

Three Innovations of Subway Line 9: Financing, Speed Competitiveness and Social Equity

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1. Policy Implementation Period

- 1994: Established route network
- 2009: Opened the 1st (Phase 1) section from Gaewha to Shin Nonhyeon stations
- 2015: Additionally opened the 2nd (Phase 2) section of Eonju, Seonjeongneung, Samsung Jungang, Bongeunsa and Sports Complex stations
- 2017: Expected to open the 3rd (Phase 3) section from Samjeon Jct. to Seoul Veterans Hospital stations

Source: JoongAng Ilbo [Cover Story] Daily lives changed by Subway Line 9, in 9 months after the opening of Seoul's Subway Line 9 extension

Seoul Subway Line 9 is a route that connects the southern part of the Han River from the east to west. The first (Phase 1) section, completed in 2009, stretches 25.5km and connects Gangnam and Gangseo, Seoul by being operated from Gimpo Airport to Banpo through Yeoui-do. The second (Phase 2) section of Eonju, Seonjeongneung, Samsung Jungang, Bongeunsa and Sports Complex stations were additionally opened in March 2015. Subway Line 9 is connected to most of the lines in the city (except for Subway Lines 6 and 8), and it is the only line in Seoul that operates an express line in the entire system.

It was constructed through private investment for the first time in Korea as an urban rail transit and promoted by a public-private partnership (PPP) project in the Build-Transfer-Operate (BTO) that transfers the ownership of the facilities to the Seoul metropolitan government after the completion and allows private investors to gain benefits from investment for 30 years of operation in accordance with the agreement with the Seoul Metropolitan Government.

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2. Background Information

Seoul experienced an unprecedented population explosion from 2 million to 10 million people due to highly compressed urbanization and industrialization for about 30 years from the 1960s to 1980s. In the early 1990s, when a plan for Subway Line 9 was established, the high-speed growth still continued and Seoul's population peaked at about 11 million in 1992.

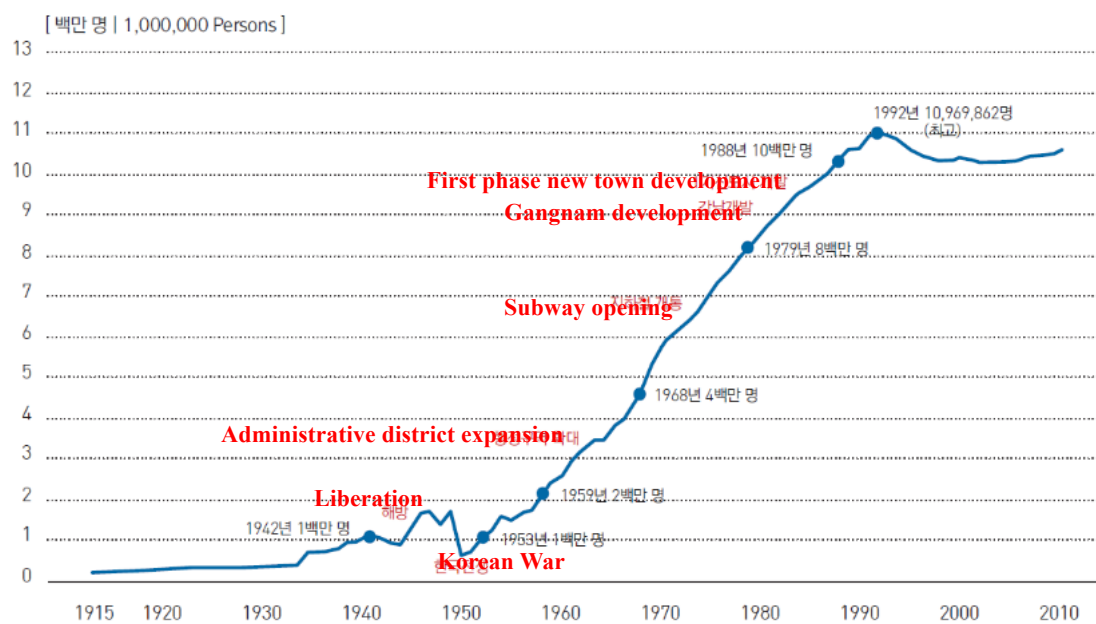


Figure 1: Population change in Seoul, 1915-2010

Source: Seoul viewed by map (2013)

Seoul Subway, which started with a full-scale economic development plan in the 1960s, took the form of a public transportation network in the early 1990s through the first subway construction of lines 1, 2, 3, and 4 and the second subway construction of lines 5-8; its transport share reached about 32%. However, with the continuous population growth and increase in demand for subway use in a positive way, there were discussions regarding a third subway construction of lines 9-12 as well as the extension of the existing subway line 3 in accordance with the city's policy to make the subway a central means of urban transportation that would account for more than 75% of Seoul's traffic volume, followed by the Basic Plan for Seoul Subway in November 1993.

However, the subway is an expensive infrastructure that requires the highest costs (as it has the highest transport capacity) among all public transportation systems. Therefore, the subway

construction policy has a lot of controversies in terms of politics, economy and society and is mostly affected by the surrounding situations and circumstances. The third Seoul Metropolitan Subway plan, which included the construction of subway line 9, was in an international context of the Asian financial crisis in terms of economy and faced with a critical situation of a reduction in finance due to the Korean financial crisis (1997-2001) - known locally as the 'IMF crisis'. This financial situation brought about a lot of changes in the overall plan, along with the inauguration of a new mayor in 1998.

Prior to this, there was a gas explosion incident at the Daegu subway construction site in April 1995, which caused 101 deaths and 202 casualties. As a result, policies for the re-evaluation of an on-going subway construction plan and a readjustment of the construction period were formulated and the completion of the second subway, which was under construction, was delayed. These factors had a considerable impact on the third subway plan.

Eventually, as the third subway plan was reviewed and delayed, measures to secure financial resources emerged as a key issue, and the feasibility of the project was adopted as a main virtue of selecting government-related projects- including PPP(public-private partnership). And thus, it was determined that subway line 9 was to be constructed in the form of a private investment business, or BTO (Buy-Transfer-Operate) after a feasibility study was carried out.

3. The Importance of the Policy

In general, public transportation facilities are essential for sustainable transportation and sustainable city construction. The construction and extension of a subway in a city, however, is a decision that requires special attention in relation to the financial sustainability of the city, given the enormous financial resources of the subway facilities as well as special fixedness and semi-permanent trait of the railway. In achieving the main goal of increasing the use of public transportation, whether new investments will have an effect on the net increase in the public transit share, or how these affect the decline in the use of automobiles, which has a relatively large negative external effect, need to serve as the basis for investment decisions.

In addition, the subway policy is accompanied by the investment of large financial resources, and thus has a characteristic in which tension is heightened by disputes about the detailed decisions of routes – especially in the present urban society where the participation of the general residents increases in relation to the redistribution of wealth over the distribution of the benefits and costs. Actually, in Korea, the construction of large-scale infrastructure has actively been carried out through the PPP since the end of 1990, based on the Act on Private Investment in SOC facilities amended in 1998; however, many questions on whether the private investment will reduce the national treasury and affect financial efficiency have been raised.

Of course, in a government with a weak financial structure, the prospects for affordability and financial sustainability of finances required for subway construction is a much more critical standard of judgment than typical virtues such as financial efficiency or secondary virtues like transit share.

In relation to these considerations, Seoul Subway Line 9 encompasses three important points.

First, in a situation where new means of finance are required due to the situational characteristics of the economy and finance in the period when the construction of Subway Line 9 was undergone, the investment and construction were promoted as a BTO (Buy-Transfer-Operate) project (unlike traditional government-invested projects), and therefore the financial burden of the government could be significantly reduced.

Second, as a decision that is not irrelevant to this, high-quality transportation services had to be provided to maximize demands in a situation with the precondition of receiving benefits, and the focus was on travel speed as the most important characteristic that would determine the quality of urban transportation services. As a result of operating express services, Seoul Subway Line 9 Express has achieved a decisive competitive edge in terms of speed, as compared to automobiles.

Third, it contributed to mitigate the access imbalance in the city by designing a route that provides access to the south-eastern region, which emerged as a traffic-neglected area through the first and second subway construction phases.

In other words, the importance is highlighted in that it has produced three remarkable achievements: a reduction in financial burden through PPP, the provision of public transportation service that obtains the competitive edge over automobiles and a reduction in regional imbalance of accessibility.

4. Relevance with Other Policies

Subway line 9 was planned as a part of the third Seoul subway construction project. The third plan was devised to continuously expand the subway network in Seoul with the construction of subway lines 9-12 and the extension of the existing subway line 3. However, the plan was reexamined all the way due to the Daegu subway fire and the Korean financial crisis, and it is one of the two components that maintained the route plan along with the plan for the third line extension. However, in the process, Subway Line 11 was shortened to the Shinbundang Line, and the rest of the lines were changed to light rail, monorail and connection lines of the first and second subways.

The construction of the first subway began in 1961 (when the city's population approached 2.5 million) as a result of formal discussions, and the subway construction plan was included in the 10-year plan of Seoul City Government. In 1966, the plan for lines 1-4 appeared in the basic plan for Seoul city. In 1970, as a result of rapid industrialization according to the national economic plan, as the population concentration and traffic congestion were intensified in the city of Seoul, the then President Park Chung-hee instructed that the public transportation construction plan be set up as a solution to the traffic congestion in Seoul. The Seoul subway construction project was jointly promoted by the Ministry of Transportation and the City of Seoul as one of the state projects. Although economic development had already helped to accumulate various technologies necessary for subway construction, Korea lacked some

particular special technologies related to subway construction and was still preparing for the economic leap it would later take. Thus, it had to depend on foreign countries for some technologies and financial resources to construct the first subway line 1. Japan, with its experience of subway construction, provided special technologies and loans.

Starting with Subway Line 1(Seoul Station-Cheongnyangni) constructed from 1971 and opened in 1974, the construction of the remaining three lines (such as Line 2 (Circular Line), Line 3 (Gupabal-Yangjae) and Line 4 (Sanggye-Sadang)) was completed in 1985, and thus the first Seoul subway construction was finalized with the subsequent opening of the four lines.

The plan for the second subway construction was established in 1989 by the Korea Research Institute for Human Settlements, and it was notable that various axes of movements centering on the trunk lines that connect base areas of Seoul were suggested instead of planning the extension of the existing four lines and branch lines. It was a route plan that aimed at the quick connection between the bases in the southern and northern parts of the Han River as well as the minimization of subway-neglected areas. Through this plan, a submarine tunnel was constructed across the Han River. In order to make full use of the existing route network, the principle of transfer was adopted, and thus the second subway construction included the development of specific routes based on a clear spatial planning goal. This included Line 5 that connects Gimpo Airport to Yeoui-do, which is the center of business functions, Line 6 centering on a neglected area in subway services, such as the area north of the Han River, Line 7 between Sanggye and Gangnam that enhances the subway network density of Gangnam with increased concentration, while mitigating the regional imbalance and Line 8 that connects Seongnam, which has emerged as a powerful satellite city, along with Bundang New Town.

Through these first, second and third periods, Seoul's subway was developed as a system globally superior in terms of network density and service quality. However, there exists a fundamental limitation in railway transportation that the subway alone is not capable enough of meeting the citizens' traffic demands in the structure of urban development led by automobiles, a means of transportation with flexibility. A variety of factors inherent in the subway policies contributed to the success of Seoul's subway system. But above all else, the clear vision of Seoul city has had a crucial role in making the subway a backbone of urban transportation, and Seoul's recent bus policies(aiming at subway-bus integrated services), especially the bus reforms implemented in 2004, cannot be overlooked. In other words, the Seoul metropolitan transportation system was fully reorganized as a system centering on public transportation, and the public transportation integration and Quasi-Public Bus management system that connects the subway to buses were established.

In addition, policies such as light rail and high-speed trains, which are centered on the neglected areas in the supply of urban railways (Seoul Development Institute 2010), also expanded opportunities for integrated public transportation services.

5. Policy Objectives

- Reduce the regional disparities of accessibility to Seoul by connecting the neglected areas in services even after the second subway construction
- Mitigate traffic congestion due to the sharp rise in the number of automobiles by increasing the subway transport share to 75%

6. Main Policy Contents

1) Introduction of private investment

Attracting investment from private companies

In the late 1990s, as the Korean economic crisis led to a lack of public funding, innovative ways of financing were sought, and investments and operations through the BTO method were determined. The central government would invest 33.3% of the total project cost, Seoul metropolitan government 51%, and the private sector 15.7%, respectively. Moreover, the private sector was determined to be in charge of the first 30 years of operation. The main issues of operation regarding the private risk-free solution, investment method and subway fares were decided through business agreements. However, as it was pointed out that the first business agreement is too favorable to the business operators, renegotiations needed to be done.

For example, initially, the minimum revenue guarantee (MRG) was adopted as a way to alleviate private risks. In other words, if there is a shortage of freight income due to differences between real demand and forecast demand, the Seoul metropolitan government will make up for 90% of the deficit for five years from the starting date of the operation, 80% from six to ten years, and 70% from 11 to 15 years. In addition, the private business operator also has the right to decide subway fares. Regarding this, there was a case in which the business operator announced a price hike in subway fares unilaterally in April 2012 during the period of fare negotiations with Seoul Metropolitan Government. The notification and guidance of rate hikes by the business operator without consultations with subway operating agency was in fact a violation of the urban Railway Act and Concession Agreement(Subway Line 9 Business Restructuring Brochure, p.44).In this regard, the Seoul Metropolitan Government set up a task force (including lawyers, accountants and transportation experts) to promote renegotiations with the private business operator and established a series of deliberations on the draft of the convention with verification and review processes conducted by professional institutions such as Seoul Public and Private Infrastructure Investment Management Center, contract judging panels and consultation with the Ministry of Strategy and Finance.

Concession agreement to change the private investment project

The restructuring of Subway Line 9 business, which has been underway for over a year, was finalized on October 23, 2013 by the conclusion of a concession agreement with Seoul Metro Line Nine Corporation. As a result of the convention, shareholders that constitute the existing private business operators were replaced entirely. That is, seven construction investors, including Hyundai Rotem, who had completed the construction of the first section of Subway Line 9, sold off their shares and withdrew from the operation of Line 9, and Macquarie, a financial investor and a Small and Medium Industry Bank also sold off their shares and withdrew from the operation of Line 9.

In addition, the existing conventions allowed for a structure in which the fare increases rapidly every year. However, as the right to decide on the fare was transferred to the Seoul Metropolitan Government through the restructuring of the business, the continuous hike in fares could be prevented. That is, in the decision of fares, the Article 27 of the Concession Agreement stipulated that ‘③the business operator should have approval from the Seoul City in advance for the payment and collection of fares and charges. Accordingly, the fare for Subway Line 9 came to be applied in the same way as other subway lines, and the period of the hike in fares could be determined in consideration of the efficient linkages with routes and means of public transportation including buses (Subway Line 9 Business Restructuring Brochure, p.93).

Besides, with the spread of negative perceptions on the minimum revenue guarantee (MRG) introduced to attract private investment in railway, road and tunnel infrastructures during a foreign exchange crisis in 1998, the government abolished the private proposal business MRG in 2006 and government notice business MRG in 2009, respectively. With MRG, the financial burden was great because of the need to maintain long-term profits (p.94). In particular, Subway Line 9, one of the government notice businesses whose agreement was concluded in 2005, was originally supposed to support MRG; however, the MRG was switched to the minimum cost compensation (MCC) that covers the operating costs with the actual business income and only supports the shortage (p.94) through the restructuring of the business, thus securing the opportunity to significantly reduce the financial burden and long-term effects. The minimum cost compensation (MCC) is a method that subtracts the interest, operating expenses and depreciation amount of quarterly management and operation right values from the total amount of various incomes (such as the quarterly operating income) and maintains the rest. Therefore, the value of management and operation rights gradually decreases and becomes 0 won in 2039, and thus the financial burden of Seoul City is reduced due to a reduction in interest. Through this method, the financial burden was reduced, and the support for private business operators could be rationally implemented (p.94). According to the existing agreement, the Seoul Metropolitan Government had to pay a total of 5.1745 trillion won in financial aid, including 783 billion won in MRG and 4.3915 trillion won in subsidies for not increasing fares. With the switch to the minimum cost compensation (MCC), the burden of Seoul City was sharply reduced to 1.9,816 trillion won (Subway Line 9 Business Restructuring Brochure, MGR abolition 94p, positive effects, p.100).

Meanwhile, Seoul City has strengthened its control authority to reduce management and operational expenses by 10% from the level set in the existing agreement and adjusted operating costs, which could not be changed for 30 years, to reexamine them every five years. As a result, the financial burden could be reduced through a downward adjustment that guarantees the operating company only the same 4-5% return rate as the new investor. In addition, it has realistically adjusted the costs of electricity, insurance premiums and alternative investment costs, which are partly affordable, to the extent of assuring service levels and stable operations and made a structure to reduce the financial burden of the city by changing the agreement so that it can include the incomes from affiliated businesses – such as the rental income of the commercial quarter and advertisement in the income of the subject who proceeds with the business and manages them (Subway Line 9 Business Restructuring Brochure – Strengthening the control authority of Seoul City, p.96).

Another remarkable point is that in the process of restructuring, Seoul City has introduced and managed a new financing method called the ‘Citizen Fund’.

The business restructuring brought about positive effects which include the effect in management and operation, financial savings and clean-up of the controversy over subsidies for not increasing fares.

In terms of management and operation, the problem of conflicts over the increase in fares was completely solved at first. After this, the fare of Subway Line 9 has remained the same as the basic fare of the other subway lines, and the period of the hike in fares has been reasonably determined at the same level as the other Seoul public transportation systems. In addition, the financial structure has changed into a solid structure by completely eliminating the 15% high interest rate subordinated loan through the business restructuring and constructing the loan structure only with the senior loan. Third, as the conflicts with the business operator, such as the two administrative lawsuits, were resolved, the anxieties of citizens were thus reduced. The fourth effect is that a minimal safety device was provided so that the financial aid supported by Seoul City can be used appropriately. That is, its control authority over the operation and management of private investors has been strengthened. Finally, the burden of Seoul City was reduced by including the revenue from the subsidiary business in the business income structure, along with the income from fares.

The biggest effect of restructuring the Subway Line 9 business is regarding the financial cutbacks. Abolishing the MRG and applying MCC was effective. Through the business restructuring process, Seoul Metropolitan Government reviewed the operation costs of Subway Line 9 for five years from 2009 and found that there are cost saving items to the extent that the subway service is maintained. As a result, it was able to save 350 billion won, about 10% of the existing management and operation costs.

Finally, the resolution of issues over subsidies for not increasing fares is also a main effect. Through the restructuring business negotiations, it was agreed not to pay subsidies for not increasing fares, which amounted to about 10 billion won each year from 2009 to 2013.

(Subway Line 9 Business Restructuring Brochure – Positive effects by business restricting process, p.98-103)

Creation of Citizen Fund (p.106-115)

This is a model in which citizens invest in Subway Line 9 bonds and receive profits higher than the interest rates of commercial banks, and its total scale is 100 billion won. It is divided into 4, 5, 6 and 7 year-types depending on the period. It is possible to invest up to 20 million won per citizen, and the average rate of yield is set at about 4.35%. In order to protect investors, Korea Financial Supervisory Service exercises supervisory authority, and mid-course sales were made possible. A total of 5,508 citizens joined the Citizen Fund, and the number of citizens who invested in the fund were highest in the six year-type and lowest in the five year-type (p.114). As a new window for financing, which is always a hindrance to the supply of large-scale public goods, this Citizen Fund was highly appreciated as an innovative model that could not only contribute to the reduction of the government's financial burden, but also improve the economic productivity of citizens through the profitability of public goods. The Citizen Fund was an innovative attempt to provide a win-win situation for both Seoul City and citizens and has its significance in that citizens invested in funds and made private investment business practices. Therefore, it is expected it will continue to provide a good example to solve various problems that have been dealt with in the administrative area with citizens (p.115). In recent years, it has been used in environment-related businesses such as renewable energy. In particular, Seoul City constructed the first Seoul Citizen's Sunshine Power Plant through a Citizen Fund in 2015. The total amount of 8.25 billion won collected through the public fund competition was invested in the construction of a 4.242MW solar power plant. As can be seen in this case, the Citizen Fund has a number of possibilities and enormous implications.

<http://mediahub.seoul.go.kr/archives/926005>

2) Step-by-step construction

Subway Line 9 has a total length of 38km, and the whole section was divided into three sections to proceed with the construction sequentially. Since the route was designed around areas vulnerable to subway services, the construction was completed from the section that is expected to have the greatest demand among three sections so that citizens' benefits, or social benefits could be created prior to the opening of all sections.

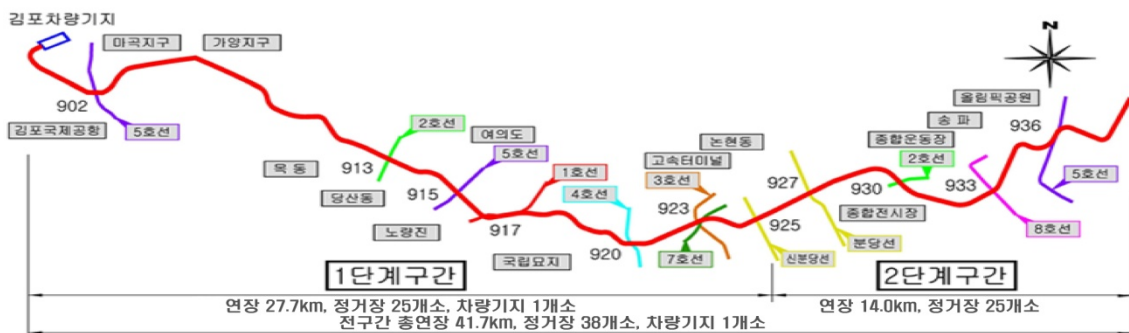


Figure 2: Subway Line 9 construction phase



Figure 3: Subway Line 9 route map

Source: Seoul Metropolitan Government (2016)

3) Express line service

Subway Line 9 provided an express service for the first time in the Seoul subway system. The additionally provided express service is to limit the number of station stops (in addition to a normal service that stops at all stations), and thus to significantly increase traffic and transport speed. For example, of the 25 stations of the first-phase section, the subway stops only at nine stations – those considered major stations, such as subway transfer stations. The express service is 40% faster than the general service, and the service frequency of express trains is increased in the rush hours compared to at other times.

In this regard, Subway Line 9 has achieved a very significant accomplishment in that it obtained a competitive edge against automobiles in terms of the travel time of the express service. For the section from Gimpo Airport to Shin Nonhyeon Station, it takes about 40 minutes to get there by car and 64 minutes by bus. However, when using the general service of Line 9, it takes about 47 minutes to travel on the same section, and it takes about 30 minutes when using the express service.

With respect to the transition from car to public transport, which is the common goal of contemporary cities, automobiles retain certain comparative advantages in terms of the quality of transportation services (such as speed, comfort and convenience) and this makes it impossible or difficult to achieve a successful transition between the means of transportation. In particular, given that the travel time penalty of the general public transportation is the biggest factor of non-competitiveness, even if a time competitiveness that the express service of Subway Line 9 has achieved is not the time competitiveness against the total travel time on the door-to-door dimension, it can be said to be a very significant achievement, considering the contemporary challenges in terms of global urban planning, which is the shift to sustainable transportation mode. In addition, after Subway Line 9, Line 1 (Bundang Line and Gyeongui Jungang Line) introduced express services, which demonstrated the positive influence and success of Subway Line 9.

4) Organization for subway operation

In order to maximize the efficiency of the subway operating organization, the operation of Subway Line 9 is based on the principle of eliminating five existing facilities and manpower, such as a stationmaster, a station office, a ticket office and a night duty room. Instead of drastically reducing ticket office personnel, transportation cards can be recharged and purchased at convenience stores within the station. In addition, the operational efficiency was enhanced by performing car maintenance, maintenance of elevator facilities and other management tasks in the form of commission. Subway Line 9 operates the same number of facilities with much less manpower than other subway operating organizations. For example, Seoul Metro requires a manpower allocation of about 70 employees for every 1km of operation, and Korea Railroad Corporation about 40 employees, whereas about 15 employees are placed on Subway Line 9.

7. Technical Details

The part that allows the participation of the private sector in the construction phase includes tracks, electric power, electric cables, vehicle manufacturing, signaling, communication, equipment automation, vehicle supervision facilities, other facility construction works, finishing work for stations, screen doors, vehicle bases and general command room construction. The outline of the project is shown in Table 1 below.

Table 1. Outline of Subway Line 9 Project

Division	Description
Total Length	25.5km (Gaewha-dong, Gangseo-gu – Nonhyeon-dong, Gangnam-gu 1st Phase section)
Project Cost	899.5 billion won(January 12, 2003, constant price basis, business expenses for the upper part)
Project Period	30 years from the start date of the public use 2001-2008
Promotion Method	BTO (Build Transfer Operate) After the completion of construction, the ownership belongs to the state, and private business operators recover investment costs through 30 years of operation

Source: Korea Transport Institute 2011

In the early days of the business agreement, it was negotiated as a zone fare system. However, as the public transport integrated fare system was implemented in 2004, the system was included in the Metropolitan Unity Fare system, and therefore the Seoul Metropolitan Government provides financial support for the fare reduction and transfer part. The Metropolitan Unity Fare system has a pricing rule based on the integrated distance proportional

system with the entire sections of the metropolitan subway as the target, and the fare system for Subway Line 9 is shown in Table 2 below.

Table 2. Fare system for Subway Line 9

Division		Transportation Card	Single-use transportation card
Basic fare	Public	1,250 won	1,350 won
	Youth	720 won	1,350 won
	Children	450 won	450 won
Fares for additional distance		o every 5 kilometers from 10km to 50km 5km: 100 won o from 50km to 8km: 100 won	

Source: Metro Line 9 website

<http://www.metro9.co.kr/site/homepage/menu/viewMenu?menuid=001001004001>

Subway Line 9 is composed of four passenger cars in one train, and a total of 144 vehicles (in 36 trains) shuttles in the entire section. By the end of 2016, there will be 32 new vehicles (in eight trains), which will increase to a total of 176 vehicles (in 44 trains). One train is expected to be added in 2017, whose composition is four vehicles (in 28 trains) and six vehicles (in 17 trains), which totals 214 vehicles, showing an increase of 38 vehicles compared with the number of vehicles in 2016. In addition, according to the plan of Seoul City, 49 vehicles will be added by 2018, and the total number of vehicles is expected to increase up to a total of 294 vehicles. Therefore, the current 144 vehicles (in 36 trains) will increase to 294 vehicles (in 49 trains) in 2019 when the third-phase subway line is opened. Thus, the plan is to solve the current congestion problem that Subway Line 9 has through an expansion of the number of trains (vehicles) in stages (Seoul internal data 2016).

Division	Present		'16 (+8Trains)		'17 (+1Trains)		'18 (+4Trains)	
	Trains	Vehicles	Trains	Vehicles	Trains	Vehicles	Trains	Vehicles
Total	36	144	44	176	45	214	49	294
4 vehicles	36	144	44	176	28	112	-	-
6 vehicles	-	-	-	-	17	102	49	294

8. Policy Effects

1) Reduction in public finances

Seoul City not only saved public finances by encouraging private business operators to pay 15.7%

of the total investment costs by attracting private investment, but also achieved financial savings of 3 trillion won through the success of business restructuring. In addition, it achieved a 10% operating cost reduction by increasing operational efficiency. One thing to keep in mind is that the Subway Line 9 business has become an example of a successful private investment project because a strong demand for services already exists. The lesson that the business whose economic feasibility is not secured cannot be a successful business even if it saves the current finances and can use advanced devices to ensure profitability was well accepted in the PPP field through the demonstrated application of many examples.

2) High traffic volume

After only one year since its opening on July 24, 2009, the average daily traffic volume reached 97% of the forecasts in 2010 and has increased steadily. In 2012, it exceeded the forecasts by 3.8% in 2012 and continued to increase steadily thereafter. Looking at the number of users, the average daily number increased from 227,882 in 2012 to 400,000 in October 2014, and to more than 450,000 in October 2015 after the second-phase subway line was opened. Figure 3 shows the trends in the yearly total traffic volume according to the frequency of getting on and off the subway train.

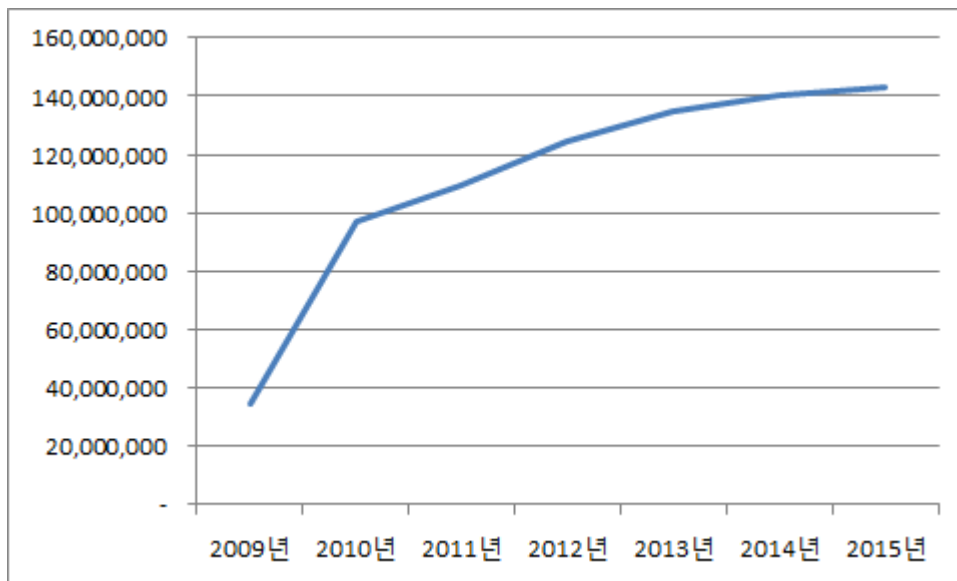


Figure 4: Yearly total traffic volume of Subway Line 9(transfer included), 2009-2015

Source: Seoul Metro 9, 2016(<https://www.metro9.co.kr>)

4) Promoting equity in society through improved access to public transportation of neglected area in public transport services

In the first two months since its opening, Subway Line 9 recorded more than 135,000 net passengers, except for transfer passengers. This figure is close to the expected traffic volume of 165,625, and there are not so many cases in which the actual traffic volume reached more than 80% of the expected traffic volume so quickly immediately after a subway opening. As there

was a consensus that a route that directly connecting the areas of Gangseo and Gangnam was required before the construction, it resulted in providing service in a section where the accessibility to the subway was relatively low. According to Seoul 2010 data, users of Subway Line 9 reduced travel time and transportation costs of about 100-200 won, which is estimated to be a customer benefit of 4.1 billion won per year.

5) Activation of neighboring commercial districts

Subway Line 9 has left behind remarkable achievements in terms of the number of passengers and the development of subway station areas, called the second golden line after Subway Line 2. Moreover, the opening of the second-phase section in 2015 invigorated commercial districts around the subway station. According to the Gangnam District office, the number of new buildings around Bongeunsa-ro, which started construction last year, totaled 24, four times as many in 2013. Even in the neighborhood of Eonju Station which houses Cha Hospital, buildings related to medical facilities have been constructed. This is due to the expectation that as Gangnam District Office has recently designated the vicinity of Cha Hospital crossroads as a medial tourism zone, rental demand for the medial industries will increase (JoongAng Ilbo 2015). In addition, since the accessibility to the Gangnam area is expected to be improved if the third-phase section is implemented, various plans for developing station influence areas are currently underway. If the economic activity of the southwestern region of Seoul is increased due to the prosperity of Subway Line 9, it may prove very helpful at solving the imbalance between regions in Seoul as intended.

9. Challenges and Solutions

1) Lack of experience in business agreements

As described above, Subway Line 9, which was the first PPP project on the urban railway, led to unsatisfactory results for Seoul City and citizens in the original business agreements. However, the Seoul Metropolitan Government soon established a plan for restructuring the Subway Line 9 business, set up a task force that included judicial officers, accountants and transportation experts, and promoted renegotiations with private business operators. In addition, it made all the necessary preparations for the private investment project convention through the verification and screening processes of special agencies such as Seoul Public and Private Infrastructure Investment Management Center, contract judging panels and consultations with the Ministry of Strategy and Finance. In particular, Seoul Metro Line 9 Corporation's unilateral price hike in fares raised citizens' resistance. However, the Seoul Metropolitan Government secured the pricing rights through a business restructuring and eliminated the possibility of similar problems occurring in the future.

2) Problem of congestion due to continuous increase in demand for express service

According to Seoul Subway Line 9, the congestion rate of the general trains of Gayang, Yeomchang, Dansan, Yeouido and Noryangjin stations at 7-8 a.m. at the end of March last year before the opening of the second-phase section was an average of 112%, and the congestion rate of September after the opening of the second-phase section was increased to 117%. The congestion rate of the express train in the same time period was also increased from 193% to 206%. The number of Subway Line 9 passengers increased from an average of 400,000 per day in October 2014 to 450,000 in October 2015 after the second-phase section was opened.

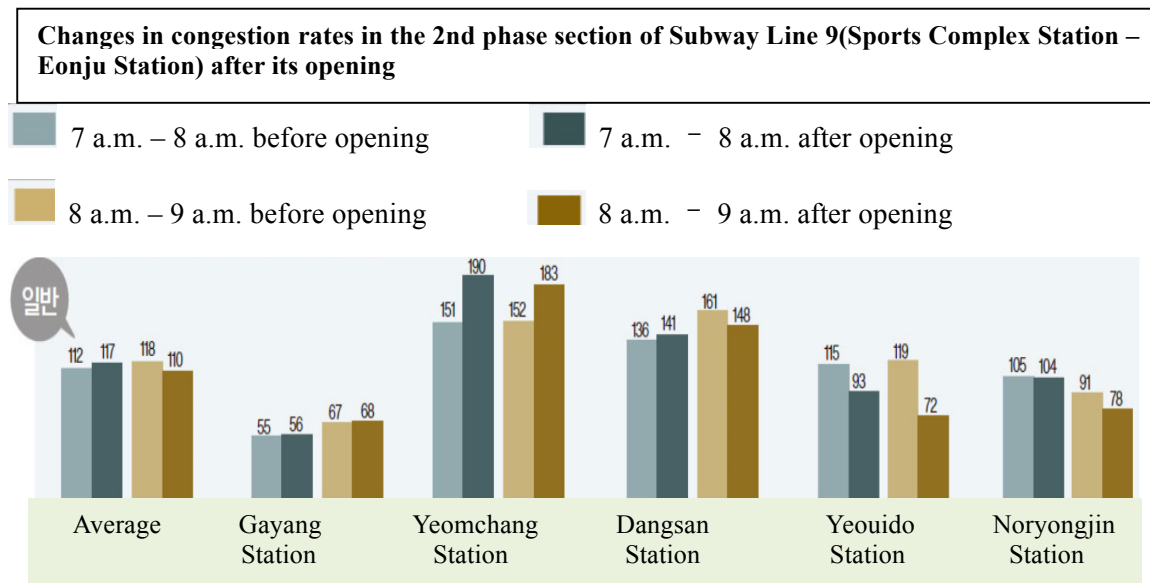


Figure 5. Changes in congestion rates of Subway Line 9

Source: JoongAng Ilbo 2015

Seoul Metro Line 9 Corporation analyzed that the reason for the surge in traffic congestion rate was that despite an increase in the number of users at the time of the opening of the second-phase section, as the number of trains was not increased, and only extended operations were conducted, the number of operations was reduced from 540 to 484. After that time, the Seoul Metropolitan Government first added three new trains in June, out of 32 vehicles (8 trains) to be increased by the end of 2016. By the end of December, as the number will be increased from 144 vehicles (36 trains) to 176 vehicles (44 trains), showing an increase of 32 vehicles and 22% (trains), more convenient use is expected. In addition, it is planned to increase 16 trains out of the existing 4 vehicles (one train) by two by the end of 2017, introduce a total of 38 vehicles with 6 vehicles (17 trains) into the express train with higher congestion rate, along with test vehicles, operate a total of 6 vehicles (49 trains) by introducing a total of 80 vehicles until the opening of the third-phase section of Subway Line 9 in 2018, and thus reduce the overall congestion rate. By 2018, it plans to increase the number of vehicles for Subway Line 9 to 294. To do this, the Gaewha vehicle base track extension project to additionally introduce trains is expected to be initiated in January 2016 and completed by August of the same year.

(Source – <http://infra.seoul.go.kr/archives/31245>) /

10. Details on the Business Restructuring of Subway Line 9

1) Key points (p.88-103)

First, business restructuring is designed to change business implementation conditions, such as MRG, rate of yield and fares in the concession agreement through renegotiations between the competent authority and private business operator in order to alleviate the financial burdens. The main contents are as follows: 1) full-scale replacement of private operators and shareholders 2) downward adjustment of earning rates to the level of commercial interest rates 3) transfer of rights to decide fares for Seoul City 4) the abolishment of MRG payment, which was absolutely advantageous for private operators 5) agreement on the value of management rights of Subway Line 9 to be 746.4 billion won 6) strengthening of the control authority of Seoul City 7) reduction of management and operation costs by 10%, cost savings.

The first is to withdraw the existing investors (including Macquarie) and attract new investors. Seven construction investors, including Hyundai Rotem, who completed the construction of the first section of Subway Line 9 sold off their shares and withdrew from the operation of Line 9. Macquarie, a financial investor and Small and Medium Industry Bank also sold off their shares and withdrew from the operation of Line 9. Instead, two asset management companies with the status of trust business operators and 11 financial investors including Kyobo Life Insurance, Hanwha Life Insurance and Hungkuk Life Insurance participated in the business. In other words, 13 construction and financial investors were changed to financial investors investing through funds.

The second is to adjust the private operator's current rate of return from 13% to 4.86%. The rate of return adjusted through the restructuring was determined to be 4.86% by applying an added interest rate of 1.75% in consideration of operational risks and fund management fees with the yield on the 5-year Treasury bond. This is similar to earning rates from the BTL project, which was drastically lowered compared to the existing post-tax earnings rate from actual business of 8.9% (current rate of yield 13%). The method of determining the rate of return has also changed from the fixed rate of return to 'fixed rate of return + variable rate of return' structure. The proportion of the fixed rate of return to a variable rate of return was set at 5:5 so that risk factors caused by interest rate fluctuations could be reduced, and financial market changes could be flexibly reflected. Accordingly, the fixed rate of return will be fixed for the next 26 years, and the variable rate of return will be adjusted every year at the rate of 5-year Treasury bond plus a 1.89% additional interest rate. The change in financial structure was also a factor in lowering the rate of yield. The loan structure was changed from the existing high-interest subordinated loan to low-interest senior loan, and some of the fixed loans were issued to the Citizen Fund to create a citizen participation environment. As a result, the high-interest subordinated loan was eliminated, and the high interest rate was adjusted to a level that is not disadvantageous.

The next is to transfer rights to decide the fares of Subway Line 9 to Seoul City. According to the existing contract, fares were determined autonomously within the fare rate set in the concession agreement by private operators. However, as conflicts over fares revealed that the surprise decisions of such fares by business operators lead to great confusion, and through restructuring, the Seoul Metropolitan Government is now to give approval in relation to the

issues regarding fares and fare imposition, collection and modification. Ultimately, the actual authority on decisions related to fares was transferred to Seoul City. In addition, the restructuring has also corrected the malfunctioning structure of the hike in fares. According to the original concession agreement, the fares are to be raised by applying the rate of inflation and increase rate of fares every year, which resulted in a constant increase in fare rates. However, as the actual right to decide the fares was transferred to Seoul City, the same subway fares could be applied to those of Line 9, and the period of hike in fares could also be determined through linkages with other routes and public transportation systems such as buses and other subways.

In addition, MRG was abolished, and MCC was adopted. The greatest significance of the restructuring is that the MRG payment has been abolished. The MRG was introduced to private investment in SOC projects, such as railways, roads and tunnels during financial crisis in 1998, but it served as a factor that caused a financial burden due to long-term conservation of earnings. The minimum cost compensation changed from the MRG is to cover the operating expenses of the business with actual business income and support only the deficiency. Through this, it was possible to reduce the financial burden and rationally promote support plans for private operators.

Meanwhile, the value of management and operation rights of Subway Line 9 was agreed to 746.4 billion won, lower than the standard of payment at the time of termination due to the nonpolitical force majeure. This was an agreement by the Maginot line which specifies that if this business is terminated before the commencement of negotiations on the value of the management and operation rights between the existing shareholders and new investors, the Seoul Metropolitan Government approves the change of investors only in cases where the value is determined to be at a lower price than the payment at the time of the termination due to nonpolitical force majeure that Seoul City should make.

The rights to decide fares that cause inconvenience in use from the management aspect of private business operators as well as consultations on the appointment of president and the director general nomination rights were transferred to Seoul City, and thus its control authority was also strengthened. In addition, management and operation costs have been reduced by 10% from the level set in the existing agreement, and the operating costs that were unable to be changed for 30 years have been adjusted to be reviewed every five years. As a result, financial resources have been able to be reduced by guaranteeing a rate of yield ranging from 4 to 5% for operating companies as in the case of new investors. The electricity, insurance premiums and alternative investment costs, which are partly affordable to the extent of assuring service level and stable operation, were also adjusted realistically. In addition, the financial burden of Seoul City was reduced by changing the agreement to include the earnings from rental business and advertisements in the income of business operators and manage them accordingly.

2) After the restructuring (118-119p)

The restructuring of Subway Line 9 was a process in strengthening the public, and demonstrated the power of citizens and the efforts of Seoul City and related experts. The effect of reduction in finances became clear after the restructuring of the business. That is, additional savings of about 7.5 billion won were achieved by 2014 thanks to the continued efforts of the Seoul Metropolitan

Government to increase the earnings by identifying additional items that could generate revenue. In addition, the Seoul Metropolitan Government appointed a technical expert in the urban railway sector as an executive director of the business operator to strengthen management supervision. The appointment of the CEO was also carried out through consultations with the Seoul Metropolitan Government.

In addition, the business restructuring of Subway Line 9 has affected other businesses as a positive precedent. The second circular road of the Gwangju Metropolitan City, Machang Bridge of South Gyeongsang Province, Misiryeong Tunnel of Gwangwon Province are all now inquiring and showing a significant interest in the Citizen Fund. Regarding the Citizen Fund, there has been a growing interest in private investment projects especially in transportation facilities, power plant construction and LED lighting.

3) Promotion process

- 12. 7. 6 Business trip for benchmarking to Daegu City
- 12. 7. 13 Business trip for benchmarking to Daegu City
- 12. 7. 23 Review meeting on the non-application of Subway Line 9 restructuring case (city council)
- 12. 9 ~ 12 Coordinated opinions on the intention to sell Subway Line 9 shares
- 12. 12. 4 Signed MOU between new investors and submitted LOI (Letter of Intent) to shareholders of Subway Line 9
- 13. 2. 13 Submitted the restructuring promotion proposal for Subway Line 9
- 13. 2. 26 Mcquarie indicated its intention to cooperate in the restructuring
- 13. 3. 15 Submitted the amendment (draft) to the Subway Line 9 convention
- 13. 3. 22 Requested support negotiating team for changes in the Subway Line 9 private investment project convention
- 13. 3. 28 [Policy] Seoul Metropolitan City Subway Line 9 phase-1 section private investment project concession agreement negotiation team composition and operation plans
- 13. 3. 29 Initiated negotiations to change the restructuring agreement
- 13. 6. 5 Notified the resumption of fare negotiations on Subway Line 9
- 13. 6. 5 Advance notice on the termination of concession agreement on the phase-1 section of Subway Line 9
- 13. 6. 12 Reply to the notice on the renegotiations of Subway Line 9 fares
- 13. 6. 19 Concluded a trading agreement between existing shareholders and new investors
- 13. 7. 3 Request for consultation on amendment to concession agreement for phase-1 section of Subway Line 9
- 13. 7. 4 Notified the commencement of formal consultations for the amendment of the concession agreement of Subway Line 9 phase-1 section private investment project

- 13. 7. 17 Requested the first review (examination) of an amendment (draft) to a concession agreement on phase-1 section of Subway Line 9
- 13. 7. 23 Requested to submit plans to coordinate the business restructuring consultations and business implementation conditions
- 13. 7. 23 Requested to comply with the agreement on the sale of shares in relation to the private investment project of Subway Line 9
- 13. 7. 24 Submitted a plan for coordination of private investment project implementation conditions for phase-1 section of Subway Line 9
- 13. 7. 25 Visited the Ministry of Strategy and Finance for preliminary consultations
- 13. 7. 27 [Policy] Subway Line 9 business restructuring promotion plan
- 13. 7. 29 Requested to review the plan for the coordination of project implementation conditions and amendment (draft) to the concession agreement on Subway Line 9
- 13. 7. 31 Submitted the concession agreement to change the private investment project for phase-1 section of Subway Line 9
- 13. 8. 8 Reviewed fund manager's suggestions regarding the Citizen Fund
- 13. 8. 12 Request for cooperation to change the concession agreement on private investment project for phase-1 section of Subway Line 9
- 13. 8. 13 Notified a change (draft) in implementation deposit related to the modification of Subway Line 9 management and operation trust agreement
- 13. 8. 14 Reply to the first review request of the amendment (draft) to the concession agreement on phase-1 section of Subway Line 9
- 13. 8. 21 Request for consultations to review the plan for coordination of project implementation conditions and amendment (draft) to the concession agreement on Subway Line 9.
- 13. 8. 22 Sent written opinions of Seoul Public and Private Infrastructure Investment Management Center on the amendment (draft) to the concession agreement on Subway Line 9
- 13. 8. 23 Business consultations with the Ministry of Strategy and Finance
- 13. 8. 27 Sent written opinions on reply results of review request for amendment (draft) to the concession agreement on phase-1 section of Subway Line 9
- 13. 8. 29 ~ 9.6 KDI business consultations
- 13. 9. 9 Notified the review results of the contract review team
- 13. 9. 11 Reply to the Seoul City's opinion on the review of the amendment (draft) to the concession agreement on Subway Line 9 phase-1 section of Public and Private Infrastructure Investment Management Center
- 13. 9. 24 Reflected the verification results of Seoul Public and Private Infrastructure Investment Management Center, contract review team and the Ministry of Strategy and

Finance

- 13. 9. 27 Completion of consensus on the details on the stock purchasing and sales agreement between seller and buyer
- 13. 9. 30 Consultations with fund manager regarding the Citizen Fund
- 13. 10. 2 ~ 8 Business consultations with the Ministry of Strategy and Finance
- 13. 10. 17 Report to Seoul City Council
- 13. 10. 22 Concluded the stock purchasing and sales agreement between existing shareholders and new investors
- 13. 10. 23 Concluded the stock purchasing and sales agreement and amendment to the concession agreement

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