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Seoul's Urban Transportation Policy and Rail Transit Plan—Present and Future

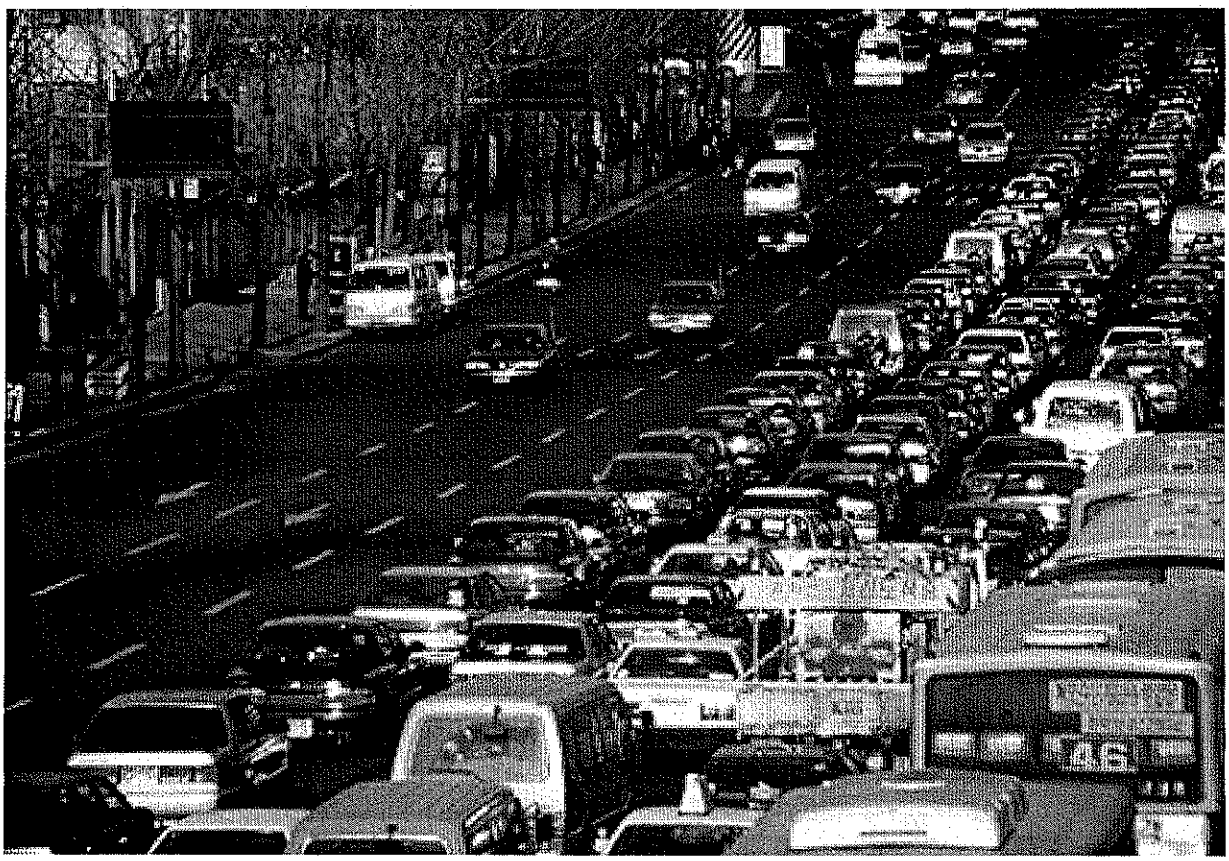
Gyengchul Kim and Jeewook Rim

Introduction

Traffic congestion and other transportation problems have become a part of everyday life in Seoul, as urbanization and suburbanization have proceeded. Reliable transport services often cannot be provided, hindering further urban development. In order to mitigate the problems, additional infrastructure has been constructed but is soon filled with new users. Such ineffective transportation supply management (TSM) has forced the government to seek another approach to the problem. As an alternative, transport demand management (TDM) has been implemented extensively in Seoul to increase public transport use and replace excessive use of private cars. Hence, the Seoul's transport policies must consider balanced application of TSM and TDM. There is strong emphasis on improving the public transportation system because Seoul's buses and railways compete with each other while use of private vehicles increases continuously. Hence, integration of different modes of public transport has been accentuated to improve the effectiveness of the transportation system. In particular, the urban rail system is often considered as more user-friendly and environmentally sound than buses, although it is costly. The recent transportation policies focus on building a sustainable city by reorganization and expansion of the rail system. This article reviews the urban transportation of Seoul in terms of the transportation system and policies, the public transport, and the new rail plan.

Transportation in Metropolitan Seoul

The urban transport system in Seoul is changing continuously as the economy grows and demand for transport increases. Until 1945, surface trams were the most popular mode and were used by more than half of Seoul's population. Public buses became the major mode when trams were abolished in 1968. After 1960, the number of vehicles increased rapidly



Congested road in rush-hour Seoul (Author)

Table 1 Trend in Number of Vehicles

	1970	1980	1990	1995	1998
Total registered vehicles (1000)	60	207	1,193	2,043	2,198
Private Vehicles (1000)	18	99	826	1,520	1,704
Vehicles per 1000 people	10.9	24.7	109.4	128.0	160.0

Figure 1 Seoul Population and Traffic

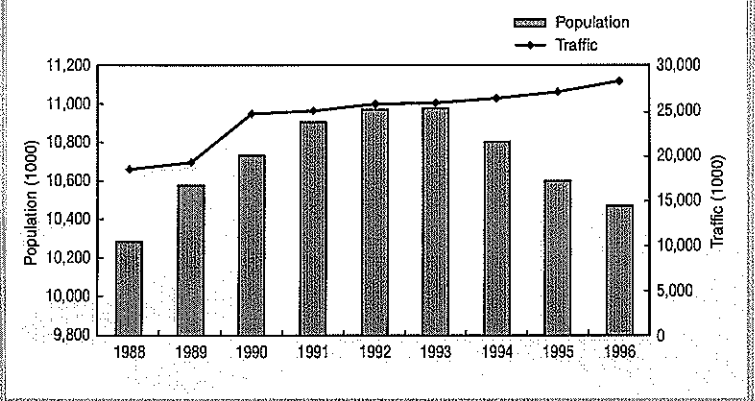
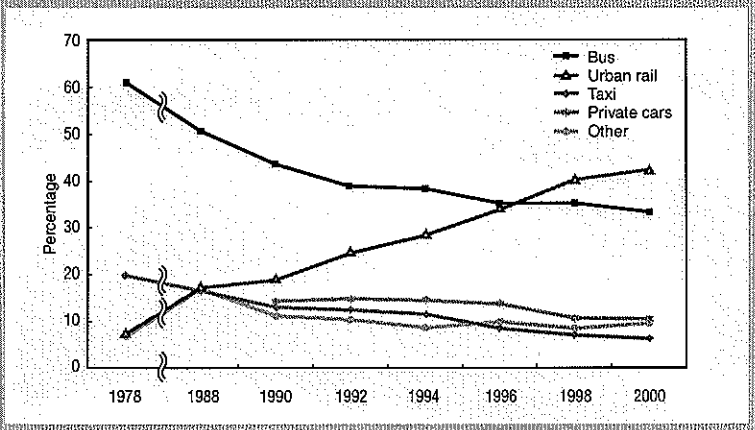


Figure 2 Passenger Transport Modal Split



due mainly to use of buses and taxies as public transport. However, even in 1970, the number of vehicles in Seoul was still less than 60,000 and very few were privately owned. Buses were the prime mode although the first urban subway was built in 1974. At that time, the subway's share was still only 6% of all passenger trips. Additional lines were constructed from 1985 and rail has since become the other major public transport mode.

The economic development and urbanization are pulling more people into Seoul, causing rapid growth in transport demand within urban areas. However, since 1992, the population of the city core itself has decreased steadily. In contrast, the population of Metropolitan Seoul has increased continuously due to suburbanization. In 1997, Seoul had a population of 10.3 million, or 22.9% of the national population. In 1996, traffic volume reached 28 million people and 2.3 million vehicles per day (Fig. 1).

As income increases, private transport becomes more popular than public transport and this trend fuelled vehicle ownership through the 1990s. The number of vehicles in Seoul reached 1 million in 1990 and doubled again by 1995. Vehicle ownership is expected to continue to grow until it reaches the saturation level. In 1997, 22% of the nation's vehicles were concentrated in Seoul, with 75% of them privately owned. The figures in Table 1 are only vehicles registered in Seoul. If traffic flow into Seoul is considered, the actual traffic volume is much larger.

The Seoul Metropolitan Government (SMG) recognizes the impact of transportation problems caused by the rapid growth in traffic volume and private vehicle use. Initially, the SMG made great efforts to expand roads and facilities to cope with increased demand. For example, paved road increased by 1.4 times from 1980 to 1996. The ratio of public roads to city area has increased from 17.3% in 1987

to 20.2% in 1996. In addition, five urban expressways totalling 147.5 km were built during the period. Despite huge effort and expense, the 10-fold increase in cars over the same period overwhelmed the progress. Until 1980, average vehicle speed remained above 30 km/h, but in 1990, it dropped to the lowest level of 16.4 km/h. As a result, the SMG introduced the TDM policy to hold down use of private vehicles and maximize use of public transport use. In 1996, subways accounted for 36% of riders; buses, 35%; private cars, 12% and taxis, 7.6% (Fig. 2). The high 70% of passenger trips by public transport shows the success of the TDM policy.

Transport Policy in Seoul

The Seoul transport policy has been changing over the last decades as the traffic environment has changed. In particular, the SMG is focusing on developing a public mass transit network, consisting of bus and urban railways, as the principal transport system. Integration of public transport modes is a priority in helping to replace private car use. Specifically, the SMG is planning to maintain a market share for public transit of 70% during rush hours and 50% at other times. Therefore, the policy must be coordinated with several strategies such as road tolls, fuel tax, and parking schemes to discourage use of private cars. The prime directions of the SMG transport policy are:

Improvement of urban railway and bus systems

- Continuously extending railways and dedicated bus lanes
- Improving service speed and convenience

Effective controls on private cars

- Discouraging private car use by using road tolls and fuel taxes
- Controlling parking in dense areas

Expansion of infrastructure and introduction of intelligent transport system (ITS)

- Constructing urban expressways (circular, radial)
- Automating control of traffic flow by developing ITS

Integration and coordination of transport systems in metropolitan area

- Easing transfer between transport modes
- Linking urban rail and expressway networks for regional travel demand

Reduction of traffic accidents and improvement in traffic environment

- Improving pedestrian facilities
- Encouraging green travel modes and improving traffic facilities

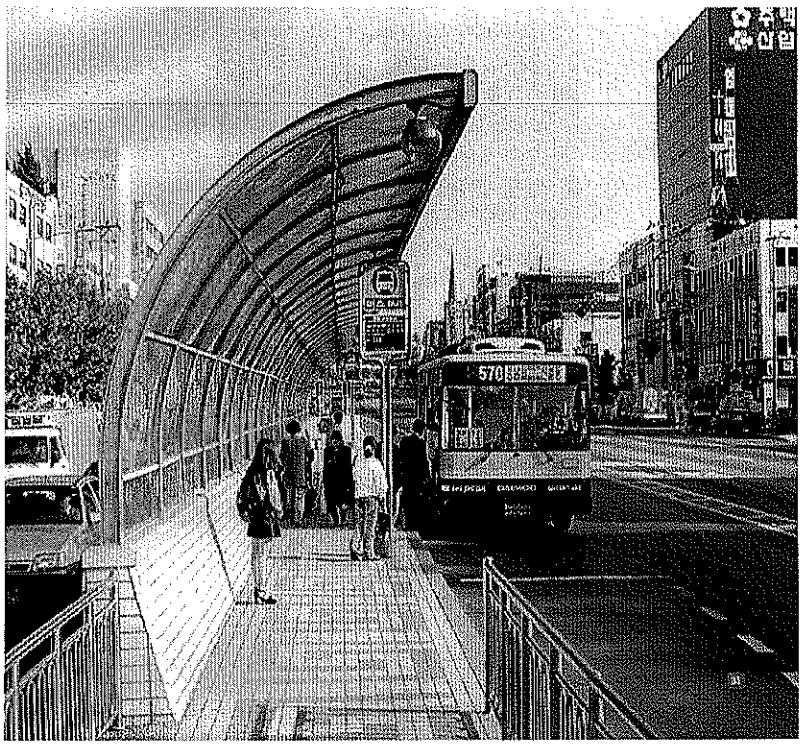
Dedicated bus lane in Seoul (Author)

The transportation census conducted by the SMG in 1996 showed that traffic volumes between Seoul and its new satellite cities had increased enormously compared to the inner city. In addition, the importance of urban railways has been highlighted by suburbanization increasing the need for longer and faster trips. Therefore, the SMG realized the necessity for overall modification of transportation planning with emphasis on public transport. The next sections give a brief explanation of buses and railways.

Public Bus Service

Seoul's public bus service began in 1953 and played an important role in the city's early economic and physical growth. Through the 1960s, the role of buses in urban transport expanded rapidly, and in 1971, they accounted for 74.2% of all passenger trips. Currently, 89 private bus companies operate 8726 buses throughout the metropolitan and suburban areas. Each company operates different routes with no competition on any particular route. Service level does not greatly influence passenger volume, so it is hard to find good standardized services.

The SMG regulates the bus companies as a public utility to ensure reliable services. It ensures a route monopoly by regulating route changes, fare levels, vehicle numbers and service frequency. These severe restrictions on bus operators make it hard for the companies to optimize service levels and respond to market changes. Also, they cause an unbalanced



Bus stop on dedicated bus lane (SMG)

distribution of transport modes, increasing private vehicle use in particular. This occurs because the number of bus passengers is stable unless an alternative transport mode is offered. Furthermore, bus operators are reluctant to improve service levels through competitive behaviour, so they tend to minimize operational costs instead of seeking to expand market share.

However, in recent years, the number of public bus trips has fallen constantly due to competition with urban railways, increased private vehicle ownership, and worsening road congestion. In 1991, 43% of all trips were by bus. By 1994, this figure had fallen to 38%, and fell again to 29.5% in 1996. In concrete terms, a bus carried an average of 1093 passengers each day in 1989 but this had fallen to 645 people per day in 1994. While Seoul's public bus companies depend on fares for revenue, recent decreases in passengers have caused losses because the SMG sets low fares that it is hesitant to change. This hinders service improvement and reinvestment because of business uncertainty due to the lack of government support. Consequently, the companies rationalize their costs by reducing service frequency and quality.

Recently, the SMG has made several attempts to improve the bus service. The dedicated bus lane (DBL) is a good example of a successful strategy to improve service and increase use. Although the first DBL was established in 1984, the length of DBLs had only reached 89 km by 1993. Since then, the length has grown much more quickly, reaching 174 km in 1994 and 226 km by 1996 when average bus speeds improved to 20.9 km/h.

Urban Rail Transit

Unlike the public bus service, Seoul's railway system is constructed and operated by the government. It forms a reliable and comfortable mass transit system within Seoul's traffic policy. Although Seoul's urban railways have only a short history dating from 1974, they are a key transport mode and occupied 35% of passenger trips in 1996. When phase 2 of the urban rail network is completed later this year, the total route length will be 278 km and about 42% of all passenger trips will be by rail. Previously, additional lines in municipal areas were proposed to achieve a target share of 70%, but the SMG replaced the plan with a new urban rail network plan based on the 1996 transport census. The network plan (Fig. 3) consists of seven lines providing express services, and a light rail system. It is expected to satisfy demand and improve the efficiency of the rail system throughout the metropolitan area.

The System

The urban railway network in Seoul consists of Seoul Subway and Metro Rail, operated by two public corporations. Seoul Metropolitan Subway Corporation (SMSC) operates lines 1 to 4 of the Seoul subway, and Seoul Metropolitan Rapid Transit Corporation (SMRTC) operates lines 5 to 8 of Metro Rail. In 1997, the seven urban railways in Seoul totalled 216.5 km in length (line 6 is still under construction) and carried 4.5 million people daily. Also, Korean National Railroad (KNR) operates 57.3 route-km within the Seoul city boundary. The national government finances and operates KNR.

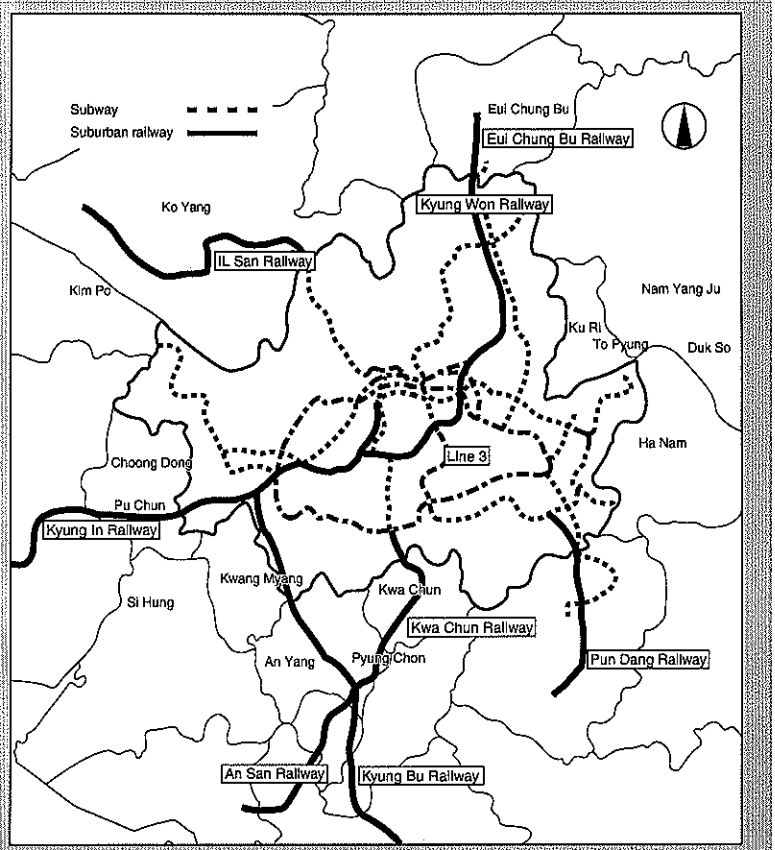
The Facilities

With the increasing passenger levels, some facilities have become worn out and the two corporations are constantly renewing them. To improve safety, the SMSC has installed colour TV monitors and automatic alarms on every platform. Passengers are informed of all train arrivals and departures. To improve passenger comfort, older stations and rolling stock are being refurbished with air-conditioning, and barrier-free facilities for disabled people are being installed. In particular, wheelchair lifts have been installed in every station along with barrier-free toilets and tactile tiles. To improve intermodal transfer and environment friendliness, 24 parking lots have been built at 22 stations, along with 47 bicycle racks at 47 stations. Sixteen stations have both car and bicycle parking.

Operation and Management

The average rail speed is 35 km/h but headways are different on different lines. The capacity has been increased by making constant efforts to introduce new rolling stock and to shorten headways. In 1991, carriage overcrowding reached 243% but the level was lowered in 1996 to around 200% by operating 10-car train sets on all lines. The headway is 3 to 5 minutes during rush hours and 4 to 6 minutes at off peak times. Service starts at 05:30 and the last train is at 01:00. Daily service frequency ranges from 1009 trains on Line 2 to 350 trains on Line 7. Ridership has improved over the last 7 years as new lines have opened; ridership on lines 1 through 4 operated by SMSC peaked in 1995, but dropped slightly in 1996 and 1997 due to several factors, especially the opening of SMRTC's phase-2 lines in late 1996. Interestingly, the new lines have not had a synergistic effect on increasing ridership, suggesting that urban

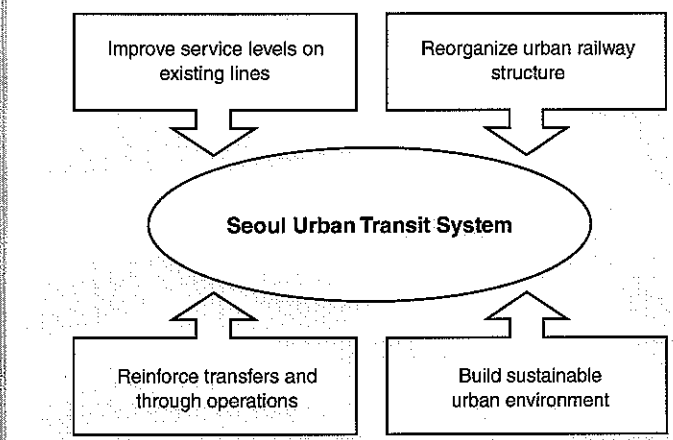
Figure 3 Current Urban Railway Network in Seoul



Subway platform with passenger information screen (SMRTS)

Automatic Fare Collection System (SMSC)

Figure 4 Future Direction of Urban Rail



railway policy should focus more on encouraging ridership rather than on new construction.

Future Direction of Urban Rail System

As briefly mentioned, the SMG has changed the earlier urban rail plan based on the 1996 transportation census. Suburbanization and growth of new satellite cities have increased demand for suburban express services, so the new urban rail plan increases the distance between stations to 2 km or more to facilitate express services. In addition, a light rail transit (LRT) system is being considered to meet demand in Seoul's city centre and to improve accessibility.

The SMG defines the role of urban rail system by four criteria (Fig. 4) that should be coordinated with Seoul's urban development plan. First, services on existing lines should be improved. In addition, the urban railway structure should be reorganized to meet increasing demand due to suburbanization. Moreover, accessibility should be improved by more through operations and easier transfers. Finally, the plan aims to build an environmentally friendly urban rail network.

Effects of New Urban Rail System

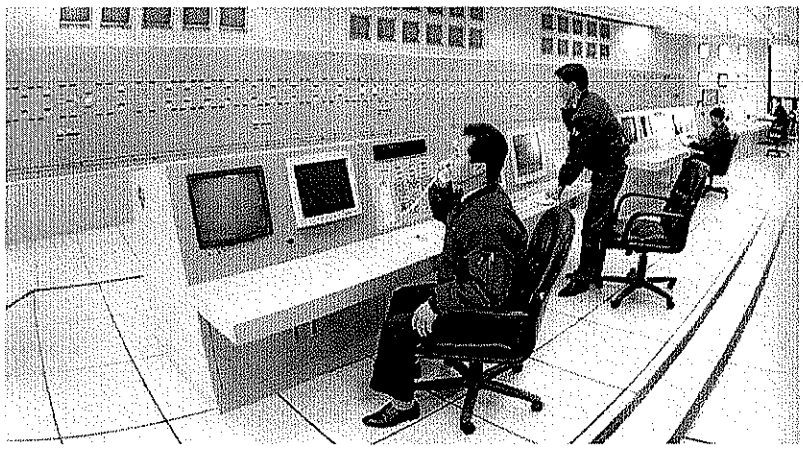
The SMG believes that it is impossible to establish a public transport network that will meet transport demand by the end of this year. By 2026, the SMG plans to carry 53.3% of all passenger trips in Metropolitan Seoul. To accomplish this goal, the SMG is planning to construct additional feeder lines, especially LRTs to areas with passenger demand of less than 20,000 per hour. This will help minimize construction and operation costs.

The proposals are to:

- Improve service levels on existing lines.

The new rail system aims to reduce congestion on existing routes and improve accessibility. The total length of seven proposed lines is 106.5 km, and perhaps 147.5 km if extensions to existing lines (Table 2) are built.

- Reorganize urban railway structure.
  The proposed lines will offer express services to suburban areas. As the urban structure becomes multipolar, traffic volumes to and from Seoul will expand enormously. Reorganization makes further suburbanization possible.
- Reinforce transfers and through operations.
  Several areas are poorly served due to lack of lines. The proposed lines will enhance service levels by shortening commuter trip times.
- Build sustainable urban environment.
  The SMG aims to reduce air pollution and noise from other transport modes. In 1998, motor vehicles generated 82.1% of air pollution in Seoul. As energy use by the transport sector grows, reduction of air pollution by making better use of environment-friendly railways is essential.



Central traffic control room (SMRTC)

Table 2 New Urban Rail Network Plan

Lines		Length (km)
New suburban Line	Line A	26.0
	Line B	17.5
New branch lines	Wolgae–Chongrang Line	19.0
	Mia–Samyang Line	13.0
	EunPyung–Sinlim Line	16.0
	Mockdong Line	8.0
	Puchon LRT Extension Line	7.0
Subtotal (7 Lines)		106.5
Planned lines	Line 9	38.0
	Line 3 Extension	3.0
Total (8 Lines)		147.5

Conclusion

Since the late 1980s, government policies have been planned and implemented to support a modern transport system for Seoul. However, the explosion of private car use has blunted some of the reforms. Investment in new infrastructure can ease conditions to some degree, but controlling urban sprawl, developing new transport technologies, and seeking more participation by citizens in policy development are other alternatives for solving urban transport problems.

As the new millennium begins, Seoul's transport system must be redefined by promoting integrated environment-friendly public transport. The urban rail system must be examined carefully and transport planners must consider Seoul's unique attributes rather than simply copying the policies of other cities. ■

Gyengchul Kim

Dr Kim is a research fellow at the Seoul Development Institute. He obtained his doctorate in Transportation Engineering from Seoul National University and has been a visiting researcher at the Institute for Transport Studies at the University of Leeds in the UK, and at the University of Kyoto in Japan.

Jeewook Rim

Mr Rim is a postgraduate student in the Department of Geography at the Australian National University in Canberra. He obtained a masters degree in Environmental Studies from the University of Newcastle, Australia.

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