

Analysis of policy processes to introduce Bus Rapid Transit systems in Asian cities from the perspective of lesson-drawing: cases of Jakarta, Seoul, and Beijing

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Abstract

Policy makers in many large cities in Asia recently started to consider the Bus Rapid Transit (BRT) as an option for their urban transport. This research aims to uncover the reason why introductions of BRTs in Asia were accelerated around 2004 from the perspective of lesson-drawing. Specifically, through comparative study of policy process for introduction of BRTs in Jakarta, Seoul, and Beijing, this study examines: (1) who played important roles in lesson-drawing processes of BRTs and what were their roles; and (2) what factors motivated those actors to draw BRT lessons. Analyses were conducted through review of newspaper articles on the BRT in the three cities and a questionnaire survey with the individuals who were involved in adoption processes of those BRT systems. The findings include: (1) during the process for BRT introduction in the three cities, lessons were drawn from the Latin American good practice cases such as Curitiba and Bogotá; (2) different international organisations played important roles in technical assistance in Jakarta and Beijing; (3) strong political will was found to be a common thread in the adoption of BRTs in all three cities; and (4) the Asian economic crisis in the late 1990s seems to have affected the shift of the values of the policy makers in Jakarta and Seoul to some extent.

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1. Introduction

Bus Rapid Transit (BRT) is commonly understood as a system that emphasizes priority for and rapid movement of buses by securing segregated busways, although there is no precise definition of what constitutes a BRT system (Wright 2005).

Policy makers in some of the large cities in Asia recently started to consider BRT as an option for their urban transport. On 15 January 2004, the TransJakarta busway was started along a 12.9 km corridor through the city centre. On 1 July 2004, BRT corridors were installed as a part of Seoul's reform of its public transport system. On 25 December 2004, the first stage commercial operation of BRT was started in Beijing. In those new BRT systems in Asia, some influences can be found from existing BRT systems such as Curitiba and Bogotá and evidence shows that those Asian cities actually learned lessons from the Latin American countries.

This research aims to uncover the reason why introduction of BRTs in Asia was accelerated around 2004 from the perspective of lesson-drawing by comparing the policy processes in three Asian cities.

2. Background

2.1. Historical development of BRT in the world

The first wide-scale development of the BRTs started in Curitiba (Brazil) in 1974, although there were several smaller-scale projects prior to its development. Since then, Curitiba's experience has inspired other cities to develop similar systems. In the 1970s, development of BRT systems was limited to the North and South American continent. In the late 1990s, the replication of the BRT concept gained momentum and BRT systems were opened in Quito, Ecuador (1996), Los Angeles, USA (1999) and Bogotá, Columbia (2000). Especially, the TransMilenio project in Bogotá started operation in 2000 and its success drew attention from the world community as an example of the state of the art in BRT systems. As of 2005, there may be up to 70 systems around the world, depending on one's definition of BRT (Levinson et al. 2003; Ernst 2005; Wright 2005).

2.2. BRT Introduction in Asia

In Asia, prior to 2000, the experience of BRTs was very limited in number and scope. The systems in Nagoya, Japan and Taipei were regarded as relatively complete systems in the Asian region (Wright 2005).

The spread of BRT in Asia has become more conspicuous since 2004. In 2004, the TransJakarta busway was started along through the city centre (Hook and Ernst 2005). On 1 July 2004, three BRT corridors totalling about 37 km were installed as a part of Seoul's reform of its public transport system (Pucher et al. 2005). On 25 December 2004, the first stage commercial operation of BRT was started in Beijing as a pilot line for 5 km (Chang 2005). In Bangkok, the plan for BRT was declared in 2004 by the newly elected governor of Bangkok Metropolitan Administration (BMA) indicating that the first BRT lines would be opened in October 2005.

Although there was some confusion in Indonesia and Seoul when those lines were first introduced, the BRTs in Jakarta, Seoul, and Beijing have shown some success and those systems are under the process of expansion and upgrading. Information on evaluation and expansion of those systems is summarised in Chapter 4. In contrast, the plan for BRT in Bangkok has been delayed and has not been introduced yet, although rail and light rail expansion is underway.

The number of cities looking into BRT is rapidly increasing. In China, a BRT longer than that in Beijing was officially opened in Hangzhou in April 2006 (CAI-Asia 2006b). According to a Website by CAI-Asia (2006a), BRTs are now planned or under construction in 18 cities and under consideration in 5 cities in Asia.

It is noteworthy that, in the new BRT systems in Asia, some similarities can be observed with existing BRT systems such as Curitiba and Bogotá. In fact, there are records that there were communications between those Asian cities and Latin American cities, such as the visit of Jakarta's Governor to Bogotá in May 2003 (Institute for Transportation and Development Policy 2003a).

2.3. Potential for BRT to address both local and global environmental problems in Asia

In Asia, a growing motorisation trend is observed for most countries and the number of vehicles is forecasted to continue to grow. Motorisation is causing adverse impacts such as congestion, noise, accidents, and air pollution. In the majority of Asian cities, mobile sources are the most significant contributor to air pollution especially for particulate matter (PM), carbon monoxide (CO) and nitrogen oxides (NO_x), and are expected to continue to be the main source of pollution in the future. Statistics show that air pollution levels in many cities in Asia still exceed the standard of the World Health Organisation (Asian Development Bank 2003).

The transport sector also contributes to greenhouse gas (GHG) emission. In 1994, it accounted for 20% of carbon dioxide (CO₂) emission in Japan, 25% in Indonesia, 28% in Thailand, 27% in the

Philippines, and 15% in Singapore, in 1994 (United Nations Framework Convention on Climate Change (UNFCCC) 2002). The share of world carbon emissions from Asia shows a growing trend: it grew from about 10% in 1971 to 23% in 1997 (Schipper, Marie-Lilliu, and Gorham 2000).

It is necessary for Asian policy makers to develop policies to mitigate those emissions from transportation without reducing the accessibility to goods and services. One of the key elements is public transport, which can reduce the use of automobiles. Energy consumption and emission of public transport are lower for each passenger kilometre than private vehicle use, if load factors are sufficient (World Conference on Transport Research Society and Institute for Transport Policy Studies 2004).

Rail based public transport systems have larger passenger capacity, higher speed and less emissions of air pollutants than bus systems (Litman 2006). However, the investment cost of rail-based public transport is significant and many Asian cities have not been able to afford to construct rail-based systems. Even in the cities with rail-based systems, many of them cannot raise the operating costs and only operate by receiving subsidies from the government (Matsumoto 2004).

The infrastructure costs of BRT systems are far less than that for rail-based systems. Existing BRT systems were constructed with costs in the range of US\$1-15 million/km, depending on the capacity requirements and complexity of the project, while elevated rail systems and underground systems can cost from US\$50 million to over US\$200 million /km (Wright 2004 cited in Wright and Fulton 2005).

There have been some attempts to calculate the actual or potential effects of BRT projects for emission reductions. The following are some examples

- CO₂ reduction in Bogotá (Hook 2005): The combined BRT, traffic demand management (TDM), and non-motorised transport (NMT) projects in Bogotá reduced CO₂ emissions by 318 metric tons per day from 1997. Approximately 90% of this reduction is the result of the modal shift from private car and taxi to bus and bicycle.
- Analysis on potential reduction of CO₂ in a city in a large developing-nation (Wright and Fulton 2005) : BRT was found to be a cost-effective measure to reduce CO₂ from the transport sector. For example, in the scenario where BRT is combined with pedestrian upgrades and cycleway investment, the package would produce over 12 million tonnes of CO₂ reduction at US\$30 per tonne.
- CO₂ emissions in a typical medium-sized city in the United States (Vincent 2006): Emission reduction of CO₂ by BRT systems were estimated for three kinds of bus fleet and estimated reduction from BRT were found to be higher than light rail

The potential of BRT to reduce GHG started to be recognised by the global community for climate change policy: a baseline and monitoring methodologies of BRT in Bogotá for the Clean Development Mechanism (CDM) was approved in late July 2006. The approved methodology can be applied to all mass transport systems based on BRT and widened the potential for BRT projects to raise funds from the sale of the environmental service of emission reductions (Andean Development Corporation (CAF) 2006).

2.4. Limitation of BRT

However, effectiveness of BRT is not always permanent. Vuchic (2005) pointed out that BRTs cannot succeed if police enforcement is not strict, citing the examples of Philadelphia and Mexico. Experiences from the U.S. cities such as Shirley Busway in Washington and El Monte Busway in Los Angeles show that pressures by automobile interests are threat to the existence of BRT. Relationship of BRT to other modes is a crucial factor for the success of BRT: BRT cannot bring success as a stand-alone policy and effectiveness depends on the presence of complementary transport options, such as promotion of non-motorised transport and integrated feeder services (Wright 2001). Another important factor for success understanding of planning and design elements, based on experiences in real-world conditions (Vuchic 2005).

3. Research framework

3.1. Definitions and Scope

Bus rapid transit (BRT)

There is no precise definition of BRT. Wright (2005) defines it as a “*bus-based mass transit system that delivers fast, comfortable, and cost-effective urban mobility*”. In Levinson et al. (2003), it is defined as “*a flexible, rubber-tired rapid-transit mode that combines stations, vehicles, services, running ways, and Intelligent Transportation System (ITS) elements into an integrated system with a strong positive identity that evokes a unique image*”. Components or features of BRT in those two references are summarised in Table 1.

Table 2 lists the details of the BRT systems in Jakarta, Seoul, and Beijing according to the components described in Table 1. It shows that while all three systems meet the basic components of BRT to some degree, each system is different. Especially, the system in Seoul is quite different in terms of penetration of advanced IT technology and integration with other modes.

This research does not intend to compare the differences in those systems themselves, although the importance of that kind of information as background is acknowledged. Rather, the focus of this research is on the policy processes that resulted in decisions to change the transport system by taking up some road space from automobiles to provide priority for public transport and why and how the lessons from other cities are reflected in the decision-making process. Although the BRT development processes are still ongoing in those cities, this study examines the process up to the point when the first line of the BRT was opened in each city.

Table 1 : Components or features of BRT system from literature

Components	Levinson et al. (p13)	Wright (p2)
Running ways	BRT vehicles operate primarily in fast and easily identifiable exclusive transit-ways or dedicated bus lanes. Vehicles may also operate in general traffic.	Exclusive right-of-way lanes.
Stations	BRT stations, ranging from enhanced shelters to large transit centers, are attractive and easily accessible. They are also conveniently located and integrated into the community they serve.	Rapid boarding and alighting. Enclosed stations that are safe and comfortable.
Vehicles	BRT uses rubber-tired vehicles that are easy to board and comfortable to ride. Quiet, high-capacity vehicles carry many people and use clean fuels to protect the environment.	Clean vehicle technologies
Services	BRT's high-frequency, all-day service means less waiting and no need to consult schedules. The integration of local and express service can reduce long-distance travel times.	Excellence in marketing and customer service.
Route Structure	BRT uses simple, often colour-coded routes. They can be laid out to provide direct, no-transfer rides to multiple destinations.	
Fare Collection	Simple BRT fare collection systems make it fast and easy to pay, often before you even get on the bus. They allow multiple door boarding, reducing time in stations.	Pre-board fare collection and fare verification.
ITS	BRT uses advanced digital technologies that improve customer convenience, speed, reliability, and operations safety.	Clear route maps, signage, and real-time information displays. Automatic vehicle location technology to manage vehicle movements.
Integration		Free transfers between lines. Modal integration at stations and terminals.
Institutional setup		Competitively-bid concessions for operations. Effective reform of the existing institutional structures for public transit.

Note: The layout of this table was inspired by Ernst (2005).

Table 2: Features of BRT in Jakarta, Seoul, and Beijing

Components	TransJakarta busway (1 st line, opened in January 2004)	Median Bus Lanes in Seoul (Bus system reform in July 2004)	Southern Axis BRT Line One in Beijing (1 st line: 5.5 km segment opened in December 2004, 16-kilometer line opened in December 2005)
Running ways	12.9-km fully physically segregated median busway corridor from Blok M, South Jakarta, to Kota, West Jakarta.	In May 2004, a 1.1 km median bus lane was opened on Samilro. Three more lines (15.8 km, 9.9km, and 10.4 km) were opened July 1 in the first phase of the project. The lanes are highlighted with colour but not physically segregated.	16 km from Qianmen in the city centre to the South. The lanes are physically segregated in the median of the roadway except for the first 2 km from Qianmen to Tiantan.
Stations	Stations provide an elevated platform for rapid boarding and alighting. In most cases, the stations are connected to the sidewalk by a pedestrian bridge and ramps.	Bus shelters are installed at stops in the middle of the road. Construction of shelters is funded by advertisement.	The stops are located in the median of the road. The bus stops are connected to the pedestrian lanes of both sides of the roads by crossroads or pedestrian overpasses.
Vehicles	Air conditioned 56 orange-and-yellow buses, which are Euro II compliant.	Low-floor buses and articulated buses and CNG buses are being introduced on annual bases.	A fleet of 15 articulated CNG buses for 5.5 km line. For the full line, 40 BRT buses and another 50 regular buses operated.
Services	Service headway is 2 to 3 min at peak period and 3 to 4 min at off-peak periods. With service hours from 5:00 a.m. until 10:00 p.m.	Seoul's system adopts "area wide network". More than 20 routes run on the Medium Bus Lanes. Average bus frequency in Seoul is 7.6 minutes/day, 3-5 min at peak time.	For the pilot project, the peak service frequency was around four buses per hour. After the opening of full line, the service frequency became round 2 to 3 min.
Route Structure	Thus far, the route structure is simple (one dedicated bus lane).	The routes are divided into a system of trunk lines and feeder lines. The buses are colour-coded and numbered according to lines.	Thus far, the route structure is simple (one dedicated bus lane).
Fare Collection	Fare is collected using a contactless fare card system in advance in stations. The current fare structure is a flat fare of 2,500 rupiah (Rp) (30 cents). A discounted flat fare of 1,500 Rp is offered for trips from 5 to 6 pm.	Fare collection is done using a card embedded with an IC micro-chip (T-money). The flat rate (800 won: 85 cents) is charged on a single bus service. For transfer, basic rate is charged once within 10 km of travel and an extra 100 won for every additional 5km.	Fare collection is done at the ticket counter at the entrance of bus stops. Tickets were sold by salesclerks, not by using vending machines. One ticket is flat rate of 2 yuan (25 cents). The fee is two-third of the subway ticket.
ITS	On-board variable message sign at the front of the bus and audio, manually operated by the driver, announce the next station in Indonesian and English.	Seoul Transport Operation and Information Service (TOPIS) informs passengers waiting at bus stops of when to expect the next bus.	Bus is equipped with an electric stop announcement system.
Integration	The system is not officially integrated with other modes. Bus feeder services have been contracted but are not yet effective.	Intermodal transfers of fees were made possible with smartcards.	The terminal of BRT is situated near the metro station. There is no integration of the fare between the metro and BRT.
Institutional setup	TransJakarta BP, a public managing company is in charge of running and planning the BRT system.	A quasi-public operation system was introduced to increase public responsibility for the system.	The BRT Company is majority owned by the state-owned and subsidised Beijing General Bus Company.
source	(Ernst 2005), (Hudiono and Harsanto 2004), (The Jakarta Post 2002).	(Seoul Metropolitan Government 2006a), (Information provided by Dr. Kim, SDI), (ITDP 2005)	(Fjellstrom 2005), (Liu 2006) (Hook, Fjellstrom, and Diaz 2006)

Lesson-drawing

Lesson-drawing is one of the terms used to describe 'the process by which knowledge about policies, administrative arrangements, institutions and ideas in one political system (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political system' (Dolowitz and Marsh 2000). Other terminologies used to describe the same or similar processes include "policy transfer", "policy diffusion", and "policy convergence". According to Rose

(1993), the term lesson-drawing describes the overall transfer process of policy and institutions, while some argue that it is a narrower concept than “policy transfer” in that it focuses on voluntary lesson-drawing while the latter encompasses diffusion and coercion (Dolowitz and Marsh 1996; Stone 1999). Rose defines a lesson in the policy process as “*a program for action based on a program or programs undertaken in another city, state, or nation, or by the same organisation in its own past*”. Lessons can be drawn across time and/or space. In the latter case, lesson-drawing can occur at and between any of the following levels: transnational, international, national, regional, and local (Evans 2004).

3.2. Research questions

This research aims to uncover the reason why introductions of BRTs in Asia were accelerated around 2004 from the perspective of lesson-drawing. Specifically, through comparative study of three Asian cities, this study examines: (1) who played important roles in lesson-drawing processes of BRTs and what their roles were; and (2) what factors motivated those actors to draw BRT lessons. Case studies are conducted on Jakarta, Seoul, and Beijing, which adopted the BRT system in one way or another since 2004.

Actors in lesson-drawing

Previous studies identified the important roles of actors such as international organisations or transnational actor networks regularly acting as ‘agents of diffusion’ (Evans 2004c; Jörgens 2001; Tews et al. 2003). Rose (1993) stated ‘intergovernmental and international organisations encourage exchanges of ideas between countries with similar levels of economic resources’, mentioning examples of the European Community and OECD. Rose also mentioned that international organisations such as the World Bank and many United Nations agencies focus on programs of concern to developing countries. Lana and Evans (2004) argued that international organisations open up channels for lesson-drawing and policy transfer between developing countries by encouraging the emulation of ‘best practice’ and even finance implementation of best practice projects.

The Institute for Global Environmental Strategies (IGES) (2007) found that international organisations played important roles in the transfer of BRT programmes to Bogotá and Quito in terms of funding. In Bogotá, the World Bank was one of the funding sources for infrastructure of the BRT system, and the Spanish Development Fund and the Spanish Banco de Bilbao Vizcaya funded the total cost of the first 11.2-km trolleybus line (US\$57.6 million) in Quito.

Thus, this paper first examines the role of international organisations in lesson-drawing processes for BRT introduction.

Question 1: Did international organisations play important roles in lesson-drawing?

Another important actor is the government. Elected officials are important actors in lesson-drawing processes because their values give direction to public policy and their endorsement is needed to legitimise the adoption of programmes, while non-elected officials provide substantive expertise to formulate programmes (Rose 1993). IGES (op cit.) examined the case studies and discussed that political leaders played prominent roles in adoption of BRT in Bogotá and Los Angeles, both of which drew lessons from Curitiba, and the transfer of road pricing from Singapore to London. They pointed out that a common thread between those three leaderships is the institutional arrangement of local transportation bodies. Also, Wright (2005) identified “political will” as the most important ingredient in making BRT work. This paper tests if importance of political will also applies to the adoptions of BRTs in Asia.

Question 2: Did political will provide an opportunity structure for lesson-drawing to occur?

Factors affecting values of the actors

If the above actors played key roles in the lesson-drawing processes, why did Asian cities only start to pay attention to BRT in early 2000? Given that Curitiba's BRT was already in place in 1974 and became famous worldwide in 1990s, the reason those Asian cities did not introduce BRTs is unlikely to be simple ignorance of such systems. There might have been some changes in the values of decision makers that favour BRTs. In fact, the political values of policymakers are one of the important influences on the process of lesson-drawing from beginning to end (Rose 1993).

One possible explanation is the worldwide change in the image of BRT as a replicable option for public transport. It has been argued that the success of Bogotá's TransMilenio system, drawing lessons from Curitiba, transformed the perception on BRT around the world (Wright 2005).

There might have been some changes in the situation in Asia that made BRTs a more attractive option. One of the features of BRTs is lower costs compared to rail based systems. Coyle (1994) argued that "in times of fiscal crisis local government tends to bear more than its fair share of the burden as the central state seeks to export or devolve its financial problems to the local level. ". While Coyle's argument was made in European context, it should be noted that Asian countries went through the financial crisis in late 1990s, with the effects more severe than any since the great depression of the 1930s. It is worth examining if this financial crisis in Asia affected the values of policy makers in favour of cost-effective alternatives such as BRT, departing from a prior preference for more expensive rail-based public transport.

Question 3: Did the economic crisis in late 1990s change the preference of policy makers to turn to lower cost options?

3.3. Data sources

Information on the introduction processes of BRT in the three cities was obtained from newspaper articles review, literature review, and expert survey.

Newspaper article review

The histories of introduction of BRTs in the four cities were examined by collecting local newspaper articles including *the Jakarta Post*, *the Chosun Ilbo*, *the Korea Times*, *Xinhua*, and *the China Daily*. *SustainableTransport*, a Newsletter issued by the Institute for Transportation and Development Policy, was also referred to.

Literature review

Literature was available on the introduction of BRTs in various forms including journal papers, papers for conferences, documentation by local governments, reports by international institutions, and internet sources.

Expert surveys

Expert surveys were conducted with individuals who were involved in adoption processes of BRT in Jakarta, Seoul, and Beijing. The survey consisted of questions regarding: (1) role of international organisations, (2) role of political leaders, (3) source of lesson-drawing, and (4) opinion on the relationship between economic crisis in 1990s and BRT adoption. Although all questionnaires shared this common structure, details of questionnaire were modified for each city accommodating the facts obtained through newspapers and other literature. Questionnaires were sent out via e-mail in June

2006 to the experts identified through literature survey and expert consultation. The list of respondents is attached as Appendix I.

4. BRT introduction in three cities

4.1. Jakarta

Jakarta is the capital of Indonesia and located in Java island. The total area of DKI Jakarta (Daerah Khusus Ibukota, a province with special status as the capital of Indonesia) is 661.52 km² and total population was approximately 8.7 million in 2005, with a population density of 13,150 persons/km² (BPS Propinsi DKI Jakarta 2005). From 1985 to 2000, despite a significant reduction in car ownership after the economic crises, travel time measured on four principal routes increased an average of 50% (Pacific Consultants International and Almec Corp. 2003 cited in Ernst 2005). The air pollution was quite serious: in the 1980s, total suspended particulate (TSP) concentration exceeded 600 µg/m³ (Shah and Nagpal 1997 cited in Ernst 2005) and 35% to 40% of TSPs were estimated to have originated from the transportation sector (Heuberger 2000 cited in Ernst 2005).

Process of BRT Introduction

Although many studies and plans for Jakarta's mass transit systems have been developed for the past several decades, little progress was made towards implementation. Before the economic crisis in 1997, the delay was mainly due to the centralised and segregated government structure. After the economic crisis, neither the national government, the municipal government nor the private toll road company had the funds for implementing an expensive railroad plan. Although a very low-interest loan from JBIC (Japanese Bank for International Cooperation) was offered for an underground metro in the Blok M – Kota area, DKI Jakarta was unwilling to move forward, since it would have been responsible for repaying at least 30% of the loan (Institute for Transportation and Development Policy 2003d). As a result, local public transit was mainly dependent on road-based modes of buses and para-transit (Ernst 2005).

In December 2001, DKI Jakarta's Governor Sutiyoso, while never ruling out a metro in the corridor, decided to introduce a Bus Rapid Transit System. Partially on the strength of his promise to implement this tentative plan, he was re-elected as Governor of DKI Jakarta by the Regional Parliament (DPRD) with the support of President Megawati (Institute for Transportation and Development Policy 2003d).

In April 2002, the city administration announced that the busway system connecting Blok M in South Jakarta with downtown Kota in West Jakarta would start operating in December 2002 (Nurbianto 2002). However, the delay of the plan was made public several times since early October 2002 due to lack of public consultation and financial preparation (The Jakarta Post 2002).

In February 2003, a delegation of 15 Indonesian government, local parliament, private sector, press, and nongovernmental organisation (NGO) representatives attended the International Seminar on Human Mobility in Bogotá (Institute for Transportation and Development Policy 2003b). In May 2003, Governor Sutiyoso himself visited Bogotá's TransMilenio bus system. After the return of the Governor, a task force was formed to implement the BRT system, officially consisting of five Jakarta agencies – Transportation, Public Works, Parks, Utilities, and Planning – plus the three affected local municipalities within Jakarta (Ernst 2005; Institute for Transportation and Development Policy 2003a).

On 15 January 2004, the 12.9 km trunk corridor busway was finally opened on the main corridor through the city centre, in line with the extension and expansion of the three-in-one traffic policy to the evening period (Hook and Ernst 2005). The construction of the first BRT cost 240 billion Rp (US\$29 million) funded by the city budget (Harsanto 2005).

Evaluation of the system

According to a survey of 320 BRT passengers undertaken by JICA in the first month of TransJakarta's

operation, 20% of TransJakarta busway passengers had switched from private motorised vehicles for the same trip (Ernst 2005). In July 2004, six months after the inauguration, the TransJakarta Busway recorded an average 46,000 passenger a day, which exceeded its estimated target of 20,000 passengers out of the 60,000 people who commute between Blok M and Kota daily (Nurabianto 2004). An estimate indicates that the modal shift to TransJakarta busway reduced the emission of nitrogen oxide by 212 kg/day and PM₁₀ by 30 kg/day (Ernst 2005).

Shortcomings of the system include: inadequate improvement of road surface for BRT lanes; terminal station capacities below passenger demand level; only one platform-level door on the platform side; ineffective feeder services; absence of in-route headway control (Ernst 2005).

Expansion of the system

Two more busway corridors (14.3 km from Pulogadung in East Jakarta and harmoni in cetral Jakarta, and 18.7 km from Harmoni to Kalideres in West Jakarta) were opened two years after the launch of the first line (The Jakarta Post 2006). As of November 2005, the city administration was planning to develop four new busway corridors in 2006 to bring the total to seven by the end of the year (The Jakarta Post 2005).

4.2. Seoul

Seoul, the capital city of Korea, has a population of more than 10 million residents in an area of 605.39 km². The city's population density was 16,994 persons/km² in 2004 (Seoul Metropolitan Government 2006b; Pucher et al. 2005). As the city grew, the total number of daily trips increased from 5.7 million to 29.6 million between 1970 and 2002. Vehicle ownership in 2003 became 215 vehicles per 1000 population, while only 0.2% of the population owned personal vehicles thirty years ago. The modal split of cars increased from 25% in 1996 to 27% in 2002 (Kim and Kang 2005).

The increase in private car use overwhelmed the capacity of the existing infrastructure and resulted in serious traffic congestion, air pollution, noise, traffic accidents as well as excessive use of scarce land for roadways and parking facilities. Economic loss due to congestion was estimated to exceed \$8 billion a year, amounting to 4% of GDP by 2003 (Kim and Kang 2005).

Process of BRT Introduction

From the 1960s until the mid-1980s, the bus sector served as the main mode of public transport (Kim and Dickey 2006). The first metro line started operation in 1974 and the metro network has been expanded since then to become the most popular mode of public transport. By 2004, the total rail network included eight subway lines reaching 487 km, and servicing more than 2.1 billion people yearly. The share of buses began to fall sharply as subway lines expanded, but much of the drop is attributed to rise in private car use and low quality of bus services (Kim and Kang 2005).

The extensive development of the metro system put fiscal pressure on both the central and municipal governments. The construction debt from the metro system expansion reached \$6 billion. In addition, since passenger fares cover only 75% of the operating costs, the annual operating deficit was estimated at \$634 million in 2004. The central government covered 40% of the construction cost, while the Seoul Metropolitan Government (SMG) financed the rest of the construction costs and operating deficits and those represented 82% of the SMG's total debt (Kim and Kang 2005). The local government also needed to spend \$65 million operation deficit and \$66 million capital deficit for the inefficient bus services (Pucher et al. 2005).

In June 2002, Myung-Bak Lee, promising to improve the problem-ridden public transport system, was elected by the popular vote. Prior to his reform, attempts to reform the bus sectors were made several times over four decades but all failed in the face of opposition from the bus industry and users (Kim and Dickey 2006). The overhaul of Seoul's traffic system was announced by the Seoul City government in early September 2002 and the "public transport reform support team," based around

researchers at Seoul Development Institute (SDI), was formed in October. While assigning research to the SDI, the Mayor himself visited Brazil, Sao Paulo, and Los Angeles to see the existing BRT systems.

The proposal for the trial BRT along Cheonggyecheon corridor in the northeastern district was developed in May 2003. However, the plan faced opposition by the bus operators' union. The Mayor decided to postpone the trial service plan and changed the decision making approach. The BSRCC (Bus System Reform Citizen Committee) was formed as an independent committee bringing together all those most directly involved in the bus system reform. The members included twenty representatives from the SMG, the Seoul Metropolitan Police Agency, the bus industry, citizen groups, and professionals. The first meeting of BSRCC was held on 26 August 2003.

The SDI, in December 2003, published detailed reports recommending better integration of bus and metro services and expanded network of reserved bus lanes. In January 2004, the start date for implementation of the reforms was announced and a public relations campaign started. An agreement was signed between Seoul Metropolitan Government and bus operators on implementation of the bus system reform in February 2004. (Seoul metropolitan Government 2006a; Kim and Dickey 2006; Pucher et al. 2005).

Thus, the public transportation reform went into effect on 1 July 2004: bus services were completely reorganized and BRTs in the form of median bus lanes were installed along three corridors.

Evaluation

The beginning of the new system turned out to cause great confusion for citizens. The traffic card did not work properly due to the omission of computer data on the new transportation program. People were confused by changes in bus routes and the colour-coding systems of buses (Youn-hee 2004). However, as the situation settled, riders started to recognise the benefit of cheap transfers between different vehicles, and reduced transportation time due to bus-only lanes (The Korea Herald 2004). Based on figures provided by the civic group Network for Greentransport, the dissatisfaction rate was 47.2% on the first day and hit a peak of 56.0% on 8 July. On the other hand, satisfied citizens were 15.4% on the starting day and went down to 10.9% on 8 July. Satisfaction increased after the end of July and it exceeded the dissatisfaction rate on 23 September. On 28 October 2004, 27% of the citizens were satisfied with the system while 13.2% were still dissatisfied (Seoul metropolitan Government 2006a).

One of the achievements of the transport reform is the increase in ridership. The daily average number of public transport passengers rose from 9.32 million to 9.83 million, i.e., by 5.5%. Specifically, bus passengers increased significantly: city bus passengers have risen by as 13.2 % on a daily average. Secondly, improvement in air quality was observed: the ambient concentration of pollution particles was reduced to 58 $\mu\text{g}/\text{m}^3$ in 2005, which is the lowest level since 1995 when such measurements were started (Seoul metropolitan Government 2006a).

In terms of reduction on the government budget burden, the reform has failed to curtail subsidy needs (Pucher et al. 2005). However, the budget for public transport in total is getting better since the deficit in the subway sector is now reduced (Fujita 2006).

The world community started to recognise the transport reform in Korea. Seoul was awarded with various international awards such as the 2006 Sustainable Transportation Award by the Institute for Transportation and Development Policy (ITDP).

Expansion of the system

The Seoul Government plans to open median bus lanes on the remaining 10 of 16 trunk and feeder lines (191 km) by 2008. All buses in Seoul will be replaced with premium buses: articulated buses, low-floor buses, and CNG buses.

4.3. Beijing

In the city of Beijing, a population of 14 million live in the area of 16,800 km². Rapid economic growth during the last two decades has resulted in a significant increase in travel demand and car ownership. In early 2006, there were around 2.8 million cars in the city, meaning that about 20% of the citizens own private vehicles (Liu 2006). The growing motorisation trend has caused serious congestion. According to statistics, 87 areas were seriously congested and the average speed of traffic is as low as 12 km per hour, keeping 40% of passengers spending over one hour in traffic (Zhenjiang 2004). The traffic also cause air pollution and enormous increases in gasoline consumption (Hossain 2006).

Under the Ninth Five-Year Plan (1996-2000), there was rapid development of the public transport system in Beijing. The number of buses increased from 4,452 to 10,077 from 1995 to 2000 and the number of bus routes grew from 260 to 422 (Zhu, Yu, and Jiang 2003). Bus lane was introduced in Beijing in 1997 in Chang'An Street and expanded to 45 roads as of 2006 (Jiang 2006).

Regarding the rail based system, the Beijing Subway Line 1 (30 km long) was constructed in 1969 for 30km and the second line (23km-long Loop Line) was opened in 1982 (Hook, Fjellstrom, and Diaz 2006). Subway construction has gained momentum in 2000s (Zhenjiang 2004). It was planned to extend subway lines by 40 kilometres per year and complete the network of around 250 km (Zhu, Yu, and Jiang 2003). However, this extensive metro network will be able to carry only 20 percent of total public transport trips, and most parts of the city will left uncovered (Xu 2004).

Process of BRT Introduction

In China, there has been a national level initiative by international organisations promoting BRT. In November 2001, the China Bus Rapid Transit Programme was started as a part of the Energy Foundation's China Sustainable Energy Program (CSEP), funded by Hewlett Packard and Blue Moon foundations (Hossain 2006). The programme targets eight project cities, including Beijing (Xu 2005).

In Beijing, conventional bus services were not attractive to passengers because of slow and poor quality service. Faced with growing traffic demand and considering the upcoming 2008 Olympic Games, the Beijing Government found it essential to build the BRT and took the lead in the BRT project. BRT was considered as a supplement to rails while expanding the rail network to increase its coverage(Zhenjiang 2004).

Thus, construction of BRT became one of the most-committed projects by the Beijing municipal government for 2004 along with 55 other projects and a task force was formed with representatives from many government agencies in October 2004 (Beijing Changdatong Transit Ltd. 2006). The first line was planned on the southern axis from Qianmen, for which the subway line 8 was originally planned. This corridor was chosen because the planned subway construction could not be expected in the short term while traffic problems continued to worsen.

The first BRT line was implemented in two phases. The first stage line for 5 km, from Qianmen in the city centre southward to Muxiyuan, started operation on 25 December 2004 (Chang 2005). The second phase, the corridor for 16-km, called the Southern Axis BRT Line One in Beijing, was opened on 30 December 2005 (Liu 2006; Fjellstrom 2005).

Evaluation of the system

The full BRT line has achieved a large ridership within the first two months of operation. Daily passenger flows averaged around 80,000 commuters. On the third day, the service recorded a peak flow of nearly 130,000 passengers per day, which is only 20,000 less than the achievement expected to occur in 2007 (Liu 2006).

The operational speed during the peak period was around 22km/hr as of May 2006, which is slightly faster than the speed of regular buses in the same corridor. Although the corridor is not currently congested except for the northern section which does not have segregated bus lanes, congestion can

be expected to increase in future and the BRT will bring more significant travel time savings for passengers compared to regular buses (Hook, Fjellstrom, and Diaz 2006).

Expansion of the system

Just after launching the first BRT line, the plan to open the second BRT line by the end of 2006 was announced by a spokesman for the capital's traffic commission. He further indicated the plan to open more BRTs (Shanghai Daily 2006). As of March 2006, the second line (Chaoyanglu Line) was under construction in Beijing's eastern districts, and two more lines cutting across the north and the west were in the planning stages (Liu 2006). The BRT network is planned to be extended to 60 km by the year 2008 (Xu 2005; Beijing Changdatong Transit Ltd. 2006).

5. Comparison and discussion

5.1. Origins and contents of lessons

Literature and responses to the expert survey provided information supporting the assumption that lesson-drawings were observed in the introduction of BRT in all three case cities.

In Jakarta, policy makers expressed their interest in learning from other cities, especially from Bogotá, during the planning process of the TransJakarta BRT. For example, Governor Sutiyoso stated that "Bogotá has been applying the busway system and it runs well. The Bogotá mayor has invited us (for the comparative study)," when he revealed the plan for him and city officials to visit Bogotá, to conduct a study of the BRT system in early 2003 (Junaidi 2003a).

According to responses from experts, the elements specifically imported to TransJakarta from Bogotá's TransMillenio include: physically separated bus lanes in the median of the roadway; high floor bus stations and wheelchair-usable pedestrian ramps; high-floor buses; pre-board fare payment with turnstiles using electronic smart-cards. Thus, Jakarta imported some components from TransMillenio which it thought feasible but did not adopt the holistic system approach found in Bogotá. Regarding Curitiba, both experts answered that Jakarta draw few lessons directly from Curitiba. However, response from one of the experts indicated that there was an indirect lesson drawing: that some elements that Bogotá adopted from Curitiba's lesson were reflected in TransJakarta. Expert survey also revealed that the TransJakarta drew lessons from Quito, in terms of concept for use of BRT in narrow streets and the factors causing failure of BRT systems. Information source which the experts found most useful to draw lessons included: visit by the former Mayor of Bogotá to Jakarta; Visit to Bogotá; Visit to Quito; and technical support by experts.

In contrast, the Bogotá system was found to be only marginally useful in Seoul. One expert explained this is because Bogotá's system is based on a trunk concept or corridor approach while Seoul wanted to address not only one corridor but the total system. Instead, Seoul did adopt the Quasi-Operational system of Curitiba, in which private bus companies earn revenue by service distance and not by the number of passengers. Components such as physical busway segregation, bus station design, and vehicle design were not imported because: (1) the weather is different; (2) there were already extensive subway systems in Seoul; and (3) the reform was designed so that existing systems can be utilised the most. In learning from Curitiba, useful information was obtained through the visit by the former Curitiba Mayor to Seoul, research conducted by the Seoul Development Institute, and international conferences held by organisations such as the Transportation Research Board (TRB) and the International Association of Public Transport (UITP).

In the case of Beijing, the experts replied that both Bogotá and Curitiba systems were referred to and some elements were incorporated into the system design in Beijing. Beijing BRT adopted the off-boarding ticketing system from Curitiba and left-side door BRT operation from Bogotá. The Beijing BRT system drew those lessons by: sending decision makers to Curitiba, inviting the former Mayor of

Curitiba to Beijing, and conducting studies on BRT system technical elements.

5.2. Actors

International organisations

For the TransJakarta project, the Institute for Transportation and Development Policy (ITDP) provided technical assistance based on a grant from the United States Agency for International Development (USAID) (Institute for Transportation and Development Policy 2003d). This assistance included support to civil society (particularly NGOs and the media), private bus operators, and the Government, primarily in the form of visits to the BRT systems in Bogotá, Columbia, and Quito, Ecuador, and visits to Jakarta by key consultants who developed the Bogotá system, including the former Mayor, Enrique Peñalosa (Ernst 2005). It also facilitated the involvement of NGOs to coordinate civil society input into the planning process. (Global Environmental Facility 2006).

Close examination of the history indicates that the visits assisted by ITDP preceded key turning points and seem to have triggered the changes. First, the decision to develop BRT was made in December 2001, right after the ITDP-sponsored visit by former Mayor of Bogotá, Enrique Peñalosa to Jakarta (Institute for Transportation and Development Policy 2003d; Ernst 2005). The second turning point was February 2003, when the BRT plan was facing a deadlock and had already been postponed several times. A delegation of 15 Indonesian government, local parliament, private sector, press, and NGO representatives attended the International Seminar on Human Mobility in Bogotá, supported by ITDP. After that, activists and urban transportation experts asked for involvement of the public in the process to fix the transportation problems in the capital, noting the importance of public involvement in Bogotá's case. The head of the City Transportation Agency admitted that more public information was necessary (Junaidi 2003b, 2003c; Harsanto 2003; Junaidi 2002).

In Beijing, the Beijing office of the Energy Foundation contributed to the BRT project by: initiating the China Bus Rapid Transit Programme together with the Hewlett Packard and Blue Moon Foundations in 2001 (Xu 2005); providing grants to the study team and technical support (He, Xu, and Chang 2004); supporting the Beijing BRT Development Symposium in 2003 (Beijing Changdatong Transit Ltd. 2006); and providing continuous technical support to Beijing BRT development through provision of a full-time consultant. The contribution of international organisations was noted as one of the key factors for the success in BRT introduction in China (Chang 2005; Hossain 2006).

By contrast, in the case of Seoul, there was no record of involvement of international organisations. The planning for the transport reform in Seoul was technically supported by domestic specialists (Institute for Transportation and Development Policy 2003c; Pucher et al. 2005).

It should be noted that neither Jakarta nor Beijing received any financial support for construction or operation of the bus systems. While in Bogotá and Quito's case the involvement of international organisations included funding, supports from the international organisations for Jakarta and Beijing were mainly in the planning and engineering phases (Hook 2004).

Political will

In Jakarta, Governor Sutiyoso of DKI pushed through the BRT project through implementation using his budget and staff (Ernst 2005). He decided to introduce a BRT system in December 2001 and was re-elected due to this promise. Therefore, the busway became "something of a litmus test" for his administration (Institute for Transportation and Development Policy 2003d). The Governor reconfirmed his commitment to opening the TransJakarta busway by the end of 2003, when he returned from the visit to Bogotá in May 2003. He set up a management team headed by an Assistant to the City Secretary, Irzal Jama (Ernst 2005). After the inauguration of the system, the Governor defended the reserved right-of-way for the TransJakarta BRT (Ernst 2005).

The conviction of the Governor was influenced by actors such as the former mayor of Bogotá. As

indicated above, Bogotá's former mayor Peñalosa, visited Jakarta in November 2001 to present the Bogotá Transmilenio BRT system and that information was relayed to Governor Sutiyoso by the Vice Governor (Ernst 2005).

The Mayor in Seoul shared a similar political commitment to Jakarta's Governor: Mayor Lee Myong-bak promised to improve the problem-ridden public transportation system when he ran for election in 2002. He held a weekly transport policy meeting until implementation of the reform in 2004 (Seoul metropolitan Government 2006a). Mayor Lee and his staff charged the transport specialists at SDI to lead the Transit Report Task Force Team and then provided the necessary political support (Pucher et al. 2005).

What is notable in the leadership of the Mayor of Seoul was change in approach when the first plan for BRT was failed due to opposition by the bus drivers' union and the bus operators' association (Seoul metropolitan Government 2006a). The previous top-down approaches by the central government and Seoul Metropolitan Government was changed into a participatory process headed by a committee supported by citizen groups and collaborative organisations by establishing the BSRCC (Kim and Kang 2005).

After the confusion with the opening of the new system, the Mayor also took public actions such as visiting Gangnamdaero (one of the corridors for Median Bus Lanes) and Korea Smart Card Co., expanded daily transport policy meetings, and received issues for the day (Seoul metropolitan Government 2006a).

Behind the strong commitment for the transport reform, there was also an influence of experience in foreign cities. During his first two months in the Mayor's office, Mr. Lee conducted fact-finding trips to investigate the BRT systems of Curitiba, Sao Paulo and Los Angeles (Institute for Transportation and Development Policy 2003c). When he visited Brazil, he asked former Mayor Lerner, who pioneered the Curitiba BRT, from 1971 to 1998, to visit Seoul. Mayor Lerner made a visit to Seoul in March 2003 and received an honorary citizenship (Hong-ryul 2003).

The major role taken by the Mayor of Beijing was to support the plans proposed by the Director of Beijing Transportation Commission. Both Xu (2005) and Chang (2005) pointed out that this support from the Mayor was one of the keys for the BRT success in Beijing. In China, such support is crucial since Mayors in China have enormous discretion in terms of transportation planning and budgets by international standards (Hook, Fjellstrom, and Diaz 2006).

Not much documentation is available on why the Mayor of Beijing expressed strong support for BRT. One reason could be that capital-intensive solutions like road infrastructure expansion and metro systems have been found incapable of solving the growing problems of congestion and air pollution. Mayors in China are responsible for the performance of the urban economy, including reforming the state-owned enterprises, and running indirectly municipally owned companies including the transport sector (Hook, Fjellstrom, and Diaz 2006).

5.3. Factors affecting values of the actors

Economic Crisis

In the expert surveys, the respondents were asked how much they agree with the following statement on the linkage between the Asian economic crisis and the introduction of BRTs:

"Policy makers in the city were long prioritizing introduction of rail-based systems as the most effective mode of public transport and were developing plans for subway construction. However, the economic crisis in Asia in late 1990s affected the budget of the city government and the policy makers started to seek lower cost solutions to provide public transport. In this context, BRT started to draw attention from the policy

makers in the city.”

(Note: For the underlined parts of the statement, names of cities, that is, Jakarta, Seoul, or Beijing were used on the actual questionnaire sheet sent to the experts.)

One respondent in Jakarta strongly agreed with this statement. However, another respondent somewhat disagreed and responded that although the economic crisis severely impacted the national budget, the impact on local government was mitigated by decentralisation of funds after the Suharto regime ended.

One expert deeply involved in Seoul's transport reform also strongly agreed with the statement, noting that the crisis changed the thinking of the policy makers on costs. However, another expert involved in the Seoul Master' Plan said that the impact of economic crisis on the transport reform was limited. Although “the looming financial crisis of Seoul's public transport system due to deficits from the subway construction and operation” was the driving force behind the drastic reforms of July 2004 (Pucher et al. 2005), this financial burden is not only due to the economic crisis in 1997 but also due to other structural reasons of public transport system in Seoul.

With a contrary view, the Chinese experts strongly disagreed with the statement. This is not surprising since the economic crisis had less impact on China than other Asian countries (Noble and Ravenhill 2000).

The literature shows that notable aggravation of congestion was observed after the recovery from economic crisis in both Jakarta and Seoul. Those rapid changes in the traffic after the recovery from economic crisis might have pressed the policy makers to seek a relatively quick solution to development of public transit.

In addition, In the case of Jakarta, the economic crisis affected the bus sector severely and put the pressure for the government to take a rapid action (Sutomo 2006).

6. Conclusion

Three pioneering cases of BRT introduction in Asia have been examined, namely, the TransJakarta busway, the Median Bus Lanes in Seoul, and the Southern Axis BRT line One in Beijing, from the perspective of lesson-drawing focusing on important actors and factors that motivated them to introduce BRTs.

First, it was found that during the process of BRT introduction in the three cities, lessons were drawn from the Latin American good practice cases: Curitiba and Bogotá. Interestingly, however, the major origins and contents of lessons differed from city to city. Jakarta drew lessons mainly from Bogotá on the specification of running ways, stations, vehicles, and fare collection. Seoul looked into Curitiba's system and adopted the institutional arrangement for payment to bus operators, but not the technical specifications such as vehicles and stations. Beijing referred to both Bogotá and Curitiba and imported the factors related to vehicles, stations, and ticketing.

Second, it was found that different international organisations played important roles in technical assistance in Jakarta and Beijing. ITDP's assistance to facilitate the visits of stakeholders to Bogotá and vice versa catalysed the lesson-drawing and lead to visible changes in the process. The technical support provided by the Energy Foundation to Beijing seems to have been more continuous technical assistance. On the other hand, Seoul's transport reform was supported by domestic experts.

Third, strong political will was found to be a common thread in the adoption of BRTs in the three cities. The governor of DKI Jakarta and the Mayor of Seoul actively lead the BRT projects. They placed the BRT introductions as one of their major political commitments, made important decisions to change the setup of the teams when faced with planning gridlocks. They both took actions when problems arose after the inaugurations of the systems. Influences by the former mayors in Latin American cities

could be tracked as one of the driving forces of the commitment of those political leaders: there were interactions and visits between the former Mayor of Bogotá and the Jakarta Governor; and between the former Mayor of Curitiba and the Mayor of Seoul. The role of the Mayor in Beijing in BRT introduction was different from other two cities. He provided support to the plans proposed by the Director of Beijing Transportation Commission. This does not mean this role as less important than other cases since the mayors have strong discretionary powers in Chinese cities.

Fourth, the Asian economic crisis in the late 1990s seems to have effected the shift of the values of the policy makers in Jakarta and Seoul to some extent in motivating them to seek lower cost solutions to provide public transport and thus focused attention on BRT systems. However, this impact of the economic crisis on the value change seem to have mitigated by the decentralisation trend in Jakarta. In Seoul, the economic crisis was not the only factor and the accumulated debts due to public transport seems to be rather bigger force that pushed policy makers to turn to the lower cost options. It was also shown that rapid change in traffic volume after the economic recovery might have added to the momentum to urgently address the transport issue in those two cities. In addition, in Jakarta, the economic crisis pushed the government to take an action to rescue the severely affected bus sector. No such linkage between economic crisis and BRT introduction was identified for Beijing.

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Appendix I: List of Respondents of Expert Surveys

Jakarta

Mr. John Ernst, Asia Regional Director, Institute for Transportation and Development Policy

Ms. Andi Rahmah, Policy analyst, Pelangi Indonesia

Seoul

Dr. Gyung-Chul Kim, Director, Department of Urban Transit, Seoul Development Institute

Beijing

Mr. Fan Jin, Executive Director, China Sustainable Transportation Center

Notes:

- Informal hearings were made with two other experts on the questions during the international conferences such as the International Conference on Environment and Transport in Aichi (2005) and the 5th UITP Asia-Pacific Congress and IPTS Conference.
- Mr. Kangming Xu, China BRT Consultant, provided information for Mr. Jin to complete the survey.