Bus System Reform in Korea

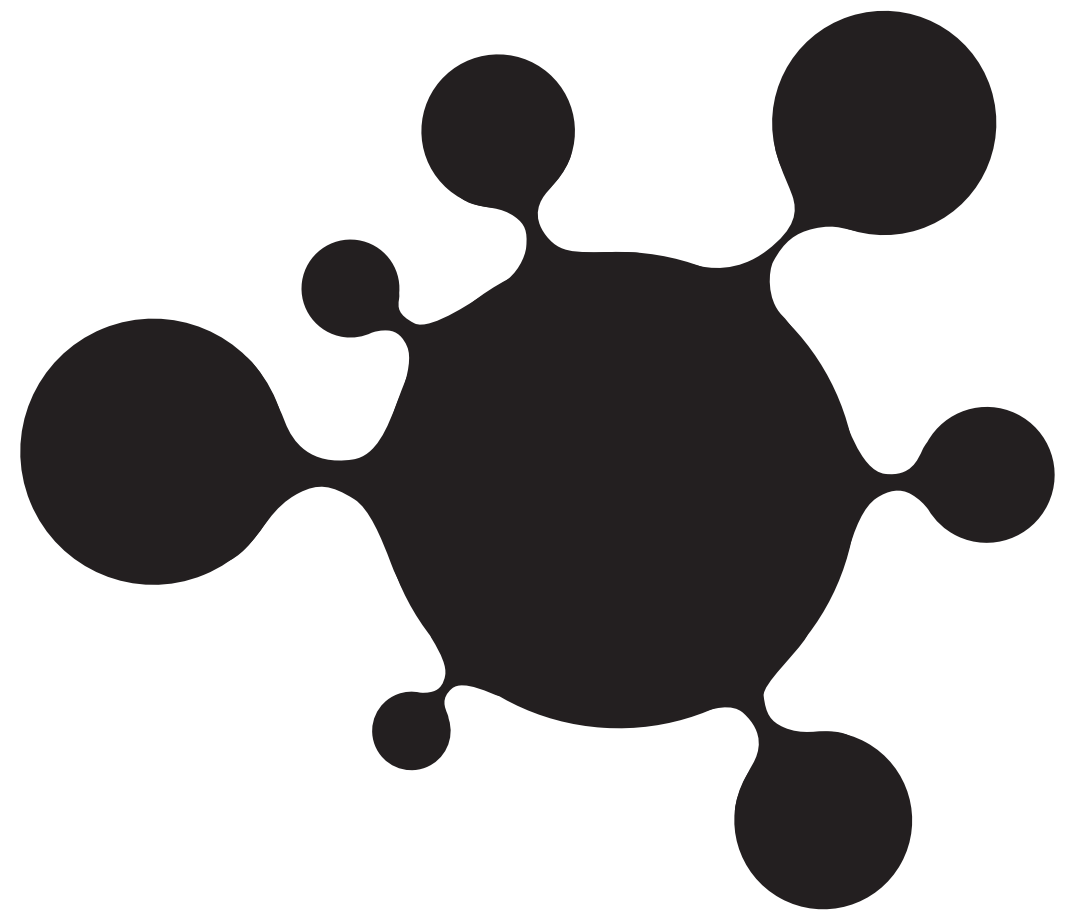Kwang Sik Kim, Ph.D. | Gyeng Chul Kim, Ph.D.

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Toward the Future, the World, and the People

"Korea's transport policy has been successful in terms of facilitating economic growth as well as promoting a sustainable transport system. … The nation has also made various mistakes, which could act as lessons to be learned by developing countries. … [The Korea Transport Institute] has carried out numerous studies on transport policies and technologies for the Korean government. Based on this experience and related expertise, KOTI has launched a research and publication project titled "Knowledge Sharing Report: Korea's Best Practices in the Transport Sector." The project is designed to share with developing countries, the lessons and implications experienced by Korea in implementing its transport policies."

- Quoted from the preface -

THE KOREA TRANSPORT INSTITUTE

Bus System Reform in Korea

Korea's Best Practices in the Transport Sector

Bus System Reform
in Korea

Korea's Best Practices in the Transport Sector

Bus System Reform in Korea

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Over the past half century, Korea has achieved phenomenal economic growth at a rapid, unprecedented rate. As a result, the international community is paying attention to Korea's economic development experience, expecting the nation to play the role of a middleman between advanced and developing countries. Furthermore, there is a growing demand in the international community for knowledge sharing concerning Korea's experience in the transport sector, which served as the cornerstone of the nation's economic growth. Korea's transport policy has been successful in terms of facilitating economic growth as well as promoting a sustainable transport system. In this regard, Korea deserves to be a role model for developing countries trying to develop successful transport policies.

Since the early stages of Korea's economic development, transport policies have played a key role in generating engines of growth. A most conspicuous example is the Gyeongbu Expressway (Seoul-Busan) built in the 1970s during the initial period of the nation's economic development. It transformed the nation into a one-day living sphere, ushering in an era of speedy economic activities and laid the foundation for industrial development. The Korean government has since continued to make consistent investments in transport infrastructure, thereby securing the basis for further expanding the national economy. The major facilities built through these investments include urban railways constructed in the 1980s and 1990s, the Incheon International Airport that opened in 2001, and the high-speed rail system that began its service in 2004.

Korea's transport policies have been aimed at pursuing a low-carbon green transport system as well as facilitating economic growth through SOC investments. Since the early stages of its economic growth, the nation has tried hard to prevent its transport system from becoming energy dependent. Specifically, the government has implemented policies designed to curb the demand for private car ownership and promote the use of public transport. Since the late 1990s, it has been making efforts to increase the efficiency of the transport system through convergence of IT and transport technologies. Additionally, the government is seeking to build an environment-friendly green transport scheme on the basis of rail-oriented SOC investments. Korea's experience in implementing transport policies for low-carbon green growth can surely serve as a guide to help developing countries build strategic policies and measures to ensure a balance between economic development and environmental sustainability.

Korea's development experience does not necessarily refer to just the outstanding examples for developing countries to follow. The nation has also made various mistakes, which could act as lessons to be learned by developing countries. For example, as a way to tackle the problem of population concentration in Seoul during the 1990s, the Korean government built new towns on the outskirts of the capital city without securing relevant urban and transport infrastructure. This led to the occurrence of social costs such as traffic congestion and environmental pollution. Also, there were various cases of overlapping and excessive transport investments caused by insubstantial road transport policies, car-centric and road supply-oriented policies, and incorrect travel demand estimations. By learning lessons from such trial-and-error experiences, developing countries would be able to make the right decisions when establishing their transport policies.

The Korea Transport Institute is a comprehensive research institute specializing in national transport policies. As such, it has carried out numerous studies on transport policies and technologies for the Korean government. Based on this experience and related expertise, KOTI has launched a research and publication project titled "Knowledge Sharing Report: Korea's Best Practices in the Transport Sector." The project is designed to share with developing countries lessons and implications experienced by Korea in implementing its transport policies. The first output of this project deals with the theme of "Bus Reform in Korea." We hope that this publication will help facilitate the process of establishing transport policies in developing countries through sharing Korea's development expertise and experience.

Gyeng Chul Kim
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BUS SYSTEM REFORM
IN KOREA

CHAPTER 01

INTRODUCTION

SECTION 01.

Background and Need of the Study

Seoul City drastically reformed its bus transport system on July 1, 2004. Demand for public transport like buses had kept declining in relative terms since the 1990s, whereas private car ownership and usage had significantly increased with improvement in citizens' income levels. While citizens had been desirous of high-quality transport services and improvement in related environments, the bus transport sector had just repeated old practices without making an effort to keep up with changing user attitudes.

In particular, many private-sector bus operators had been more interested in gaining profits than in serving the public interest through passenger transportation. Once they had been given permits to run buses on certain routes, such operators had held a near-monopoly status on the routes, acting as if they were their personal property.

In addition, the poor services toward passengers had led to a reduction in ridership and subsequently, a plunge in fare revenues. This, in turn, had aggravated the financial conditions of bus companies to the extent that some had gone bankrupt or been taken over by others. The increase in the bus companies' deficit had led to growth in the amount of subsidies given by the Seoul city government. Such a

vicious cycle caused by chronic and structural problems necessitated a fundamental reform in the city's bus transport system.

Seoul City's reform of the bus transport system is having a great impact on metropolitan cities in the provincial regions. These metropolises are devising or implementing policies to inject vitality into the public transport sector. This move represents their efforts to tackle the problem of worsening traffic conditions caused by a rapid rise in the number of cars resulting from improvement in residents' income levels.

In this context, there is a need to review, analyze and assess the changes and achievements made during the past one and a half years since the Seoul Metropolitan Government reorganized the city's bus transport system. The outcome should serve as a basis for objectively evaluating public transit reform projects of other metropolises, and identifying various related problems.

In addition, it is necessary to carry out studies to examine the government's existing public transport policies, in relation to the efforts of devising effective ways to establish a future metropolitan public transport system.

Bus median lane in Gangnamdaero (Seoul)

SECTION 02.

Purpose of the Study

This study is aimed at examining the evaluations made by the Seoul city government and outside organizations concerning the bus reform project. Under this objective, it analyzed the relevant assessments conducted by the municipal government, the Seoul Development Institute, civic organizations engaged in the transport movement, and news media.

This study is also intended to assess the project achievements through a before-after comparison of the major project goals and results. The assessment was conducted over six core areas: routes, fares, semi-public operation of buses, smart transport cards, transfer centers, and median bus lanes.

In addition, this study has the purpose of analyzing the bus reform project's impact on public transport and the overall transportation system, thereby exploring directions and strategies for metropolitan public transport policies. In order to achieve this purpose, this study makes suggestions aimed at invigorating public transport and ensuring effective transport demand management. These suggestions are based on the examination of various related foreign examples.

SECTION 03.

Scope of the Study

This study covered the post-reform period from July 2004 to September 2005. Yet, pre-reform 2003 data was used flexibly when pertinent data was not available concerning the post-reform period.

In terms of the spatial scope, this study mainly concerned Seoul. However, it also covered cities and counties of the neighboring Gyeonggi Province as well when dealing with wide-area bus services.

In terms of content, this study focused on the following issues:

• This study evaluated the bus reform project of Seoul City, identifying its problems and suggesting improvement measures. Specifically, the project's effects were assessed through the collection and analysis of data related to transport achievement indices. Additionally, objective analysis of the project's problems was conducted to produce suggestions for improvement. The following are the target areas for evaluation.
 - Adequacy of the trunk/feeder lines of the reorganized bus route system.
 - Adequacy of the integrated distance-based fare system.
 - Management efficiency checks related to bus service subsidies

administered under the semi-public operation system.

- Malfunctions of the smart card fare collection system and the issues related to erroneous fares.
- Adequacy of transfer center locations.
- Investigation of the exclusive median bus lane system regarding its effectiveness and related accidents.

• Next, this study looked into the effectiveness of measures taken by the government to invigorate public transportation in metropolises as well as its transport demand management policy. Based on this investigation, the study presented basic plans and policy directions designed to ensure the development of public transport in metropolises. The following are the specific contents examined in this study.

- The investment plan for the public transport system (bus, rail, light rail).
- The plan to build linkage systems to ensure connections among transport modes and regions.
- The urban congestion pricing system (imposition areas, criteria, collection methods, etc.).
- The feasibility of various projects, including one for constructing parking lots in downtown areas, in relation to transport demand management policy.
- Suggestions for setting up new metropolitan public transport policies.
- Transport policies concerning facility supply and demand management, as well as the question of determining their priorities.

SECTION 04.

Methodology of the Study

For this study, various domestic and foreign policies were examined in relation to public transportation, traffic supply and demand management. Numerous reference materials were also reviewed concerning the urban public transport system.

In addition, relevant data was collected through field trips and interviews of experts and officials who had participated in the bus service reform project.

There are various methods to evaluate achievements: simple comparison, before-after comparison, statistical analysis of time series, and cost-benefit analysis. This study mainly employed the before-after comparison method as it has advantages over others in collecting data with ease and ensuring clear understanding on the comparison results. In short, this study compared the trends of change during pre- and post-reform periods by category.

SECTION 05.

Utilization Data List

The list of data necessary for this study is shown in <Table 1-1>. Substitute data was used when it was impossible to collect pertinent data.

Table 1-1. The list of data utilized for this study

Data name	Category	Temporal scope		Use	Organizations that provided data
		Before reform	After reform		
Bus operation hours	Comparison of scheduled and actual times of arrival at terminal by route (monthly rate)	-	04.7 -05.9	Adequacy of route reorganization	Seoul City
Route length	Origin-destination length by route (monthly)	-	04.7 -05.9	Adequacy of route reorganization	Seoul City
Number of bus stops	Number of stops by route (monthly)	-	04.7 -05.9	Adequacy of route reorganization	Seoul City
Route reorganization	Route reorganization by bus type (monthly)	-	04.7 -05.9	Adequacy of route reorganization	Seoul City
Civil complaints	Classification of civil complaints about bus lines by area and route (monthly)	-	04.7 -05.9	Adequacy of route reorganization	Seoul City
Bus/subway revenue	Total revenue, transport revenue per km, average revenue per passenger, number of users, by month (based on card usage)	03.1 -04.6	04.7 -05.9	Adequacy of integrated fare system	Seoul City
Average public transport fare	Average bus/subway fare (based on card usage)	03.1 -04.6	04.7 -05.9	Adequacy of integrated fare system	Seoul City
Transfer frequency	Number of monthly inter-modal transfer discounts (based on card usage)	03.7 -04.6	04.7 -05.9	Adequacy of integrated fare system	Seoul City
Bus/subway costs	Total monthly expenses, transport costs per km and passenger	03.1 -04.6	04.7 -05.9	Check on the semi-public operation system	Bus Transport Business Cooperative, Two subway corporations
Financial statements of operating organizations	Financial statements of Bus Transport Business Cooperative and the two subway corporations	03.1 -03.12	04.1 -04.12	Check on the semi-public operation system	Bus Transport Business Cooperative, Two subway corporations
Subsidy	Breakdown of subsidies administered by Seoul City	-	04.1 -04.12	Check on the semi-public operation system	Bus Transport Business Cooperative, Two subway corporations
Frequency of card system malfunctions	Number and type of reports of malfunctioning cards and readers	03.7 -04.6	04.1 -04.12	Smart card errors	Seoul City (Card company)
Card-related complaints	Classification by type, number of reparations paid	-	04.1 -04.12	Smart card errors	Seoul City (Card company)
Financial statements of card companies	Balance sheet and a statement of profit and loss	-	04.7 -05.9	Smart card errors	Seoul City (Card company)
Transfer frequency by bus stop	Number of monthly transfer discounts by station	03.7 -04.6	04.7 -05.9	Adequacy of transfer centers	Seoul City
Traffic accidents	Statistics related to median lanes	03.7 -04.6	04.7 -05.9	Efficiency of the exclusive median bus lane system	Seoul City
Speeds of buses /private passenger cars, number of users	Speed on the median bus lanes, number of users	03.7 -04.6	04.7 -05.9	Efficiency of the exclusive median bus lane system	Seoul City
Citizen satisfaction survey	Research on detailed opinions of citizens regarding the bus service reform project	-	04.7 -05.9	Assessment of comprehensive effects of the reform project	Seoul Development Institute
Public transport investment plans	Public transport-related yearly investment plans and policy programs of each metropolitan city and province	-	00 -05	The central government's public transport invigoration policy	Ministry of Construction and Transportation
Enactment and revision of related laws	Progress in efforts to enact or revise laws for public transport invigoration	-	00 -05	The central government's public transport invigoration policy	Ministry of Construction and Transportation
Demand management measures	Demand management-related investment plans of each metropolitan city and province, and moves to enact or revise relevant laws	-	00 -05	Active promotion of demand management-related policies	Ministry of Construction and Transportation

BUS SYSTEM REFORM
IN KOREA

CHAPTER
02

EVALUATION
OF THE SEOUL BUS SYSTEM
REFORM PROJECT

SECTION 01.

Overview of the Bus System Reform Project

1. Purpose and Action Plan

This project is aimed at fundamentally improving the traffic congestion problem by increasing bus and subway ridership and discouraging the use of private vehicles through revolutionary restructuring of the bus system (Seoul city government, 2005).

To achieve this goal, the municipal government pushed for restructuring of the bus operation system, services, and the industrial structure. Specifically, it carried out the following programs: redesigning of bus routes, fare system reform, operation system renovation through introduction of the semi-public operation scheme, the smart card and bus management system (BMS) through the use of IT technology, construction of public transit centers, and the implementation of the exclusive median bus lane system.

The rest of this section deals with the achievements made so far in relation to the bus reform project, as well as the evaluations conducted by the Seoul Municipal Government, the Seoul Development Institute, and civic organizations.

2. Achievements

1) Changes in the Bus Service System

The routes were restructured into trunk and feeder lines, which led to increases in the number of lines, total length of the routes, and the number of buses sanctioned for operation (see Table 2-1). However, the number of buses in actual operation and the total distance traveled by the buses went down, indicating that the bus companies cut down on operations on low-efficiency or overlapping lines.

Table 2-1. Changes by category after bus service reform

Category	2003.12	2004.12	As of 2005
Number of companies (including community shuttle buses)	57(207)	69(189)	69(189)
Number of routes (including community shuttle buses)	368(618)	461(665)	448(652)
Number of buses sanctioned for operation (including community shuttle buses)	8,110(9,665)	8,306(9,635)	8,307(9,536)
Number of buses owned by companies (including feeder line buses)	7,967	7,982(8,304)	-
Number of buses in operation	7,311	7,293(7,603)	-
Length of total routes (km)	14,973	15,493	-
Total operation distance (1,000 km): second half	387,797	372,310	-
Gangnam Street median lane speed (km/h)	13.0	17.8	-
Fare (won)	650	800	800

2) Ridership

The number of bus users during the one-year period immediately after the reform rose 9% to 1,919 million from 1,760 million recorded during the previous one-year span, according to official statistics compiled by the Seoul city government. Subway users also increased 0.2% in number from 2,272 million to 2,277 million (Korea Transport Institute, November 2005).

In March 2005, the Seoul Development Institute released the results of a survey which had covered 12 sample sections regarding bus ridership. It also showed upward trends as shown in <Figures 2-1, 2-2, 2-3>.

These results may reflect a mode shift among transport users, or just an increase in the frequency of bus use caused by the division of long routes and the

introduction of the transfer discount scheme. With no analysis that can clarify this matter, it is difficult to determine the correct relationship between the bus system reform and the increased demand for bus use.

Yet, the reform aimed at public transit integration is considered to have generated a partial synergistic effect, thus contributing to increasing bus and subway ridership.

3) Changes in Revenue

Comparison of pre- and post-reform annual transport revenues in the bus sector showed a 2.6% expansion from 1,089.4 billion won to 1,118.3 billion won. Subway

Figure 2-1. Monthly trend of public transport ridership

Figure 2-2. Monthly trend of public subway ridership

Figure 2-3. Monthly trend of public bus ridership

Figure 2-4. Monthly trend of public transport ridership

Revenue jumped as much as 16.8% from 989.2 billion won to 1,155.5 billion won (KOTI, November 2005).

The survey conducted by the Seoul Development Institute also showed that the bus sector registered an increase in transport revenue by over 10% as shown in <Figure 2-4>. (Seoul Development Institute, March 2005).

4) Subsidy Conditions

Bus operation subsidies given by the Seoul Metropolitan Government went up, but those for subways dwindled. Thus, the overall subsidies for public transport modes were found to be decreasing every year (Seoul city government, 2005).

The bus subsidy rose in amount, but the increase could be accepted favorably to the extent that it reverses the trend of declining bus use.

5) Accidents and Civil Complaints

Compared to the pre-reform period, the number of traffic accidents increased slightly, and of that accident-related deaths rose sharply. This phenomenon is considered to be related with the exclusive median bus lane system, which led to increases in bus travel speeds and jaywalking.

Figure 2-5. Change in the daily number of civil complaints

As shown in <Figure 2-5>, the number of traffic-related complaints dropped significantly, suggesting that the reform has led to improvement in the level of bus services recognizable by citizens.

3. Summary of Achievement Evaluations

1) Self-Assessment by Seoul City Hall (October 2005)

① Positive aspects: Increase in the number of mass transit users, decrease in bus accidents, improved bus travel speed, improvement in punctuality of bus operation, decline in civil complaints, and enhanced user satisfaction.

② Negative aspects: Unstable transport card system, abolition/alteration of unprofitable routes and reduction in the number of buses put into operation on such routes, problem with bus information signs, increased burden of fares on citizens commuting to Seoul from the city outskirts or satellite cities in the capital area, and bus traffic overload within median bus lane sections.

③ Matters that need improvement: For most of the problems pointed out in its self-assessment, the Seoul city government has already drawn up corrective measures and put them into practice. To ensure continuous implementation of the restructuring project, it is also implementing various follow-up programs such as the expansion of the median bus lane system, a new transport card scheme, second-stage BMS, increased use of deluxe buses, and expansion of the subway commuting ticket system to cover Seoul's neighboring cities in the capital area.

2) Assessment by Outside Organizations

Below are summaries of some of the media reports, commentaries and studies on the bus reform implemented by Seoul City.

① Seoul's public transit rated high in quality of service, but something left to be desired in safety (Green Transport, Hankyoreh, 2005. 1. 28).

Category	Seoul	Busan	Daegu	Incheon	Gwangju	Daejeon
Facility level	17(1)	12(3)	7.5(5)	14.5(2)	8.5(4)	3.6(6)
Usage level	12(1)	10(2)	7(3)	5(4)	5(4)	3(6)
Punctuality	9(2)	11(1)	8(3)	4(5)	8(3)	2(6)
User convenience	12(1)	9(2)	9(2)	5(4)	2(6)	5(4)
Service quality	13(2)	9(4)	10(3)	16(1)	7(6)	8(5)
Safety	3(6)	7(3)	7(3)	11(1)	8(2)	7(3)
Fare level	10(1)	4(5)	6(3)	10(1)	6(3)	3(6)
Investment level	13(1)	11(3)	13(1)	7(6)	9(5)	10(4)
Consideration for mobility handicapped people	12(1)	5(4)	5(4)	8(2)	6(3)	3(6)
Total	101(1)	78(3)	72.5(4)	80.5(2)	59.5(5)	44.5(6)

• Numbers within parentheses indicate ranks.

② Bus reform one-year anniversary survey (Hankook Ilbo, 2005. 7. 1, conducted by the civic group "Green Transport").

- Satisfied 30.4%, Medium 51.4%, Not satisfied 17.5%.
- Transfer discount system received favorable response.
- Convenience facilities at bus stops and driving attitudes cited as factors that need improvement.
- Concerning the median bus lane scheme, 39.5% expressed satisfaction, while 10.7% voiced dissatisfaction.
- On the introduction of articulated buses and low-floor buses, 41.1% expressed satisfaction.
- Implementation of the BMS and smart card systems made it easier to manage bus schedules and routes, helped enhance the rate of keeping regular service spans, and significantly lowered the number of related civil complaints.
- Reduction in household transport expenses (The Seoul city government estimates that the free-transfer benefits would amount to 200 billion won a year).

③ Effects and the remaining tasks (Hankook Ilbo, 2005. 7.1).

- The deficit caused by the semi-public operation system is the largest problem (Bus companies no longer need to pursue profits. Increased labor costs (16.14%), oil price hikes (22%) and reduction in the number of weekend passengers due to the implementation of the five-day work week system are also cited as contributing factors). Other problems include user inconveniences caused by route reduction and frequent route changes, increased financial burden related with the implementation of the distance-based fare system, and the complexity of the fare system.
- To tackle the deficit problem, the municipal government of Seoul has drawn up the following measures: implementation of the work hour reduction system and the incentive scheme designed to improve management, abolition of unprofitable lines or diversion of buses on such lines to crowded routes, and imposition of an 800 won fare for community shuttle bus passengers.
- The exclusive median bus lane system also has problems that need to be addressed.
- Also worrisome is procrastination in work to integrate the fare systems of Seoul and the neighboring Gyeonggi Province.

④ About half (49%) of the route alterations and abolitions were aimed at improving the financial conditions of bus companies. This raised questions about the bus reform project's purported goal of increasing the convenience of citizens. In the meantime, the city government did not make sufficient PR efforts. (Segye Times, 2005. 5.19).

⑤ The feasibility of follow-up programs should be verified through analysis of the costs and benefits of the reform project, particularly with regard to blurred distinctions between trunk and feeder lines as well as the failure to ensure an increase in bus ridership. (Statement by the Traffic Safety Alliance, 2005. 7.28).

⑥ Frequent route adjustment (Seoul Shinmun, 2005. 6.27).

- To reduce the deficit, the city government is frequently taking adjustment steps such as route abolition, route shortening and reduction in the number of buses put into operation, targeting routes with low ridership and

overlapping lines. Changes have been made to a total of 210 lines since July last year. This breaks down to changes on 96 lines between July and December last year, 27 lines between January and March this year, and 87 lines afterwards. A bus company reaches the break-even point when there are at least 730 passengers per bus a day. In reality, however, the daily ridership per bus falls short of 400 on 70 to 80 lines of the entire 460 routes. Citing these figures, the municipal government of Seoul asserts that route adjustment is unavoidable. To ensure both public profits (citizen convenience) and profitability (deficit reduction), the city government ought to urge the bus companies to lower costs while requesting financial assistance from the central government.

⑦ Residents of Gyeonggi Province are using Seoul buses to receive transfer discounts, thereby aggravating financial conditions of the buses serving provincial routes (Internet Briefing on National Policy Affairs, 2005. 5.17).

⑧ To address the problem of operating agencies arguing over revenue settlement, the Seoul Development Institute has started research to establish guidelines on distributing the public transit revenue. (Naeil Shinmun, 2005. 6.14).

⑨ The five-day work week system has resulted in an increase in the number of non-operating buses during weekends, which has subsequently led to longer bus waiting time, causing inconvenience to users. The bus companies need to slash their workforce in accordance with the increase in the number of no-business hours. Otherwise, giving subsidies to bus companies would be considered a waste of taxpayers' money. (Gyotong News, 2005. 11.14).

⑩ The average travel speed of buses in the five median bus lane sections has increased by 56%. In addition, the passenger transport capacity of the median lanes has improved by up to 2.8 times. However, there is a serious shortage of capacity on the median lanes of Manguro. (Chosun Ilbo, 2005. 12.12).

⑪ The bus routes and the fare system should be readjusted so that they can be applied to the entire capital area. The application scope of the transport card also needs to be expanded to cover the whole capital area. In addition, financial problems must be resolved to continuously promote the BRT project and make investments in public transportation. It would be desirable to secure funds for these projects by making private car users take on additional financial burdens such as oil tax, license tax, registration tax and congestion fees. (Pucher et. al, 2004).

⑫ Recommendations by the International Association of Public Transport (UITP)'s evaluation team (Daily Surprise, 2005. 7.8).
 • Taxis should be incorporated into the public transport system.
 • Efforts ought to be made to look for various options to secure financial resources for public transportation.
 • A specialized management agency needs to be set up to sustain the effects of the reform.

⑬ The number of traffic accidents involving buses went down by 10.66% during the one-year period since the restructuring. Of them, crosswalk accidents decreased by 18.52%, while intersection accidents dwindled by 54.12%. The number of accidents taking place near sidewalks plummeted by 66.67%. The casualties caused by bus accidents decreased in number by 10.66%. The number of accidents at bus stops went up by 12.99%. (Prof. Im Sam-jin of Hanyang University, Yonhap News, 2005. 7.8).

⑭ The number of accidents decreased by more than 25%, according to Seoul City Hall. Yet, civic groups assert that the number of accidents on the median bus lanes should be considered to have increased, given the accident-reducing effect of the exclusive lanes. They specifically pointed to the fact that the bus accident-related deaths had shot up by 1.8 times. (Hankook Ilbo, 2004. 11.27).

Establishment of Evaluation Methodology

1. Need for Evaluation and Direction Setting

1) Necessity

Few people can raise serious objections to Seoul City's restructuring of the bus system in terms of its timeliness and the necessity for such a reform. Also, it can be considered largely a success, given the achievements made so far and the favorable international attention it has attracted.

However, some news organizations and civic groups are continuing to take issue with the project. They are pointing out various problems, while not accepting the Seoul city government's assertion that it has taken all the necessary steps to compensate for defects. A civic group named the People's Solidarity for Participatory Democracy has even submitted a petition to the Board of Audit and Inspection, calling for official investigation into the bus reform project. This group took the action, citing the following reasons: ① negligence in pre-reform preparations, ② excessive hikes in transport fares, and ③ expansion in financial assistance. There is no denying that the bus reform project caused serious confusion in the initial stages of its implementation. In addition, opinions still differ among

various related organizations on the project's effects. In this context, this study conducted a detailed evaluation of the bus reform project on the basis of the relevant existing data.

2) Setting Directions for Evaluation

This study set the following directions for evaluation.

① Emphasis needs to be placed on contents assessed differently by various organizations.

② To determine whether the reform project is successful, it is necessary to evaluate the attainment of the ultimate goal of improving the city's traffic congestion situation as well as the objectives of individual programs.

③ It is necessary to consider whether there are unclear points or errors in the methodologies used by the Seoul city government or related organizations, the methods used to obtain relevant data, and the use of the data. Whether the evaluation covered all the relevant areas also needs to be taken into account.

④ Restructuring the bus system is aimed at reinforcing the integral competitiveness of public transportation. As such, it has a significant impact on other means of public transport. Accordingly, evaluation of the reform project needs to be conducted in terms of promoting an integrative public transport system incorporating subways as well as buses, particularly when assessing important achievement indices such as changes in user demand and financial aid given by the municipal government.

⑤ In general, few questions have been raised concerning the direction of the reform. It is difficult to determine whether the decades-old traffic problem has been resolved just on the basis of achievements made during a one-year period. Furthermore, the median bus lane system was in operation at just five sections at the time of the evaluation. Hence, it is too early to make judgment of the system, which is a crucially important part of the reform project, particularly with regard to its intended network effects. Because of these limitations, any evaluation on the project at this time cannot but be an interim assessment. Therefore, this study conducts the evaluation with the

expectation that its results would be of help to other local governments when promoting similar reform projects.

⑥ Seoul City's bus reform was characterized by a simultaneous implementation of multiple programs. Given this nature, various problems that occurred in the initial stage should be considered short-term technical or administrative problems, not fundamental matters. In this regard, the timings for full-fledged evaluations need to be set by taking into account whether the project has reached a stage where it can be implemented with a certain degree of stability.

2. Evaluation Methodology

Seoul City's bus reform has the purpose of restructuring the bus operation system and improving the service quality, thereby increasing bus ridership and reducing the use of private vehicles and ultimately, resolving the traffic congestion problem. To achieve this goal, the city government has reorganized the operation system through such programs as route redesigning, fare system renovation, median bus lanes, and the semi-public operation system. Through these programs, the municipal government is exerting efforts to improve bus accessibility, reduce the burden of transport expenses, increase bus travel speeds, and prevent unnecessary fare hikes through ensuring the rational management of bus companies. (SMG, 2005; UITP, 2005 Roma).

Accordingly, the first-stage evaluation focuses on checking changes in pertinent indices to confirm whether individual reform programs have contributed to improving relevant services. The second-stage evaluation determines the extent to which the city's traffic situation has improved through the reform project carried out with the specific purpose of increasing bus ridership and decreasing private car use.

The first-stage evaluation covers the following categories. These items have been selected by taking into account arguments over initial assessments, questions raised about the reliability of assessment data, and civic groups' call for official inspection over the reform project.

① Redesigning of bus routes
- Whether blind spots in service have occurred due to the expanded implementation of trunk/feeder route system (related complaints).
- Improvement in punctuality of bus operation through redesigning of long-distance, convoluted lines.
- Have there been excessive route reductions (travel distance, number of stations), or too frequent route changes (route restructuring records), to cut back on subsidies?

② Integrated fare system
- Rationality in fare-setting criteria and principles (related civil complaints, problems that may occur when pursuing an integrated metropolitan fare system).
- Changes in the average fare burden on public transit users (number of users, total revenue).

The transport system of Seoul has been greatly improved since the bus reform.

- Changes in user convenience as represented by transfer frequency per person (transfer frequency per person).

③ Semi-public operation system
- Has the productivity of bus companies improved? (transport cost per km and per passenger).
- Has the quality of service improved in association with changes in productivity? (service evaluation data).
- Has the issuance of public transit subsidies increased due to moral hazard? (Detailed data on subsidies administered by the Seoul city government: bus subsidy, subway subsidy).

④ Smart card
- Have malfunctions in the card system been decreasing in number?

⑤ Public transfer center
- Are the centers installed at locations with high transfer rates? (the number of transfer passengers by station).

⑥ Median bus lane system
- Has improvement been made in the travel speed of both buses and passenger cars? (speed data for each traffic mode in relevant sections).
- Are there any safety problems like traffic accidents? (traffic accident data).
- Has the bus ridership increased? (the number of bus users in relevant sections).

The second-stage evaluation is aimed at determining the degree of contribution the reform project has made in improving the city's transport system by expanding public transit ridership. Below are the evaluation items for this stage.

① Changes in demand for public transportation
- Data released by public transit operating agencies on changes in demand for public transport
- Identifying the demand for passengers switching from cars to public transport

② Improvement in road congestion levels

Bus Route System

1. Content of Reform

1) Restructuring of the Bus Route System

The bus route restructuring was designed to improve various user inconveniences and to ensure that the bus sector can fulfill its roles and functions as a public service industry.

A. Objectives

As shown in <Table 2-3>, the restructuring objectives can be classified into three categories on the basis of the perspective of users, operators and managers.

Table 2-3. Basic goals of Seoul City's bus system reform

User (citizens' perspective)	• Ensuring speed and punctuality, and easing car crowdedness on high-density routes • Ensuring equity through improving accessibility and expanding opportunities to use buses • Increasing convenience through improvement of services
Operator (bus companies' perspective)	• Aiming to improve management • Enhancing the efficiency of bus operation • Ensuring speedy operation of buses
Manager (social aspects)	• Provision of stable services • Establishment of an integrated transport system • Invigoration of bus transport • Environmental improvement and reduction in energy consumption

B. Direction

① Establishing a function-based hierarchy among buses
  • Bus services designed to meet the various needs of users.

② Enhancing equity in route service supply
  • Bus service available anywhere.

③ Minimizing passengers' travel time through improved inter-zone mobility
  • Inter-zone bus operation connecting central districts.
  • Convenient transfer and linkage between routes.

④ Improving punctuality by increasing bus travel speed.
  • Buses that come on time.
  • Predictable bus arrival time.

⑤ Enhancing bus operation efficiency
  • Reorganization of bus routes through integration/adjustment of crowded and overlapping lines

⑥ Improving route recognition
  • Forming a network of core trunk routes that can match the subway network in public awareness.

C. Action Plan

① Establishment of hierarchy among buses according to major functions
  • Establishing a dual system of trunk and feeder lines.
  • Trunk routes are long-distance lines aimed at ensuring speedy mobility between districts. Trunk-route buses operate mainly on arterial roads, running speedily along straightened routes.
  • Feeder routes are short-distance lines designed to ensure convenient access within districts. Feeder-route buses run on supplementary arterial roads, sometimes along curved routes.

② Separation of bus types by operational zones
  • Buses can be divided into four types in accordance with the following operation routes: general trunk routes, wide-area trunk routes, general feeder routes, and circular feeder routes.

  • General trunk routes are to accommodate travel demand between districts within the city
  • Wide-area trunk routes are to handle travel demand between major points on the outskirt of the city and central business districts/sub-centers.
  • General feeder routes are to cope with travel demand within districts and link trunk lines and subways to support the handling of travel demand between districts
  • Circular feeder routes are to promote convenience in accessing high-density commercial and business districts and handle traffic demand within districts.

③ Reorganization of the bus color and code systems
  • Colors signifying the type of bus and numbers indicating the origin, mid-route stops, and the destination
  • Designed to help users easily recognize the routes
  • Simplified code system for easy recognition and improved visibility

④ Expanded implementation of the median bus lane system
  • The number of routes with dedicated bus lanes increased from one (7.6km) to fourteen (177.6km) under the purpose of ensuring stable traffic flows and stable bus operation, recovering trunk route functions, enhancing user satisfaction, increasing bus ridership and reducing the use of private vehicles.

⑤ Introduction of the articulated bus
  • Introduction of large-capacity articulated buses to provide better transport services to citizens.
  • To check the feasibility ahead of the introduction, pilot operation was conducted on the median bus lane in the Dobong-Jongno 5-ga section (14.23km).

2. Analysis of Achievements and Problems

1) Blind Spots in Service

To determine the existence of blind spots in service, this study examined various data such as the number of civil complaints, the space of areas benefiting from bus services, the number of bus stops, the total length of the routes, and the number of routes. As a result, the bus service areas were found to have expanded.

① Number of civil complaints and inquiries

The number of civil complaints and inquiries drastically reduced from 84,623 in July 2004 to just around 500 in September 2005. The number of complaints and inquiries about route changes went down from 1,216 in July 2004 to 44 in December, and to 31 in September 2005 (see Table 2-4).

Table 2-4. Monthly trend of civil complaints

(Unit : number)

Category	Total	Concerning transport cards and fares	Inquiry about routes	Concerning route adjustment	Concerning headway	Bus stops and the route map	Reckless driving, unkindness, buses not stopping at desired stations	Concerning routes, fares, and PR activities	Others (suggestions, transfer)
'04. 7	84,623	59,871	-	1,216	1,638	561	392	331	981
'04. 8	16,372	14,999	-	271	608	70	138	70	316
'04. 9	11,663	9,640	1,229	87	368	32	67	16	204
'04.10	14,928	9,037	5,311	87	240	22	73	24	134
'04.11	12,454	7,558	4,398	89	212	35	63	18	111
'04.12	9,019	4,820	3,883	44	141	24	40	19	48
'05. 1	7,374	3,968	3,201	33	97	20	22	5	28
'05. 2	5,413	2,676	2,347	27	86	15	34	2	27
'05. 3	2,927	1,546	1,236	23	56	9	23	3	32
'05. 4	1,723	724	878	20	30	5	21	3	42
'05. 5	1,527	840	774	16	29	4	30	1	34
'05. 6	664	226	74	39	77	12	72	3	161
'05. 7	559	149	71	63	74	28	39	1	134
'05. 8	598	205	51	58	59	15	74	3	133
'05. 9	439	121	48	31	51	8	58	9	113

② Number of bus stops

As shown in <Table 2-5>, the number of bus stops rose from 5,175 in 2003 to 5,818 in 2005, representing a 12.4% improvement in the accessibility to bus transport.

Table 2-5. Yearly change in the number of bus stops

Classification	2003	2005
Number of bus stops	5,175	5,818

• Source: Seoul City Hall

③ Space of bus service areas

The space of bus service areas was measured through the calculation of the rate of the number of bus stops to urbanized areas. The rate improved from 14.6/km^2 (July 2003-December 2003) to 16.35/km^2 (July 2004-December 2004) (see Table 2-6).

Table 2-6. Yearly change in bus service area

Category	2003 (July~December)	2004 (July~December)
Bus service area (number/km^2)	14.6	16.35

• Note: 1) Calculation is made by defining the bus service area as the number of bus stops per square kilometer of urbanized space.
2) Bus service area (number of bus stops per one square kilometer of urbanized space).
3) Bus service area (number/km^2)=Number of bus stops/Urbanized space.
4) Urbanized space: A zoned space excluding green and undesignated areas.

④ Total length of the routes

The total length of the routes increased from 14,973km in December 2003 to 15,493km in December 2004, indicating expansion in the bus service areas (see Table 2-7).

Table 2-7. Yearly change in bus service area

Category	December 2003	December 2004
Total length of the routes (km)	14,973	15,493

⑤ Number of the routes

The routes increased by 94 (25.5%) in number from 368 to 462. The number of buses operating on the routes rose by 160 from 8,146 to 8,306. The expansion in the routes and the increased number of buses helped reduce blind spots in bus services.

2) Punctuality of Bus Operation

Bus operation punctuality was analyzed through estimation of headway coefficients

Figure 2-6. Headway coefficients

regarding service spans. As shown in <Table 2-8>, the nearer to 0–the coefficient, coefficient, the better the punctuality. During the period from October to December in 2004, the coefficient approached to 0 while showing a minus growth rate, thus indicating improvement in punctuality. In addition, <Table 2-4> above shows that the number of complaints decreased as the system stabilized, from 1,683 in July 2004 to 29 in May 2005 (see Figure 2-6, Table 2-9, 2-10).

Table 2-8. Evaluation standards on route reliability based on headway coefficient of vehicle (HCV)

Coefficient value	Extent of dispersion
HCV = 0	• Bus operation conducted as scheduled, with the bus service dispersion rate of 0
0 〈 HCV 〈 1	• Target range for bus operation
HCV = 1	• Bus operation conducted with the coefficient in the negative range • Operation at interval of exact 2
HCV 〉 1	• Fairly big dispersion value of bus service intervals • Very low level of reliability

• Source: Monitoring of bus operations and service levels following the bus system restructuring. Seoul Development Institute. March 2005.
• Note: The closer the value gets to 0, the better the reliability becomes.

Table 2-9. Monthly average headway coefficients by time slot of 12 analyzed routes

Route number	Monthly morning averages				Monthly afternoon averages			
	October	November	December	Average	October	November	December	Average
110	0.56	0.48	0.44	-0.113	0.58	0.55	0.46	-0.108
140*	0.48	0.41	0.49	0.025	0.45	0.39	0.44	-0.003
172*	0.55	0.59	0.49	-0.048	0.61	0.65	0.50	-0.083
270*	0.54	0.48	0.53	-0.003	0.62	0.50	0.51	-0.087
302	0.51	0.53	0.46	-0.046	0.55	0.55	0.51	-0.036
361	0.62	0.62	0.60	-0.016	0.63	0.61	0.64	0.009
370*	0.54	0.50	0.50	-0.037	0.45	0.48	0.44	-0.008
470*	0.51	0.54	0.54	0.029	0.50	0.58	0.57	0.071
505	0.63	0.63	0.60	-0.024	0.63	0.59	0.63	0.002
601*	0.39	0.44	0.39	0.007	0.42	0.41	0.42	0.000
640	0.61	0.60	0.55	-0.050	0.49	0.46	0.45	-0.041
760*	0.50	0.47	0.32	-0.190	0.52	0.53	0.34	-0.170
Average	0.537	0.524	0.493	-0.039	0.538	0.525	0.493	-0.038

• Note : * : Routes with median bus lanes

Table 2-10. Trend of headway coefficient by year

Category	2003(July~December)	2004(July~December)
Change in punctuality	-	0.537(October) → 0.493(December) → 0.37(March 2005)

3) Route Adjustment Frequency (Frequency of Route Changes and Reductions)

To ensure the completion of the integrated route network, route adjustment continued even after the initiation of the reform project (see Table 2-11).

- 2004. 7-2004. 12: Route adjustment was carried out to resolve the inconveniences caused by the bus system restructuring. In all, 96 routes were affected: 45 lines were altered, 22 extended, 14 newly launched or separated, 4 made shorter, and 11 merged into other routes or abolished. There was virtually no change in the number of buses, which rose from 8,306 to 8,307.
- 2005. 1-2005. 3: Readjustment was executed, targeting overlapping routes, high-density routes and complaint-prone areas. It affected 27 routes: 11 lines were altered, three lengthened, 10 shortened, and three merged into other routes or abolished.
- 2005. 4-present: Adjustment was implemented for routes with extremely

low ridership and overlapping lines. It was aimed at improving the balance of payment conditions in the transport sector. The adjustment resulted in route alteration for 36 routes, merger or abolition for 20 routes, and abridgment for 19 routes.

The total length of the routes jumped from 14,973km in December 2003 to 15,493km in December 2005. But, the total operation distance decreased from 387,797km to 359,344km during the same period (see Table 2-12). This may be attributable to the reduction in the number of routes.

Table 2-11. Status of route adjustments

Classification		2004. 7		2004.7-2004.12		2005.1-2005.3		2005.4-2005.6	
		Number of routes	Number of buses	Number of routes	Number of buses	Number of routes	Number of buses	Number of routes	Number of buses
Status of routes	Trunk	90	2,983	96	2,997	95	3,030	97	3,050
	Feeder	328	4,566	318	4,554	316	4,545	309	4,525
	Wide area	39	723	38	722	37	700	37	700
	Circular	5	34	5	34	5	32	5	32
	Total	462	8,306	457	8,307	453	8,307	448	8,307
Route adjustment	Change	-		45		11		36	
	Lengthening	-		22		3		8	
	Opening separation	-		14		0		4	
	Shortening	-		4		10		19	
	Merger removal	-		11		3		20	
	Total (number of cases)	-		96		27		87	

Table 2-12. Yearly trends of total length of routes and total travel distance

Category	December 2003	December 2004
Total length of routes (km)	14,973	15,493
Total length of travel distance (1,000km)	387,797	359,344(372,310)

*( ) includes the distance traveled by buses switched to feeder routes.

Results of bus rerouting

3. Evaluation Results

Some critics assert that blind spots in bus service occur because bus routes are adjusted on the basis of considerations for profitability. Judging from various factors such as civil complaints about routes, service areas and the number of routes, the assertion should be considered to be lacking in persuasiveness.

As for punctuality, the level of civil complaints concerning bus frequency has decreased. The bus service reliability, as measured in the headway coefficient, was also found to have improved.

Opening of new routes or route extensions are less frequent than closure or shortening of the routes. But, the total length of the routes and the number of bus stops increased compared to the pre-reform period. In this regard, it is not persuasive enough to argue that frequent route adjustments are to improve the financial conditions of bus companies. To minimize the inconveniences related to route changes, attention should be paid to the following matters.

- In principle, route adjustments like closure and reduction must be implemented only when there are alternative routes and modes of transport.
- High-passenger-density routes need special management such as putting additional vehicles into operation or operating sectional routes (covering high-density sections) during commute hours.
- Customized routes currently in service on Mt. Nam, Seonyu Islet and Mt. Bukhan need to be expanded (for stadiums, department stores, performance halls, etc.)

Compared to the first six months following the reform, the next six-month period saw more frequent route adjustments. This is believed to have been related with the efforts to respond to changes in demand for bus travel caused by the large-scale route restructuring.

Restructuring the Fare System

1. Content of Reform

Seoul City's previous public transport fare system was one-dimensional in nature, so it could not adequately respond to various changes in travel demand, thereby causing inequity in fare pricing among public transport users and lowering the efficiency of the overall transport system. To tackle this problem and subsequently improve the city's public transport competitiveness and cope actively with changes in travel demand, the Seoul Metropolitan Government has restructured the fare system.

1) Objectives

① Improving user fare equity

The subway zones set by irrational standards often resulted in short-distance travelers paying higher fares than long-distance users. In addition, irrationally determined fare standards were applied to passengers crossing municipal boundaries. To address these problems, the city government is considering introducing a distance-based scheme that imposes the basic fare

and surcharge based on the distance traveled.

② Reflecting revenue of operators

The levels of revenue and transport fares are too low to cover the costs, resulting in a decrease in the quality of public transport services. Instead of resorting to the old practice of covering the loss through fare hikes, the city government is aiming to resolve the problem by forming a new effective pricing system involving the supply of rational services.

③ Diversifying the fare system to increase user convenience

The city government will step up efforts to relieve the fare burden on public transport users through implementation of various discount schemes such as the time-based differential pricing system, commuter tickets, one-day free passes and integrated tickets.

④ Easing the fare burden associated with transfers

The current transfer discount rate of around 7% is not sufficient enough. It is necessary to offer higher rates of discount to relieve transfer users of the burden of paying excessively high fares. There is also a need to ensure a rational system of allowing discounts for transfers not only between buses and subways but between buses also.

2) Reform Directions

① The reform should be based on the awareness that the use of public transport contributes to easing traffic congestion, improving the environment and generating various other positive external economic effects. In particular, there is a need to apply the principle of equity related to the provision of transport services to people in low-income brackets.

② Rather than relying entirely on market functions, the government needs to try to enhance the quality of services through direct/indirect interferences.

③ Seoul City's public transport fare policies need to be administered according to the following three indices.

• User index: The direction for public transport fare policies needs to be set in a way that they contribute to promoting public transport use, increasing user convenience, overcoming the equity problem through differential fare pricing, and expanding the scope of choices for various user groups.

• Public transport finance index: The direction should also be directed toward increasing revenue, preventing the leaks of revenue, minimizing collection costs, and reinforcing financial strength through adoption of the prepaid charging system.

• Management/acceptance index: In addition, the direction ought to be set in a way that the policies can be easily implemented and secure the acceptance of residents.

3) Action Plan

The Seoul city government announced a finalized scheme for restructuring the fare pricing system for public transport (buses, subways) on June 10, 2004, and implemented it on July 1 of that year.

A. Fare Pricing System for Transfers and Bus/Subway Travel

① Transfers

• Establishing a system of offering free transfers for travel distance of up to 10km through the integrated distance-based fare pricing system.

• Distance unit: Payment of a basic fare for the distance of up to 10km, and additional charge of 100 won per every 5km afterwards.

• Application targets

 - Applied to subway/subway transfers.

 - Applied to transfers among trunk buses, branch buses, circular buses, community shuttle buses and subways: newly introduced.

 But, this scheme does not apply to buses serving wide-area routes, due to their high basic fare (1,400 won) and long travel distances.

• Application method: Benefits are given only to transport card users.

② Bus travel: flat fare system (same as the existing system)

• The rates differ depending on the bus type: trunk, feeder, circular (community shuttle), and long-distance buses.

• As for trunk and feeder buses that travel beyond city limits, the existing surcharge system is abolished to be replaced by the flat fare scheme of collecting just the basic fare.

③ Application of a unified distance-based fare pricing system for subway travel in Seoul and the metropolitan area.

• Replacing the previous zone-based system with the distance-based scheme.
- The basic fare of 800won for travel distance of up to 12km.
- Surcharge of 100 won for every additional 6km within the 12~14km range.
- Surcharge of 100 won for every additional 12km for travel distance exceeding 42km.

B. Introducing the Transport Card Standard Fare System

① Abolishing the transport card discount system and introducing the transport card standard fare system.

② Applying the free-of-charge transfer system only to transport card users.

③ The new transport card system is equipped with the function of recognizing boarding/disembarking stops, so it can impose charges based on the integrated distance regardless of transfers.

④ Introducing a proper surcharge system for single-ride tickets (cash fare).

⑤ Discontinuing the issuance of prepaid subway cards.

C. Renovating the Student Discount System

① Replacing the existing standard single-ride ticket (cash) fare system with the standard transport card fare system that allows student discounts only for transport card users.

② Discount rates: Simplifying the existing system of offering separate discounts by modes.

• Youths: 20% discount for all modes of transport.
• Elementary school students: 50% discount, 30% discount in case of

wide-area buses.

2. Analysis of Achievements and Problems

1) Reasonable Standards and Principles for Fare Determination

The fare system restructuring is chiefly aimed at addressing inequity among public transport users, which was caused by the fact that free transfer benefits were available for subway passengers, but not for bus users.

As a way to resolve the problem, the distance-based system was applied to subway travel, thus reducing the free transfer-related benefits. As for the bus passengers who had a relatively high financial burden related to transfers, the integrated distance-based fare system was introduced. The new scheme allowed the bus passengers to pay additional charges only when traveling long distances, thus helping to remove the relative gap in fares between modes of transport.

Introduction of the integrated distance-based fare system helped relieve the passengers of the burden of paying extra charges for transfers between modes of public transport. Under the scheme, the level of fares for single-mode users increased, while that for multiple-mode users went down. This is quite a positive development in that it helped promote the integration of public transport modes.

Fare levels for individual modes of public transport were set strictly on the basis of the concept of standard costs. This move was aimed at helping to induce business rationalization of public transport service providers. It should also be considered an indication that they would be held accountable for poor management.

Despite these positive aspects, concerns were raised about the restructuring in terms of simplicity, clarity, substitutability and predictability, which are the principles generally required of public utility charges.

• Simplicity: Fare determining criteria are overly diverse. For example, the criteria includes distance of up to 10km for bus and subway, distance of 10km or more for subway, distance of up to 10km for travel involving intermodal transfers, and distance of 10km or more for travel involving

intermodal transfers, and travel using long-distance metropolitan buses.

- Clarity: Fare payment is made electronically via cards and terminals, so it is difficult for ordinary citizens to verify whether the fares are imposed rationally. Any breakdown in the card or terminal system would result in a fairly large number or complaints about the levels of imposed fares.

- Substitutability: Cards are used as the chief means of paying public transport fares. However, the partial use of supplemental payment means like cash is essential, particularly for passengers who have lost their cards, maxed-out cards, or non-card holders like visitors to the city. The current system may be effective in promoting the use of cards, but cause excessive inconvenience to non-card holders.

- Predictability: Fare calculation is made automatically via the computerized system. Yet, citizens become uncertain about the level of fares they should pay whenever they travel. The fare is a very important factor in making decisions about travel frequency, destination selection and mode choice, but under the current system, it is difficult for public transport users to make rational decisions on such matters.

2) Changes in the Average Fare Burden on Public Transport Users (Based on Card Use)

The average fare burden was calculated by dividing the public transport revenue by the number of public transport users. It decreased 8.2% from 599 won to 550 won in the case of buses, and increased 18% from 660 won to 779 won for subways (see Table 2-13).

Table 2-13. Change in average fares

	September 2003	September 2004	Growth rate
Bus	599 won	550 won	down 8.2%
Subway	660 won	779 won	up 18.0%

The average extra charge for transfers was 64 won for bus users and 281

won for subway passengers. The annual savings on public transit expenses are estimated to be about 204.4 billion won.

The average burden went down for bus users and up for subway passengers. This phenomenon should be interpreted as an indication of the above-mentioned inequity being addressed. In particular, the hike in the burden for subway users suggests that the subway fare has been normalized by reflecting transportation costs in the fares.

3) Change in the Level of User Convenience

The level of user convenience was estimated by using various data such as the card usage rate, the number of passengers using transfers and the transfer rate. The user convenience level as measured by these data was found to be steadily improving. The percentage of transport card users kept increasing as the scope of transfer discount benefits expanded. The percentage was estimated at 89% for buses and 71% for subways.

As shown in <Figure 2-7>, the daily number of public transport users making transfers showed a steady upward trend following the restructuring in

Figure 2-7. Changes in the number of public transport passengers using transfers

July 2004. The number rose from 1,373 in July 2004 to 1,821 in December of that year. It is compared with the growth trend registered during the same period a year earlier.

<Table 2-14> shows that the number of transfers made per day rose from 782,000 in July 2004, to 1,117,000 in March 2005 and to 1,197,000 in September 2005.

Table 2-14. Average number of daily transfers by month

(Unit: 1,000 transfers/day)

Category		Intracity bus (Excluding operators with switched licenses)	License switch	Total
2004	July	732	50	782
	August	771	57	826
	September	842	62	904
	October	934	68	1,002
	November	963	70	1,033
	December	946	68	1,014
2005	January	865	62	927
	February	831	60	891
	March	1,040	77	1,117
	April	1,059	75	1,134
	May	1,076	75	1,151
	June	1,097	75	1,172
	July	1,061	70	1,131
	August	1,041	67	1,108
	September	1,124	73	1,197

• Note : 1) Data for July 1, 2004 and Jan. 11, 2005 is excluded because of card system breakdowns and subsequent free rides that took place on those days
2) License switch means a shift in license from community shuttle buses to city buses that was granted on July 1, 2004 when the bus reform project was kicked off
3) Calculation of the number of transfer passengers was based on the modes of transport boarded after leaving the initial mode. For example, when a passenger uses a subway, a bus and another bus, the bus rides are counted as transfers while the subway ride is excluded.

The ratio of transfers, as measured on the basis of modes of transport boarded after leaving the initial mode, was 22.5% for public transportation (as of December 2004). It represented an increase of 6.7 percentage points from 15.8% registered a year earlier. The ratios for subways and buses stood at 15.1% and 27.7% (December 2004), up by 4.1 and 8.1 percentage points from a year earlier,

respectively.

The transfer ratio showed a trend of going upward every month compared to the previous year. Indicating improvement in utility related to transfers, this phenomenon should be considered a positive development in terms of ensuring integrated use of public transport modes (see Table 2-15, Figure 2-8).

Table 2-15. Public transport transfer rates

(Unit: %)

Category	Public transport				Subway				Bus			
	2003	2004	Growth	Growth rate (%)	2003	2004	Growth	Growth rate (%)	2003	2004	Growth	Growth rate (%)
July	15.8	19.4	3.6	22.3	11.3	11.5	0.2	1.4	19.1	25.4	6.3	33.1
August	16.1	21.2	5.1	31.7	11.4	14.1	2.7	24.0	19.4	26.0	6.6	33.8
September	15.9	21.7	5.8	36.6	11.5	14.7	3.2	28.1	19.1	26.4	7.3	38.6
October	15.9	22.0	6.1	38.2	11.4	14.9	3.5	30.7	19.3	26.9	7.6	39.1
November	15.9	22.5	6.6	41.7	11.2	15.1	3.9	35.1	19.5	27.6	8.1	41.5
December	15.8	22.5	6.7	42.4	11.0	15.1	4.1	36.5	19.6	27.7	8.1	41.4

• Calculation of the transfer rate is based on the modes boarded after leaving the initial mode during travel involving intermodal transfers.

Figure 2-8. Changes in the public transport transfer rate

3. Summary of Evaluation Results

The restructuring helped address the problem of inequity in financial burdens among public transport users. In particular, the financial burden on bus passengers was reduced because of transfer discount benefits. Yet, the revenues of buses and subways began to show an upward trend, thanks to the increase in demand for travel using these modes. The transfer ratio climbed steadily, indicating that the utility of public transport use was improving because of the implementation of the integrated distance-based fare system and the transfer discount benefits.

The average daily revenue earned by the public transport sector (buses plus subways) was 6,541 million won, up 12.9% from 5,792 million won a year earlier. The growth rate was 26% for community shuttle buses, 21.4% for subways and 2.5% for common buses operating in the city. The monthly growth rate compared with the previous year showed an upward trend, rising from 4.3% in July, 9.8% in August, 10.5% in October and 12.9% in November.

The revenue kept rising thanks to the gradual increase in ridership. The daily average of public transport users in November was 10,193,000, up 7.1% from 9,516,000 recorded during the same period of the previous year. Bus ridership increased 11.2%, higher than 7.1% for subways. This shows that buses were surpassing subways in terms of ridership expansion, although it was the other way around when it came to the revenue growth rate.

These are undoubtedly favorable developments. However, there still remains a significant problem related to the different fare systems used in Seoul and surrounding towns in the capital areas. Due to the delay in the project to launch an integrated fare system covering all these areas, residents of Gyeonggi Province are using Seoul buses, thus aggravating the deficit problems of buses in service in the provincial areas. Conflicts are even arising between relevant bus service providers. To resolve this problem, adjustments need to be made to the routes and the fare system. There is also a need to expand the scope of transport card application to cover the entire capital area.

In addition, there is concern about whether the restructuring was made on the basis of abiding by the principles generally required of public utility price hikes - simplicity, clarity, substitutability and predictability. To ease such concern, it is necessary to put up posters containing detailed information on the new fare scheme on subway stations and bus stops.

Due to problems with the fare system, future attempts to adjust fares are expected to encounter difficulties in setting the scope. There also exist worries about the risks

By restructuring a bus fare system, fare equity among different public transport modes has been improved.

of mechanical errors in the current fare collecting system. In the early stage of implementing the new system, Seoul City suffered enormous confusion due to inexperience and poor operation. This problem may occur again when other metropolitan cities and provinces seek to restructure their transport systems. To resolve these issues, it is necessary to devise adjustment standards for the basic fare and surcharges and to make it mandatory to conduct regular inspections designed to ensure the safety of the system.

SECTION 05.

The Semi-Public Operation System

1. Content of Reform

Seoul City has restructured the bus operating system to increase the benefits of the entire routes by firmly establishing the concept of public management of bus routes, and to enhance the efficiency of the sector through introduction of the principle of latent competition.

1) Objectives of the Reform

① Ensuring transportation equity for citizens through provision of stable bus services.

② Enhancing the efficiency of business operation.

③ Gaining the trust of bus users through ensuring punctual bus services, expanding the scope of modes that can be used in traveling to the destination, and providing safe and comfortable services.

④ Ensuring profits for bus service providers in return for providing stable services, and inducing effective management for subsequent enhancement of efficiency in bus operation.

⑤ Securing the basis for providing stable public transport services to society as a whole by revitalizing the bus transport sector.

2) Directions and Basic Principles for Restructuring

① Directions

• Ensuring proper levels of profit for bus companies, and in return, urging them to conduct restructuring efforts to improve their financial conditions.

• Introducing the concept of public support in the bus transport sector, thereby reinforcing the public nature of bus routes.

• Encouraging the existing companies and labor unions to participate in the restructuring process, by minimizing changes affecting the vested corporate interests and the union status

② Basic principles

• Establishing the concept of the public management of routes.
 - Flexible route adjustments in accordance with changes in demand.
 - Providing stable bus services for unprofitable lines.

• Ensuring job stability, thereby minimizing destabilizing effects on society.
 - Minimizing the restructuring-related job relocations while guaranteeing the employment status of workers.

• Encouraging consultations through participation of citizens, experts and stakeholders.
 - Generating agreements through consultations participated in by the stakeholders of company management and unions as well as citizens.

• Building up a competitive market.
 - Establishing a monitoring scheme and a service-enhanceable system.

3) Action Plan

① Bidding for key trunk routes

• Target routes: 10 main arterial routes
 - Subway substitution functions/along key spines of the city (installation of median bus lanes).

- Introduction of deluxe buses such as articulated and low-floor buses
- Company type and size: 4 companies operating 741 buses
  - 200~300 buses for 2~3 major trunk routes
  - Existing companies encouraged to form consortiums.
- Operation/management system
  - Operation methods such as route designing and service scheduling to be determined by the municipal government in accordance with public demand
  - Bus companies to be in charge of the management of vehicles and garages as well as recruitment of workers
  - Functional connections to the transport card company, bus revenue settlement, subsidy issuance
- Company selection and awarding of limited licenses
  - Selection of qualified companies through competitive bidding by considering various factors such as total operation expenses, management and financial capabilities, service improvement plans and employee

The semi–public operation system was adopted to increase public interest and efficiency of the bus operation.

welfare programs.
  - Selected companies to be awarded limited licenses (a six-year term) according to contracts

Promoting autonomous adjustments by the bus companies

- Target routes: 70 trunk lines, 291 feeder lines.
- Autonomous route adjustments after forming a consultative body
  - Route adjustments and joint management of revenues in accordance with a joint transport agreement
  - Autonomous adjustments by zones on the basis of depot locations
  - Utmost emphasis to be placed on public interest in adjusting route arrangements, number of buses in service and bus frequency
- Building a private-sector self-operation system
  - Route determination: Adjustments through joint action of the municipal government and the bus companies' consultative body on the basis of public demand
  - Operation method: Flexible adjustment of service spans and operation schedules through business plan changes
  - Business license: Issuance of new business licenses by route
  - Operation evaluation: Implementation of regular evaluations on orderly operation and service quality
- Joint management of transport revenues
  - Concluding an agreement and forming a body for joint revenue management
  - Distribution of revenues according to operation records on the basis of standard costs guidelines (number of buses · km)
  - Losses to be covered by subsidies under a scheme to ensure stable profits
- Introduction of a bus operation monitoring and evaluation system
  - Promoting a service-based competitive system by conducting evaluations of operation records and service quality via digitalization of relevant data and establishment of a monitoring scheme

2. Analysis of Achievements and Problems

1) Productivity of Bus Companies

<Table 2-16> shows that transport revenues per km are lower than costs per km. The gap displayed a slightly declining trend, but the situation was found to be fluid.

Table 2-16. Bus transport revenue and cost

(Unit: 1 million won)

Category	Total ridership	Transport revenue			Transport cost		
		Total revenue	Revenue per km	Revenue per passenger	Total cost	Cost per km	Cost per passenger
04.7	116,869,499	75,928,856,144	1,188	650	106,862,789,676	1,672	914
8	122,420,670	79,112,346,649	1,296	646	104,849,038,372	1,717	856
9	125,890,164	80,783,971,230	1,370	642	102,159,134,195	1,732	811
10	140,809,181	89,762,182,531	1,425	637	106,587,603,044	1,692	757
11	135,840,392	85,284,767,852	1,387	628	104,582,966,297	1,701	770
12	136,653,364	85,462,662,777	1,338	625	106,879,244,362	1,673	782
05.1	118,119,425	73,924,782,517	1,198	626	104,715,433,371	1,697	887
2	106,170,337	66,253,719,633	1,226	624	96,837,632,927	1,793	912
3	143,199,648	88,150,566,706	1,374	616	109,817,311,484	1,712	767
4	140,937,866	86,907,621,527	1,412	617	106,881,176,996	1,736	758
5	146,939,337	90,438,056,462	1,427	615	110,786,976,764	1,748	754
6	143,543,546	88,239,491,844	1,428	615	106,946,736,857	1,731	745

• Total ridership: The number of usages by date (July 1, 2004 and Jan. 11, 2005 excluded).
• Transport revenue: Distributed amount of revenue by date (July 1, 2004 and Jan. 11, 2005 excluded).
• Transport cost: Amount that does not include profit gains.

The Seoul Metropolitan Government has introduced the semi-public operation system, which requires subsidy payment under the following two objectives. First, it aimed to reinforce the public utility nature of route operation by exercising the right to adjust the bus routes. Secondly, it aimed to enhance the efficiency of bus company operation through the route tendering system. As mentioned in the previous section, route adjustments are being made relatively speedily and without being affected by the conflicting interests of bus firms, while the municipal government is exercising the right to adjustments. So, the first objective is considered to have been achieved. To judge whether the second objective has been accomplished, it is necessary to conduct productivity-related evaluations.

The productivity evaluation in relation to the Seoul bus reform has recently been dealt with intensively through research carried out by Mi Young OH and Seong Su KIM (2005). The evaluation was based on two types of output (distance traveled and the number of passengers) generated by using five kinds of input data concerning driving, maintenance, management, vehicle and fuel. Analysis showed that most–except 10 out of the 57 companies showed declines in productivity, when the distance traveled was considered the output. In contrast, when the number of passengers was considered the output, a majority of the firms except for 22 companies displayed increased productivity. When both were taken into consideration, there was little change in productivity on average.

The evaluation showed that productivity went down in terms of distance traveled, and improved in terms of the number of passengers. However, the increased ridership included passengers who received transfer discount benefits. When such passengers are excluded from calculation, productivity as measures in terms of the number of passengers can be said to have deteriorated as well (see Table 2-17, 2-18)

Increased wage levels for drivers were cited as the most important factor that caused the drop in productivity. But, a survey by Green Transport (2004) found that the drivers' satisfaction level improved drastically from 16.7% in June 2004 to 30.2% five months later. This result showed that the drop in productivity was compensated for by the improvement in service.

Table 2-17. Changes in technological efficiency, technology and productivity following the bus reform (distance traveled)

Category	Before reform (2003.12)		After reform (2004.12)		Change in technological efficiency	Change in technology	Change in productivity
	Based on 03	Based on 04	Based on 04	Based on 03			
Averagevalue	1.141	1.008	1.125	1.223	1.018	0.904	0.920
Maximum value	1.340	1.215	1.531	1.742	1.263	1.075	1.163
Minimum value	1.000	0.702	1.000	0.743	0.662	0.809	0.588
Standard deviation	0.103	0.119	0.100	0.165	0.091	0.055	0.098
Value=1	12	0	11	1	8	0	0
Value>1	45	35	46	51	31	4	10

Table 2-18. Changes in technological efficiency, technology and productivity following the bus reform (number of passengers)

Category	Before reform (2003.12)		After reform (2004.12)		Change in technological efficiency	Change in technology	Change in productivity
	Based on 03	Based on 04	Based on 04	Based on 03			
Average value	1.135	1.291	1.249	1.077	0.925	1.148	1.060
Maximum value	1.631	1.919	2.232	1.927	1.181	1.253	1.351
Minimum value	1.000	0.755	1.000	0.714	0.690	0.846	0.802
Standard deviation	0.150	0.220	0.245	0.216	0.120	0.071	0.142
Value=1	16	0	11	0	9	0	0
Value>1	41	52	46	33	11	54	35

2) Improvement in Service Quality

Below are research data cited from a monitoring survey conducted jointly by Green Transport and the Seoul Development Institute in March 2005 to find out the "bus operation status and the service level in relation to the restructuring of Seoul's bus transport system."

Analysis of service levels before and after the restructuring (citizens' satisfaction level)

• The percentage of citizens expressing satisfaction with the bus reform

Figure 2-9. Citizens' satisfaction level concerning the bus system restructuring

Figure 2-10. Overall satisfaction level regarding bus services

displayed an upward trend, while that of citizens voicing dissatisfaction showed a downward trend.

Of those surveyed, about 50% were found to have medium- level satisfaction regarding the overall bus services. About 30% said they were satisfied, while 24% replied that they were dissatisfied (see Figure 2-10).

As shown in <Table 2-4>, the most prominent factors causing discontent were found to be inconvenience related with the use of transport cards, irregular headway and violent driving. Complaints concerning routes were found to be rapidly declining in number.

3) Earnings Status and Changes in Subsidy Expenditure

The bus transport deficit covered by Seoul municipal government subsidy increased from 97.2 billion won in 2003 to 157.9 billion won in 2004 and to 220 billion won in 2005. In contrast, the deficit in the subway sector kept decreasing. The combined deficit also showed a downward trend, reducing from 637.2 billion won in 2003 to 619.7 billion won in 2004, and to 581.9 billion won in 2005.

Table 2-19. Public transport deficit trend

(Unit: 1 million won)

Category		Public transport deficit (A+B)	Subway deficit (A)			Bus deficit (B)
			Total	Urban rail	Seoul subway	
2003		637,277	540,077	273,741	266,336	97,200
2004		610,655	452,760	262,982	189,778	157,895
	The first half year	313,015	268,161	147,484	120,677	44,854
	The second half year	297,640	184,599	115,498	69,101	113,041
2005 (forecast)		581,988	351,988	219,222	132,766	220,000

• Note: 1) Subway transport deficit = Transport revenue (Free ride subsidies excluded, settlement of joint transport revenue included)- operating cost (interest cost excluded).
　　　 2) The 2005 subway transport deficit was calculated by deducting the 2004 operating cost from the 2005 transport revenue predicted by Seoul Metro and Seoul Metropolitan Rapid Transit Corporation.

The bus deficit's major contributing factors are as follows:

• Increase in the number of routes (24.2%), and route extension (3.5%)

• Drastic hikes in major component expenses (latter half of 2004)

- Personnel expenses: Up 16.14% compared to the previous year (39.4 billion won in additional burden).

- Fuel expenses: Up 22.2% compared to the previous year (24.1 billion won in additional burden).

- The personnel and fuel expenses accounted for 56.2% of the transport deficit of 113 billion won recorded in the second half

• A significant drop in the number of passengers on Saturdays, Sundays and holidays due to the introduction of the five-day work week (30% reduction compared to weekdays)

• Free transfers, which led to an increase in benefits for citizens

- 5.2% decrease in fare per ride (from 670 won in May 2004 to 633 won one year later)

- Free transfer benefits are estimated to be worth about 200 billion won a year.

With regard to subsidy payments, what matters most is whether the expenditure brings about improvement in convenience levels and benefits to the extent that it can be justified. The extent of improvement may be estimated through a survey of citizens on their intention to pay for the enhanced quality of services. Research will be needed to determine the adequate level of subsidy expenditure in relation to user convenience and benefits.

3. Summary of Evaluation Results

An evaluation of the semi-public operation system showed that productivity of bus companies dipped due to an increase in personnel and other expenses. Yet, given the remarkable improvement in the quality of services, including those related to the drivers, the fall in productivity needs not necessarily be considered a completely negative outcome. Nevertheless, there is a need to revise transport cost settlement guidelines so that the quality of service would be reflected in wage increase rates, thus ensuring that future wage raises would be linked to service improvement.

In the bus service survey mentioned above, nearly 24% of the citizens questioned expressed discontent. Improving this situation would require endeavors to stabilize the transport card system and tackle the problems of reckless driving

Bus median lane at Seoul Samilro

and bad customer service.

In addition, the subsidy program under the semi-public operation system might cause moral hazard on the part of bus companies. There are also mid- and long-term risks of the city government constantly receiving direct pressure to raise wages of the bus company workers. Given these concerns, it is necessary to seriously consider whether to continue the semi-public operation system or to pursue privatization by launching an independent bus management organization once the restructured transport system is stabilized.

Implementation of the semi-public operation system has led to an increase in the city's bus subsidy expenditure. But, the amount of subsidies given to the entire public transport sector has been dwindling every year. Hence, the system is considered to be generating positive effects in terms of financial aspects. Although the public transport subsidy expenditure is on a downward trend, the city government should be prepared to cope with the possibility of the business efficiency of bus companies going down. Thus, it needs to take preventive steps, including eliminating ineffective elements through continuous management evaluations.

The Seoul city government is asserting that free transfer benefits amount to 200 billion won. Given the fact that some transfers have been made to occur unavoidably because of the route restructuring, it is likely that the amount of the benefits was somewhat overestimated.

Smart Card

1. Content of Reform

The use of smart transport cards helps to ensure the scientific quality of public transport policy measures such as the distance-based integrated fare system, the optimal bus operation scheduling scheme and transparent management of transport revenue.

- Securing international compatibility through adoption of global standards.
- Providing reinforced security plus multi-functional services through the use of a smart card (EMV adoption) instead of a simple memory card.

Smart card data can be used in a variety of ways.

- Optimum route: Analyzing the

Various types of smart cards

data on passenger distribution by hourly time slots. Drawing up effective service schedules and estimating the required number of buses on the basis of the analysis. Delivering the schedules and estimations to bus companies for use in actual bus operation.

- Optimum scheduling: Route designing and adjustment through analysis of passenger data by routes/hourly time slots.
- Reduction in working hours (shift system): Estimating proper shift work ratios by routes through analysis of passenger distribution.
- Developing a congestion management model through trip-chain analysis.
- Handling civil complaints with objective data, and providing citizens with real-time information.

2. Analysis of Achievements and Problems

On Jan. 11, 2005, malfunctions occurred with about 4,700 terminals (57% of the total).

- The malfunctions occurred during the process of applying to the terminals P/L (positive list) data for detection of suspended credit cards. The P/L data delivered from credit card companies contained erroneous data, which caused the system breakdown.
- The Seoul city government gave instructions that vehicles with malfunctioning terminals allow free rides to passengers. The malfunctioning terminals were repaired and back to normal 11 hours later.
- To prevent the recurrence of such trouble, Korea Smart Card Co. conducted inspections on data generation processes of credit card companies. It also reinforced the functions for checking the inclusion of erroneous data in the P/L data before sending them to terminals.

The number of civil complaints related with malfunctioning transport cards was 35,458 in July 2004. It plummeted to 2,455 in October 2005 after the system

gained stability (see Table 2-20).

Table 2-20. Status of transport card payment complaints and refunds

Year & Month	Number of complaints	Number of refunds	Amount of refunds
04. 7.	35,458	35,458	76,995,080
04. 8.	17,989	17,989	32,833,302
04. 9.	18,064	18,064	17,721,558
04. 10.	15,960	15,960	21,788,981
04. 11.	14,605	14,605	17,950,106
04. 12.	7,915	7,915	7,524,891
Total for 2004	109,991	109,991	174,813,918
05. 1.	7,005	7,005	4,434,701
05. 2.	4,314	4,314	2,255,120
05. 3.	4,254	4,254	2,250,097
05. 4.	3,314	3,314	1,890,426
05. 5.	3,180	3,180	1,747,284
05. 6.	3,157	3,157	1,220,887
05. 7.	3,013	3,013	913,800
05. 8.	2,991	2,979	695,356
05. 9.	2,486	2,440	618,780
05. 10.	2,455	2,217	401,111
Total for 2005	36,169	35,873	16,247,562
Total	146,160	145,864	191,241,480

The planned supply of T-money cards equipped with the built-in central processing unit is being delayed, posing difficulties for efforts to ensure full functions of smart cards.

3. Summary of Evaluation Results

Introduction of the smart transport card system has made it possible to implement various discount programs. Offering benefits such as reduced fares and transfer discounts, these programs in turn have helped promote the use of transport cards as a means of paying fares. The system is particularly effective in preventing revenue

More than 90% of public transit passengers use smart transit card for fare payment.

leaks.

However, the T-money cards can be recharged only with cash; credit cards are not accepted. Another problem is that card users cannot receive income tax deduction benefits because cash receipts are not issued.

The malfunctioning problem has been almost completely resolved with the stabilization of the card system. Yet, there remains concern about whether the system would operate in a reliable manner when an integrated transfer discount system is fully implemented in Seoul and the surrounding regions of the capital area.

The supply of quality cards with smart card functions is being delayed, due to conflicting interests among various card companies. This necessitates enactment of relevant regulations that can help such problems.

Public Transport Transfer Centers

1. Content of Reform

① Improvement of user convenience by reducing transfer distance and time
② Forming transfer networks by zones such as central business districts, sub-centers and city limits
③ Cheongnyangni and Yeouido transfer centers opened on July 3 and July 10, 2005, respectively. Construction of Guro Digital Complex Center to

Figure 2-11. Artist's conception of transfer centers

Artist's conception
of Cheongnyangni Transfer Center

Artist's conception
Yeouido Transfer Center

be completed in December (see Figure 2-11).

④ Jamsil, Express Bus Terminal, Sejong Center for the Performing Arts, and Dongdaemun Stadium transit centers slated to open in 2006

2. Analysis of Achievements and Problems

For the transfer centers to play their roles properly, there should be clear distinctions in functions between trunk and feeder lines. The Cheongnyangni Transit Center has no clear standards on placing buses on each of its three platforms. There are no integrated bus route maps, so passengers have to visit each platform to confirm the available bus lines.

Buses spend a considerably long time while stopped at the center, inconveniencing the users. In addition, passengers have to cross two crosswalks in order to transfer from feeder-line buses to trunk-route buses (Cheongnyangni center). This raises concern about the safety of the users, particularly those with handicaps in mobility.

Public transport transfer center (Cheongnyangni, Seoul)

There is also controversy over the center's location. It selection is alleged to have been based not on correct analysis of transfer demand, but on the following factors: being in a station area, concentration of bus routes, and the ease of securing the lot.

In a related development, there was a suggestion that a large-scale transfer center be built on the southern outskirts of Seoul to attract car commuters from southern capital areas to the city toward public transport (Seoul Development Institute, 2001). The idea was not realized, however, because of the difficulty of securing the lot and opposition from residents who regarded a transfer center as an unfavorable facility.

3. Summary of Evaluation Results

Located at transport nodes, most of the transit centers are contributing to ensuring smooth transfers. However, there is a need to conduct in-depth analysis on the location adequacy, disabled accessibility to the centers, and user safety.

SECTION 08.

Exclusive Median Bus Lane

1. Content of Reform

The median bus lane scheme was launched as part of the bus system reform project in July 2004, beginning with the Cheonho-Hajeong and four other sections whose combined length reached 36.1km. (see Figure 2-12).

- Cheonho-Hajeong: 7.6km
- Dobong-Mia: 15.8km
- Susaek-Seongsan: 6.8km
- Gangnam: 4.8km
- Samilro: 1.1km

In March 2005, additional median bus lanes were installed, covering 21km of streets on three routes.

- Mangu-Wangsanro: 4.8km (Mangu Station~Cheongnyangni Station)
- Gyeongin-Maporo: 6.8km (Oryu IC~Yeouido)
- Siheungdaero~Daebang-ro: 9.4km (Anyang city boundary~Daebang Station)

Figure 2-12. Median bus lane installation plan (191.2km for 16 routes)

As of 2006, the designing process was underway to establish median bus lanes on 21.2km of roads on three routes.

- Dongjak-Sinbanporo: 8.4km
- Songpadaero: 5.3km
- Sinchon-Yanghwaro: 7.5km

2. Achievements and Analysis of Problems

1) Improvement of Speed

As shown in <Table 2-21>, the bus operating speed increased in all sections where median bus lanes were installed. Particularly impressive is the Dobong-Mia section, where the bus speed improved by more than 100% compared to the previous period, indicating that the median bus lane system contributed greatly to improving the competitiveness of buses.

Table 2-21. Changes in travel speed on median bus lanes

Classification		Before reform ('04. 6)	After reform ('04.12)	Difference
Speed on median bus lanes (km/h)	Dobong-Mia	11.0	22.0	Up 11.0(100%)
	Susaek-Seongsanro	13.1	21.5	Up 8.5(64.9%)
	Gangnamdaero	13.0	17.3	Up 4.3(33.1%)

• For reference, the speed on Gangnamdaero in 2000 was 12.97, similar to the post-reform level as shown in the table
(Ki Yeon HWANG, Jo Young LEE, 2003)

The speed of passenger cars was found to be increasing during morning commute hours, but decreasing during the afternoon commute in all three sections (see Table 2-22, Figure 2-13, 2-14, 2-15). This result can be interpreted as meaning a partial failure to achieve the goal of resolving the traffic congestion problem by enhancing bus ridership and discouraging the use of private vehicles through implementation of the median bus lane system. To ensure complete achievement of this goal, it would be necessary to implement the TSM project, thereby preventing the influx of cars from neighboring roads into the sections with designated bus lanes. In addition, more active efforts ought to be made to curb the use of private cars through transport demand management.

Table 2-22. Bus and passenger car speeds before and after reform   (Unit: km/h)

Classification	Type of car	Route	Before reform (2004.6)	After reform (2004.11)	After reform (2004.12)	Changes compared to pre-reform period (As of December)
Morning commute (07:00 ~ 09:00)	Bus	Dobong~Miaro	11.0	21.4	22.0	Up 11.0 (100.0%)
		Susaek~Seongsanro	13.1	21.5	21.6	Up 8.5 (64.9%)
		Gangnamdaero	13.0	17.7	17.3	Up 4.3 (33.1%)
	Passenger car	Dobong~Miaro	18.5	20.3	21.6	Up 3.1 (17.0%)
		Susaek~Seongsanro	20.3	20.2	22.3	Up 2.0 (9.9%)
		Gangnamdaero	18.0	18.7	18.6	Up 0.7 (3.7%)
Afternoon commute (18:00 ~ 20:00)	Bus	Dobong~Miaro	9.4	19.6	20.1	Up 10.7 (113.5%)
		Susaek~Seongsanro	13.1	25.5	25.5	Up 12.4 (94.6%)
		Gangnamdaero	10.0	17.5	16.9	Up 6.9 (68.8%)
	Passenger car	Dobong~Miaro	20.1	17.9	18.4	Down 1.7 (-8.7%)
		Susaek~Seongsanro	25.8	24.4	24.4	Down 1.4 (-5.4%)
		Gangnamdaero	14.5	13.8	13.9	Down 0.6 (-4.4%)

2) Safety

Accidents at the sections with designated bus lanes increased 4% in number during the one-year period after the reform, compared to the previous one-year span. The
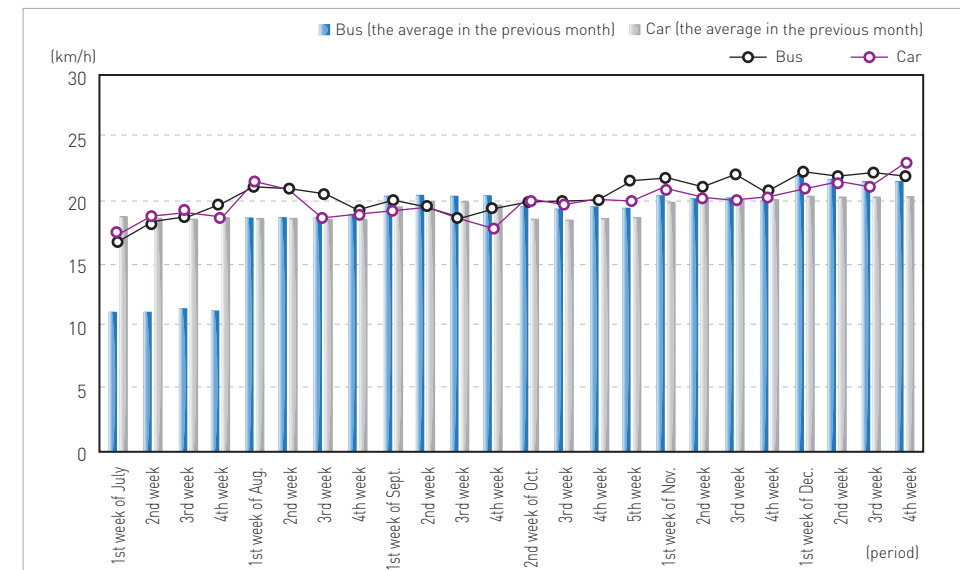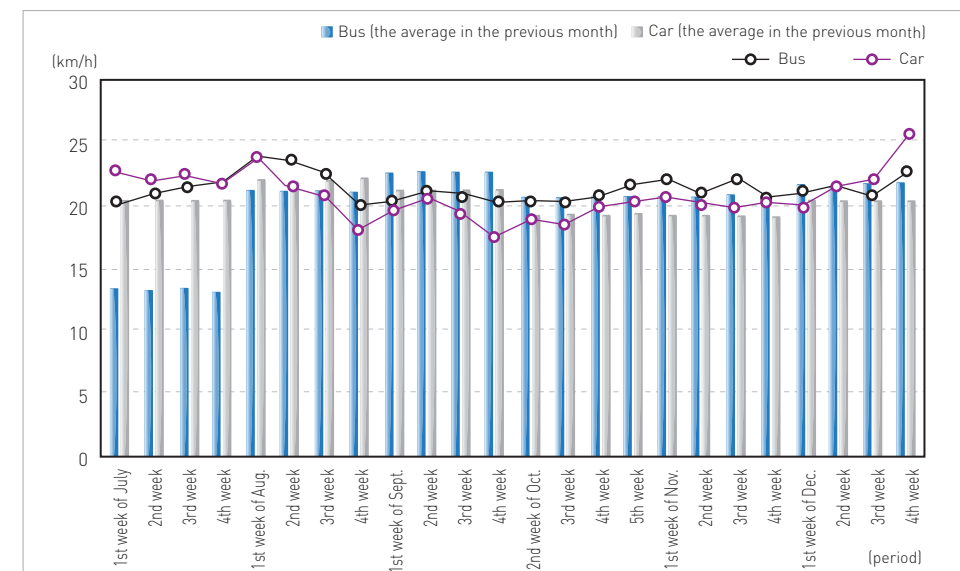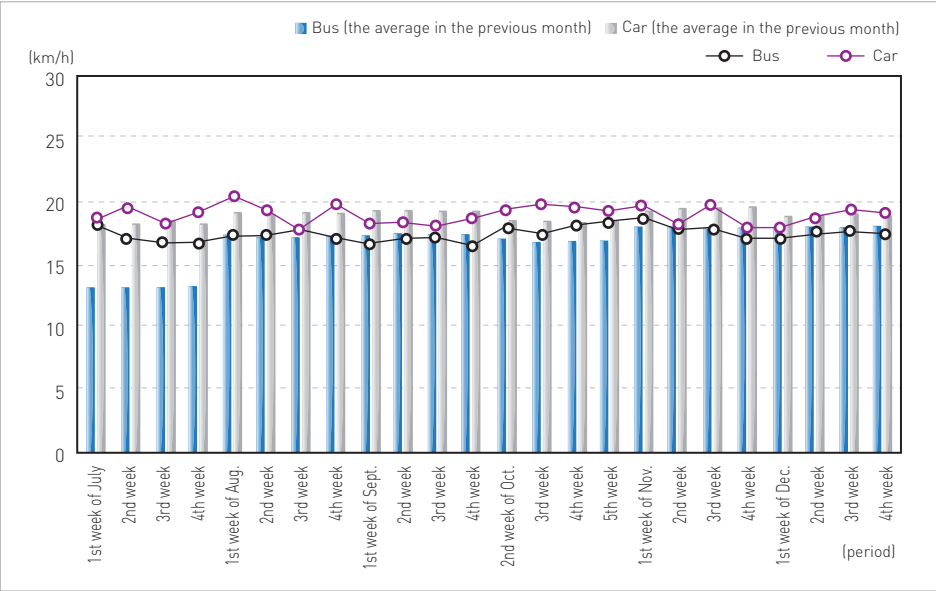
Figure 2-13. Changes in speed on the Dobong-Miaro corridor

Figure 2-14. Changes in speed on the Susaek-Seongsanro corridor

Figure 2-15. Changes in speed on the Gangnamdaero corridor

number of deaths jumped by 80% (see Table 2-23).

Table 2-23. Status of accidents during the one-year period before and after reform

Exclusive bus lanes	Enforce-ment date	Pre-/Post-reform (1 year)				Comparison (%)			
		Occur-rence	Death	Injury	Property damage	Occur-rence	Death	Injury	Property damage
Samilro (Jongno 2-ga~ Chungmu 2-ga)	'04.05.01	44/25	0/1	48/25	12/14	-19 (-43.2)	1 (100)	-23 (-47.9)	2 (16.7)
Dobong~Miaro (Samseon R~Uijeongbu city boundary)	'04.07.01	512 /518	11 /11	805 /849	227 /266	6 (1.2)	0 (0.0)	44 (5.5)	39 (17.2)
Changgyeong PalaceÐHajeongro (Wonnam R~ Yongnam R)	'04.07.01	104 /125	0/3	69/81	51/59	21 (20.2)	3 (300)	12 (17.4)	8 (15.7)
Gangnamdaero (Sinsa R~ Yeongdong 1 Bridge)	'04.07.01	240 /220	2/4	292 /295	122 /127	-20 (-8.3)	2 (100)	3 (1.0)	5 (4.1)
Susaek~Seongsanro (Rear entrance to Ewha Womans University~Seoul city boundary in Susaek)	'04.07.01	169 /223	2/8	252 /306	87 /122	54 (31.9)	6 (300)	54 (21.4)	35 (40.2)
Total		1,069/ 1,111	15/ 27	1,466/ 1,556	499/ 588	42 (4)	12 (80)	90 (6.1)	89 (18)

The increase in the number of accidents can be attributed to the following factors:

- There are differences in vehicle speeds between designated bus lanes and others. This makes it more likely for jaywalkers to suffer accidents.
- The median-lane bus stops are located in the middle of the roads, while there are only two to three non-bus lanes on one side of the road. This makes it relatively easy for jaywalkers to cross the streets.
- The distance between the bus bay and the crosswalk is short. So, when the bus stops at the bay, it often restricts the visibility of both pedestrians and bus drivers on driving lanes.
- Frequently, buses speed excessively in driving lanes.
- There are no safety barriers on the pedestrian islands, raising the risk of causing danger to pedestrians. In addition, jaywalking often takes place on streets without sidewalk barriers.

This study suggests the following measures to address the problems mentioned above.

- Relocating the stop line on median bus lanes backwards, thus lengthening the distance between the bus bay and the crosswalk.
- Limiting the speed at the bus stop sections to 20km/h to prevent speeding on driving lanes.
- Installing traffic safety mirrors to help secure visibility for pedestrians and buses on driving lanes.
- Installing safety barriers on the pedestrian islands to ensure the safety of pedestrians, and sidewalks barriers to prevent the crossing of the streets at places other than crosswalks.

3) Increase in Bus Ridership

The speeds and operation punctuality of buses running on median bus lanes have improved significantly, which resulted in steady increases in bus ridership (see Table 2-24).

Table 2-24. Number of bus passengers on median bus lane routes

(Unit: 1,000 people/month)

Classification	Before service ('04.6)	After service					Change (Compared to November)
		('04.7)	('04.8)	('04.9)	('04.10)	('04.11)	
Manguro (13 routes)	5,635	5,854	5,809	6,015	6,116	6,262	Up 627 (11.1%)
Gyeonginro (3 routes)	1,717	1,770	1,746	1,816	1,820	1,868	Up 151 (8.8%)

• Calculation covered the bus routes encompassing the entire median bus lane sections.

Transport efficiency on median bus lanes has improved remarkably to the extent that the passenger transfer ratio between the central bus lanes and others reached a maximum 5.78 (Susaekro).

Table 2-25. The ratio of passenger transport capacity of dedicated bus lanes to that of ordinary lanes

Classification	Median lane	Non-median lane	Remarks (Median lane/Non-median lane)
Traffic volume (number of cars/hour)	206	1,392	0.15
Number of passengers (number of passengers/car)	25.2	1.33	18.95
Number of transported passengers (number of people/lane/hour)	5,308	948	5.78

• The transport efficiency of median bus lanes that pass along the Seongsan Hall was measured at 9.6. (Bus traffic: 360 vehicles/hour, Transport capaccity: About 9,100 passengers)

Bus ridership, which had continued to contract due to poor services and the 40-hour work week system, began to turn around upward (see Table 2-26, Figure 2-16).

• The number of public transport users reached a daily average of 9,765,000, up by 483,000 (5.2%) from the pre-reform figure of 9,282,000.

• Intra-city bus ridership went up by 5.3%, whereas it had dwindled at an annual average rate of 5.4% before the reform. Community shuttle bus ridership increased by 24.9%.

• However, there are no statistical grounds for determining whether the bus ridership has risen due to increased transfer demand caused by the restructuring or a shift from other modes to bus. There is a need to make it mandatory to conduct a travel pattern survey when implementing similar

projects in the future.

Table 2-26. Changes in public transport ridership

(Unit : 1,000 people/day)

Classification	Public transport (A+B)	Subway (A)	Bus (B=C+D)	City bus (C)	Community shuttle bus (D)
2004.7~2005.5 average	9765	4545	5220	4068	1152
2003.7~2004.5 average	9282	4497	4785	3863	922
Growth	483	48	435	205	230
Growth rate (%)	5.2	1.1	9.1	5.3	24.9

Figure 2-16. Trends of bus ridership

3. Summary of Evaluation Results

Analysis shows that the median bus lane system has helped increase bus speeds and improve operation punctuality. Through operation management using BMS, the punctuality (the service schedule observance rate) steadily improved, being registered at 0.54 in October last year, 0.27 in December and to 0.37 in May 2005. The average passenger car speed also improved during the morning hours. In afternoon hours, however, it reduced slightly for all sections compared to the

Bus median lane at Siheungdaero (Seoul)

previous period. This phenomenon is presumed to have occurred as the sections attracted a number of cars from other crowded sections due to the less congested conditions.

The number of bus-related accidents sharply reduced following the restructuring. However, the accidents on the bus lane sections increased in number. To address this problem, it is necessary to take steps to prevent jaywalking near crosswalks leading to bus stations. A lower speed limit is particularly required to prevent accidents in those sections.

Currently, many median-lane bus stations are difficult to be reached directly from subway exits, or can be accessed only after walking relatively long distances, thus raising the risks of accidents. To improve this problem, it is necessary to complement the transfer system by lengthening the underground sections of subways so that the exits can lead directly to bus stations.

Bus ridership in the bus lane sections is steadily on the rise. Besides this, it also showed higher passenger transport rates compared to non-bus lane sections. In particular, the number of passengers using buses operating in the median bus lane sections shot up by as much as 11%, whereas the ridership of other buses climbed

just 5.3%. This result indicates a positive impact of the median bus lane system. It also raises expectations that expansion of the bus lane system would lead to further increases in bus ridership.

As mentioned above, the travel speeds of both buses and passenger cars improved during morning hours. This is presumably due to a decrease in demand for passenger car operation. Despite this effect of mode transfer, the passenger car speed dropped again in the bus-lane sections during afternoon hours due to the influx of cars from other crowded sections. To address this problem, the bus lane system needs to be accompanied by a policy to curb the use of passenger cars in non-bus-lane sections. (Donghyeong YUK, Kangsoo KIM, 2005). In addition, it is necessary to implement the traffic system management (TSM) project covering the roads in the neighborhood of the bus-lane sections, thereby curbing the influx of passenger cars.

During the initial stage, the shortage of median-lane capacity caused buses to form long, slow moving lines in such sections as Gangnamdaero. To prevent the recurrence of such trouble, it is necessary to secure sufficient road capacity for the bus lanes through left-turn restrictions. On streets where a large number of buses travel on, it would be desirable to install separate stops along sidewalks for feeder-line and community shuttle buses.

2nd-Stage Evaluation: Assessment of the Impact on the Seoul Transport System

1. Has bus ridership in Seoul really increased?

The bus passenger statistics compiled by the Seoul Metropolitan Government cannot clearly explain the increase in bus ridership. This is because the survey of travel pattern changes did not make distinctions between modal shifts and transfer demands. Therefore, to confirm whether the bus system restructuring led to a genuine increase in bus ridership, this study employed a presumption method by using relevant data.

- The demand for bus travel during the one-year period after the restructuring was found to have risen 9% on average a day, compared to the previous one-year period. Of the increased demand, the users of community shuttle buses (Maeul bus) accounted for the largest portion.
- The demand for bus transport went up, but the deficit of the bus companies continued to expand. Given this phenomenon, it is highly likely that the increased ridership mostly represents passengers benefitting from transfer discounts offered with municipal government subsidies.
- In the past, expansion in subway lines normally led to a decrease in

demand for bus travel. This indicated that the two modes were in a substitution rather than supplemental relationship. This time, however, the two modes displayed a supplemental relationship as demands increased for both bus and subway travel. This phenomenon may be ascribable to efforts to integrate the two systems through the integrated distance-based fare system, which subsequently is believed to have triggered transfer demands among subway users as well.

- In some corridors where dedicated median bus lanes were introduced, the passenger car and bus speeds improved at the same time. Given this phenomenon, it may be presumed that buses, which relative competitiveness in travel time improved, partly absorbed passenger car users. However, the median bus lanes account for a very low percentage in the entire transport network, so the level of their contribution may be said to be negligibly low.
- The five-day work week scheme began to be implemented in earnest during the evaluation period. This may have led to a decrease in demand for public transport. Additionally, due to oil price hikes, some of the passenger car users may have switched to public transportation. There is still no detailed research on the effects of these external environmental changes on the use of transport modes.
- In conclusion, the increase in bus ridership is attributable, to a considerable extent, to growth in the number of transfers, rather than a modal shift from personal vehicles to bus. However, the implementation of the integrated distance-based fare system led to a change in the relationship between bus and subway from substitution to supplemental relations, thereby making it possible to secure an integrated public transport service system. In any case, the increase in the number of transfers indicates improved utility related to the use of public transport. Also noteworthy is the probable occurrence of a demand shift effect on the corridors where median bus lanes are installed. These positive developments raise expectations that expansion in the median bus lane system would lead to a genuine increase

2. Has the Traffic Congestion Situation in Seoul Improved Through Bus System Restructuring?

There is no specific data showing post-restructuring changes in the city's traffic congestion situation.

However, the following facts may be taken into consideration as references: ① there was not a significant amount of modal shift from passenger cars to public transport, ② there were no effective regulations on passenger car operation, and ③ travel speeds generally improved during morning hours on some corridors with dedicated median bus lanes, but the bus lane system has not yet been installed in a significantly large number of streets of the city. Given these facts, it is difficult to say now that the restructuring has led to a remarkable improvement in the traffic congestion situation of Seoul.

The network of the median bus lanes has yet to be completed. Its completion would lead to improved operations conditions for buses, and make it possible to have a clear understanding on the restructuring's impact on the city's overall transportation system.

Results of Comprehensive Evaluations and Matters That Need to Be Improved

1. Positive Aspects

Through the evaluation of Seoul City's bus restructuring project, the following aspects have been found to be positive:

- The reorganization of the bus routes has led to spatial expansion in bus operation and improvement in operation reliability.
- The restructuring of the fare system has led to improvement in equity among bus and subway users. Transfer discounts resulted in a decrease in the average fare per bus passenger.
- Implementation of the integrated distance-based fare system has led to the establishment of an integrated public transport network involving community shuttle buses, route buses and subways. The relations between modes changed from a relationship of rivalry and substitution to a supplemental relationship.
- Implementation of the semi-public operation system led to reinforcement of the public management of routes, thus making it possible to build a route management system that can quickly respond to changes in demand.

A transit center in front of Seoul Station

- Improved wage conditions for drivers has led to enhancement of the quality of driver-related services, decreasing the instances of reckless driving and bad customer service.
- Rationalization of bus and subway fares has led to a downward trend in the amount of municipal subsidies for the entire public transport sector encompassing buses and subways.
- The restructuring has led to the establishment of a diversified public transport discount scheme using a card system as well as a reduction in collecting costs.
- Introduction of the median exclusive bus lane system has led to an improvement in bus speeds, punctuality and passenger car speeds during morning hours as well as a reduction in the number of accidents.

2. Problems and Matters That Need Improvement

The following are matters that need continuous improvement (see Table 2-27).

- The profitability of routes is directly related with the amount of subsidies the Seoul city government has to provide. Thus, there is a tendency to close or reduce the number of unprofitable lines. Efforts should be made to improve bus service reliability and refrain from frequent route changes.
- The fare system is complicated, its excessive reliance on computerized equipment raises concern. There is also a need to integrate the fare systems of the metropolitan area. In addition, there is difficulty in preparing proper standards for the next fare adjustments.
- Wage hikes and other factors caused a drop in the productivity of the bus industry, which in turn led to an increase in the amount of subsidies. User complaints about the level of service have not been completely resolved, and there is concern about possible aggravation of management conditions caused by moral hazard.
- It is necessary to address the problem of malfunctioning transport cards and the delay in the supply of high-quality cards. As for transfer centers, questions have been raised about whether their locations had been decided on the basis of reasonable grounds. Furthermore, the operation of the centers needs to be improved in terms of user convenience.
- There is a need to tackle the problem of insufficient capacity of median bus lanes, improve bus stop accessibility, and secure a safety mechanism to prevent accidents. Additionally, it is necessary to secure data needed to understand why passenger car speeds go down in the bus-lane corridors during afternoon hours and what has caused the increase in bus ridership.
- There has been an increase in bus ridership. However, what it represents is not a modal shift from private vehicle use to bus, but growth in the number of transfers. The bus restructuring has not yet achieved its goal of achieving an epochal improvement in the traffic congestion problem of Seoul.

The following measures are needed to address the problems outlined above.
- When readjusting the routes, due consideration should be given to confirming alternative routes so that blind spots in bus service do not take
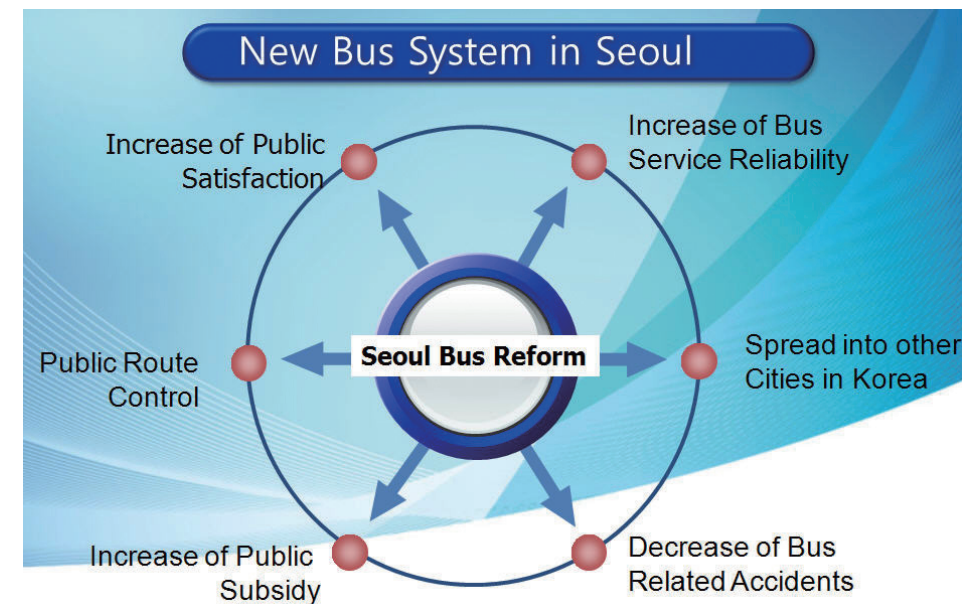
place. In case alternative routes do not exist, customized measures, such as the opening of new community shuttle bus lines and route changes need to be taken. In addition, it is necessary to step up efforts to improve the punctuality of bus service through resolution of road traffic congestion and utilization of BMS information.

- The task of launching an integrated fare system covering Seoul and the surrounding capital area ought be pursued as a core project of the Metropolitan Transport Authority. In preparation for future fare adjustments, it is important that research is done on rational methods of carrying out adjustments and providing relevant information to the public. It is also necessary for the Seoul city government to conduct regular inspections on the accuracy of the system.

- To prevent a fall in productivity of bus companies and the phenomenon of moral hazard, they ought to be subject to regular management evaluations. Efforts need to be made to increase bus ridership through improved services, thus partially absorbing the factors for fare increases. It is also necessary to consider re-privatizing the bus operation system by establishing an independent bus management organization after the restructured bus system is stabilized. In addition, there is a need to revise transport cost settlement guidelines so that the level of drivers' services can be evaluated and reflected in fare adjustments.

- To prevent errors of transport card terminals, inspection procedures must be systematized. And, to ensure the supply of high-quality transport cards, it is necessary to enact relevant regulations that can help reconcile the conflicting interests of card companies. In addition, the information service system at transfer centers needs to be improved for more efficient operation. Transfer center locations ought to be determined using analysis of demand for transfers.

- To improve the accessibility and safety of the median bus lanes, it is necessary to study ways to allow direct approaches from the subway to bus stops. To ease congestion on passenger car lanes, the transport system

management (TSM) project needs to be implemented on nearby roads. It is also necessary to minimize left turns to improve the capacity of median bus lanes.

- Public transport reform alone cannot solve the traffic problems of Seoul. Therefore, it is necessary to pursue a transport demand management policy designed to rationally control the use of private vehicles as well as to implement a land use policy based on the concept of transit-oriented development (TOD).

- Provincial cities may try to promote a bus system restructuring modeled on Seoul City's reform. However, they have low levels of fiscal self-reliance compared to Seoul, so it is questionable whether they are up to such a project. Given the need for subsidies, provincial cities would find it difficult to implement such reform without financial support from the central government. Therefore, it is desirable for them to make decisions after considering their financial conditions.

Positive effects of the bus reform

Table 2-27. Problems of bus reform and improvement measures

	Problems	Improvement measures
Route system	Reorganization based on profitability, causing poor service quality in some areas	Opening temporary customized routes
	Punctuality improved, but supplementary measures needed	Easing road traffic congestion and BMS operation
	Frequent adjustments like closing and shortening	Determining, in principle, to conduct route adjustments only when there are alternative routes
Fare system	Not much progress in efforts to build an integrated fare system covering the capital area	Pursuing the capital-area fare scheme as a core project of Metropolitan Transport Authority
	Lacking in simplicity, clarity, substitutability and predictability	Stepping up PR efforts by putting up posters containing detailed information on the new fare system at subway stations, bus stops and inside subway cars and buses
	Difficulty in setting the scope of fair adjustment due to the complicated system; the risk of errors taking place in the fare collection system	Devising guidelines for adjusting the basic fare and distance-based surcharges; making it mandatory to regularly inspect the fare collection system
Semi-public operation system	A drop in productivity due to increases in personnel and other expenses	Need to rewrite transport cost settlement guidelines to ensure that wage hikes are linked to service improvement
	Lingering user complaints about service level	Stabilizing the transport card system, and addressing the problems of reckless driving and unkindness
	Concern about a possible decrease in management efficiency of bus companies due to moral hazard	Need to consider whether to maintain the semi-public operation system or to pursue privatization by launching an independent bus management organization after the restructured system gets stabilized; conducting management evaluations
Transport card	Passenger confusion caused by malfunctioning transport cards	Inspection by Korea Smart Card on credit card firms' data generating processes; reinforcing the function for checking data before sending them to terminals
	Delay in supplying high-function transport cards	Need to enact regulations to adjust conflicting interests among card companies
Transfer center	Site selection not based on analysis of transfer demand	Requiring analysis of transfer demand as a prerequisite for site selection
	Unclear distinction in locations between trunk and feeder buses; inconvenient mobility for people with physical disabilities	Establishing a guide system on bus numbers at the centers; building additional facilities for people with physical disabilities
Median bus lanes	A decrease in passenger car speeds at median-bus-lane routes during afternoon hours, worsening traffic congestion	Need to block the influx of passenger cars through TSM project for neighboring roads; need to curb growth in demand for passenger cars by exerting more vigorous efforts for demand management
	Traffic accidents on median-bus-lane routes up 4%; deaths 80% above year-earlier level	Relocating the stop line backwards; setting the speed limit for bus stop sections at 20km/h; installing traffic safety mirrors; installing sidewalk barriers
	Difficulty in determining whether the rise in bus ridership is due to transfers or a shift from other modes to bus	Making it obligatory to include questions concerning travel behavior change when conducting monitoring surveys in the future

3. Improvements Needed for Objective Evaluations

The following improvements are needed to ensure more objective evaluations of similar reform projects in the future.

- The number of transport card users continues to increase due to fare discount benefits. So, it is necessary to secure other reliable data in addition to the card usage data when trying to grasp changes in user demand.
- To know the extent to which a modal shift is made, it is necessary to conduct surveys on travel pattern changes caused by implementation of a reform.
- There is a need to build up a proper evaluation system so that the improvement effects can be assessed not by individual mode of transport, but in an integral manner.
- The improvement effects should be assessed in terms of the goal of the entire project, and not in relation to individual policy tasks. Accordingly, the effects must be evaluated on the basis of the entire network instead of partial sectors.
- It takes time for the restructured system to get stabilized. Transport users also need time to get accustomed to the new system. So, the reform project should not be judged on the basis of short-term effects.

BUS SYSTEM REFORM
IN KOREA

CHAPTER
03

**PLANS TO PROMOTE
PUBLIC TRANSPORT
IN METROPOLITAN CITIES**

Effectiveness Evaluation of the Existing Policies

The automobile era has arrived in Korea later than in many other industrialized nations. Yet, Korea's metropolitan cities are suffering from serious traffic problems due to various reasons such as rapid economic growth and a subsequent increase in the income level, high-density development, high land prices, the shortage of usable land, and a surge in private car ownership. The nationwide traffic congestion costs reached 22.8 trillion won in 2003, and the traffic accident costs amounted to 10.7 trillion won in the road transport sector alone in 2002 (Korea Transport Institute, 2005). In particular, the Seoul metropolitan area is expected to encounter ever worsening traffic problems because of a diversity of factors such as large-scale development of satellite cities, rapid expansion in the number of mini-cities, the insufficient capacity of the metropolitan rail network, the continued phenomenon of economic activities concentrated in Seoul, the overcoming of economic hardships caused by the Asian financial crisis, and the downward trend in investment efficiency. Fundamental measures are needed to cope with this problem.

To tackle this problem, the central government has been pursuing the following policy goals (Ministry of Construction and Transportation, 2000).

① Construction of wide-area trunk roads and urban rail as well as suburban transfer facilities. Improvement of wide-area transportation services by operating long-distance metropolitan buses and taxis under the concept of a single living sphere.

② Promoting a management-focused transport plan to cope with the anticipated limitations in expansion of road and urban rail facilities.

③ Establishment of a transit-oriented transport system to relieve traffic problems caused by an increase in private vehicle use as well as to build a sustainable and environment-friendly transport system by keeping up with relevant global trends.

④ Rigorous implementation of demand management measures and promotion of environment-friendly modes such as walking and cycling as a way to cope with problems related to the growing number of cars under limited facility supply conditions.

Yet, as shown in <Table 3-1>, the travel share of public transport decreased in nearly all the metropolitan cities, while the share of private passenger cars sharply increased, during a period from 1999 to 2003. This result indicates that the central government did not take active steps to implement the policies devised by the Ministry of Construction and Transportation.

For example, the Metropolitan Transportation Authority was formed only recently to deal with issues related to wide area public transport in the Seoul metropolitan area. Until then, no important action had been taken concerning the public transport problem affecting the capital area as a whole. In addition, except for Seoul, none of the nation's metropolitan cities have tried to reform their bus systems to reverse the trend of falling travel shares of buses. Nor have they introduced the congestion pricing system. Additionally none of the metropolitan cities are implementing the Transport Congestion Special Management Zone system, a strong demand control scheme introduced in accordance with the Urban Traffic Improvement Promotion Act in 2003. It should also be noted that specific legal action has yet to be taken concerning the call to safeguard the right to walk, in relation to efforts to promote the use of environment-friendly modes of transport.

Table 3-1. Changes in traffic mode share (Unit : %)

Category	Year	Seoul	Busan	Daegu	Incheon	Gwangju	Daejeon	Ulsan
City bus	1999	28.8	32.6	48.5	29.5	41.0	31.7	21.1
	2000	28.3	30.1	48.6	28.9	40.0	31.1	20.9
	2001	27.6	29.0	37.0	28.3	39.4	31.1	16.4
	2002	26.8	31.4	36.5	28.3	38.7	31.0	17.9
	2003	27.6	29.3	25.9	22.8	37.2	30.6	16.9
Urban railway	1999	33.8	11.9	7.0	13.4	-	-	-
	2000	35.3	11.5	6.6	15.3	-	-	-
	2001	36.5	12.6	4.3	17.4	-	-	-
	2002	37.8	13.4	4.3	17.6	-	-	-
	2003	35.0	12.6	3.2	9.9	-	-	-
Sub-total	1999	62.6	44.5	55.5	42.9	41.0	31.7	21.1
	2000	63.6	41.6	55.2	44.2	40.0	31.1	20.9
	2001	64.1	41.6	41.3	45.7	39.4	31.1	16.4
	2002	64.6	44.8	40.8	45.9	38.7	31.0	17.9
	2003	62.6	41.9	29.1	32.7	37.2	30.6	16.9
Taxi	1999	9.2	18.1	17.5	8.8	14.6	17.9	16.4
	2000	8.8	17.5	15.8	8.6	14.9	18.4	16.5
	2001	8.4	17.0	17.6	8.4	15.2	18.4	16.2
	2002	8.0	16.6	17.1	8.4	15.3	18.3	18.8
	2003	7.3	15.8	12.7	7.3	15.1	18.1	15.6
Private passenger car	1999	19.6	20.0	12.8	27.5	13.0	29.7	26.3
	2000	19.1	20.1	12.3	27.5	13.3	29.8	26.7
	2001	18.7	21.4	34.0	27.4	15.7	29.8	28.5
	2002	18.4	23.1	35.0	27.5	16.0	30.0	23.9
	2003	25.0	27.0	25.9	31.9	17.7	30.3	33.57
Others	1999	8.6	17.4	14.2	20.8	31.4	20.7	36.2
	2000	8.5	20.8	16.6	19.7	31.8	20.7	35.9
	2001	8.8	20.0	7.1	18.5	29.7	20.7	38.9
	2002	9.0	15.5	7.1	18.2	30.0	20.7	39.4
	2003	5.1	15.4	30.6	28.1	30.0	21.0	33.9

• Note: Other modes include walking, bicycles, motor cycles and commuter buses.
• Source: Ministry of Construction and Transportation's Land Transport Bureau (http://www.moct.go.kr).

Metropolitan transport policies in Korea are not being implemented as originally intended because of conflicts among stakeholders over priorities concerning policy directions. This phenomenon is ascribable to the lack of philosophy needed for presenting policy directions as well as to the lack of priorities or differing priorities regarding policy goals. For example, no priorities have been set between the two major transport goals that call for convenient road traffic and environment-friendly transportation, respectively. As a result, policy options are presented in an uncoordinated manner. Even if they are implemented, these options often bring about mutually offsetting effects. The important conflicts over policy priorities are as follows:

① Priority conflicts between human-centric and automobile-oriented policies: installation of crosswalks and lane reduction vs. traffic flow, crackdowns on illegal parking on sidewalks vs. protection of commercial rights, parking on local roads vs. securing community spaces, etc.

② Conflicts between public transport and private vehicle policies involving the following issues: installation of dedicated bus lanes and the resultant reduction in travel speed of private passenger cars; collection of congestion charges and charge exemption benefits for public transport; and, cheap public transport expenses and high private vehicle taxes.

③ Conflicts between public transport modes: reduction in bus ridership due to expansion of subway lines, bus routes overlapping with subway lines, and overlap between city bus routes, the routes of community shuttle buses and buses operated by large retail outlets.

④ Conflicts between the supply-side approach, which emphasize the need for expansion of road and overpass facilities as well as additional construction of urban rail. Also, the the demand management-focused method that calls for effective management of the existing facilities and measures to control demand for private passenger cars. (These conflicts arise because of insufficient understanding about the problem of the supply of transport facilities generating demand in cities with high-level attraction power like Seoul.)

In addition to direct conflicts, external conflicts among various related sec-

Yeouido Transit Center

tors, administrative agencies and opinion-leading organizations make it difficult to resolve transport problems.

① Under the current mechanism, it is difficult to secure synergistic effects through the combination of related fields such as national land and urban planning, the environment, logistics and cutting-edge information technology. In particular, the Seoul Metropolitan Area Readjustment Planning Act allows housing construction, but restricts the establishment of factories, including those of conglomerates and cutting-edge industries, in the capital area. This restriction deepens the concentration of jobs in Seoul, thus aggravating the traffic problem caused by long-distance commuters driving to work.

② Construction, management and operation of transport facilities in the Seoul metropolitan area are carried out by separate agencies as independent sectors. The examples are as follows: operation of traffic signs/signals and urban railways under the control of national police; traffic management and public transportation under the Transport Management Office; road construction and operation under the Construction Bureau; subway construction under the Subway Construction Headquarters; subway operation under two

subway corporations; local road projects under district (gu) offices; and, metropolitan transport facility projects under the Ministry of Construction and Transportation, Gyeonggi Province and Incheon City. This system makes it difficult to approach and address transport problems speedily and effectively from an integrated perspective.

• The national police, which has the authority to revise the Road Traffic Law, intervenes in low-level administrative affairs of local governments such as traffic flows and safety.

• Operation of public transport organizations based on administrative zones irrespective of living spheres is weakening the competitiveness of public transport.

③ Transport administrative authorities are lacking in proper philosophy needed for mediating the different interests of media, local councils, civic organizations, and the stakeholder groups of residents and businesses regarding devised policies. This status makes it difficult to put into practice even rational restrictions essentially needed to preserve the environment, save lives and ease congestion. In particular, transport demand management policies involving price regulations usually encounter unconditional opposition even from experts. Local governments normally avoid dealing with such policies.

Basic Plans for Promoting Public Transport in Metropolitan Cities

1. Prospects for Change

1) Prospects for Change in Transport Goals

Mobility represented by expressways and automobiles served as the transport paradigm of the 20th century. Yet, it is questionable whether it can retain its status in the 21st century. Mobility corresponds to the concept of development and efficiency. As such, it can be understood as a paradigm valued during earlier times when the supply of efficient transport facilities was essentially needed to achieve urban development by overcoming spatial impedance. Three elements of safety, convenience and economic feasibility have served as the major criteria for realizing the paradigm of mobility,

However, the mobility paradigm came to face a crisis with rapid changes in external environments, mainly in large cities, such as depletion of land resources, excessive financial burdens caused by facility construction, technological limitations of predictions, accumulation of deficits, improvement in the level of resident awareness, and expansion of the new awareness of environmental values (Meyer, 2000). The paradigm crisis began to spread rapidly in the late 20th century amid growing concern about the destruction of natural environments (Kaiser et al, 1995).

Accessibility is expected to replace mobility as a paradigm for transport policies. Accessibility represents the concept of reviving the use of multiple modes such as public transport and walking instead of realizing mobility through the use of automobiles. In other words, accessibility is based on the idea that any person should not be discriminated against in reaching a desired destination no matter which mode they use and where they live. From the perspective of accessibility, travel has multiple aims. In this regard, transport plans need to be devised by taking multi-modality into consideration.

2) Prospects for Change in Transport Planning Measures

The main issues of concern in traditional transport plans were traffic congestion, mobility and accessibility, economic development and efficiency. As major policy implementation measures, the traditional plans employed road engineering or transport engineering methods designed to ensure the supply of facilities and raise their efficiency. With these methods, the plans focused on constructing large-scale facilities, building up facility networks, expanding the existing facilities, ensuring traffic safety, managing traffic flow and enhancing the efficiency of traffic systems.

With the appearance of a new urban paradigm calling for the realization of sustainable cities, significant changes are expected in the main issues of interest dealt with when devising transport plans. Emphasis will shift toward such issues as global warming, social equity, the quality of life and energy consumption. This change will lead to changes in policy measures as well. The important policy measures are expected to be integrated management of public transport modes, land use management and growth management, transport demand management, intelligent transportation system, incidence management, traffic calming and urban designing, walking and cycling, and education. The traditional measures are characterized by traffic engineering policies focused on the supply of facilities. In contrast, the new measures feature social engineering policies oriented toward managing the existing facilities and transport performers. The number of types of

such policy measures aimed at mediating various conflicting interests is expected to grow explosively.

3) Prospects for Change in Transport Planning Process

Realization of the mobility paradigm required objective rationality that can be represented by technical, instrumental and economical elements. Such rationality made a clear distinction between common people and experts, defining them as two separate groups that cannot understand each other. It was predominantly believed that subjective interests of common people could not take precedence over objective rationality. The prevalence of the mobility paradigm led to the use of a top-down approach in establishing transport plans. Under this mechanism, the decision-making process in the top used to be affected by many political factors, thus often resulting in the loss of objectivity.

In a society equipped with basic transport infrastructure, it is difficult to execute major transport projects just on the basis of objective rationality. Large-scale projects normally face numerous difficulties as they are likely to affect the existing facilities and traffic performers significantly due to financial and spatial restrictions. In the past, it was not difficult to disguise political intentions as technical rationality and reflect them in policy measures. Now, however, policy measures must undergo the consensus-building process to reconcile differences among various stakeholders. Technical rationality alone cannot resolve conflict of interests. The communicative rationality approach based on the theory of Habermas and Friedmann is expected to play an important role as a new paradigm in relieving conflicts and enhancing the prospect of realizing projects. This approach places considerable importance on the role of planners equipped with professional expertise and communication skills to persuade others. Transport planners actively try to promote discourse between the government and stakeholders by using their communication skills based on their professional expertise and the selection of proper expressions. They arrange relevant meetings, encourage the stakeholders to participate in the meetings, and try aggressively to induce agreement among stakeholders on the basis of reason through mutual learning and resolution of

differences.

2. Overseas Examples

1) U.S.A.

The directions for U.S. transport policies for the 21st century are incorporated in the Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) enacted in 2003. The act, which replaced the Intermodal Surface Transportation Efficiency Act (ISTEA) and the Transportation Equity Act 21 (TEA21), calls for placing the highest priority in transport policies on user safety, accountability, flexibility, efficiency and equity rather than on just efficiency and equity. The law contains provisions aimed at drastically improving the antiquated transport facilities, particularly road facilities, ensuring effective management of the existing facilities rather than constructing new ones, and improving the environmental problems caused by transport. The act is also designed to guarantee public transport users alienated by passenger car-centric urban transport more benefits, to make private car users pay for congestion and have air pollution costs imposed on society by them, and to introduce the highway toll system under the polluters-pay principle and the benefit principle. The act calls for enhancing the accountability and flexibility in the selection, establishment and execution of transport policies while placing emphasis on traffic safety.

- Upon starting his second term in office as the mayor of New York, Rudy Giuliani in 1998 took the step of giving a 100% intermodal transfer discount to public transport users as an action program.
- The Location Efficient Mortgage (LEM) system was introduced to give tax benefits to residential complexes that have an environment favorable to environment-friendly transport modes such as walking and cycling.
- The Value Pricing Project is underway, targeting all the highways throughout the nation.
- Employers are given a tax deduction of up to $65 per person when they

purchase public transport vouchers or passes for employees.

- Those renouncing the right to use parking spaces are given cash compensation.
- Under the influence of such concepts as New Urbanism and Smart Growth, new transport policies are switching away from the traditional emphasis on car-centric operation to transit-oriented development (TOD) which involves projects to create an environment that minimizes vehicle use, improves pedestrian environments, and promotes high-density development.

New Urbanism in the United States started in 1993 when the Congress of New Urbanism (CNU) was launched to seek new directions in the fields of urban planning, designing, architecture, landscaping and transportation. Regarding urban planning, this idea calls for the following measures: formation of metropolises with clear distinctions between central business districts and neighboring areas, development of idle lands within city areas, building pedestrian- and bicycle-friendly road networks, mixed-use land development with a range of housing choices, transit-oriented urban development, creation of comfortable parks and greenways, and reflection of urban history and features in architectural designing. The United States is applying the New Urbanism strategy to about 500 areas, including existing main cities, suburban areas and new growth areas.

Smart growth is an idea proposed by the American Planning Association (APA) and the Department of Housing and Urban Development (HUD) to prevent the reckless urban sprawl and ensure a balanced development of urban areas. It emphasizes the following aspects: recycling of the existing urban infrastructure, high-density development, mixed-use land development with a range of housing choices, preservation of environmentally sensitive lands and farmland, building transportation networks friendly toward pedestrians, bicycles and public transport.

2) United Kingdom

The United Kingdom's vision for the 21st century is expressed in the New Deal for Transport, which deals with the following issues: improvement of environmental

problems, transit-oriented development, observance of the polluter-pays principle in urban transport, intermodal integration in public transport, building an extensive social integration system involving various fields such as transport and environment, land use, education and health.

The New Deal for Transport has the following objectives: provision of diverse travel opportunities, provision of passenger-centric bus and rail services, grand compromise with private car users, road repair and maintenance taking precedence over construction of new roads, promoting rail freight transport, and building a safe and convenient transport system.

Under the New Deal's integral transport policy, provincial governments can receive transport subsidies only when they reflect the central government's policy goals and strategies in their respective transport plans (which correspond to the master plan for urban transport improvement in Korea).

The New Deal strategy sets out the following tasks: improvement of air quality, enhancement of traffic safety, improvement of public transport, and reduction in road traffic. It suggests improving the traffic congestion and air pollution problems through such policy means as road pricing and collection of parking fees. For implementation of these tasks, the central government revised the Planning Policy Guidance (PPG), encouraging the provincial governments to depart from the automobile-dependent urban planning and transport plans.

The car-centric transport policies based on the "predict and provide" concept are gradually being replaced with sustainable transport policies for the preservation of the natural and ecological environments. In relation to this development, a new concept called "new realism" has appeared. This idea calls for a shift from road-centric transport policies to environment-friendly sustainable policies.

The transport policy based on new realism involves the following measures: promotion of public transport, expansion of traffic calming facilities, promotion of green transport such as walking and cycling, expanding the intelligent traffic system, collection of congestion charges, integration of transport and land use plans, and curbing and discontinuation of road construction. New realism deserves credit for helping to change the direction of transport policies of the United

Kingdom.

- The action program calls for placing more emphasis on effective management of the existing facilities through active utilization of leading-edge technologies rather than on using the traditional demand-responsive facility supplying method based on transport demand predictions.
- Mayor of London Ken Livingstone has helped improve the city's traffic congestion problems considerably by reducing the traffic volume by more than 30% through the implementation of the congestion pricing system. Having successfully implemented his initial congestion charge project, he was reelected on the pledge that he would double the size of the charging zone. (Seoul Development Institute, A Study on Collection of Congestion Charges, 2005).
- London is implementing a compact land use strategy, which features minimum height requirements for buildings imposed for maximum utilization of public transport-supportive environments.

3) Singapore

In its recently released White Paper, Singapore expressed its 21st transport policy goal of building a "world class land transport system." It includes specific policy objectives such as provision of diverse public transport modes, building an integrated transit use system through establishment of a hierarchy among public transport modes, integration of transport and land use, transport demand management based on strict observance of the polluter-pays principle, and expansion of the road network and maximization of its efficiency. The action program includes the following projects:

- The area licensing scheme (ALS), a scheme to charge drivers entering downtown Singapore, was replaced with a more advanced system called Electronic Road Pricing in 1998. At the same time, the pricing system was expanded to cover congested urban expressways as well. In addition, a flexible road pricing system was introduced to enhance the efficiency of land use so that the vehicle speed would exceed a minimum of 25Km/h in

downtown areas. (Seoul Development Institute, A Study on Collection of Congestion Charges, 2005)

- An organization has been established for integral management of various public transport operation agencies, carrying out a diversity of functions such as transport revenue management, route restructuring, information service provision and joint use of facilities.
- A high-density housing strategy based on combined land use/transport policies is being implemented for transit-oriented development.

The above-mentioned 21st-century transport visions are based on the awareness of the need to restore transport equity, and commonly contain the following requirements: improvement of environmental problems, invigoration of public transport, transport demand management based on benefit principle/polluter-pays principle, building an integrated intermodal public transport system, improvement of pedestrian environments, and transit-oriented compact development. Particularly noteworthy is the fact that most of the countries are trying to aggressively implement policies to curb the use of private passenger cars,

Electronic Road Pricing (ERP) System in Singapore

which have been difficult to execute due to public opposition. This move represents strong will to actively try to resolve the overlooked problem of social costs related to congestion, air pollution and traffic accidents caused by the use of cars.

3. Basic Plans for Realizing a Public Transport-centric Society

Seoul City's public transport reform has important implications concerning the directions other Korean metropolises should follow in devising their transport policies. On the basis of the evaluations on the bus reform as shown in the previous chapter, this study presents the following basic plans for realizing a public transport-centric society.

① Pursuing a "sustainable low-cost, high-efficiency society" by promoting inexpensive management-oriented transport investment alternatives, reducing demand for automobiles, decreasing social costs and building an environment-friendly transport system.

② Pursuing a "society where the socially underprivileged have no difficulty in living" by realizing a human- and transit-oriented transport system, promoting public transport based on areas of living sphere, and observing the benefit/polluter-pays principles.

③ Pursuing a "society where various social functions are organically integrated in a balanced manner" through harmony in urban planning/environment/ culture as well as comprehensive improvement in transport-related fields/ administration/education.

SECTION 03.

Setting Directions for Public Transport Promotion Policies

The current problems can no longer be overlooked, nor can we face the forthcoming future without any measures to tackle them. This study presents measures to invigorate public transport on the basis of Seoul City's experience in restructuring its mass transit system as well as 21st transport policies of foreign countries. These measures focus on setting priorities among transport sectors as well as directions for implementing relevant policies.

First, priorities should be determined among modes of transport.

In determining the priorities, more emphasis is placed on equity rather than on efficiency. Human beings take precedence over cars, and public transport is given more emphasis than private passenger cars. Priorities also need to be established among modes of public transport. For example, subways take precedence over buses in corridors with high demand for transport. Priority among buses should be decided in accordance with the hierarchy of roads. As for community shuttle buses, connections to subway should be the determining factor.

Second, policy implementation directions can be set as follows under the priorities among modes.

① Improving the services of public transport so that it can compete with private passenger cars.
  • High-density streets which have been developed already need to be redesigned by changing curbside bus lanes into dedicated median bus lanes, building a subway system underground, expanding sidewalk width, and reducing roadway width.
  • Curbing the use of private vehicles for long-distance travel through early construction of metropolitan express railways.
  • Promoting the use of transport cards as the sole means of paying fares, while exerting efforts to improve subway transfer facilities, introduce a transfer discount scheme, increase the speed of existing subways, develop new modes of transport, and diversify taxi services.
  • Giving tax deduction benefits to business operators in case they provide subsidies to employees for using public transport.
② Rigorously applying the benefit/polluter pays principles to private car users, and using the proceeds from relevant programs in upgrading public transport and supporting integrated operating organizations.
  • Expanding the congestion pricing system, and using the proceeds to improve public transportation. In addition, implementing various relevant systems such as corporate traffic demand management, provincial driving tax, local road pricing and the designation of special transportation management zones.
  • Ensuring smooth traffic flow on urban expressways by collecting congestion charges in crowded sections and minimizing the influx of traffic in these sections.
③ Pursuing a paradigm shift in road transportation from a car-centric system to a human-centric system.
  • It is necessary to continue to implement the "walkable street" project. In Seoul, the project has so far led to the opening of a pedestrian plaza in front of City Hall, the installation of crosswalks in Gwanghwamun, improvement of Donhwamun streets, and expansion of sidewalks along

Well aligned roads and pedestrian streets

Mugyoro. In addition, roads in Myeong-dong and Konkuk University have turned into pedestrian-friendly streets. Yet, the plan to build walkable streets in Jongno has been called off due to concern about the prospect of hampering traffic flow.
  • Seoul City has removed the Cheonggye overpass, restored the Cheonggye stream, and created a pedestrian-friendly road network along the stream. This urban renewal project has helped prevent further aggravation of the problem of unbalanced development between southern and northern parts of Seoul. It has also served as an occasion for a paradigm shift in urban restructuring. Due to the ever increasing number of visitors, the city government has taken the step of banning vehicles on pathways from Cheonggye Plaza to Samilro during weekends. It is planning to expand the pedestrian-only roads in and around the Cheonggye area.
  • It is necessary to induce automobiles into urban expressways dedicated to vehicle traffic, thus separating cars from pedestrians to the maximum possible extent, and to ensure speedy traffic flow through introducing a road pricing system. Additionally, there is a need to redesign the general arterial roads into spaces that can be conveniently used by public transport and pedestrians.
  • Improvement ought to be made to bus operations on curbside lanes, thus reducing the risks of accidents involving pedestrians. It is also necessary to ensure that buses adopt a roof-top exhaustion system so that pedestrians are not directly exposed to gas emissions.

④ Ensuring effective traffic flow functions through harmonization of the supply and management of transport facilities.

- When devising urban master plans or traffic improvement plans, it is necessary to determine in advance the amount of traffic volumes that can be accommodated through improvement of the existing facilities. The goals for reducing traffic volumes through demand management should also be set in advance as well. New facilities need to be constructed only for the portions that cannot be taken care of by these two measures.
- The U.S. CMP tries to ensure that 20% of increases in traffic volume are taken care of through demand and facility management. France has stipulations that require the accommodation of 4-8% of traffic volume through management of facilities and demand.

⑤ Pursuing integrated transport plans/policies by taking into account their association with other fields.

- Tackling the traffic problem caused by the job-housing mismatch through promoting transit-oriented compact development and mixed-use of land under New Urbanism and Smart Growth policies.

⑥ Improving the environment for transport administration and strengthening transport education.

- Integrating the Construction and Transportation Ministry and the Environment Ministry to launch a new national land management system oriented toward environmental protection.
- Launching a staff organization under the mayor's direct control in each local government to integrate the scattered planning functions.
- Establishing an organization to draw up transport plans for the metropolitan area, and award the relevant budget right to the body

Action Plan

> ### Goal 1.
> Building up convenient and safe transit facilities that give public transport the edge over private passenger cars.

Task 1. Establishing a convenient and safe public transportation system. There is a need to induce a modal shift from private cars to urban rail/buses by building a convenient and safe transit system that gives public transport an edge over private vehicles.

Achieving this task requires the following measures:

- To establish the principle that public transport should be used when entering the city from outlying areas. Under this principle, it is necessary to curb the construction of bridges, major arterial roads, expressways and other facilities that can expedite the inflow of passenger cars into metropolitan cities. If necessary, the capacity of the existing facilities should be reduced.

Improvement of pedestrian way (transit mall)

- To build transport systems linking the city and its outlying areas with environment-friendly modes of public transport such as subways, railways and light rail.
- To develop high-density streets into transit-oriented areas by providing subway services in parallel with dedicated median bus lanes, reducing roadway width and expanding the width of pedestrian walkways.
- To build transit malls as a way to encourage the use of public transport, curb private vehicle use, and create road spaces where pedestrian travel and activities take precedence over movement of other modes.
- To promote building an urban rail network that can function as the mainstay of transportation in parallel with new modes of transport. It is necessary to pursue double-track electrification of the conventional railways for corridors that are not linked to urban rail. There is also a need to reinforce the traditional railway lines for corridors that have urban rail services but show poor rates of using them.
- To develop metropolitan railways so that they can be the mainstay of wide-

area transportation, while making sure that they are closely connected to major development programs and transport facilities.
- To promote an urban rail branch route project under the objectives of improving urban rail accessibility for all relevant areas, helping to reorganize urban space structures, and contributing to easing the congestion problem at the most crowded subway sections.
- To determine the hierarchy of buses on the basis of their connections to urban railways (including subways). Additionally, the criteria for routes, fares and services should be decided in accordance with the hierarchy.

Table 3-2. Determining the functions of trunk and feeder buses

Category	Trunk bus	Feeder bus
Function	Higher speeds	Connections to subway and trunk bus lines
Route distribution	Linking central business districts/sub-centers with suburban residential areas	Linking traffic-generating spots and residential areas within districts
Travel distance	Mid/long distance	Short/mid distance
Service areas	Between districts (covering 2-4 traffic zones)	Within districts (covering 1-2 traffic zones)
Road condition	Operating mainly on arterial roads (high travel speed)	Operation focused on collector/distributor roads (low travel speed)
Route curvature	Straightening the route except for the origin and the destination	Curvature allowed depending on user demand (circular)

- To reorganize the functions of wide-area routes connecting Seoul's major areas with satellite cities.
- To conduct an all-out bus route restructuring on the basis of rational standards so that buses, along with subways, can make up the mainstay of public transport. In a related move, efforts should be made to remove blind spots in transport service through creation of demand for bus travel.
- To designate full-time bus-only lanes for expressway sections that pass through the city, and to promote a pricing scheme that gives toll-paying motorists access to high occupancy toll lanes (HOT lanes) as a way to ensure effective utilization of road spaces.
- To integrate and expand taxi service areas, and promote differentiation of taxi service and fares, as a way to increase user convenience and improve

services.

Task 2. Building up an integrated operation scheme and a node system for public transport. These systems need to be built by taking into account the hierarchy of public transport modes, thereby ensuring public transport's competitiveness over private passenger cars.

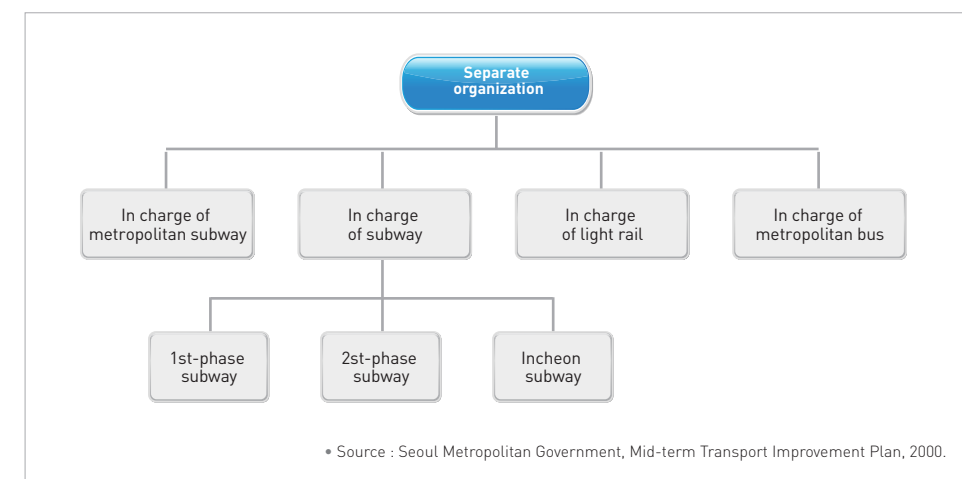Achieving this task requires the following measures:

- To select the node facility locations by considering the prospects of addressing the problem of unbalanced regional development, distribute urban functions in accordance with multi-nuclei development of urban space structures, ensure balanced supply of demands, and promote a transit-oriented restructuring of the traffic system.
- To devise plans to build transfer centers in accordance with the zonal classification that divides a metropolitan city into three categories: outlying areas, outskirts of town, and central business districts/sub-centers. The centers need to be built at busy traffic sites where major corridors intersect, and be given different roles and functions.
- To overcome the inefficiency caused by the lack of an effective linkage system among the node facilities and among transport modes through integration of their dissipated functions, and to induce reduction of private vehicle traffic by encouraging a switch from private passenger cars to public transport.
- To build transfer centers at major exit/entry points and other important areas along the city limits for convenient connections to urban railway stations and bus stops through such schemes as Bus & Ride, Kiss & Ride, Bike & Ride and Taxi & Ride.
- Outlying areas: To encourage city commuters driving their cars to turn to public transport.
- Outskirts of town: To encourage those driving their cars to city sub-centers to switch to public transport.

- Central business districts/sub-centers: Facility restructuring needs to be carried out with emphasis given to ensuring transfers between public transport modes, and to securing connections with circular bus routes within districts.
- To reduce the length of time it takes to get to terminals through readjustment of passenger transport terminals, and to resolve the spatial imbalance of midtown terminal sites through restructuring of transport facilities under a scheme to reorganize metropolitan spatial structures. These efforts need to be made in connection with changes in the metropolitan transport system as well as the need to establish terminal facilities in preparation for national unification.
- To steadily pursue construction of effective parking lots for transfer stations on the outskirts of town.

Task 3. Establishing an integrated organization for public transport management. This project should be designed to ensure that public transport functions properly to serve the public interest and provide living sphere-based transport services.

Achieving this task requires the following measures:

Figure 3-1. Draft plan for the proposed integrated public transport management agency

* Source : Seoul Metropolitan Government, Mid-term Transport Improvement Plan, 2000.

• To launch a unified body for public transport management and enact living sphere-based service criteria on such matters as routes, fares and vehicle standards. It is also necessary for the organization to use its financial resources to encourage individual transport operators in the capital area to better serve the public interest. (See Figure 3-1).

Task 4. Ensuring the competitive edge of public transport over private passenger cars through improvement of its service environment. It is necessary to integrate various public transport systems concerning information services stations, fare revenue management and discount fares – thereby upgrading transit service to the extent that it can match the door-to-door private car service.

Achieving this task requires the following measures:

• To promote the use of public transport through diversification of the ticketing system and establishment of a compatible transport card system.
• To expand the transfer discount scheme for subways and buses, and pursue integration of metropolitan fare payment systems.
• To establish a standardized user-centric route information system for buses and urban subways, putting an end to confusion caused by the operator-centric information service system.
• To pursue a scheme to develop station areas in association with adjacent buildings and land as a way to secure spaces for subway exits and entrances, as well as pedestrian convenience facilities.
• To introduce the bus information system (BIS) as part of efforts to improve public transport services.
• To ensure objective and rational determination of fares through flexible fare adjustments on the basis of basic plans, thereby helping to ease financial difficulties of public transport businesses and improve passenger services.
• To progressively expand the call function to cover all taxis owned either by individuals or companies, thus ensuring the status of taxis as a high-quality transport mode that can protect user privacy and provide door-to-door

service. This scheme should also help ease road traffic congestion as the taxis would wait to be called at certain locations instead of driving around streets looking for passengers.

Task 5. Diversifying public transport services through introduction of new modes of transport. This project is aimed at increasing the scope of choice for citizens in selecting travel modes.

Achieving this task requires the following measures:

• To help urban residents realize that riding buses or trams does not signify the status of belonging to the low-income class, and to develop trams, buses and subways into attractive modes that make it possible travel to cities with ease and comfort.
• To put light rail into use on branch and circular subway lines and introduce new transport modes in congested areas, thus boosting subway usage and eventually, establishing an urban rail-centric public transport system.
• To steadily improve the quality of air through the introduction of environment-friendly transport modes.
• To study the possibility of introducing caterpillar buses as a new mode of transport that are equipped with mass transit capability and require less amount of investment compared to subway/electrified railway construction.
• To introduce various modes of taxi services to guarantee users the right of choice and increase the benefits of citizens.
• To actively promote teleworking by using advanced information-communication technologies, thus reducing demand for commute and business trips, and eventually easing traffic congestion.
• To consider introducing ship transport as a new mode of transport for metropolitan areas.
• To devise plans for building a network of short-haul air transport that could establish itself as a means of speedy travel with increases in the value of travel time.

- To expand the moving belt on long pedestrian walkways to increase pedestrians' mobility convenience and replace other modes of transport for short distances.

Task 6. Pursuing high-quality public transport services while continuing to exert efforts to improve the operation environment.

Achieving this task requires the following measures:
- To allow public transport service providers to adjust headways autonomously in accordance with changes in demand, thereby helping to reduce deficits and improve services.
- To improve the services of public transport and intensify its competitiveness through steady restructuring of relevant businesses.
- To improve the welfare of public transport workers so that they can work with pride and a sense of job security to implement capability enhancement programs and raise wages for the employees.
- To seek the possibility of launching express and various other urban rail services to meet the travel needs caused by the widening commuter belt and the formation of an urban system active 24 hours a day.
- To devise measures to address the most frequently cited problem of "narrow platforms and long transfer distance" concerning subway use, subsequently inducing a shift from other transport modes to subway.
- To implement measures to prevent contamination within station complexes by improving ventilation and removing dust particles, thereby ensuring a comfortable subway environment. In addition, installing platform screen doors is recommended.
- To establish a subway disaster control system by preparing measures to cope with driving impediments caused by terrorist activities, flooding, fire and earthquakes, and expand crime-prevention facilities within subway complexes.
- To establish new bus routes or increase the number of buses for certain

routes through a tendering system, thus minimizing traffic inconvenience of citizens.
- To introduce the concept of public management of buses, and build public bus garages to help bus operators secure a basis for management rationalization.
- To relieve tax burdens on bus operators as a way to help them improve their financial conditions.
- To provide comfortable bus services by steadily upgrading the level of buses in terms of structure and performance.
- To implement a bus service evaluation system to improve bus services, ultimately increasing bus ridership.
- To build a taxi fare system using transport/credit cards and improve the taxi fare system, increasing convenience for passengers and realizing an advanced taxi transport culture.
- To improve the irrational management system for individually owned taxis as a way to restructure the taxi service industry and improve user service.

> **Goal 2.**
> Establishing a transport system based on the benefit/polluter-pays principles through demand management.

Task 1. Ensuring smooth traffic flow on the basis of equity. Automobiles are induced to toll-collecting urban expressways as a way to separate cars from pedestrians to the fullest possible extent and guarantee speedy traffic flow. Furthermore, social costs related to noise, air pollution and traffic accidents that take place on car-only roads are strictly internalized.

Achieving this task requires the following measures:

- To collect tolls from drivers using urban expressways to cover the construction and maintenance costs by rigorously applying the benefit principle.
- To allow construction of urban expressways with private-sector investments, and ensure smooth traffic flow and high-quality services through collection of tolls at properly determined levels.

Task 2. Collecting congestion charges under the polluter-pays principle. It is necessary to impose congestion fees on drivers using crowded roads by applying the polluter-pays principle.

Achieving this task requires the following measures:
- The congestion pricing scheme in Korea, currently under implementation only at Namsan tunnels in Seoul, is functioning effectively by steadily improving congestion problems in the city. Yet, it has raised complaints about collection of charges during non-congested hours as well as an equity problem related to its implementation only in restricted areas. These problems and the expansion of congested areas are prompting the need to consider expanding the congestion charge system to cover more areas. It is also necessary to study the prospect of collecting congestion fees from urban expressway users.
- To consider introducing a rebate system that pays back some of the congestion toll revenue to payers in credits, which can be used to receive discounts when using public transport. This system would help overcome public reluctance to accept the congestion pricing scheme, and promote the use of public transport.

Task 3. Diversifying the transport demand management policies to minimize the inconvenience of citizens.

Achieving this task requires the following measures:

- To designate the congested areas as special traffic control zones to ensure space-centric management, and pursue integrated implementation of various traffic-related projects to maximize their effects, thereby reducing travel time through the maintenance of optimal traffic volumes and securing comfortable pedestrian spaces.
- To progressively lower automobile-related tax rates, and integrate them into the distance-based driving tax under a scheme to help correct the practice of driving excessively long distances (which is one of the important factors causing traffic congestion), reduce environmental contamination and road damage.
- To encourage corporate participation in efforts to reduce traffic through demand management, and reward actively participating enterprises with reduced traffic-causing charges.
- To expand the parking space ceiling scheme to cover more areas, and rewrite the criteria for applying related regulations to parking facilities annexed to buildings by region and use. It is necessary to implement the scheme along with block-by-block parking demand control measures to ensure optimum transport demand management.
- To introduce a traffic confusion management program and devise comprehensive traffic demand management plans to cut back on demand that exceeds Seoul's optimum level of traffic volume. Then, the effects of various options need to be quantified so that proper measures can be executed expeditiously to proactively cope with traffic congestion in a way that is oriented toward achieving goals and targets wide areas.

Task 4. Fostering convenient parking environments through the application of the benefit/polluter-pays principles. Efforts need to be made to devise well-coordinated policies regarding parking facilities, while refraining from repeating the past practice of simply trying to supply more parking spaces.

Achieving this task requires the following measures:

- To make correct estimations of parking demand by region and usage through parking demand management by blocks, thus making it possible to implement a diversity of measures.
- To promote a revision of parking lot-related regulations to allow for the construction of fee-based multi-floor parking structures instead of building parking facilities for individual buildings when constructing new cities or conducting urban renewal projects.
- To introduce a system to issue orders demanding that parking facilities exceeding the permissible level be reduced, thus helping to ensure the optimum level of traffic volume at central business districts and sub-centers by controlling the parking capacities. It is also necessary to revise related laws that would make it possible to change parking spaces to health centers or rain water storage facilities.
- To promote the construction of fee-based public parking lots to resolve the shortage of parking spaces in residential areas and restrict private vehicles driving into central business districts.
- To launch a campaign to secure a garage in residence as part of efforts to restore the functions of local roads in residential areas, and to introduce the garage certificate system, thus helping to enhance public awareness of the accountability related to vehicle storage.
- To improve the parking fee system as a way to reduce traffic volume in congested areas and induce a modal shift from private automobiles to public transport.
- To impose fees on all the parking spaces on local roads by applying the benefit principle, helping to reduce traffic volume of private vehicles and ensure orderly parking practices, and to gradually reduce the number of curbside parking spaces as a way to reduce on transport demand in congested areas.
- To strengthen crackdowns on illegal parking by using an electronic detection system, and to step up efforts to establish orderly parking practices.

Goal 3.
Promoting a paradigm shift toward a human-centric transportation system featuring conveniently accessible public transport.

Task 1. Creation of public transport/pedestrian spaces which are safe and easy to access. It is necessary to restructure the roads at minor arterial and lower levels into spaces that can be accessed safely and conveniently by transport users and pedestrians.

Achieving this task requires the following measures:
- To reduce the pedestrian accident rate at crosswalks and improve the safety of pedestrian environments through restoration and expansion of intersection crosswalks.
- To enhance pedestrian convenience by improving the geometric structures of excessively wide intersections and transport plazas being operated in a car-centric manner.
- To improve the functional system for roads within each zone and create comfortable neighborhood alleys.
- To study whether to maintain curbside bus lanes and operations that pose a danger to pedestrians.
- To maximize traffic safety through the reinforcement of safety management, inspection and maintenance of road facilities (including bridges), installation of more guide signs for pedestrians, and active installation/maintenance of safety facilities.

Task 2. Promoting the use of bicycles in daily life. It is necessary to encourage cycling, which is a pollution-free mode of transport, thereby helping to improve subway accessibility, easing traffic congestion, relieving parking problems, preventing air contamination, and promoting public health.

Achieving this task requires the following measures:

- To ensure effective use of bicycles as a short-distance traffic mode through expansion of related infrastructure such as bike parking spaces at subway stations as well as improvement of bike lanes and various relevant facilities.
- To establish bike route plans so that local district governments can effectively promote the use of bikes as a pollution-free means of transport.
- To build up a network of arterial bicycle routes to improve long-distance cycling conditions, and improve relevant station facilities so that bicycles can be effectively used as a means of ensuring linkage in the public transport system.
- To comprehensively redesign the transfer system involving bikes and subways, thus absorbing short-distance traffic demand, increasing the use of public transport, and ultimately relieving traffic problems within areas.
- To introduce the bike rental system to help ensure the establishment of cycling as a public transport mode for short-distance travel.

Bicycle use needs to be promoted as a means of a zero-emission vehicle.

Task 3. Creating walkable streets in the city.

Achieving this task requires the following measures:

- To transform waterside areas buried amid roads into open spaces, and develop them into prominent walkable places by fostering water-friendly environments and walking routes.
- To form car-free corridors in town, and improve pedestrian safety and the quality of pedestrian spaces.
- To designate car-free days, helping to improve pedestrian environments, invigorate the use of public transport, and preserve air quality.
- To turn roads, where pedestrians and cars coexist, into one-way streets after conducting a traffic effect evaluation, and to promote projects to create pedestrian-centric green streets in areas where traffic flow would be little affected by lane reduction.
- To ban parking on pedestrian walkways and clear them of various facilities that get in the way of pedestrians.
- To study the possibility of reorganizing city hall plazas in various cities into pedestrian malls.

Task 4. Providing travel convenience to people with mobility impairments.

Achieving this task requires the following measures:

- To promote barrier-free road restructuring, fostering conditions to ensure easy access to roads and comfortable travel for people with walking disabilities.
- To improve public facilities in terms of accessibility and mobility convenience for people with disabilities, thereby relieving their inconveniences in employment and daily activities.
- To pursue equity in provision of transport modes by introducing buses equipped with structures and functions that can be easily used by people with mobility impairments.

- To devise and implement plans for developing and installing special pedestrian facilities for people with vision impairments.
- To designate the main travel routes of the mobility impaired as protected areas, and steadily carry out projects to improve them.

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Goal 4.
Establishing a function for ensuring effective vehicular traffic flow by keeping a balance between the supply of traffic facilities and their management.

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Task 1. Supplying traffic facilities on the basis of investment efficiency. Before drawing up master plans for urban development and transport improvement, the following matters need to be determined in advance: the amount of traffic volume that can be accommodated through usage efficiency improvement of the existing public transport facilities, and the traffic reduction goal to be achieved through demand management. Provision of new facilities would be needed only for the portions that cannot be covered by these measures.

Achieving this task requires the following measures:
- To devise transport-related plans after ensuring that 10-20% of the anticipated increase in traffic volume would be taken care of through demand management and usage efficiency improvement of the existing facilities. It is necessary to lower investment costs and reduce transport demand by supplying facilities only for the portions uncovered by these measures.
- To encourage the use of public transport for long-distance travelers crossing city limits by expanding the urban rail network and bus routes, and to build up plans to use detour routes for entering and exiting Seoul.

However, it would be necessary to provide public transport-oriented systems to outlying areas experiencing constant congestion due to the problem of unconnected roads and the availability of just one or two roads bound for metropolises. Under unavoidable circumstances, construction or expansion of substitute roads needs to be considered. In addition, the community road spaces need to be steadily improved.

Task 2. Maximizing the functions of the existing facilities. It is necessary to utilize the existing facilities to the fullest possible extent with low-cost investments, instead of just seeking to build new facilities. There is also a need to consider removing roads which are found to be unnecessary or contain unsafe structures.

Achieving this task requires the following measures:
- To focus on maximizing the functions of the existing roads through expansion and improvement of exit and entrance networks of urban expressways, rather than building new roads.
- To restructure or remove the roads that are unnecessary or add to traffic congestion as well as the roads and elevated structures that have problems with safety. Or, measures to use such facilities effectively must be secured.

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Goal 5.
Promoting an environment conducive to public transport use by ensuring harmony with other sectors.

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Task 1. Devising transport plans that integrate land use and environmental schemes. Establishing integrated land use/transport plans is necessary to execute relevant policy measures effectively.

Achieving this task requires the following measures:

- To implement compact development of station areas, thereby helping to create public transport-centric cities oriented toward ensuring proximity between jobs and housing.
- To promote mixed-use land development to minimize the rate of trip generation.
- To promote the development of areas along the median bus lane routes, turning them into major public transport corridors.
- To accelerate the development of station areas by reinforcing financial incentives such as the application of additional discount rates for housing mortgages.

Task 2. Creating a balanced city where urban transport develops in harmony with other sectors such as the environment and culture.

Achieving this task requires the following measures:
- To introduce a comprehensive air pollution index system that incorporates various types of air contamination indices, and implement a scheme that restricts the operation of cars depending on the level of air pollution as shown by the index.
- To refrain from using diesel as bus fuel, and make price adjustments so that diesel becomes more expensive than gasoline, as part of efforts to improve air quality.
- To introduce a civic monitoring system concerning the pedestrian environment, enhancing local residents' interest in the issue and subsequently inducing their participation in projects to improve the walking environment in their neighborhoods.
- To build up a support system for foreign travelers as part of efforts to improve the public transport information scheme and various other travel conditions for foreigners visiting Korea.
- To implement a mandatory community service program for traffic accident perpetrators, in order to enhance their traffic safety consciousness and help

establish a sound transport culture.
- To propose setting aside certain percentages of funds earmarked for public transport-related construction and renewal projects, and spend them on programs to reinforce artistic and esthetic features of relevant facilities so that they can be utilized as comfortable and pleasant cultural spaces.

Task 3. Building a convenient public transport system through the utilization of leading-edge technologies. It is necessary to establish a sustainable and effective/low-cost public transport system by consistently introducing the most advanced technologies in the fields of information, electronics, communications and control for application to road transport infrastructure and automobiles.

Achieving this task requires the following measures:
- To prepare and implement detailed plans to execute a transit-oriented ITS project in a systematic and effective manner on the basis of stage-by-stage policy goals, instead of promoting a partial introduction of ITS. Measures need to be taken to help Seoul residents experience the traffic improvement effects and conveniences realized through ITS introduction.
- To provide intelligent public transport services through various techniques available in the transport and electronics/communication fields, and to enhance the mobility of buses and improve their operation system by building a BMS system.
- To build comprehensive public transport information centers like Seoul City's TOPIS and a system ensuring connections among transport information centers in the capital area, thereby making it possible to collect and manage related information in a coordinated manner and to expeditiously take measures to cope with incidents amid close cooperation with the responsible organizations.
- To expeditiously build an integrated fare payment system by utilizing transport cards.
- To introduce an automatic nonstop toll collection system and build an

effective/systematic traffic facility operation and management system, under a scheme to improve the road functions through integrated management of congestion, incidents (traffic accidents, road construction, etc.), repair/management, patrol, towing, fire prevention and medical services.

• To introduce a highly sophisticated travel guide system that can provide information on the shortest path from departure points to destinations, estimated travel time, and parking lot conditions, and to establish an ultra-modern freight transport and public transit information system to ensure optimum operations of public and freight transport and increase user benefits.

• To secure the walking right of general pedestrians and people with disabilities as well as their travel welfare by building an advanced guidance system.

• To form a dedicated organization for the transit-centric ITS project, and devise operations plans so that it can take charge of project planning and implementation as well as related R&D activities–thereby fostering an environment for active development activities and investment plus preventing overlapping investments.

Task 4. Restructuring the transport system in a way that places the utmost focus on improving the bus operating conditions. The bus problem needs to be dealt with as the top priority issue in implementing the existing traffic system improvement project. In addition, the access management project ought to be pursued in a manner that best suits the characteristics of each zone, thereby helping to ensure a mechanism that can steadily achieve improvements such as improvement in vehicular traffic flow and reduction in traffic accidents.

Achieving this task requires the following measures:

• To ban the entrances and exits of buildings from directly leading to arterial roads in order to ensure smooth curbside bus operations, and to make it mandatory to control private vehicle traffic volume through metering within the building.

• To consistently carry out the project to improve arterial roads by bringing various programs into one package aimed at improving intersections and road structure, signal operation and access management.

• To steadily increase the road capacity for bus operation through regular monitoring of bottlenecks, interrupted sections and congested intersections as well as through installation of traffic safety facilities and improvement of geometric structure.

• To ensure the connectivity and coherence concerning travel routes through gradual improvement of road signs, to improve the visibility of road signs by ensuring their conformity with traffic regulations, and to build a convenient traffic information system by improving the road signs to meet international standards.

• To steadily implement systematic and comprehensive transport improvement projects by blocks in residential areas, placing the utmost priority on improving walking environments and enforcing strict traffic

By reforming the transport system, traffic flow has been streamlined.

safety regulations for inner roads with a high risk of accidents.

- To draw up work zone traffic control guidelines designed to give proper consideration to pedestrian and vehicle traffic during roadworks, and to foster conditions and an environment for observing them.
- To systematize the post-evaluation process for the TSM project to ensure that the results of its effects analysis are reflected in its implementation process.

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Goal 6.

Achieving the goals and objectives through improvement of external environments such as administration, organization and education.

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Task 1. Establishing a wide-area planning organization to tackle transport problems of the Seoul metropolitan area. It is necessary to launch a wide-area planning organization or a wide-area transport operation organization that can deal with traffic problems of the capital area by reinforcing the integration and mediation functions of metropolitan transport administration.

Achieving this task requires the following measure:
- To ensure effective implementation of projects through integration of the separate transport systems and reinforcing the pool of experts.

Task 2. Improving the external conditions for enhancing public knowledge and awareness of transportation. It is necessary to strengthen transport-related education at elementary, middle and high schools as a way to achieve this objective.

Achieving this task requires the following measures:

- To strengthen public transport-related education at elementary, middle and high schools through consultation with the Ministry of Education and Human Resources Development.
- To steadily conduct public education programs, PR activities and awareness campaigns.
- To reinforce the education programs for government officials with the aim of enhancing the professional capabilities of transport-sector officials, helping them better understand transport affairs, and increase their motivation.
- To promote education programs for transport service providers.

CHAPTER
04

**CONCLUSIONS
AND POLICY SUGGESTIONS**

Conclusions

Below are the summary of key results of this study and its conclusions.

The bus operating environment is considered to have improved considerably through implementation of the following measures: route restructuring, fare integration, semi-public operation, the use of smart cards, operation of public transport transfer centers, and dedicated median bus lanes.

Improvement in the competitiveness of public transport has led to an increase in user demand for both buses and subways. Although the increase is mainly attributable to growth in transfer demand, it is considered to be a favorable development representing the improved utility of public transport for its users. The competitiveness of buses has improved thanks to the following factors: expansion in service areas through route restructuring, a reduction in fare burdens through introduction of the free transfer scheme, and improvement in punctuality and competitiveness in time through implementation of median bus lanes.

Despite increased demand for public transport, the overall road traffic conditions in Seoul have not improved compared to the pre-reform period, except for some routes with median bus lanes during the morning hours. This may indicate that the scope of an intermodal shift from private vehicles to public transport has not that been great.

These findings show that there are limitations in resolving the city's traffic congestion problem with measures only aimed at improving the competitiveness of public transport. Yet, the median bus lane system, which has been found to be effective in improving traffic conditions during some time slots, keeps expanding in scope. At present, therefore, it seems too early to make a final judgment on the demand for intermodal shifts.

The productivity of bus companies was found to have fallen compared to the pre-reform period, according to the results of a productivity evaluation based on the operating distance, which is the criteria for giving out subsidies (Mi Yeon OH, Seong Su KIM, 2005). There is concern that increases in personnel costs might lead to a continuous fall in the productivity of bus companies, thus lowering the competitiveness of the bus industry. Proper measures need to be taken to cope with this prospect.

Public transport subsidies paid by the Seoul city government are on a downward trend despite the increase in public transport ridership. This indicates improvement in the efficiency of the city's budget expenditure.

In addition, the following improvements need to be made in the existing reform measures in order to ensure continuous enhancement of the competitiveness of buses.

- Fare integration in the Seoul metropolitan area
- Laying the foundation for rational fare adjustments
- Fare adjustments reflecting the productivity of bus companies
- Improving the insufficient capacity problem of median bus lanes
- Full-fledged implementation of the TSM project on roads near the median bus lane routes. This measure is to tackle the problem of passenger car speeds dropping conspicuously on the routes during afternoon hours, which is attributable to demand for route changes.
- Implementing traffic demand management and transit-oriented development measures to supplement land use policies to generate practical effects on the traffic system of Seoul

The following are measures needed to be taken by other cities when implementing similar public transport reforms.

- Securing credible data on user demand
- Conducting research into travel behavior changes
- Building an integrated public transport evaluation system
- Conducting evaluations for not only individual categories but ultimate purposes
- Conducting an evaluation targeting the entire section rather than its parts
- Setting the evaluation period by considering the length of time needed for stabilizing the system

The following are measures needed to invigorate public transport in metropolitan cities in the future.

- Building a convenient and safe transit system that gives public transport the edge over private passenger cars
- Active implementation of transport demand management
- Improving conditions for use of environment-friendly modes such as walking and cycling
- Refraining from making excessive investments in traffic facilities
- Pursuing transport policies consistent with new land-use concepts such as compact city and transit-oriented development
- Improving the administrative/organizational/educational environments to enable the above-mentioned measures

Policy Suggestions

① The bus reform project conducted by Seoul City has been found to be conducive to improving the competitiveness of buses. This study therefore suggests that other cities take their cue from Seoul City and apply reform measures such as fare integration, smart cards, public transport transfer centers and median bus lanes in appropriate ways. It is also recommended that the central government actively support such reform projects in terms of technology and funding.

② The semi-public operation system is a useful scheme that can help restore the public service nature of routes, improve the services of drivers, and ensure speedy route adjustments. Yet, its implementation requires a lot of financial resources, causing concern about a possible fall in productivity. Thus, this study recommends that the central government provides support to local governments suffering from financial difficulties, and at the same time, suggests that productivity be reflected in fare hikes so that excessive increases in personnel costs would not cause a drop in productivity.

③ Implementation of the median bus lane system is recommended. Yet, when the median lanes have insufficient capacity, it is necessary to minimize left turns and introduce larger-capacity transport modes. To minimize congestion on non-bus

traffic lanes during afternoon hours, the TSM project needs to be implemented on nearby roads to minimize the influx of vehicles into the median bus lane routes.

④ Efforts should be made to encourage the establishment of reform plans based on the concept of integrated operation of modes in order to ensure maximization of synergistic effects among public transport modes.

⑤ Public transport reform alone has limitations in resolving fundamental urban traffic problems. Therefore, it is necessary to encourage the implementation of a demand management scheme involving the imposition of monetary burdens on private car users in parallel with the bus reform project.

⑥ From mid- and long-term perspectives, there is a need to create user demand for buses by inducing high-density land use along the median bus lane routes. At the same time, endeavors need to be made to intensively develop subway station areas and bus median lane corridors through the transit-oriented development and land-effective housing finance schemes.