjustment to deal with different city's characteristic. Those differences can be enriching our perspectives as lesson to the TOD and BRT implementation.

Curitiba, has over the last three decades developed public transportation, implement well public-private partnership, and advance public sophisticated transport system without subsidized from local government. The long term perspectives, innovative and integrated problem solving provide the citizens much supported system which gives priority to effective public transport rather than private transport. According to (Frieberg, 2000) the user rate of public transport approximately 75% of all weekday commuters which is the highest user rates of all state capitals in Brazil.

Bogota, has solved their huge transportation problems with implement integrated BRT system which only spend very limited time from preparation until it can be operated. With encourage advance public transportation system supported by public private partnership, Bogota not only can solved their big transportation problem but also improve level of service of public transportation and more effective citizen mobility, reducing congestions, pollutions and improvement city quality of live.

#### ***3.1. Description of Study area and historical Aspects***

##### **A. CURITIBA Case:**

Curitiba is the capital of Parana province located 400 km south east of São Paulo with the total area 432 km<sup>2</sup>. Curitiba is located in 1000 meters altitude and classified as sub tropical climate. From the 1950's to the 1970, Curitiba was the fastest growing

city in Brazil. Its population in 1960's was 500.000, but recently Curitiba's population is about 1.6 million in the Curitiba city itself and 2.3 million in the metropolitan area (Cahmpbell, 2003). The dominant economic activity in Curitiba is industry and state capital activities

Brazil for about five decades, like other developing countries, has a rapid urbanization. People moved from rural area or countryside and shrinking agrarian sector for seducing hope for a better life in city or urban area (Friberg, 2000). Furthermore Friberg stated that the movement of people from rural area combined with nature growing population created city growth around five percent each year.

As a rapid growing city with growth rate about 3% per year during 1960's, Curitiba faced overwhelming transportation congestion as result of in-migration from the rural surroundings (Miller & Buckley, 2000). The Curitiba transportation condition in 60's before they implemented integration between land use and transit system was unreliable and erratic especially for their public transportation. The service coverage area of public transportation was very low, there were a lot of area was not served by public transportation because of low potential revenue.

According to Rabinovitch and Hoehn (1995) at that time, the public transportation route were set by custom and in delayed to the city growth, most of the public transportation especially buses began in city center and fanned outward which resulted in congested in city center and a lot of passenger passed through the city center even if their destination is in sub urban or down town area. Furthermore Rabinovitch and Hoehn write that uncertainty to the investment return is one significant factor which influences the little effort to improve their quality service.

Curitiba's development with its world-renowned transportation system started in the late 1960s and early 1970s. Like no other urban in developing countries, at the time, Curitiba's planners decided to address the process of transportation as an integrative approach which can guide and assist the city development and they recognized that transportation systems can serve as the backbone for the development and growth of the city for the future (Parasram, 2006).

According to Birk and Zegras (1993), Curitiba city, has consider about integrated sustainable transport concept into all of their plans for city development, road infrastructure development, and local community development and it outlined in a preliminary urban plan and Master plan in 1965. Furthermore Birk and Zegras said that the main goal of preliminary urban plan and Master plan is restricting central area growth and encouraging commercial and service sector growth along two structural north-south transport arteries, radiating out from the city center.

In the late of 1960's the government of Curitiba city started to take a significant change to their city by direct growth to enhance the urban life quality. The Curitiba had a view that land use, road network and transportation planning as key tools for directing and coordinating urban growth (Rabinovitch and Hoehn, 1995). In order to

integrate transit and land use, Curitiba's planners began with establish five arterial corridors to fan out from city central by using the existing streets and physical modification only done as minor changes. Those corridors which planned as high density pathways not only used for structuring the transportation route but also used for directing settlement growth.

The Curitiba's preliminary urban plan was conducted in 1964 by SERETE (Society of Studies and Projects), and Jorge Wilhelm-Associated Architects, and collaborate with local technicians such as Lubomir Ficinski and Jaime Lerner (Campbell, 2006). In a year there were several public debates and seminars organized with support by mayor's office and civil society to discuss of "Curitiba Tomorrow" with aims to open and transparent planning to the local population (Campbell, 2006).

The Institute of Urban Research and Planning of Curitiba (IPPUC) was playing very important role in the Master plan making processes. They play role not only as concepthor, but also as coordinator, make modification when needed, and supervise plan implementation.

## **B. BOGOTA Case:**

Bogota is the capital of Columbia which located 8.500 feet above sea level in the Andes mountains area with population about 6.5 million and about 15% of total country population. The total urbanized area is over 28.153 hectares which is most of them are plat area. With the population and total area like those, makes Bogota as the dense city, with approximately 3,717 people per km<sup>2</sup>.

The Bogota's per capita Gross Domestic Product of US\$2300, in 1999 which is 15% higher than the Columbia's national average. Bogot'a's automobile ownership rate is 110 cars/1000 residents (Ministerio de Transporte, 2002) is relatively low compared with other cities with similar size in South America. Although the comparison of car ownership is lower than other cities in South America, Bogota faced huge mobility problem, such as congestion and reliable public transportation, un-well structured public transportation service coverage etc. According to Rodr'iguez, (2003) the average speed in the peak hours in the arterial roads reduce till less than 12 km/h in 1999.

According to Leal and Bertini (2003) Bogota's transportation condition before they implemented Transit system was very bad. 95% of the road was filled by 850.00 private cars, which carrying approximately 19% of total population and almost 70% of the trip was shorter than 3 km using private car. Bus rideship was low with very low average speed for about 10 km/hr with very old bus which most of them were more than 14 years old.

The transportation system at that time was dominated by multiple private operator which depending their income from the number of busses that they have. With that

condition, the amount of the buses grows very fast for about 72% but the increasing demand was only 27% (Leal and Bertini, 2003). Besides the high gap between bus and demand growth, the growth of bus was disorganized and it show that there was a lack of control and planning in their transportation supply (Transmilenio S.A., 2000).

The other impact of unbalance of growth according to Leal and Bertini (2003) was the emerge of “the war of the cent” phenomena which it refer to aggressive war of bus drivers to get passengers as much as they can and that condition usually influence the street condition where the bus can pick passenger anywhere besides bus stations. With the low level of service of public transportation, the citizens who have their own car have no motivation altering to use public transportation rather than private car.

There are several studies conducted to find a solution to improve transportation conditions in the last few decades, almost all attempts to provide a solution related to the transportation and city’s mobility condition have failed. And in the last half decade there is an important mobility and urban development initiatives which undertaken to implement a sustainable strategy for city’s transportation system (Sandoval and Hidalgo, 2003)

In 1999, when Bogota city concerned to deal with oversupply of transit capacity, lowering vehicle speeds, bad safety and environmental conditions, they invested BRT system to their urban transport system. Furthermore the investment in BRT system was part of a broader, integrated strategy for better mobility conditions; improve access to green space and reclaims public space for pedestrians

### ***3.2 Curitiba and Bogota Transit integration with Urban Spatial Planning***

#### **3.2.1 Busway Integration in Curitiba and Bogota Master Plan**

##### **A. CURITIBA Case:**

The integration between transit and land use in Curitiba was begin when they prepared their Master plan in 1960’s. In the Master plan they used the concept of structural transport axes which ensured linear development of the city and reduce the importance of downtown area as main focus of all transport activity which can lead minimizing the congestion (Birk and Zegras, 1993). Furthermore Birk and Zegras said that the Master plan which integrate between traffic management, transportation and land are used to reach its goal, and keep the flexibility in its regulations to deal with many possibilities for future development scenarios. Related to the Curitiba’s Master plan, Campbell stated:

*“These central tenets of the Curitiba Master Plan laid the groundwork for a range of transport innovations, among them that commerce, services, and residences should expand in a linear manner from the city center along “structural axes.”.... (Campbell, 2006)*

Furthermore Campbell argues that the plan has several guidelines to:

1. Change the radial urban growth trend to a linear one by integrating the road network, transport, and land use,
2. Decongest the central business district while preserving its historic center,
3. Manage, not prevent, population growth,
4. Provide economic support to urban development, and
5. Support greater mobility by improving infrastructure.

In the concept of transportation as backbone for the city development, the backbone was combined with land use, road and transport system formed the structural axes and the road hierarchy (Friberg, 2000). The most important changes in Curitiba's transportation system were the formation of road hierarchy and land control system which occurred in 1974. According to Friberg (2000), the planning department started to build two of five arterial structural roads in coordinating with the master plan forming the structural growth corridors and directing the growth pattern of urban area.

Curitiba as primary city examples which succeed in coordinating transportation and land use planning on a city level supported by their Master plan that has a strict zoning code, it directs the growth along transit corridors and forbid high density elsewhere and apply this code as compulsory. Through Curitiba's management approach, the transportation system and land use have a stronger relation and complement each other. Their policy in directing the city growth by limiting the growth in the city center and push the growth into the corridors which called as structural sectors. Those structural sectors are also the base of transportation line especially for public transit by high speed, high capacity and direct buses. With implement this kind of policy, the influence to the condition in whole of the city was significant, especially to the congestion in city center. The crowded in city center streets was changed with the pedestrian malls in shopping areas.

In order to support the implementation of Master plan, the Curitiba local government thinks that they need an institution which can support the integration between several related aspects that crucial in master plan implementation. Respond to above considerations, in 1965 the government of Curitiba established Instituto de Pesquisa e Planejamento Urbano de Curitiba (IPPUC) as a municipal autarchy, which give it certain administrative and functional independence (Campbell, 2006). Furthermore Campbell describe that the major Ivo Arzua, in the establishment of IPPUC believing that only advisory office would not be enough to lead the reform foreseen in the plan, so the major obtained support from the association of architects, commercial associations and other related interest groups.

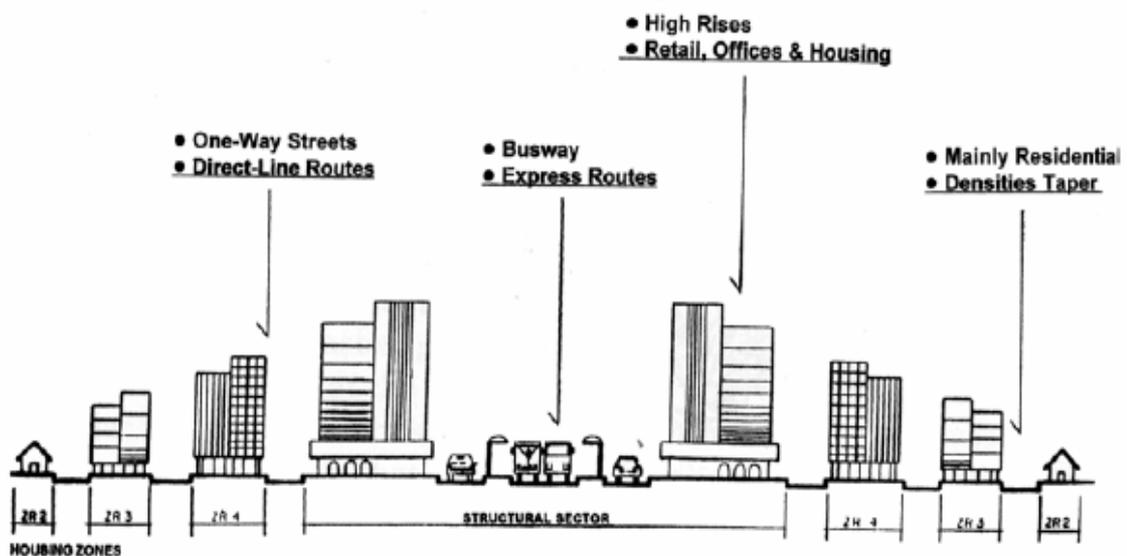
The integration between transportation and land use were applied by transportation and density controls guide development for the whole city area. Before the Curitiba developing the corridors, they strategically acquired nearby land and built low income housing (Rabinovitch and Hoehn, 1995). With those kind of effort it support low

income people/households to have low cost access to commerce, jobs, and other activity in the city. The other significant impact from that kind of integration and good intra-urban transportation is it is make the city easier to direct and locate new industries to be in industrial park in the edge of the city. With supported by good intra-urban transportation the industry activity growing well and till now it achieve approximately 20% all jobs in the city (Rabinovitch and Hoehn, 1995).

The most significant effect of TOD in Curitiba is indirect and long-term achievement of creating a transit oriented urban form where citizen use high capacity transit rather than private car (at least for working trip) although they afford or even have their own car (Gilat & Sussman, 2003). Those kinds of Curitiba’s achievements are very significant, because Curitiba is the second highest car ownership in Brazil after capital city. The other significant effects of Curitiba’s TOD is its availability to enhance accessibility by directing the city land use that the important trip destination always keep in the location near the transit line which is influence commuters decision in using transit/bus service rather than their own car.

The basic concept of integrating land use development with transit system can be drawn as figure 3.1 where the high density activity located closed to the bus way line and the density decreasing according to the distance from transit line. With this kind of concept, the service of bus way more effective because the higher density which need support high accessibilities support by high accessibilities and make the BRT line as “backbone” of city’s development structure. This concept not only has positive impact in shaping effective urban development but also support the adequate passenger to maintain the BRT system operation. The adequate potential demand for BRT passenger is an important factor to sustain bus-way operation.

Figure 3.1  
Curitiba’s transit and land use integration concept



Source: Robert Corvero in Adam and Fleming (Effective BRT Oriented 2005)

There are three basic elements which are addressed in Curitiba's master plan: transportation system, land use controls and hierarchical road network structure (Rabinovitch and Hoehn, 1995). At that time Curitiba's planners think that all of those aspects as complementary instrument in guiding city growth out of the city center into arterial growth corridors. These corridors are defined by arterial and feeder roadways, and land use control on the density. There are five structural growth corridors which used to redirect city growth. Those kinds of plan are also having purpose to support the public transit system to keep and maintaining the number of passenger which leads to public transit to be self financing. Rabinovitch and Hoehn (1995) describe that convenient transportation system and well balanced density also encourage:

- economic development by reducing the costs of mobility, trade, and exchange within the city;
- in reducing the indirect costs of other infrastructure improvements such as water, sewage, electricity, and communication; and
- in preserving historic buildings and areas in center of the city

Curitiba's bus way transit system has played an integral role to support the successfulness of articulation between an integrated land use and transport strategy (Targa, 2003). The other Curitiba's policy in supporting the integration between land use and transit is done by effective land bank generated by a failed 60m wide radial boulevard-based plan. According to Adam and Fleming (2005) the land had been acquired but not built because adequate project funds and land could be obtained until the BRT system was devised which allowed the land for faster built and integrated uses. The example of this approach is office space could have more floor space than residential because it generates higher trip in that transit line. Adam and Fleming (2005) furthermore said that Curitiba also activating commercial uses which unregulated on those two floors for all kind of development as such provide access corridors and convenience circumstances for walk and wait the transit service.

## **B. BOGOTA Case:**

The integration between transits in Bogota is not done as well as it done in Curitiba, because the starting point of Curitiba was a comprehensive Master plan. But in Bogota the starting point of the implementation of BRT was the improvement of bad condition of urban transit system. But with Bogota implement BRT system, the city development has been changed, there is a lot of improvement condition especially in the city center which in the previous condition is in the bad condition.

According to Wright and Montezuma, 2004 related to the integration between transport and urban land use said that city living condition and urban mobility hardly ever succeed by using a single project approach or only focus on a single transport mode. Furthermore Wright and Montezuma (2004) write that Bogota achieved succeed in synergies city element by addressing several topics, such as:

1. Reclamation of public space
2. Improvement of public transport
3. Promotion of non-motorized transport
4. Implementation of auto restriction measures

With the synchronize transport and land use, there are significant improvement in city quality of live such as improvement pedestrian facility (by closed some street), better public space (like parks, plazas and commercial area) which are taking place from changing parking area.

To establish TOD with bus as their main transit system, Bogota was reclaiming their public space. According to Wright (2004) in the reclamation, they focused on several elements: new infrastructure development; beautification and enforcement of usage restrictions. Those kinds of betterment include the improvement of sidewalks, parks, plazas, and commercial areas. This kind of improvement will support public transportation, because the development of public transportation will not succeed without supported by other city infrastructure and facilities

### **3.2.2 Metropolitan Coordination Issues**

#### **A. CURITIBA Case:**

Curitiba as capital of Parana Province, have a significant spatial impact to the surrounding area and forming metropolitan Curitiba. The interaction between Curitiba and surrounding area can not be separated by its administrative boundary. The interaction is occurred among Curitiba as economic and activities center while surrounding area as housing area and other supported activity. Curitiba metropolitan region consists of 26 municipalities and according to 2005 census have total population of 3.2 million (Wikipedia, 2006).

The BRT system in Curitiba is done with link to this high interaction between Curitiba and its surrounding area in the metropolitan area. Some corridors were support the commuting activity from surrounding Curitiba area. To achieve the good integration between Curitiba and surrounding area, Curitiba make an integration of their transport system that make the system can be match.

#### **B. BOGOTA Case:**

Bogota as capital city of Columbia can not separated their transport and land use planning with it surrounding cities. The high interaction between Bogota and its surrounding area form Bogota metropolitan area which consists of several cities. In the first year their operation, TransMilenio have serve about five millions commuters and resident of the metropolitan region (Wynne, 2003).

The TransMilenio not only carries citizen of Bogota but also carrying commuters from other city surrounding in Bogota Metropolitan area. Because metropolitan issue with its commuting phenomena is important in Bogota, the BRT system in developing their system consider about integration with surrounding area. To make the comprehensive BRT system which cross border services, the coordination among related local government must be done properly.

### **3.2.3 Involvement non public sector in Urban Planning**

#### **A. CURITIBA Case:**

In coordination transit and spatial land use, Curitiba involved non public sector in their master plan. The involvement of private sector was done by involve them in the earlier phase (planning) of integrated transit and spatial land use . There are many innovations which integrated transit and land use that involved non public sector where public transport system relies on public-private partnership which not only shares rewards but also risks (Campbell, 2006). The Curitiba innovation required involvement and support from public sector. Public consultations take place to promote the central area for pedestrian usage.

When implemented their new concept Curitiba not use top-down but bottom-up approach led by Lerner as their mayor. This approach was followed by all mayors after Lerner who worked with in intensive partnership with private companies, NGO's, neighborhood and community groups or in the other word with all of involved stakeholders. The continuity of interconnected between public and non public sector suporttiing solutions which lead to be more communicative planning. Beside high intensive partnership with non public sector, Curitiba establishes public debate and discussion with widespread participation which lead to a broad consensus. By implementation consensus planning, there are a lot of the innovative ideas and concept comes from its citizens by this process. And the other significant advantages from reaching consensus by wide participation is the solution from their discussion can be realized rapidly and highly successful because of full support from involved stake holder.

In Curitiba, the partnership between government and private or business has been highly effective, and it's supported by positive action by civic practice. Developers and investor receive a tax reduction when they built a project which supports the government planning concept. The property owner within heritage or historic area can transfer the building potential of their site to other part of the city. It is a win-win solution where the historic area can be preserved and the owner receipt adequate compensation. When municipality design the area of the city, businesses or private sector can "buy" up two extra floors from its normal legal limit and can pay by land or in cash, where those cash or land can be uses for low-income housing.

## **B. BOGOTA Case:**

Bogota, in coordination transit and spatial land use, involved non public sector in their master plan. The involvement of private sector was done by invite them from the earlier stage, so they can give significant support and advice to the public sector.

In BRT Bogota project the private sector involvement not only done in the system operation but also in the planning and design of the system. From the early stage at the beginning of the BRT establishment the private company which provided service in transit in this city was given opportunity to become the operator of new transit system. This offer to private operator was done with explain them the opportunity and advantage if they participated and that will be eliminated protest and work stoppage from them. The private operator experiences in operating the buses was recognize as one key success factor which support the implementation BRT in Bogota.

The BRT project was planned, designed and also constructed by the cooperation between local and international company and it takes about 18 months to fulfill the preliminary study until conducted the detail plan of the Bogota BRT system. The other BRT experience such as Curitiba, Sao Paulo, Santiago and other BRT in South America's city was very helpful when they identified key elements in planning process and in designing the system.

### ***3.3 Curitiba and Bogota BRT***

#### **3.3.1 BRT Implementation**

##### **A. CURITIBA Case:**

Curitiba chooses bus as their transit system and as its primary means of public transport not only because it was the choice of transport in the past but also the most effective means of transport (Friberg, 2000). Before they decided to choose bus, the Instituto de Pesquisa e Planejamento Urbano de Curitiba (IPPUC) as the institution that responsible for planning the implementation of Curitiba's master plan, had calculated that the bi-articulated bus in BRT system as it is developed in Curitiba spent cost about 3 million USD/km to construct compared to tram system which need about 8–12 million and around 50–100 million USD/km for a Subway (Friberg, 2000).

The Curitiba's BRT system was started to operate in 1972 which have several features such as separated line, fare collection, signal priority, and high frequency service to maintain high quality Metro-like service. For more than three decades, Curitiba has been succeeding to incrementally expand and upgrade their system related to finances availability and demand condition.

Nowadays, Curitiba's BRT system was used by about 75% of all of commuter although Curitiba is the city with the highest car ownership rate in Brazil. The total BRT networks lines in Curitiba is about 58 km for express bus lane, 270 km for feeder bus routes, and 185 km for inter-district routes with approximate used by 1.9 citizen trips every day (city of Curitiba in Wright, 2001).

There are ten private companies which provide all public transit in Curitiba and paid by the distance that they traveled and they can earn an operating profit. The payment by their distance is done to make a balanced bus route distribution between potential and un-potential line (avoiding the un-potential line un-served).

Although the operating of bus was the rule of involved private operator, but the local government supports them by pay the company about 1 percent of the bus each month. The older buses or more than 4 years are taken control by local city government and using them as transportation from or to park facility and it can be use for mobile schools.

According to Campbell (2006) there are four main stages in Curitiba's BRT implementation related to the TOD implementation such as:

1. Establishing Rudiments of Urban Form: 1967–1972
2. Structuring the Transport System: 1972–1983
3. From Broad Strategy to Contraction: Inflation and Social Issue 1983–1989
4. Revival and New Powers. Surface Metro and Consolidation of the Social Sector; 1989–1994

## **B. BOGOTA Case:**

For almost two decades, Colombian government searches an adequate concept for better transportation system in Bogota. There were a lot of possibility was studied or even being implemented. LRT concept was discussed but never being implemented because of its high cost, and complaint from existing private company which operated public transportation system. According to Leal and Bertini (2003), in 1998 Bogota stated a mobility strategy with the purpose of overcome transportation problems. Furthermore Leal and Bertini write that mobility strategy was beginning with implemented some strategy in reducing congestion such as decreasing 40% cars used in peak hour by number restrictions, bikeway network realization, improvement pedestrian path and the last is the establishment of BRT system.

From its blueprint concept until it can be operated and ready to serve about five millions citizen, BRT system of Bogota need three years only. The first stage of Bogota BRT system was planned in 1998, which is conducted from 1999 to 2000. The bus operation was started in December 2000 just for only two corridors.

With the affordable flat rate (1000 Col pesos in 2003 or equivalent with 0,36 US\$ at that time), the return cost recovery is enough for private company to participate in BRT system with sufficient profit (Gomez, 2004). The low rate which affordable for Bogota citizen makes the ridership very high, approximately it can service 800.00 one-way trip each day over 42.5 km (Gomez, 2004). According to International Energy Agency, 2002, The Bogota's Trans Milenio effectively carries more passengers than the other mass transport system in many large cities in the world.

With the purpose of achieving good urban transit system, the infrastructure, management, control and planning are handled by a new transit authority and for fare collection and operation systems are handled by private company (Leal and Bertini, 2003). In October 1999 Bogota established TransMilenio S.A with the task to manage, control and plan the system which is supported by 3% of fare revenue and other activities such as commercial advertising (Hidalgo and Sandoval, 2001).

Bogota established BRT system with its infrastructure by financing from fuel tax, local revenue, and support from World Bank by a credit and grants from national government.

The infrastructure which is needed to support the new transit system was built by local private contractor with the supervision by Institute of Urban Development (Instituto de Desarrollo Urbano, IDU). The new infrastructure which was constructed: 35 km busway line with its complementary lanes, 4 terminals, 4 parking and maintenance place, 58 stations, 17 pedestrian overpasses, plazas, sidewalks, built or fixing 126 km of road which is used by feeder system (Leal and Bertini, 2003). Those entire infrastructure finished constructed in about 24 months and estimated about 17.000 people are involved in the project. And the Bogota's BRT which is called TransMilenio was started to operate on 18<sup>th</sup> of December 2000.

The cost composition for Bogota's BRT can be seen in table bellow:

Table 3.1  
Bogota BRT Cost Composition

Component	Total Cost (US \$ million)	Cost/km (US \$ million)
Trunk Lines	94.7	2..5
Stations	29.2	0.8
Terminal	14.9	0.4
Pedestrian overpasses	16.1	0.4
Bus depots	15.2	0.4
Control centre	4.3	0.1
Other	25.7	0.7
TOTAL	198.8	5.3

Sources: Lloyd Wright, GTZ, 2004

### 3.3.2 Extension Coverage Area

#### A. CURITIBA Case:

As a backbone in integrated TOD, the full coverage of BRT system in Curitiba is very essential. Curitiba needs more than 30 years to achieve full BRT system which integrated with feeder, park facility and other adequate support facilities. There are two important factors in the effort of to have full BRT with the service which cover all area of the city; the first is infrastructure and the second is operational factor.

High development cost is the major handicaps to implement fully integrated TOD with BRT as backbone. That condition even occurred in the city in developed countries and for city in developing countries the condition is often worse. Curitiba as city in developing country face this obstacle by improves the partnership with private sector. Public sector is responsible for provide infrastructure and private sector is focus on the operational side.

Curitiba transit system has expanded and upgrades their system incrementally for more than thirty years. Besides consider the demand condition of bus services, the expansion and upgrading of the system consider about the finance availability. The role of partnership between public and private is very significant in expansion the ridership and capacity of transit system. Approximately the Bus transit system carried only 54.000 passengers each day in 1974 increase to about 400.000 in 1982. Nowadays with the significant improvement such as: route extensions, vehicle improvement, fare collection, and distribution, until it can serve approximately 1.000.000 passengers each day.

#### B. BOGOTA Case:

The Bogota's BRT system was done step by step beginning from 2000 and it planned to be full system in 2018. Although it still not cover al the planned area, but the impact of the BRT system to the city mobility is very significant.

The stage of enlargement the catchments service area for Bogota TranMilenio can be seen in table below. The full BRT coverage service area calculated need by support of 388.9 km and for 2005 it only fulfilled about 30%, but the impact to the city transportation as a whole is very significant.

Table 3.2  
Bogota's BRT Development Plan

Year	Km of Busway expected
2005	130.4
2010	252.6
2015	384.3
2018	388.9

Sources: T. Leal and Bertini (2003)

Bogota's BRT system was planned as a fully-integrated network system which have the same characteristics with those that Curitiba's have except for the land-use control policies and park and ride facilities for stations located in the outside of urban core area (Targa, 2003). Furthermore Targa (2003) argue that the lack of supportive land-use policies both in planning and implementation process has been a consequence of the inadequate study related to the usefulness of BRT in shaping urban form, because of high density and administrative responsibilities which involved different institutional unit.

According to Hidalgo, the Bogota BRT system divides in two phases:

1. First phase

The first phase includes three trunks corridors covering 41 Km, 7 feeder zones with routes covering 309 km. The BRT system was supported by 4 terminals, 4 intermediate integrated stations and 53 standard stations (Hidalgo). In the broader scope, related facilities, to support the transit system with TOD concept, there were constructed 27 pedestrian overpasses, plaza and sidewalks.

2. Second phase

The second phase implementation began in 2002 operated in November 2003, and expected to be completed in 2005. The second phase includes three corridors with exclusive lanes for length about 40 km. Compare with the first phase, there is several quality improvement such as improvement in contract, in pedestrian bike ways facilities, and land acquisition. But on the other hand as consequences the cost was increase form US\$5.1 million to US\$7.5. The infrastructure costs were covered by local revenue from gasoline tax and national grants.

Learning from experiences in first phase, Bogota transit system make some significant improvement related to the relation between public and private in their second phase which is introduce some new concept such as (Hidalgo). Related to the relation between public and private in Bogota transit system according to experiences in first phase, there are some modifications and introduce some new concept such as (Hidalgo):

- Responsibility to cover cleaning and safety of the new stations assigned to new trunk line operators
- More participation of the local authority in the system revenues
- Incentives to include owners of 1 or 2 buses as shareholders of the trunk line operator companies with a minimum of 10% of the shares (points were awarded to those that increase the offering, resulting in 21% owners participation and close to 4,000 shareholders).
- Requirement to scrap at least 6 obsolete buses to introduce each new articulated bus (points were awarded to those that increase the number of buses scrapped, resulting in a 7.1 new bus to old buses replacement ratio).



- c. Define capacity and schedules
- d. Regulated and control bus system
- e. Collection all fare.

Related to 16 operator companies, the choosing operator is not doing by tender process and contracts are rolled over by negotiation on their expiration.

#### **BOGOTA Case:**

Bogota local government establishes TransMilenio SA as public company which has duties to oversee operations and work out issues of expansion and maintenance. TransMilenio S.A is not a big structure, and its operation funded from BRT system itself. TransMilenio receive 3 percent of the ticket sales and other related activities.

There are four companies under TransMilenio SA supervision as the main lines operators: Metrobus, Integrated Transportation System SI-99, International Consortium for Massive Transportation, and Future Express. The feeder system consists of three companies involved: Codatermil, Sidauto S.A. and Uribe Consortium. For development of Bogota BRT which needs a lot of fund, investment comes from five public institutions or entities and one of them are Bogota Mayor's office.

To maintain the service quality, TransMilenio state regulation which must be followed by the private company operated and invite comment from passengers by use the suggestion boxes in order to improve the service quality and as a good feed back of their operation.

### **3.3.4 Feeder System**

Both Curitiba and Bogota implement 'closed' system where passengers only have to pay only when they want to enter an enclosed bus stop and they can board and alight from buses quickly and transfer to other bus at the same station without pay again (Hook, 2005). In the closed system, it is easy to modify or change contract and regulatory structure in the system with no change of the outside the system. On the other hand the closed system required the integrated and advance management among BRT system itself and feeder system. Besides, it usually had been done at the same time with the reconfiguration of bus routes in the corridor from direct services toward 'trunk and feeder' services (Hook, 2005).

#### **A.CURITIBA case:**

The Curitiba BRT system was managed and supervised by URBS. The existence of feeder system is one significant factor which supports the entire BRT system and contributes to the success of Curitiba BRT. The feeder bus mix with traffic on all city

roads (not on the specific lines) bring passengers to the transfer station which called “District Terminals” before continuing use BRT service.

#### **B. BOGOTA case:**

The BRT services can not be separated with its feeder system. The success of BRT system is influenced by the integration between BRT with its feeder system. To coordinate the BRT with its feeder system, Bogota done by integrate BRT service with feeder network especially in periphery areas, using flat fare and integration infrastructure in transitional and terminal points (Hidalgo, 2003).

### **3.3.5 Pedestrian**

#### **A. CURITIBA Case:**

Curitiba concern to the pedestrian facility and develop its first central pedestrian mall in 1972. The pedestrian have been a focus of Curitiba to support their public transportation system besides the idea of the three main axis, minimum density requirement (Ziemann, 2006)

Curitiba was one of the first city in the world which have pedestrian area by establish historic boulevard the Rua Quinze de Novembro, which converted virtually overnight to become a pedestrian area. This street was closed on Friday night until Sunday night for about 48 hours, and has function as pedestrian area; this regulation is one of the first in the world.

#### **B. BOGOTA Case:**

According to Wright and Montezuma 2004, Bogota has the longest pedestrian corridor in the world, which consists of 17 km which is called “Alameda Porvenir”. This long pedestrian connects several low income houses to the shopping area, employment and public service. Beside construct pedestrian corridors, Bogota also constructs a world class bicycle network with total 260 km. Pedestrian corridors and bicycle paths are factors which supported in integrated public transportation which use BRT as a main public transportation service.

Bogota included the development their BRT system with its pedestrian development. This integrated development make the development of pedestrian space facility such as convenience sidewalks, plaza, and even the trees planting which really integrated to make the higher attraction of private car user to switch using public transit. The Bogota government includes the development of adequate pedestrian facilities in their BRT cost which make cost per km of BRT trunks higher than Curitiba and Jakarta. The average cost for each km of Bogota BRT is 5 million \$ US, while Curitiba is 2 million and Jakarta 1 million for each km.

Bogota's planning BRT system realized that the development of BRT must be supported by the convenience circumstance for people use that system which can not be separated with pedestrian facility because people go from house to their destination using pedestrian. This kind of integration makes the changing environment of Bogota city very significant and can be seen obviously in the short time, and supported much to the successes of Bogota's BRT system as a whole. Plazas, sidewalk is developed not only to support pedestrian but also improve the bicycle access (Hidalgo, 2002).

Realized that Bogota have tropical climate which the sun shine usually make the people not convenience to walk in open space, Bogota included the planting the trees to make shady condition from sun for people walking in the side walks and other pedestrian facilities. The cost of planting tree was included in BRT system cost.

### **4.3.5 Parking Facility**

In the concept of push and pull approach for the better urban transport with dominated by public rather than private car, parking play an important role. Parking policy can be used as supported tool to push private car usage to public, by parking control and pricing in the city center which can be used to improve the public space and pedestrian. .

#### **A. CURITIBA Case:**

To support the role of BRT as back bone in TOD in Curitiba, the role of complemented service such as parking facilities and convenient pedestrian, is important. Besides the integrated with feeder system, Curitiba also prepare with adequate park facility. Because there are a lot of commuters who live outside of BRT and feeder coverage service, who have to use their car, they can park their car to continue their trip to work by BRT. The parking supply and control has a significant impact to support commuters to work by bus besides the fact that Curitiba success in direct and control the city growth. There is a park and ride facility in Curitiba BRT system to deal with commuters who live far away from BRT and feeder system to use their car from home and park their car before using transit system.

In Curitiba transit system and city management, parking policies have significant influence in shaping travel demand, especially trip to and from central city area. The limited roadside parking in central area was changing by off street parking. Off-street parking in central city become more expensive and will influence the passenger to choose the public transportation.

The most determinant factor in parking management in Curitiba may be public policy in parking supply and price. The Municipal of Curitiba was setting minimum parking requirement by Decree 582 in 1990.

## **B. BOGOTA Case:**

To support citizen to use public transportation rather than private car, Bogota integrates parking facilities for car. This effort was done by give incentives to provide off-road parking area to the private sector (Hidalgo, 2003). This incentives is supported by create the Parking Master plan. Bogota has a concept to provide the passengers with park and ride services to especially to support passengers who stay faraway from trunk line of BRT service. The existence of park and ride is included in their extension of BRT coverage area.

### ***4.4 Public Private Partnership***

Both BRT system in Curitiba and Bogotá, are operated by partnership between public and private companies which all of the system controlled and supervised by the corporation of public transportation. With that kind of partnership, managerial and organizational setting, it is possible for the BRT system to be come as a financially self-sustaining with no subsidized from public sector for its operation. By the good management and institutional arrangement, BRT systems in both cities not only unnecessary supported subsidies from the government but also it's actually making profit.

## **A. CURITIBA Case:**

To keep the bus in the good condition municipal establish law which states that the busses can not older than 10 years. With the fresh bus condition it will help to keep the pollution from bus low. In the Curitiba BRT system with municipality control of the service quality, there are ensured that the bus route were sufficiently profitable give the private operator conducive circumstances to make investment in modern buses. And in the long term make Curitiba's private bus operator finance providing the buses.

In Curitiba BRT system, the bus operator responsible for the station maintenance and cost of it was covered by fare box revenue. Because there are many private operators, while trunk lines were added the system, the free transfers among different trunk lines operated by various companies introduced in 1979. The various conditions, where a certain lines more benefited than others as result from free transfer system, the Municipality and bus operators make an agreement to set a compensation fund to compensate the losers and URBS as institution which have authorities in BRT system management have authority to manage the compensate to the losers. Those system was implemented until 1987, the new fare system change the direct collection of the fare by private operator and take over by the URBS.

## **B. BOGOTA Case:**

The BRT in Bogota or Trans Mlienio is a transit system which operated by public-private partnership system, its designed to be operated by private company under government supervision. This Trans Milenio operated without any subsidy from public authorities and prepared to be fully recovery by its operation fare. The concept of partnership is the public provide the infrastructure and the private provide buses operation.

The private operation company allowed enhancing revenue from expanding and increasing passenger ridership. But on the other hand the private bus operators also require facing the increasing cost and the demand declines and must deal with risk and lose. That kind of scheme encourage the private bus operator not only operated their buses but also always keep their operation effective and efficient to deal with risk and loses and always improve their service that will lead to increase passenger and revenue. The public authorities such as local governments and national government are only deal with capital investments.

It can be implemented successfully because of well public-private partnership, where the government funding for infrastructure and overseeing long term planning functions, and private sector play role in operation of a handful of BRT lines on cost-plus basis. The extension of the system was planned will be done in next 13 years, when all of corridors (about 388 km) in all of the system will be fulfilled and expected to service 85% of the city daily trip (Hidalgo,2003)

In Bogota BRT system the private operator are required to absorb the risk and losses, if the cost increase and the demand decrease while the local government only covering capital investment. Private operators handle system operation, following the strict quality standard which set by concession contracts with centralized control. TransMilenio operators are consortium of traditional local transport operators, associated with national and international investor which have busses, hire drivers and maintenance personnel. The concession award by open bidding mechanism and payment for each operator is based on the kilometers that they operate. Besides pay by kilometer operated, the management also implement penalties and bonuses which positive incentive to keep the quality good and encourage private operator to improve their performance.

### ***4.5 The Role of Government***

Because TOD is a long term-term policy and can not be resulted in the short time, the role of government to sustain the policy from one political leader to the next political leader is very important. The changes of planning culture must be support by the political leader.

The development of a TOD based on BRT involved the broad institution and many actors which are need an adequate coordinator to managing them to be inline and support its implementation. In every stage's decision-making of TOD and BRT development involved various stake holder in a variety ways. According to Miller and Buckley (2000) the major players in the political arena that govern the local jurisdictions in which the Bus operated play role as key decision-makers. Their commitment as major player is a crucial factor in the success of a BRT system.

Related to the push and pull approach, the role of government with its leadership is determining. Only government can do two side of the approach with high synergy. If they only focused on the push factor without following by the adequate pull factors, sustainable transport development will not be achieved. In this BRT case, the push factor (get citizen out of their cars) such as parking policy must be followed by improvement public transit service as pull factor (get citizen using public transportation) and in the contrary.

#### **A. CURITIBA Case:**

The role of Curitiba's government in developing the integrated system between transportation and land use which encouraging PPP is very significant. This policy was beginning when the major of the city have a strong vision for the future and they cooperative with University with have a strong knowledge and scientific base. Without strong will and political power from political leader like Learner the implementation of this kind of policy is almost invisible to be done.

In Curitiba's case, after Learner's era as the mayor, the next mayor still consistent to improve the integration transit (BRT) and land use. This kind of political consistency capability make Curitiba become a famous example for integrating transit especially BRT with urban land use. There is a planning culture changing related to the integrated approach in Curitiba. The interdisciplinary planning with other related aspects becomes more crucial. Planning institution plays a critical role and need to be managed by adequate and credible leadership.

According to Rabinovitch and Hoehn (1995), political will and political skill were essential aspects in initiating the practical steps in the Curitiba's transportation system plan implementation. Furthermore Rabinovitch and Hoehn said that official and government employee had to adjust each of elements of the plan and even re-setting them in order to translate two dimensional planning concepts to the three dimensional and to implement the idea or concept to the real world which led to a practical planning process. The role of official and government employee who involved in this planning process, bridging the concept and reality gaps, and until implementation process is very crucial.

## B. BOGOTA case:

Similar to the condition in Curitiba, the role of political leader and political will is very crucial in the Bogota transit system establishment. There are a lot of political leaders who benefited Bogota with their good progressive and long term view on the urban space importance. According to Wright (2004) the high level of political will contributed significantly to the spectacular changes in Bogota, such as: reclamation of public space; improvement of public transport; promotion of non-motorized transport; and, implementation of auto restriction measures.

Bogota has achieved successes in improving the urban mobility, public service, and public space. The significant improvement is can be seen obviously in the 1998-2000, in the era of Mayor Enrique Penalosa but some of the measure were supported by some action and policy which was taken in the previous administration era such as Mayor Jaime Castro (1992-1994) and Mayor Atanas Mockus (1995-1997, 2001-2003) (Wright, 2004). Furthermore Wright (2004) concluded that Bogotá's success can be credited as an outstanding chain of policy continuity which supported an enhanced urban environment across multiple political administrations.

Bogota government have a strong and clear vision that within 15 years, most resident will live within at least 500 meters from rapid line where in this cases using BRT (Hoffman, 2005). That vision can be achieved about 100 years if they using metro for their rapid transit system.

## 4.6 Conclusions

From previous elaboration about Transit Oriented Development based on Bus Rapid Transit in Curitiba and Bogota, it can be summarized in table bellow:

Aspects	Curitiba	Bogota
<b>Transit integration with Spatial Planning</b>		
Busway Integration in Master Plan	<ul style="list-style-type: none"> <li>• Already planned in Master plan before BRT implementation</li> <li>• consider integrated sustainable transport concept into all of their plans for city development, road infrastructure development, and local community development and it outlined in a preliminary urban plan and Master plan</li> <li>• Clear concept of integration</li> <li>• Changing radial to linear urban growth (push urban growth into corridors called structural sector)</li> <li>• Strict zoning code</li> </ul>	<ul style="list-style-type: none"> <li>• Addressing several topics:               <ol style="list-style-type: none"> <li>1. Reclamation of public space</li> <li>2. Improvement of public transport</li> <li>3. Promotion of non-motorized transport</li> <li>4. Implementation of auto restriction measures</li> </ol> </li> </ul>

	<ul style="list-style-type: none"> <li>• Establish institution to coordinate related aspects in the master plan implementation</li> <li>• Supported by land bank</li> <li>• Cooperated with university in develop strong concept</li> </ul>	
Metropolitan Coordination Issues	Integrated	Integrated
Involvement non public sector	<ul style="list-style-type: none"> <li>• Involved in early stage of Master plan preparation</li> <li>• Support by public consultation</li> <li>• bottom-up approach</li> <li>• communicative &amp; consensus planning</li> <li>• Developers and investor receive a tax reduction when they built a project which supports the government planning concept</li> <li>• University play role as conceceptor, coordinator, make modification when needed, and supervise plan implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• Involved in early stage</li> <li>• Involved in operation, planning and design</li> </ul>
<b>Curitiba &amp; Bogota BRT</b>		
BRT Implementation	<ul style="list-style-type: none"> <li>• Started operated in 1972</li> <li>• Support about 75% commuter</li> <li>• 10 private operators</li> <li>• 58 km bus line</li> <li>• 185 km feeder line</li> <li>• 3 million US \$/km</li> </ul>	<ul style="list-style-type: none"> <li>• Started operated in 2000</li> <li>• The transport system which most passengers carrier in the world</li> <li>• BRT Infrastructure financing by fuel tax</li> <li>• 4 private operators</li> <li>• 35 km bus line</li> <li>• 5.3 million US \$/km</li> </ul>
Extension Coverage Area	<ul style="list-style-type: none"> <li>• Need more 30 years to complete the system</li> <li>• Separated infrastructure and operation investment (public for infrastructure &amp; private for busses)</li> <li>• Intensive public private partnership</li> <li>• Expanded incrementally</li> </ul>	<ul style="list-style-type: none"> <li>• Need about 18 years to complete the system</li> <li>• Separated infrastructure and operation investment (public for infrastructure &amp; private for busses)</li> <li>• Intensive public private partnership</li> </ul>
Institutional & Organization of BRT	<ul style="list-style-type: none"> <li>• BRT managed by URBS a state owned company in 1963</li> <li>• URBS managing and coordinating the private company involved</li> <li>• Private operator paid by km operation</li> <li>• Operated self-financing without government subsidies.</li> <li>• Fare stated by URBS</li> <li>• URBS as BRT agency also control taxis, parking, bus terminals and shopping and markets</li> </ul>	<ul style="list-style-type: none"> <li>• BRT managed by TransMilenio a state owned company in 1963</li> <li>• TransMilenio managing and coordinating the private company involved</li> <li>• Private operator paid by km operation</li> <li>• Operated self-financing without government subsidies.</li> <li>• Suggestion box as feedback, quality control and improve the service.</li> </ul>
Feeder System	<ul style="list-style-type: none"> <li>• Implement 'closed' system</li> <li>• Once pay for passenger to use BRT and its feeder service</li> </ul>	<ul style="list-style-type: none"> <li>• Implement 'closed' system</li> <li>• Once pay for passenger to use BRT and its feeder service</li> <li>• Flat fare</li> </ul>
Pedestrian	<ul style="list-style-type: none"> <li>• As focus in supporting public transportation</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated development with BRT and bicycle path</li> </ul>

	<ul style="list-style-type: none"> <li>• The first in the world that regulate certain street which closed in the certain day to be used as pedestrian</li> </ul>	<ul style="list-style-type: none"> <li>• Included pedestrian development cost in BRT development cost</li> <li>• Has the longest pedestrian in the world</li> <li>• The shady tree planting included in BRT development cost to support pedestrian activities</li> </ul>
Parking Facility	<ul style="list-style-type: none"> <li>• Provide park &amp; ride service</li> <li>• The limited roadside parking in central area</li> <li>• public policy in parking supply and price</li> </ul>	<ul style="list-style-type: none"> <li>• Provide park &amp; ride service in their extension system</li> <li>• incentives to provide off-road parking area to the private sector</li> <li>• create the Parking Master plan</li> </ul>
<b>Public Private Partnership</b>	<ul style="list-style-type: none"> <li>• The concept of partnership is the public provide the infrastructure and the private provide buses operation</li> <li>• bus operator responsible for the station maintenance</li> <li>• the Municipality and bus operators make an agreement to set a compensation fund to compensate the losers in closed system</li> <li>• direct collection of the fare by private operator take over by the URBS</li> </ul>	<ul style="list-style-type: none"> <li>• its designed to be operated by private company under government supervision</li> <li>• The concept of partnership is the public provide the infrastructure and the private provide buses operation</li> <li>• The private operation company allowed enhancing revenue from expanding and increasing passenger ridership</li> <li>• the private bus operators also require facing the increasing cost and the demand declines and must deal with risk and lose</li> <li>• Private operators handle system operation, following the strict quality standard which set by concession contracts with centralized control.</li> <li>• Besides pay by kilometer operated, also implement penalties and bonuses which positive incentive to keep the quality good and encourage private operator to improve their performance</li> </ul>
<b>The Role of Government</b>	<ul style="list-style-type: none"> <li>• strong vision for the future</li> <li>• intensive cooperation with university</li> <li>• Strong political will, leadership and political skill</li> <li>• Planning institution plays a critical role and need to be managed by adequate and credible leadership</li> </ul>	<ul style="list-style-type: none"> <li>• Strong vision for the future (within 15 years most resident will live within 500 m from rapid line.</li> <li>• Strong political will, leadership and political skill</li> <li>• outstanding chain of policy continuity</li> </ul>

## **Chapter 4**

### **Jakarta Conditions and what can be learn from Curitiba and Bogota**

#### ***4.1. The Study Area Description and Historical Aspects of Jakarta***

Jakarta is the capital of Indonesia located in the north-west corner of Java Island with the total area about 650 km<sup>2</sup>. Jakarta is a rapid growing city with the population about 10 million. The development in Jakarta make his city shown sign as “modern” city with its high-rise buildings, substantial infrastructure such as highway with a large number of private cars and motorbikes. According to Fulton and Susantono (2002), the car ownership is about 10% of population which is has more cars than Manila and more motorized vehicles than Singapore.

Jakarta relies on its public transport to the highway-based public transport system such as bus system since long time ago but the operation system has been overlooked by the government with the tendency to adopt highway intensive provision (Fulton and Susantono, 2002). That tendency has an impact to the high usage of private car and with the consequence public transportation which almost neglected. Related to that condition, that public sector contribution is very low in this sector, private sector feel that as positive condition which lead them to take this opportunity to provide this kind of service which in the long term play as dominant role in providing service of public transport service. According to Fulton and Susantono (2002) the modal share of public transport has been declining for the last 30 years from 61% to 49%.

Jakarta BRT system which called Trans Jakarta was planned with fund from DKI Jakarta and supported by US AID funds to ITDP in reviewing the plan by international consultants. The total amount fund for planning and detail engineering for the whole system was about \$1,000,000.

The previous bus system in Jakarta uses system that called “quantity licensing”, basically route licenses granted by Jakarta government to many different operator but supported by adequate coordination on each route. The un-coordination between same route make the service coverage seem not balance and not well distributed, there are a lot of overlapping service in a certain corridors but on the other hand there are a lot of corridor with un-adequate service. The licenses which are granted from government only stated fleet size not regulate quality of service aspects such as safety, reliability and bus frequency.

The decentralized of Indonesian governance style has give local government power and authority to managed their administration area. Those conditions make transportation improvement not too depend on the national government.

In the last 30 years, the modal share of public transport in Jakarta has been reducing from 61% to 49%, the fleet number is much less than the captive demand, the fleet quality were poor, and there are a lot of competing route between modes (Alvinsyah, Soehodho, and Naingolan 2005). The government concerns in improving public transportation seem not serious and they don't have significant concept and good action plan to deal with low level of transportation service quality. There are not clear plan to prepare or provide a good network system plan, strict enforcement, guideline of standard level and other related aspects to keep a good service (Alvinsyah, Soehodho, and Naingolan 2005)

The Jakarta's government concern to the bus has been the main consideration as city public transportation since the early of 70's by attention of Jakarta to enlarge the bus fleet in its First Five Years Plan (1969-1974). The framework for urban transport policy at that time which stated in Jakarta Transport Plan was composed by four tiers system which consist of electric trains, buses, taxi and other small motorized vehicle such as bajaj. The role of public sector in public transport serviced with PPD (Perusahaan Pengangkutan Djakarta) was dominated until in the middle of 70's which began with under the USAID program allocated 2000 Dodge buses to ten new privates bus companies (Dick, 1981). Those ten private companies were given franchised monopolies on particular routes. The role of private companies was decline in the end of 70's because most of them can not manage and operate well related to the ageing vehicle and low regulated fares. In 1979, related to the collapse many of them which influence the repay credits on the old vehicle and bad service standard, the PPD taken over the management of eight from twelve private companies.

According to Rini (2003) the Jakarta's vehicle growth is about 10% but on the other side, the road infrastructure growth is only 1%, the worst congestion will be occurred unless there is significant integrated concept to encourage public transportation service and usage rather than private car usage.

From studied done by JICA which called Sitramp in 2000, the total passenger trip are 16 million person-trip per day, where 25% of them are commuter trip from surrounding area called Botabek (Bogor, Tangerang and Bekasi). The percentage of public and private usage are 50.7% by public transportation and 49.3% are private usage.

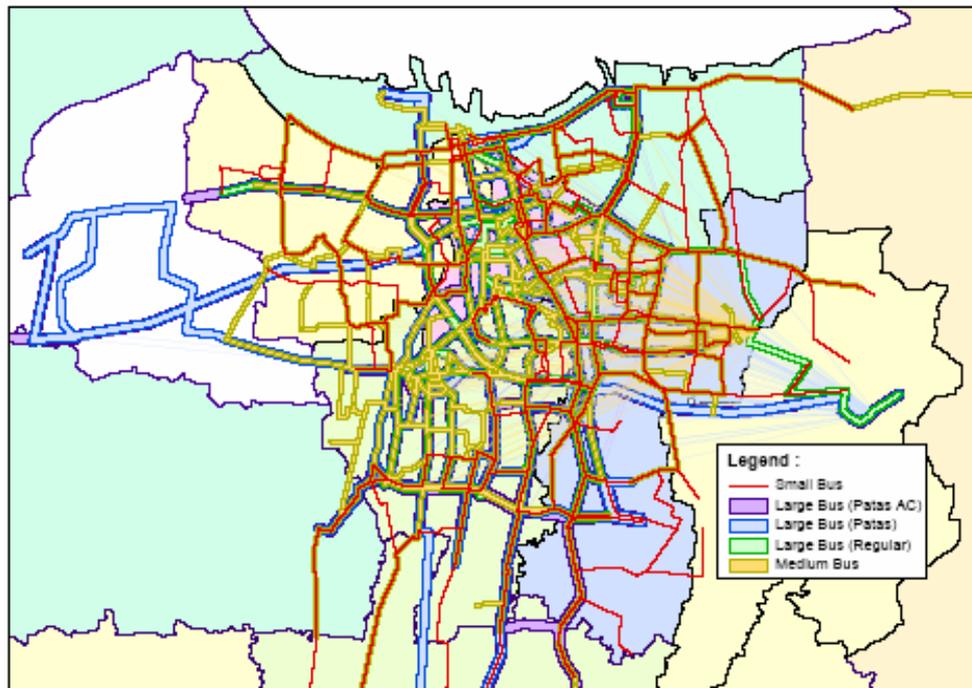
The number of bus and taxi was dominated public service in Jakarta but if compare with the amount of passengers, bus service was the biggest public transportation in Jakarta. There are 18 bus public operators from big bus service to small bus service. Although most of them have licenses for a certain number, but average only about 68 percent from that number that operated take passengers. The composition of bus operator with number of lines, busses, permitted fleets, and number of bus which in operation can be seen in table bellow.

Table 4.1  
Number of Fleet Permitted and in Operation

No	Company	No. of Lines	No. of Permitted Fleet	No. Of Operated Fleet	Percentage of Fleet in operation (%)
<b>Large Bus</b>					
1	Perum PPD	166	2,565	843	32.87
2	PT. Mayasari Bhakti	106	1,439	820	56.98
3	PT. Ikawali Pusaka Jaya	4	32	21	65.63
4	PT. Pahala Kencana	13	62	50	80.65
5	PT. Bianglala	23	219	100	45.66
6	PT. Steady Safe	66	581	137	23.58
7	PT. GI. Andalan	15	83	23	27.71
8	PT. Agung Bhakti	4	19	15	78.95
9	Koperasi ARH	4	25	14	56.00
10	PT. Koda Jaya	7	100	45	45.00
11	PT. Hiba Utama	3	40	22	55.00
12	Koperasi Himpurna	10	100	75	75.00
13	PT. Metromini	4	0	49	81.67
14	Kopaja	8	86	31	36.05
<b>Total</b>		<b>433</b>	<b>5,411</b>	<b>2,245</b>	<b>54.34</b>
<b>Medium Bus</b>					
15	PT. Metromini	70	3,112	2,177	69.96
16	Kopaja	38	1,472	1,034	70.24
17	Koantas Bima	7	190	116	61.05
18	Kopami Jaya	3	161	108	67.08
19	PT. Jewa Dian Mitra	5	46	32	69.57
<b>Total</b>		<b>123</b>	<b>4,981</b>	<b>3,467</b>	<b>67.58</b>
<b>Small Bus</b>					
20	Mikrolet	58	6,669	5,454	81.78
<b>Total (all modes)</b>		<b>614</b>	<b>17,061</b>	<b>11,175</b>	<b>67.90</b>

Source: Journal of the Eastern Asia Society for Transportation Studies, Vol. 6, 2005

Figure 4.1  
The Public Transport Network before Busway Implementation



Source: Journal of the Eastern Asia Society for Transportation Studies, Vol. 6, 2005

## ***4.2 Jakarta's Transit integration with Urban Spatial Planning***

### **4.2.1 Busway Integration in Jakarta Master Plan**

With the high economic growth in the last decade Jakarta has been experiencing significant changes in its landscape. Especially with its function as capital of Indonesia which have implication to the dominating economic and political center of the country, Jakarta has been growing economically and demographically with about twice as fast as the nation as a whole (Sutantono, 200?). Unfortunately, the planning and management of Jakarta can not follow the rapid changes adequately. Because of those conditions, land use changes often do not inline with their plans, which have impact to the congestion that almost happen in all of city area especially in the peak hour.

The same condition with Curitiba and Bogota, for several time ago, Jakarta conduct many studies and plans for Jakarta mass transit systems but none of those planned systems have implemented. Jakarta city has been a long time tried to manage the integration between land use and transportation in a good manner. But Jakarta still not applied certain concept to integrate both of them in their master plan. There is a lack of integration in development of land use and transportation which caused urban sprawl and heavy congestion. Actually Jakarta can shape their city form more effective and efficient if they can integrate land use and transport earlier in their spatial planning concept. Transit Oriented development can be use as one approach to integrated them which resulted more efficient citizen mobility, movement and other broad impact to the city as a whole.

With the implementation Busway, actually Jakarta can managed urban land use using TOD concept with Busway used as its 'backbone'. It is true that it is not easy and need long time to reform the existing land use condition especially in the city center, but Jakarta have to concern about it if they want to shaping Jakarta in the better condition in the long term. If Jakarta have an adequate concept in integrated land use and transportation, those kind of integration can be extend to the surrounding area which called Jakarta Metropolitan area or Jabodetabek (acronym of Jakarta, Bogor, Depok, Tangerang and Bekasi). Jakarta can not neglect neighboring area because of their strong linkage in every aspect of the city. For instance although Jakarta already have adequate public transportation for inner Jakarta city, but if they do not linked it the surrounding area, the effectiveness of transport system won't be significant because in the recent condition most of the employee who work in Jakarta are living or stay in the surrounding area.

The last two decades of Jakarta developments tend further out into suburbs or surrounding areas which encourage the huge amount of commuters. According to Fulton and Susantono (2002) between 1985 and 1993, the daily commuter number increased amazingly by four times. The significant influence factor is the high growth

of economic and demography of Jakarta is spread and Jakarta can not accommodate all of consequences especially for settlement area. The other influence factor is the development of highway infrastructure with the rapid growth as about six percent per year between 1976 and 1994 (Fulton and Susantono, 2002).

Land use pattern of Jakarta is mixed and complex without being segmented into certain divided districts with special land use (Sutantono, 1998). Some land use for residential and non residential follow the patterns of the street hierarchy forming a ribbon pattern. The transportation infrastructure system (road) is a significant factor which influences the existing activity in almost city area. Non residential uses such as commercial and service like offices (private and public) are usually located along the main street with residential uses behind them. The higher street hierarchy in the transportation system, the more valuable and prestigious the commercial or the offices is, and for some cases with the higher offices building along that street.

Those linear pattern was occurred for industrial activity about decade ago, where a lot of small and medium industry located along the main street which usually uses the high access to the harbor or to the other cities (Bogor, Tangerang and Bekasi) with the low-income settlements behind them (Sutantono, 1998). But with the increasing concern with the environment impact of industry especially in mixture (industrial, commercial, and residential) area, Jakarta government began to concentrate industrial in some area which most of them located in the periphery area or even in the eastern and western peripheral areas of the metropolitan region which administratively located outside of DKI Jakarta administration, in Tangerang, Bekasi and Bogor (Sutantono, 1998).

The Jakarta effort to direct the city development or city growth was stated in Jakarta Master Plan which is called The Structure Plan for DKI Jakarta 2005. In that Master plan written that the city growth directed westward and eastward because of avoid of development in the southern area which has function as water recharge areas and as a controlling the water run off from the mountainous areas in the southern. Although the government have planned to direct the city growth, but the implementation in many cases are not consistent.

Recently DKI Jakarta still has not formally approved a transportation master plan which can direct the transportation development more integrated and well managed. The related document that they have is only a master plans which conducted by JICA SITRAMP and Perencanaan Transportasi Makro (Macro Transportation Planning) proposed by The University of Indonesia's Center for Transportation Studies/CTS-UI (Trans-Jakarta BRT System Technical Review, 2003). JICA SITRAMP was conducted for Bappenas (The National Planning Agency) and CTS UI has been accepted by the governor but still haven't status legally and formally.

The local government of Jakarta, like stated in their transport master plan besides developing Jakarta busway consist of 14 corridors which planned fulfilled in 2010,

also preparing monorail and subway (Soejachmoen, 2004). Because of investment issues, the progress of implementation monorail and subway still very low.

The plan to build monorail and subway in Jakarta transport system besides BRT system shown that Jakarta local government have not a good prioritize in their transit system. If from the previous result of first corridor shown a good result, why the government does not focuses to the busway system and makes them as first priority which they can more concern and support the infrastructure development to the busway system. I think it could be better if government more concern to the integration busway system with the transportation from outer Jakarta like commuter activity.

#### **4.2.2 Metropolitan Coordination Issues**

The development of full BRT, which is integrated not only for Jakarta but also Tangerang, Bekasi and Bogor as surrounding area, can be used as backbone of the Jakarta metropolitan growth. The integration with surrounding area is significant because of high inter-linkage between Jakarta and Botabek area is closed and can not be separated. If the Jakarta develops their transit system without integrated with surrounding area, the result of solving transportation problem can not be achieved well. This condition is inline with Gilat and Sussmen, 2003 statement related to TOD implementation that government organization with planning and taxation powers concentrated above the level of the single town (i.e. at the metropolitan or regional level).

With the population condition which in 1990 reached 17.132.000 people, only half of them live in Jakarta and the population growth of Jakarta is decreasing but on the other hand the population growth for Botabek area is significantly increase (Susantono, 1998).

Jakarta can not separate its transportation system with surrounding area (Botabek region) because their linkage is very high which almost 30% of populations in the work hour in Jakarta stay in Botabek region. The extension of TOD and BRT to Botabek region is a crucial aspect which needs to be considered in the long term because settlement growth in this region is fast and will be faster in the next several years. The shuttle bus facilities which done by several big settlement or new town like BSD and Citra land which connect their resident area with city center of Jakarta can be done to the other new town and big settlement as a good feeder for busway system.

Related to the commuter activity, Asri (2005) write that everyday around 700.000 people traveling from Botabek to Jakarta and if the trend of depend on Jakarta still going on, and doubled by increasing private car usage, the development of road can not accommodate the fast vehicle growth. The pattern of commuter trip form concentric radial toward city center. Commuter come from outer toward city centre which contributed significantly to the heavily congestion in the city centre. Because

the high linkage between Jakarta and its surrounding area, it is need a good coordination among local governments of Botabek region. This condition had been considered by two governors in 1976 by establish BKSP (Development Coordination Agency) when the first Jabotabek Metropolitan Development Plan was arranged. The main task of BKSP is preparing, determining a cooperation policy and action/implementation plan and supporting the integrated regional development implementation.

Transportation coordination is one of the most important which need to be coordinated among metropolitan area because citizen movement can not bordered by administrative boundary. Although Macro policy in Indonesia is pursuing decentralization which give local government higher authority but in the case of Jakarta Metropolitan or Jabotabek region with its commuting phenomena and high inter-linkage, the transportation must be managed cooperatively among them. The effort of reducing dependency to the private car to use public transit also need to be done involved many local government otherwise Jakarta will faced total congestion in about next ten to sixteen years like many transportation expert has predicted.

### **4.2.3 Involvement non public sector**

In order to have the transport system more efficient, the local government of Jakarta need to restructuring the whole public transport system in Jakarta which includes route, licensing, fare system, management of the whole transit and for the long term, they have to integrated transportation system with urban land use in their master plan. To conduct an integrated and comprehensive planning, the local government of Jakarta should involved operators and other related stakeholders

## ***4.3 Jakarta BRT***

### **4.3.1 BRT Implementation**

During 2003, local government of DKI Jakarta has been preparing BRT system as Jakarta first Mass Rapid Transport which is called Trans Jakarta. Before they decided Bus as their mass transport, there are a lot of studies to build the adequate mass transportation system which can be implemented in Jakarta with all of its conditions. BRT was selected because the government of DKI Jakarta was considered as the most feasible, the fastest and the cheapest system which suitable to be implemented in Jakarta with the recent condition. This kind of transportation system has been recommended in DKI Jakarta Transport Master Plan as an intermediate solution of its transportation problem (Alvinsyah, Soehodho and Naingolan, 2005)

The first corridor was started operated on 15 January 2004 two years later the second and third phase was beginning their first operation on 15 January 2006. A brief comparison from each corridor can be seen in table bellow:

Table 4.2  
Brief Comparison Corridors in Jakarta Busway

No	Items	Corridors I	Corridors II	Corridors III
1.	Busway system length	12,9 km	14 km	19 km
2.	Number of busses	91 unit	83 unit	121 unit
3.	Number of stations	20 unit	23 unit	16 unit
4.	Capacity per hour	3.400 pass/hour	6.860 pass/hour (2 lanes)*	8.786 pass/hour (2 lanes)*
5.	Capacity per day	30.600 pass/day	-	-
6.	Frequency	40 bus/hour	-	-
7.	Total investment	US \$ 22 million		

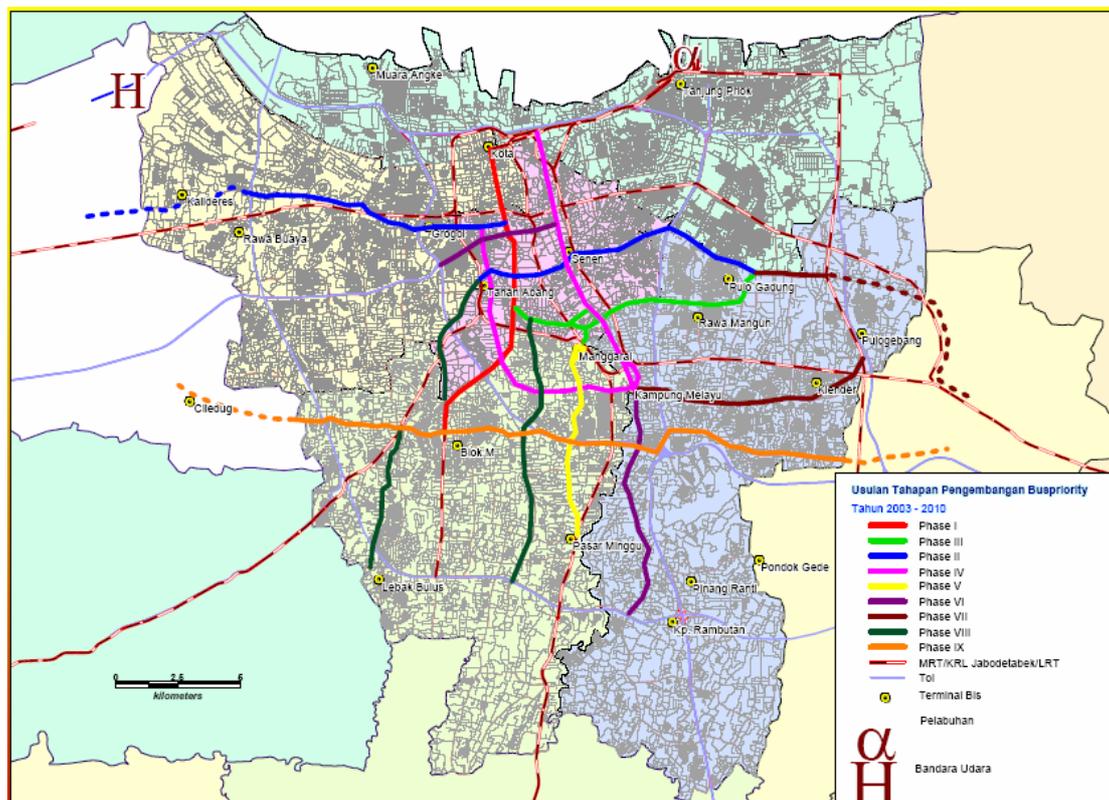
Sources: TransJakarta (2005)

Note: (\*) predictions

### 4.3.2 Extension Coverage Area

The extension of Busway coverage is an important issue related to the BRT implementation in Jakarta. The TransJakarta system shown that have significant positive influence to the city public transportation which is encourage for about 16% private usage to alter using busway although it only done its first phase from all of 9 phases. The second and third phase was fulfilled to be operated after two years first phase operated. If development of Busway following this pattern with high dependency to the government budget, the full busway system need long time to be achieved.

Figure 4.2  
Full Corridors of Jakarta Busway



Sources: TransJakarta, 2005

Related to the highly dependency to the government budget, Jakarta can learn from Curitiba which involve private sector in the busway system development more extensively. In the development of busway system in Curitiba and Bogota, they do not have to invest high amount of fund for buying the busses. The government only focus to the infrastructure development and integrated the development with other related aspects. Jakarta can learn from Bogota how they involved previous private bus operator to participate in busway system not only as feeder system, because they have experience in operation. That kind of involvement is one of the important aspects which support the success of Bogota BRT system. The government can help them with support them with special soft loan for buy the new busses.

In extend the coverage of busway, TransJakarta still using local government budget for term of infrastructure development, and provide the busses. TransJakarta institution still can not establish independently from local government.

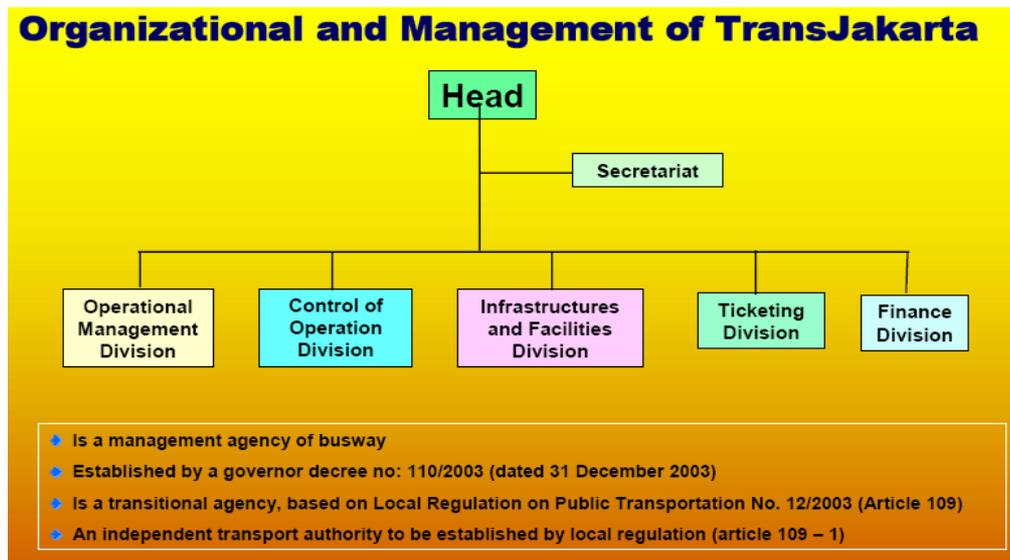
### **4.3.3 Institutional and Organization of BRT**

The Jakarta BRT is under the management of Trans Jakarta agency. Trans Jakarta is a non structural local government organization which responsible to the Governor DKI Jakarta. To do their duties, the fund sources of this organization are come from APBD (local budget allocation) of DKI Jakarta government and other legal incomes. The functions of this organization according to Governor Decree number 110 year 2003 is:

- a) Planning and programming busway system
- b) Busway operation which consist of main lanes (trunk) system and feeder system
- c) Selecting operator in busway system
- d) Conducting and controlling operational service standard
- e) Supervising and controlling all busway operational system
- f) Maintaining all of their assets
- g) Coordinating development and maintaining infrastructures and facility which are under other institution authority.
- h) Managing and controlling ticket system
- i) Regulating, counting and controlling financial income from operation activities

The Government of DKI Jakarta using this kind of agency as a transitional agency to became an independent authority which is established by local regulation. The structure of Trans Jakarta agency can be seen in figure bellow.

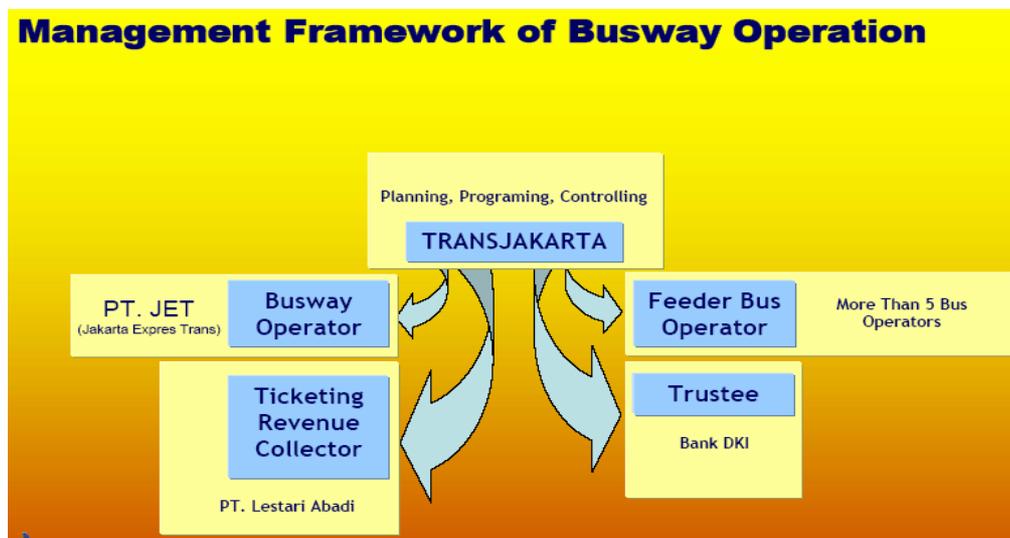
Figure 4.3



Sources: TransJakarta, 2005

The relation of Trans Jakarta agency with other related institution involved in busway operation can be seen in the figure bellow:

Figure 4.4



Sources: TransJakarta, 2005

### 4.3.4 Feeder System

For the existing busway performance, feeder integration with other transportation system still need to be improve and become important aspects which many transportation experts said to be arrange the existing route. The integration busway with feeder system is one significant aspect which makes Curitiba and Bogota success in managing their urban transportation system. Bambang Susantono as secretary general of Sustainable Transportation Action Network (SUSTRAN) for Asia Pacific



corridors busway planned haven't supported by the good and convenience pedestrian ways facilities.

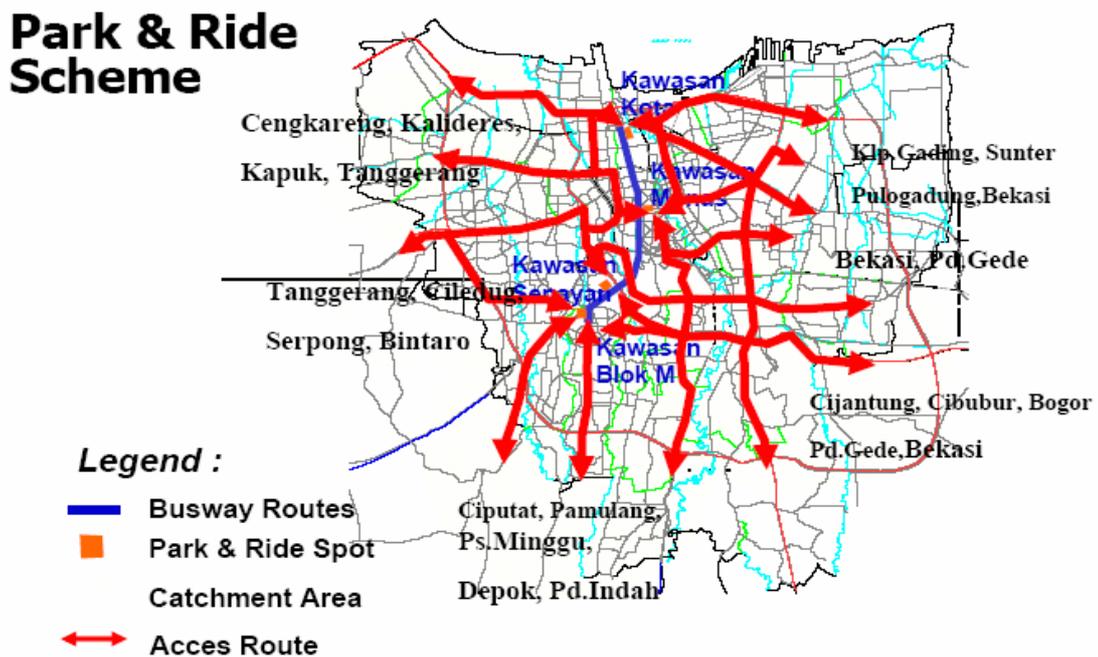
With encouraging the use of public transit which support more efficient urban move, the other supported facility must be considered and taking account into their action plan. Although there a lot of weaknesses in pedestrian development, some expert say that the new sidewalks along the Busway corridor look magnificent and contributed to the change of Jakarta's face. The development of pedestrian facility should be integrated with BRT development itself, like the concept of Bogota BRT.

As city with tropical climate, Jakarta need involved tree planting in pedestrian way development to improve the citizen convenience when passing the in sunny hot day. Jakarta can learn from Bogota which involved tree planting in pedestrian development.

### 4.3.6 Parking Facility

Jakarta busway system have already consider about integrated park facilities which can be extend with park and ride service. The local Jakarta government has a concept of integrated park facility like drawn in figure bellow but only for the first corridor and it still haven't implemented yet. The concept still can not deal with commuters because its location is in the city center. Parking area can be done with public-private partnership, where private sector can develop potency to catch positive externality from this activity such as vendor area, workshop for car and other positive indirect impact. Government can support private sector by special regulation, such as tax reduction, special permit and other attractive incentive.

Figure 4.6



Sources: International Seminar on Sustain Mobility, Bogota, Colombia, 2003

In order to implement TOD which uses BRT as backbone of its transportation system, Jakarta can learn from Curitiba and Bogota how they can support the system with adequate pedestrian and park facility.

#### ***4.4 Public Private Partnership***

Trans Jakarta has a master plan which consists of 9 stage plans, which already finished the first, second and third phase. The first phase corridor Blok M – Kota was starting operated in January 2004, and the second and third phase was started to be operated in January 2006. If the development of one stage scheduled like the existing scheme which is highly depend on the local provincial of Jakarta, it is need more than 15 years the achieved the full BRT coverage. Because of above condition, the involvement of private sector in the Jakarta's BRT system can play role to accelerate the full BRT system development by Public private Partnership scheme.

Related to the private involvement in support TOD by BRT system, Soehodo, Hyodo, Fujiwara and Montalbo (2005) argue that because development of mass rapid transit in Jakarta still too expensive to finance, and not supported by existing infrastructure conditions, the lack of finance can be tried by involving partnership of private sectors although it is need a long way to achieve because public transport is a public domain

The Jakarta busway operated with not full “public-private partnership” because the entire cost and financial risk of the busway system has been assumed by the government of DKI Jakarta. PT Ratax as operator only operated the bus. If Jakarta want to have a self finance operation this partnership must be improve till the government only have to deal with infrastructure investment and do not have to spend a lot of fund for bus and maintenance of the bus and station.

#### ***4.5 The Role of Government***

Before Busway implementation, there are a lot of controversy between agree and disagree with busway system development, but after busway operate for about two years, with the significant improvement in reducing dependency to the private car, the controversy has been decline and most of them expected that full system can be developed as soon as possible.

The DKI Jakarta province has been studied to implemented BRT system in their public transport system for many years before 2003. The significant progress was achieved when Governor Sutiyoso with some key decision maker related to the BRT development visited Bogota to see how the BRT systems built and managed in 26 April – 7 Mei 2003. They not only visited Bogota as object of comparison study but also visited Sao Paolo, Brazil and Mexico City. They were impressed with the well system which done in Bogota, and after that, Sutiyoso accelerated the preparation to implement BRT system in Jakarta. The BRT in Jakarta adopts the concept of Bogota BRT system.

Like occurred in Curitiba and Bogota, the role of local government with its political leader in Jakarta busway development is crucial. The role of Sutiyoso as DKI Jakarta governor in establishing Jakarta busway is important like Jamie Lerner in Curitiba and Penalosa in Bogota. In the early stage of busway development there were a lot of people, organization who against this concept. The main reason why people against busway because it use the existing road, which make road space which is limited become more limited and have high potency of congestion. Sutiyoso still continuo and after result of corridor 1 which can be said have positive result in reducing private car usage and potential to be an integrated public transit system, there are a lot of people turn back to support the busway and hope busway will capture the whole of Jakarta and Botabek in not very long time.

#### ***4.6 What Jakarta can learn from Curitiba and Bogota***

After elaborating the condition in Curitiba, Bogota and Jakarta this part will discuss what Jakarta can learn from Curitiba and Bogota experiences to improve the condition in Jakarta. Before we go any further, there will be brief descriptions about three cities in the table bellow:

Descriptions	Curitiba	Bogota	Jakarta
City area	432 km <sup>2</sup>	1.737 km <sup>2</sup> (9)	650 km <sup>2</sup>
Metropolitan area	n.a	270 miles <sup>2</sup> (4)	638,273 ha (2)
City population	About 3.1 million	About 6.5 million	About 10 million
City density	2.800 / km <sup>2</sup>	3.717 /Km <sup>2</sup> (9)	15.584 / km <sup>2</sup> (5)
Metropolitan population	About 3.1 million (7)	About 8,1 million (7)	About 23 million (5)
Total length of full BRT system	65 km (7)	388 km (3)	106,3 km
Progress from whole planned System (km)	65 km (7)	84 (7)	45,9
Corridors quantity	7	22	3 from 9
Buses quantity	470 (8)	770 (3)	n.a
Station quantity	103 (7)	114 (2)	n.a
Started operation	1976	2000	2004
Planned Full operation	-	2016	2010
Progress from whole planned System (%)	Fully	About 30%	About 25%
Ticket price ( \$ US)	About U.S.\$0.40	About \$0.30 (3)	About \$0.30
BRT operator companies	16	4	1
Feeder operator company	n.a	3 (3)	Not yet integrate
Integration with Spatial Planning (land use)	Very integrated	integrated	Not integrated
Integrated planning with pedestrian facility	yes	yes	Not integrated
Integrated planning with parking facility	yes	yes	Not integrated
The role of Private partnership	intensive	intensive	limited
Integration with feeder system	integrated	integrated	Very limited
Capital cost/km (US \$ million)	\$ 2	\$ 5 (incl pedestrian, etc)	\$ 1
Actual capacity	15.000	35.000-45.000	8.000

(pas/hour/directions)			
Total pass/day	1.3 million (3)	0.8 million (planned) (3)	n.a
Speed average	20 -30 km/hr	26 km/hr (6)	n.a

Sources:

- (1) Taken from other part of this study
- (2) Wikipedia
- (3) Asia-Pacific Environmental Innovation Strategies (APEIS), Good Practices Inventormy TransMilenio Bus Rapid Transit System of Bogota, Colombia
- (4) Curitiba, Brazil: Urban Renewal, Municipal Revitalization by Hugh Schwartz, 2005
- (5) BPS DKI Jakarta, 2000
- (6) TransMilenio, S.A
- (7) Latin American Experience with Bus Rapid Transit, Gerhard Menckhoff, 2005
- (8) Examining Accessibility and Proximity-Related Effects of Bogotá’s Bus Rapid System Using Spatial Hedonic Price Models by Felipe Targa, B.Sc. 2003
- (9) TransMilenio Bus Rapid Transit System Expansion 2002-2005 – Bogotá, Colombia D. Hidalgo, 2003

## A. Transit integration with Urban Spatial Planning

There are three aspects which important to study related to the integration Transit and spatial planning: Busway integration in Jakarta Master plan, Metropolitan issues and involvement non public sector in urban planning.

### A.1 Busway Integration in Jakarta Master Plan

The most crucial aspect related to the integration transit and spatial planning is Jakarta still have not integrated concept which integrated their transit system with urban spatial planning. Jakarta is still looking how to integrate them in properly system. Although it is not easy to integrate them because Jakarta can be said very late to integrated them, because Jakarta is already developed and it is very hard to modify the city structure to become more integrated. But still Jakarta must have concept to direct the city growth and transit can be used as orientation of their urban growth.

The Curitiba case is significantly different because they implemented TOD concept which integrated transit and urban growth started from mature concept so that the integration both of them seem more easier to be done. They started to develop both in the same time with a clear concept in Masterplan. But Jakarta can learn from Curitiba to adopt their concept in integrate transit with urban spatial planning with applied the transportation and density controls guide development for the whole city area and even to the metropolitan area.

Jakarta can use the Curitiba concept which the high density activity located closed to the bus way line and the density decreasing according to the distance from transit line. With this kind of concept the service of busway will be more effective because the higher density which need support high accessibilities support by high accessibilities and make the BRT line as “backbone” of city’s development structure. The adequate potential demand for BRT passenger is an

important factor to sustain bus-way operation Jakarta can using Curitiba's concept in their urban and metropolitan growth management which can be seen in figure 3.1

The Jakarta condition is more similar to Bogota condition where they implement the BRT system to solve the bad transportation in the city especially in the city center. Jakarta can learn from Bogota that succeeds in synergies city element by addressing several topics such as: reclamation of public space, improvement of public transport, promotion of non-motorized transport and implementation of auto restriction measures.

## **A.2 Metropolitan Coordination Issues**

All of three cities related to the interaction with surrounding cities can be categorized as metropolitan where the integration among surrounding city or municipality is play as crucial aspects. Curitiba and Bogota included the commuter from their metropolitan cities when they design and developed their transit system. If Jakarta only considers the trunk line only for Jakarta itself, the result of good transportation system can not be achieved because about 30% of people who work in Jakarta nowadays are live in Botabek area and this percentage will be increased in the next decade.

In Jakarta case, the integration between Jakarta and Botabek region must be increasing. With recent growth tendency which rapid growth in Botabek area, the bus transit can be used as orientation of new big settlement in Bogor, Tangerang and Bekasi. In the 70's and 80's the growth of big settlement in Botabek follow the main road which connect Jakarta with Botabek. In the 90's and 2000's because the main road which connect Jakarta with Botabek become congestion line especially in the peak hour, the tendency was changed to the toll road. In the 90's and 2000's there are a lot of big settlement even new town was develop using toll road as their orientation because people who work in Jakarta is their main prime market. The intensive development in the area along the toll road recently can not accommodate the high trip demand of new commuter which caused congestion even in the toll road.

Although Jakarta have Train lines call KRL Jabotabek which connect Jakarta and Botabek area, but because their level of service is very low, besides can not reliable related to the schedule, a lot of commuter still using their car although they have no other good choices from public transportation.

The BRT line can be used as an orientation of metropolitan growth not only urban growth. It can be proposed that every new town or big scale which will be developed in Botabek must be connected to the BRT trunk lines at least they provide with adequate feeder system which can be followed by BRT line in the next time if the demand is potential.

### **A.3 Involvement non public sector in Urban Planning**

Both in Curitiba and Bogota, involved non public sector in urban planning shows play as important aspects in success of integration of transit and urban land use. Curitiba involved non public sector in the earlier of integrated transit and spatial land use. Jakarta can start to be more interactive with non public sector which will lead interconnected evolving solutions and to be come more communicative planning. Other thing that Jakarta can learn from Curitiba is the establishment of public debate and discussion with widespread participation which will lead to a broad consensus. And the other significant advantages from reaching consensus by wide participation is the solution from their discussion can be realized rapidly and highly successful because of full support from involved stake holder

Jakarta can examine how Curitiba establish highly effective partnership between government and businesses which supported by positive action by civic practice. For example developers and investor receive a tax reduction when they built a project which supports the government planning concept. The owner of property within historic area can transfer the building potential of their site to other part of the city. It is a win-win solution where the historic area can be preserved and the owner receipt adequate compensation. Other example is when municipality designing certain area, private sector can “buy” up two extra floors from its normal legal limit and can pay by land or in cash, where those cash or land uses for low-income housing.

## **B. BRT Implementation**

There are six aspects which is important to elaborate related to the Transit system that support to the TOD concept to have a better urban transport system with BRT as their backbone of the urban transport system. The six aspects are: BRT implementation, extension coverage area, institution and organization of BRT, feeder system, pedestrian and parking facility

### **B.1 Extension Coverage Area**

The extension of Busway coverage area is becomes a significant aspect in Jakarta case. Jakarta’s busway already have full BRT schema, but it need a long time to be done because the development of busway is depend on Jakarta budget not only for infrastructure bit also bus procurement. If Jakarta following previous investment scheme which very depend on the Jakarta government budget for both infrastructure and buses, the extension of busway will need very long time.

Jakarta can learn from Curitiba and Bogota which separated the bus procurement to the private operator so that the government only focuses to the infrastructure development. In Jakarta busway, the operated bus is owned by government, and private operator only manage for operation of the bus. Jakarta can follow incremental approach which used by Curitiba, where this concept more flexible and responsive to the factual conditions.

## **B.2 Institutional and Organization of BRT**

The important issue related to the institutional aspects is how TransJakarta interacts with involved government institution and private sector who both directly and indirectly involved in BRT system. TransJakarta as BRT agency have status as Badan Pengelola (Authority Agency) under government authority. With its status as government origination its have several weaknesses such as dependent in decision making, dependent in financial aspects and dependent in forming their own structure.

The agency can be formed as private enterprise (Perseroan Terbatas) where government play role as their boards. In the board of director, several involved government institution can be pointed as board member such as transportation agency, planning board, City planning office, public work agency, and other related agency. With integrating several involved institution will support the integration policy which related to the busway system. Ideally the board member is chaired by the Governor which will easier to coordinate with other government institution. Furthermore TransJakarta can learn from TransMilenio when they receipt big loan from international institution (World Bank) the national government as institution who responsible for the loan was involved in board member.

The other important aspects is the agency who managed Jakarta BRT must create incentive for the public and private sector resulting reliable service quality, effective operation which will lead to the low price which can be affordable for the society. The institutional structure which must be support the above condition to make the Jakarta Busway became as a good public transit system.

Because the existence of Transit agency to the transit operation is very significant, this agency must be empowered by adequate qualified personnel, who have certain capability in technical aspect and responsibility in coordination with related government institution and deal with private operator and other related private enterprises.

### **B.3 Feeder System**

Jakarta busway system can learn from the scheme which Bogota implemented in integrating BRT with its feeder system. Bogota's BRT system pay feeder bus operator by the passenger who transferred from or to BRT. In Bogota the passengers do not have to pay to the feeder bus operator and they only have to pay when they reach at TransMilenio station. With that kind of scheme, passengers are allowed to get in from feeder system in TransMilenio station only.

The other aspect is related to the feeder system. The success of BRT system can not be separated with their feeder system. Jakarta can learn from Bogota which involved previous operator to improve their service quality. Because although the BRT system is good but if the feeder service quality is bad, people still think not to use Busway because they do not accept the low service quality of feeder service although they accept the service quality of busway. The inter linkage with higher transportation system such as Airport and intercity train is need to be supported by busway system service.

Curitiba was not implemented integrated fare system between BRT and its feeder system in its early operation years which caused passenger have to pay twice. Jakarta can use other concept of feeder bus system that operator using a certain of buses with platform-level left side door which allowing these buses to operate not only off of corridors but also on the corridors. With that kind scheme of integration feeders service allowed them to use existing TransJakarta's stations in several locations and its make passenger more comfort because they can transfer with convenience in busway station without pay twice. The integrated fare system will attract private user to change their trip to public transport services significantly.

The implementation of that concept needs adequate route management, clear regulation and feeder operator capability to buy a new kind of busses and improve their service quality. But I think this concept can be a win-win solution for both of them and for passengers as well.

The other improvement of Jakarta Busway is improvement mixed traffic congestion in BRT corridor and adding a system of feeder busses because recently the integration between busway and regular busses still not well integrated. Trans Jakarta as BRT agency can issue competitive bidding for feeder bus operation that served the BRT corridors. And it would be better if Transjakarta can regulate them so the passenger can only pay once for using the integrated BRT buses include the feeder service. The feeder operator must be select from a competitive tender, and their profitability should be assessed more interesting rather than using conventional model. As the first stage, TransJakarta can use scheme that feeder bus operator paid by using a combination of

kilometer they served and amount of passenger they take from or to Busway system. The integration between Busway and feeder system show that it is important to the success of Curitiba and Bogota BRT system.

The integration with other transportation mode is also need to be improved. The integration with train and airport is needed to link the busway system with external transportation mode. The integration busway with commuter train can be improve to deal with commuter issue and in the long term it can be proposed an integrated fare for commuter which every moth commuter pay amount of money to use several mode for their trip from home to work place and from work place to home again.

#### **B.4 Pedestrian**

In the first Busway corridor, it's obviously that the pedestrian overpasses are still not good enough. Local government should improve all those facilities related to the pedestrian facility such as covering zebra-cross, walkways and access paths to the buildings along the route continuously and not do it fragmentarily and separately (Joga, 2004). The pedestrian facilities development should be providing safety, convenient, shady and healthy.

Because of space limitation especially where there are not availability space for pedestrian facilities, local government can involve private sector who their land located in pedestrian corridor plan to participate. Related to the encouraging public-private partnership, involvement private participation to share or lend their front or backyard for pedestrian facilities can be implemented in supporting busway. The private who share or lend their land can achieved many compensation such as tax or fiscal incentives.

The pedestrian network should be seen as integral subsystem on the city's human movement macro linkage system and integrated with macro transportation network system, because in the system which dominated to the public transportation, all passengers have to arrive in their destination by walk (Joga, 2004).

The effort to transfer private car usage to public transport usage must be followed by improvement other support facilities which more attract passengers to use public transportation instead of their private car. Besides well route and operator management which directly related to transportation system, pedestrian facility play important role in succeeding attract private car user to switch using public transportation. Curitiba and Bogota support their BRT system with adequate and convenience sidewalk facility. The improvement of pedestrian facilities is done by Bogota by integrated its development with BRT development even some road is closed for vehicle and used as pedestrian way. Because of Bogota have tropical climate which in the middle of the day usually

not convenience because of hot sun shine, they included the tree planting in their pedestrian development.

### **B.5 Parking Facility**

Two important aspects of TOD using BRT as main transportation related to the parking facility: park and ride scheme which support the commuter who lives faraway from BRT service lines and public policy in parking supply and price. This aspect is important for Jakarta cases consider Jakarta metropolitan area is bigger than Bogota and Curitiba, so that the existence of park and ride facility is more necessary.

The providing park and ride services can be done and organized by BRT agency. BRT agency can invite private sector to provide off-street parking and make an agreement to provide park and ride service which will attract passenger to use this facility. Passengers can use this service which using car from their home, park their car in the periphery area than use Busway to the work place.

Government can support this activity by give private sector tax reduction and special permit to attract private sector to provide this kind of services. Other important case from Curitiba is making the parking master plan which integrated with urban master plan and Transit lines.

### **C. Public Private Partnership**

In order to have a self financing BRT system which operated without subsidies, the role of partnership must be improve. One of those aspect is the agreement based that private party involved not only operated the bus but also responsible for providing the bus and maintenance the station. The selection a proper private operator who capable in term of financial and management is not easy in Jakarta case, because they usually operated their bus with low service quality and usually not obey the regulation. If they want to participated as operator of BRT buses, they have to follow all strict rules and on the other hand the busway agency must have an adequate regulation which give penalties if operator breaking the rules and will get incentive if they operated well.

Jakarta busway can learn from Bogota with implemented the advance partnership which the private operator are required to absorb the risk and losses, if the cost increase and the demand decrease while the local government only covering capital investment. With that kind of relation, the agreement between BRT agency and private operating company should include financial reward and punishment for their service performance, maintenance busses and stations and other social objectives. That kind of partnership will encourage private operator to do their job as well as they can rather than they only receive amount of money according to the kilometer they provide.

Because there are no local private operator who have experience in operated as private operator in BRT system, it is possible if Jakarta invite international company to participated in tendering as became bus operator where they can invest their money in bus providing but on the limited time, so that the local operator can learn from their experience, or in the other word can use as transfer of knowledge. Other possibility is TransJakarta higher experienced consultant to advisory the bus operation.

#### D. The Role of Government

Because the development of TOD is not a short term development the Role of government to sustain the policy from one political leader to the next political leader is crucial aspect. Jakarta can learn from Curitiba and Bogota experience although they were really depend on political and government leader, but they already have basic planning concept and a clear vision for long time periods so that the next political and government leader can continue and improve it because they already have a strong foundations of the system.

One thing can be underlined related to the Curitiba planning concept that make them famous for integrating transit and land use is the planning culture changing where interdisciplinary with other related aspect become more crucial and that condition need to be supported by adequate planning institution which managed by capable technical background and credible leadership.

TOD and BRT development involves institutional arrangements because many group and institution are involved, from local planning board, transportation department, public work department, transit agency, private sector, and its citizens. All of those involved actor must be coordinate to make a synchronize policy and actions to achieved the goals. Related to formal institution government must be capable to coordinate all institutions involved both in vertical relation and horizontal relation.

Government can support the TOD integration with increase public private partnership. Government can give private sector incentive such as tax holiday or tax reduction if they want to build something that supports the government plan. Because there are a lot of good plan which really hard o be implement because the government alone can not do it without private contribution. With implement that concept there will be a win-win-win solution, where government can implement their planning concept; private can have so may advantages such as tax reduction and permit incentive, where community can impact by outcome of the plan.

#### ***4.7 Conclusions***

Briefly, the Jakarta condition related to the integrated transit and land use and public private partnership can be seen in table bellow.

Aspects	Jakarta
<b>Transit integration with Urban Spatial Planning</b>	
Busway Integration in Master Plan	<ul style="list-style-type: none"> <li>• still not applied certain concept to integrate transit and land use in their master plan</li> <li>• lack consistency of implementation with their planning</li> <li>• lack of focus (busway have not full implemented yet, monorail will be develop)</li> </ul>
Metropolitan Coordination Issues	<ul style="list-style-type: none"> <li>• integration with surrounding area is significant because of high inter-linkage between Jakarta and Botabek area</li> <li>• the road development can not accommodate that fast commuter growth</li> <li>• Harder because of decentralized issues</li> <li>• Need high integration among them to support reducing dependency to the private car to use public transit</li> </ul>
Involvement non public sector	<ul style="list-style-type: none"> <li>• need to restructuring the whole public transport system</li> <li>• lack of involvement non public sector</li> </ul>
<b>Curitiba and Bogota BRT</b>	
BRT Implementation	<ul style="list-style-type: none"> <li>• Started operated in 2004</li> <li>• Support about 75% commuter</li> <li>• private operators only manage the bus operation without owned bus</li> <li>• 46 km bus line</li> <li>• Not yet integrated with feeder line</li> <li>• 1 million US \$/km</li> </ul>
Extension Coverage Area	<ul style="list-style-type: none"> <li>• High dependency to the local government budget both for providing infrastructure and bus</li> <li>• No support from government by special soft loan for buy the new busses for private operator</li> </ul>
Institutional & Organization of BRT	<ul style="list-style-type: none"> <li>• under the management of TransJakarta agency</li> <li>• TransJakarta is a government organization which responsible to the Governor</li> <li>• Still not independent t authority</li> <li>• Not yet integrated with feeder system</li> </ul>
Feeder System	<ul style="list-style-type: none"> <li>• Not well prepared by local government</li> <li>• the major handicap of busway operation</li> <li>• still searching a suitable partnership which will be benefited and fair for both busway, feeder service operator and passenger.</li> <li>• Shuttle bus service from several new town in Botabek area can be improved as feeder system to busway</li> </ul>
Pedestrian	<ul style="list-style-type: none"> <li>• Lack of integration between land use, transportation and pedestrian way</li> <li>• Pedestrian way not well supported by planting tree.</li> </ul>
Parking Facility	<ul style="list-style-type: none"> <li>• Have a plan to provide park and ride services</li> <li>• Need integrated parking by parking and ride with Botabek region</li> </ul>
<b>Public Private Partnership</b>	<ul style="list-style-type: none"> <li>• Can play as accelerator of busway extension</li> <li>• operated with not full “public-private partnership”</li> <li>• the entire cost and financial risk of the busway system has been assumed by the government</li> </ul>
<b>The Role of Government</b>	<ul style="list-style-type: none"> <li>• Strong political will and leadership</li> <li>• Need to strengthen vision for the future</li> <li>• Need to develop institutional relation structure to coordinate all involved aspects in TOD implementation concept</li> </ul>

## Chapter 5

### Conclusions and Recommendations

Transit Oriented Development is a concept which integrated urban land use and transit which need support from certain transit mode. The choice of transit mode is depend on the characteristics of city. Related to the connection between Transit Oriented Development and Transit mode, Bus Rapid Transit system have advantages of higher impact to the city land use growth rather than rail system because bus system can have shorter distance between one station to the other rather than rail system. If the TOD based on Rail the development only focused on the area surround the station area but the BRT can focus and influence not only to the surrounding area but also in the line along the BRT system.

To implement Transit Oriented Development as a new concept for Jakarta, it is important to learn from previous implementation in the other cities. The more similar conditions between city which used as example and the city which will implement the concept, the better result that can be learn.

From the previous discussion about Curitiba, Bogota and Jakarta, there are many significant similarities which are important in a lesson learn study. Those significant similarities are: the first; all of three cities are categorized as fast growing city in developing country, the second; facing the “heavy congestion” and will be worsen if there is no significant transportation system improvement, the third; strong political leadership, the fourth; limited financial resources to develop sub-way or Metro and light rail transit, the last; all of three cities had tried many policy or program to solve the congestion and other inefficient and ineffective transportation system before they implemented TOD based on BRT but not succeed because of some limitation such as financial and technology.

There are several significant differences between those three cities such as: the first; the size of the city and urban area where Curitiba relative small if compare with Bogota and Jakarta, the second; the built up area coverage where the city with lower build up area like Curitiba is easier to be integrated rather than higher build up coverage area like Bogota and Jakarta, the third; population size and density where Jakarta population is almost 4 times of Bogota pupolation and about 7 times of Curitiba population, and the density of Jakarta is about three times of Bogota and fourth time of Curitiba density which have more complex and difficulty for Jakarta to restructure their city form, the last is government commitment to be consistent in implementing their concept which stated in their Master plan which is well done in Curitiba and Bogota but not in Jakarta.

Furthermore from elaborating Curitiba, Bogota and Jakarta, the characteristic of each city can be summarized in the table bellow. That table is used for further conclusion that Jakarta can use to improve their TOD and BRT system from Curitiba and Bogota experience.

Aspects	Curitiba	Bogota	Jakarta
<b>Transit integration with Spatial Planning</b>			
Busway Integration in Master Plan	<ul style="list-style-type: none"> <li>• Already planned in Master plan before BRT implementation</li> <li>• Clear concept of integration</li> <li>• Changing radial to linear urban growth (push urban growth into corridors called structural sector)</li> <li>• Strict zoning code</li> <li>• Establish institution to coordinate related aspects in the master plan implementation</li> <li>• Supported by land bank</li> </ul>	<ul style="list-style-type: none"> <li>• Addressing several topics: <ol style="list-style-type: none"> <li>1. Reclamation of public space</li> <li>2. Improvement of public transport</li> <li>3. Promotion of non-motorized transport</li> <li>4. Implementation of auto restriction measures</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>• still not applied certain concept to integrate transit and land use in their master plan</li> <li>• lack consistency of implementation with their planning</li> <li>• lack of focus (busway have not full implemented yet, monorail will be develop)</li> </ul>
Metropolitan Coordination Issues	Integrated	Integrated	<ul style="list-style-type: none"> <li>• is significant because of high inter-linkage with Botabek area</li> <li>• the road development can not accommodate that fast commuter growth</li> <li>• Harder because of decentralized</li> <li>• Need high integration among them to support lowering the private car usage and improving public transit usage</li> </ul>
Involvement non public sector	<ul style="list-style-type: none"> <li>• Involved in early stage of Master plan preparation</li> <li>• Support by public consultation</li> <li>• bottom-up approach</li> <li>• communicative &amp; consensus planning</li> </ul>	<ul style="list-style-type: none"> <li>• Involved in early stage</li> <li>• Involved in operation, planning and design</li> </ul>	<ul style="list-style-type: none"> <li>• need to restructuring the whole public transport system</li> <li>• lack of involvement non public sector</li> </ul>
<b>Curitiba &amp; Bogota BRT</b>			
BRT Implementation	<ul style="list-style-type: none"> <li>• Started operated in 1972</li> <li>• Support about 75% commuter</li> <li>• 10 private operators</li> </ul>	<ul style="list-style-type: none"> <li>• Started operated in 2000</li> <li>• The transport system which most passengers carrier in the world</li> </ul>	<ul style="list-style-type: none"> <li>• Started operated in 2004</li> <li>• private operators only manage the operation without owned bus</li> </ul>

	<ul style="list-style-type: none"> <li>• 58 km bus line</li> <li>• 185 km feeder line</li> <li>• Investment cost 3 million US \$/km</li> </ul>	<ul style="list-style-type: none"> <li>• BRT Infrastructure financing by fuel tax</li> <li>• 4 private operators</li> <li>• 35 km bus line</li> <li>• Investment cost 5.3 million US \$/km</li> </ul>	<ul style="list-style-type: none"> <li>• 46 km bus line</li> <li>• Not yet integrated with feeder line</li> <li>• Investment cost 1 million US \$/km</li> </ul>
Extension Coverage Area	<ul style="list-style-type: none"> <li>• Need more 30 years to complete the system</li> <li>• Separated infrastructure and operation investment (public for infrastructure &amp; private for busses)</li> <li>• Intensive public private partnership</li> <li>• Expanded incrementally</li> </ul>	<ul style="list-style-type: none"> <li>• Need about 18 years to complete the system</li> <li>• Separated infrastructure and operation investment (public for infrastructure &amp; private for busses)</li> <li>• Intensive public private partnership</li> </ul>	<ul style="list-style-type: none"> <li>• High dependency to the local government budget both for providing infrastructure and bus</li> <li>• No support from government by special soft loan for buy the new busses for private operator</li> </ul>
Institutional & Organization of BRT	<ul style="list-style-type: none"> <li>• BRT managed by URBS a state owned company in 1963</li> <li>• URBS managing and coordinating the private company involved</li> <li>• Private operator paid by km serve operation</li> <li>• Operated self-financing without government subsidies.</li> <li>• Fare stated by URBS</li> <li>• URBS as BRT agency also control taxis, parking, bus terminals and shopping and markets</li> </ul>	<ul style="list-style-type: none"> <li>• BRT managed by TransMilenio a state owned company in 1963</li> <li>• TransMilenio managing and coordinating the private company involved</li> <li>• Private operator paid by km serve operation</li> <li>• Operated self-financing without government subsidies.</li> <li>• Suggestion box as feedback, quality control and improve the service.</li> </ul>	<ul style="list-style-type: none"> <li>• under the management of TransJakarta agency</li> <li>• TransJakarta is a government organization which responsible to the Governor</li> <li>• Still not independent t authority</li> <li>• Not yet integrated with feeder system</li> </ul>
Feeder System	<ul style="list-style-type: none"> <li>• Implement 'closed' system</li> <li>• Once pay for passenger to use BRT and its feeder service</li> </ul>	<ul style="list-style-type: none"> <li>• Implement 'closed' system</li> <li>• Once pay for passenger to use BRT and its feeder service</li> <li>• Flat fare</li> </ul>	<ul style="list-style-type: none"> <li>• Not well prepared by local government</li> <li>• Become the major handicap of busway operation</li> <li>• still searching a suitable partnership which will be benefited both busway and feeder service operator</li> <li>• Shuttle bus service can be improved as feeder system of busway</li> </ul>
Pedestrian	<ul style="list-style-type: none"> <li>• As focus in supporting public transportation</li> <li>• The first in the world that regulate certain street which closed in the certain day to be</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated development with BRT and bicycle path</li> <li>• Included pedestrian development cost in BRT development cost</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of integration among land use, transportation and pedestrian way</li> <li>• Pedestrian way not well supported by planting tree.</li> </ul>

	used as pedestrian	<ul style="list-style-type: none"> <li>• Has the longest pedestrian in the world</li> <li>• The shady tree planting included in BRT development cost to support pedestrian activities</li> </ul>	
Parking Facility	<ul style="list-style-type: none"> <li>• Provide park &amp; ride service</li> <li>• The limited roadside parking in central area</li> <li>• public policy in parking supply and price</li> </ul>	<ul style="list-style-type: none"> <li>• Provide park &amp; ride service in their extension system</li> <li>• incentives to provide off-road parking area to the private sector</li> <li>• create the Parking Master plan</li> </ul>	<ul style="list-style-type: none"> <li>• Have a plan to provide park and ride services but not yet implemented</li> <li>• Need integrated parking plan by parking and ride with Botabek region</li> </ul>
<b>Public Private Partnership</b>	<ul style="list-style-type: none"> <li>• The concept of partnership is the public provide the infrastructure and the private provide buses operation</li> <li>• bus operator responsible for the station maintenance</li> <li>• the Municipality and bus operators make an agreement to set a compensation fund to compensate the losers in closed system</li> <li>• direct collection of the fare by private operator take over by the URBS</li> </ul>	<ul style="list-style-type: none"> <li>• designed to be operated by private company under government supervision</li> <li>• the public provide the infrastructure and the private provide buses operation</li> <li>• private operation allowed enhancing revenue from expanding and increasing passenger ridership</li> <li>• private bus operators also require facing the increasing cost and the demand declines and must deal with risk and lose</li> <li>• Private operators handle system operation, following the strict quality standard which set by concession contracts with centralized control.</li> <li>• Besides pay by kilometer operated, also implement penalties and bonuses encourage private operator to improve their performance</li> </ul>	<ul style="list-style-type: none"> <li>• Can play as accelerator of busway extension</li> <li>• operated with not full “public-private partnership”</li> <li>• the entire cost and financial risk of the busway system has been assumed by the government</li> </ul>
<b>The Role of Government</b>	<ul style="list-style-type: none"> <li>• strong vision for the future</li> <li>• intensive cooperation with university</li> <li>• Strong political will, leadership and political skill</li> <li>• Planning institution plays a critical role and need to be managed by adequate and credible leadership</li> </ul>	<ul style="list-style-type: none"> <li>• Strong vision for the future (within 15 years most resident will live within 500 m from rapid line).</li> <li>• Strong political will, leadership and political skill</li> <li>• outstanding chain of policy continuity</li> </ul>	<ul style="list-style-type: none"> <li>• Strong political will and leadership</li> <li>• Need to strengthen vision for the future</li> <li>• Need to develop institutional relation structure to coordinate all involved aspects in TOD implementation concept</li> </ul>

To direct the urban growth using the TOD concept, the first consideration is what kind of transit which will be used as orientation, the choice must match with city characteristics. Each transit mode has its own characteristic and with knowing its characteristic the next consideration is how to integrate that transit type in urban land use, to make the transportation system effective and efficient. The concept of TOD can be used in Jakarta urban growth management where BRT is used as 'back bone' of urban growth and city development. Jakarta can use transit lines in determining the activity intensity where the closer location to the rapid lines the higher degree of density that they have.

To integrate transit and land use development, Jakarta must prepare several conditions such as: must have a master plan for its integration, have a clear concept in the long term, adequate institution coordination, involve the non public sector from early stage (planning preparation) and the most important is consistency between implementation and planning. The establishment of land banking will support the TOD implementation.

Related to the high inter-linkage between Jakarta and Botabek as its surrounding area, the TOD concept can be used in the large extent as metropolitan growth orientation. To deal with metropolitan issues, Jakarta and Botabek region must improve and extend their coordination and it should have a stronger institutional arrangement with adequate regulation rather than only coordination without stronger regulation aspects. The Jakarta effort to reduce congestion and high dependency of private car usage which encourage public transit usage must be followed by integrating its transportation system with Botabek as its surrounding area.

In transit - land use integration, the involvement of broad related actors in the early stages will be benefited to the success in achieving its goals. Because the implementation of TOD based on BRT involves many formal institutions (vertically and horizontally), non government organizations, private sector, related stakeholders and citizens. Involvement of all of them from early stage of the planning process will be important to have a broad participation and broad support from all of them. Bottom up approach will have impact to the higher degree of support from broader related actors rather than top down approach. Communicative planning approach by providing public consultation will lead to the higher degree of consensus in supporting the plan because every involved actor participated in decision making process. Besides support with communicative planning approach, there is high possibility of great and brilliant ideas to support the planning implementations. This kind of involvement is one aspect which is important of the success of Curitiba and Bogota in integrating of BRT and land use development policy and implementation.

In Jakarta's busway implementation, the significance of BRT system can be achieved when it operated in the entire city region. The effectiveness of BRT system is depend on the coverage area of this system, the more it services cover all city area the more

effective the system is. To accelerate the development and expansion of busway operation, Jakarta can learn from Curitiba and Bogota case which separated the bus procurement to the private operator so that the government only focuses to the infrastructure development. Even for the development of infrastructure it can be implemented by BOT scheme, if the demand condition, private capability (financial, technical and managerial) and other aspects are possible.

The form and status of who managed BRT system play significant role in determining the success of BRT system. The status of TransJakarta as government institution do not give it adequate independent to manage the BRT system and hard to avoid intervention from other government institutions. I recommend the TransJakarta to change it status to become a private enterprise. The government can be involved in the board member with Governor can be pointed as chairman and other involved government institution as member. Involved related institution in board member will benefit in supporting and coordinating. We can learn from Curitiba and Bogota cases that to make the BRT system operated self-financing without government subsidies, the BRT agency play a significant factor. The role of organization arrangement between related institutions plays an important role in the BRT system. The BRT management agency must be independent, have a good inter-institutional formal relation with many involved government institutions and involved private sector.

It can be seen obviously that the integration between BRT and its feeder system play important role in the success of Curitiba and Bogota BRT system. The integration between BRT and its feeder system in Jakarta can be said as one weakness. Jakarta Busway still looking to find one scheme which can be integrated them in the fair way. To support that integration between BRT system and its feeder system, local transportation authority needs to revise the existing route to be matched with BRT system.

In TOD and BRT concept which encouraging public transportation usage, all passengers have to arrive in their destination by walk. To support the TOD concept and BRT implementation, pedestrian way need to be improved. The Pedestrian development must be integrated with its land use master plan and BRT master plan. To provide convenience pedestrian Jakarta can learn from Bogota which involved tree planting in their pedestrian development because of the tropical climate. When facing the limited space to implement pedestrian way, Jakarta can adopt Bogota concept which make a partnership with the land owner to share or lend their land where they can receive much compensation such as tax, fiscal incentives or permit dispensation.

The existence of park and ride facility is for support the integration between busway system and private car, especially for capture the commuter demand that live faraway from busway and its feeder line but potential and interest to use or continue their trip by

busway service. Curitiba has implemented park and ride service which integrated with their BRT system. TransJakarta can be given authority to provide this kind of service. They can cooperate with other private company who interested to catch this potential demand and government can supports them by tax and permit incentive. TransJakarta can provide a certain service that passenger can use their car to the parking facilities and continue to use busway with once payment.

Jakarta busway can learn from Bogota with implemented the advance partnership which the private operator are required to absorb the risk and losses, if the cost increase and the demand decrease while the local government only covering capital investment. It is possible to extend the private partnership not only in busway operation, but also in develop infrastructure for BRT system. If the demand of busway passenger is potential profitable, the Build Operated Transfer can be studied to be implemented. Government can support by tax reduction, special permit for private who interested and other incentive which attractive for business activity. It is needed further study to implement this kind of BOT in providing BRT infrastructure and maybe learn from other country like China which implemented BOT in provide busway infrastructure.

Because the implementation of Transit Oriented Development, Bus Rapid Transit and Public-Private Partnership is in public domain, the role of government is crucial. To integrate all of those concepts, it needs a strong government commitment. The most important is government has a clear concept and plan in the long term perspective, so that all the related aspects can be set or driven to support that plan with improve the coordination among them. In all three cities, the leadership of political administratively was a crucial factor who pioneering the implementation of BRT system. And the consistency and continuity from next political and administration leader in the long term influence the sustainability of the TOD and BRT system. The role of supporting institutions and regulatory structure is determining the success of busway system. To establish those kinds of institution and regulations is not easy and can not be done in the short time. The building institutional structure is more difficult than the issues of physical BRT design, because it's related to the planning culture and need consensus from broad involved institution and stakeholders.

It can be concluded that the key factors in integrating TOD based on BRT supported by PPP are: the first, strong political will and leadership, the second; supported by comprehensive master plan, the third; supported by good institutional frame work and coordination, the fourth; involving related stakeholders, the last; supported by good partnership between public and private sector which encourage private business to participated more.

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