

Integrated Multiple-Operator Urban Public Transport System: Case Study of Seoul, Bogota, and Rhein-Main-Verkehrsverbund*

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Abstract: Integrated public transport takes advantages on not only system management but also passenger attractiveness. Success in changing the system from independently operated by many operators to uniform system under one administrator has drawn attention from transport authorities and researchers. This study reveals some facts, achievement, and lessons learned from three well known and successful systems, i) Rhein-Main-Verkehrsverbund, Germany, ii) Transmilenio, Columbia, and iii) Seoul's BRT, South Korea. Furthermore, some challenges and rooms for improvement are discussed as well.

1. INTRODUCTION

Integrated public transport derives from coordination among different transport operators in the system. Increasingly, urban public transport systems that are operated by multiple operators in many countries are moving toward integrated system to take advantages of easy managing and uniform servicing. Under one administrator, multiple operators are provided same operational scheme. As a result, passenger could take advantages of coordinated routes, timetable, and fare and quality of transport service which could greatly be improved. Some examples of integrated public transport city are found in i) Rhein-Main-Verkehrsverbund (RMV), State of Hessen, Germany- classical integrated transport system, ii) Bogota of Colombia- famous and well integrated Bus Rapid Transit (BRT), and iii) Seoul of South Korea- newly well developed BRT.

2. HISTORY OF INTEGRATION AND GENERAL INFORMATION

(1) History of Integration and Characteristic of system

Prior to establishment of integrated public transport, all of three cases suffered, though different degree of severity, from independently operation of various transport operators in their regions. In the state of Hessen of Germany, public transports were well provided by many choices of modes and operators however riders suffered from this diverseness. As a result, transfers among routes and modes were troublesome and costed considerably time and money. Inconvenience of public transport together with increasing in car ownership caused significant declining in public transport patronage¹⁾.

Recognizing predicament of diversification, Verkehrsverbund system was first applied to the region in 1974. Verkehrsverbund is a special public authority that fully coordinates public transport services while preserving the individual transport operators which still responsible for providing service. In 1994, the integrations were finally unified in terms of tariff and transport associations throughout the whole region of Rhein-Main cover 15 counties and 11 cities (total area is 14,000 km² with approximately 5 million inhabitants²⁾). Within RMV coordination are not only in terms of planning and operation but also contract on tariffs and distribution of fare income.

Table 1²⁾: Public transport system component of RMV

Item	Mode			
	Railway	Metro	Tram	Bus
Number of operators	8	2	3	141
Network length (km)	1500	58	125	N.A.
Number of lines	46	16	14	870
Number of stop/stations	400	84	N.A.	11,500

Table 1 shows public transport components in RMV. For more detailed picture of transport network, please refer at ²⁾. At present, there are 4 modes of transport provided: heavy rail (regional train, regional express train, S-Bahn train), U-Bahn (metro), tram, and bus operated by more than 150 transport operators including public and private firms. Only one thicket is needed to travel from an

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origin to a specific destination and can be used for any modes of local transport regardless how often they change.

The situation in Bogota and Seoul were somewhat different. In Bogota, Public transport has solely depended on bus system. Prior to the year 2000, traditional bus was the only public transport in Bogota. Too extensive routes and services have resulted in extremely high level of competition for passengers called ‘Penny War’. At that time there were more than 30,000 vehicles (both legal and illegal) provided by approximately 64 private operators³⁾. These were the main causes of low service quality, long travel times, high pollution level and high accident rates.

Therefore, in order to eliminate drawbacks of the traditional bus, new mode of public transport named Transmilenio was established in 2000 and has been in attempt to replace the traditional bus. Transmilenio is a trunk-feeder BRT system which has its own right of way. According to the master plan of Transmilenio, Transmilenio system will consist of 8 phases with approximately 388 km length which would cover 85 percent of daily trip demand as shown in Figure 1. Until now, phase I and II are in operation by 7 private operators and feeder services are operated by 6 private operators. Phase III is in construction and the other phases are planned to be completed by the year 2031⁴⁾. Entire systems are integrated in terms of routes, timetable, and uniform fare though there are many transport operators. Passengers can take advantage of free transfer between feeder and trunk line. As city of Bogota try to replace the traditional bus with Transmilenio, all of Transmilenio operators are formed by combination of international transport operator and agglomeration of the traditional bus operators. According to this practice, Transmilenio could take advantage of reducing traditional bus service and obsolete vehicles.

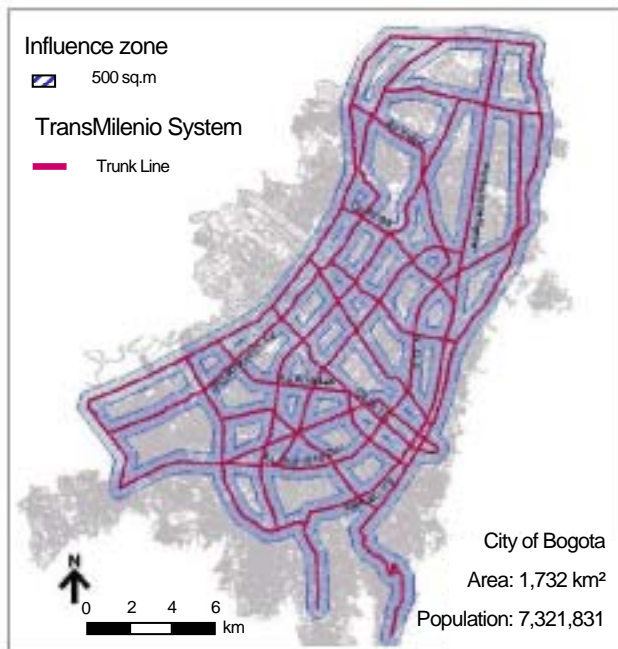


Figure 1⁴⁾: Transmilenio Master Plan

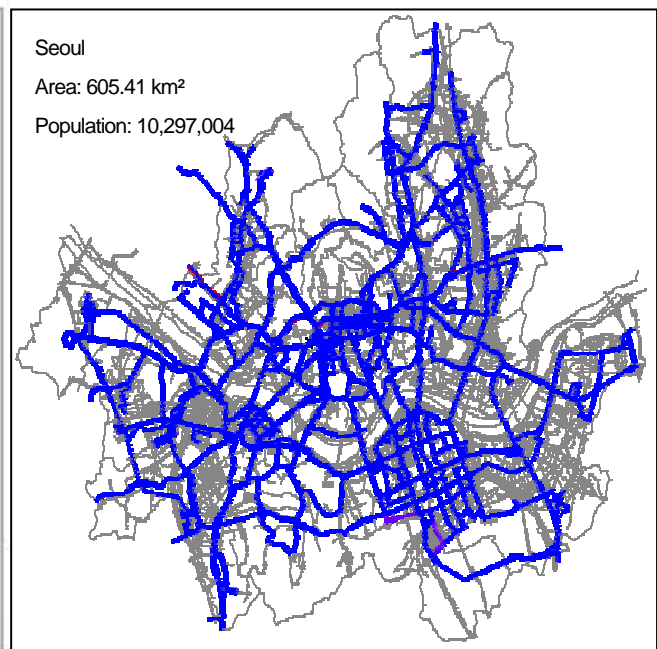


Figure 2⁵⁾: Seoul Bus Master Plan

Similar to Bogota, before 2004 Seoul bus transport was also in a very fierce competition. Too extensive bus service supply, fierce competition for passenger, bad condition of vehicle, increasing in private car ownership, and congestion problem resulted in declining of bus patronage and bankrupt of many bus operators. As bus service was operated in an inefficient and uncoordinated manner. The Seoul Metropolitan Government (SMG) decided to regain control over the operator by planning for the new routes, assigning bus routes, determining bus schedule, and define fares⁵⁾. In 2004, old bus system in metropolitan area was completely replaced by the new system whose network was entirely re-designed to integrate all bus routes. Bus network of Seoul is shown in Figure 2. Bus services were grouped in hierarchy manner as express, trunk, feeder, and local. Integrated fare system is distance-based and free transfer. At present, fare system is now integrated with subway system too.

(2) Institutional Arrangement

As shown in previous section that within each case, there are many parties involve in the system range from public transport authority and many operators. The keys of integrated multiple-operator public transport emphasize on what is the responsibility of each party and how transport authority could control, manage and compromise all relevant parties. The organizational structures of each case are shown in Table 2.

For RMV, the directly responsible transport authority is Rhein-Main-Verkehrsverbund GmbH (RMV GmbH) which is public corporation. Its function is to link between the policy level and operational level. It is responsible for implementation part for example plan and develop integrated timetable, check quality of service, marketing, and control and allocate revenue to relevant party. In policy level, supervisory board takes action for regional transport policy objectives for example the service to be offered, and tariff system. The supervisory board consists of member appointed from RMV GmbH's share holders who are admirations of city in RMV area. Public transport operators are linked with RMV via a transport contract. Around 154 transport operators corporate to provide service but act independently in terms of their operational organization.

Table 2: Organizational Structure of Integrated Public Transports of RMV, Transmilenio, and Seoul Bus

	Responsibility	Organization	
Policy Level	master plan, tariff system, and financing	RMV	Supervisory Board of RMV GmbH
		Transmilenio	Bogota Mayor's office, Transmilenio S.A.
		Seoul	BSRCC, SMG
Management Level	infrastructure provision, service planning and control, contract, and management of revenue	RMV	RMV GmbH and Local Authorities
		Transmilenio	Transmilenio S.A., Fare collector, Trustee
		Seoul	SMG
Operational Level	corporate planning and service provision	RMV	public transport operator
		Transmilenio	public transport operator
		Seoul	public transport operator

For Transmilenio, Transmilenio S.A. who is the independent organization works together with Bogota Mayor's office at policy level for planning service and providing infrastructure. Similar function to RMV GmbH, Transmilenio S.A. also takes part in management level by providing operational plan and taking care of quality of service. However, revenue of Transmilenio is managed independently by third parties who are private organizations, fare collector and trustee. Fare collector is the one who takes care of fare revenue from the system and then trustee would distribute them to relevant parties which are Transmilenio S.A. and transport operators. At the operational level, transport operators which consist of trunk operators and feeder operators also independently in carryout their own business.

Apart from two cases, Seoul bus system is mainly managed by SMG. In the early stage of bus reform, a special entity called Bus System Reform Citizen Committee (BSRCC) was formed to decide bus routes, bus fare, and bus operating system. BSRCC consists of stake holder of bus system such as SMG, citizen group, bus company, and lawyers etc. Later on after the reform, SMG has taken main responsibility for master plan, operational plan, distribution of revenue, and system oversee by creating several agencies to be representative of SMG to responsible for these tasks. In operational level, transport operators who are all private companies are responsible for running service according to SMG plan and also managing their own vehicles and employees. This pattern of organization arrangement is called quasi-public operation which can be explained as public authority is responsible for supervise and construct the system and private firms are responsible for service operation.

3. SYSTEM OPERATION

(1) Involvement of Transport Operator and Assignment of Right of Operation

The involvement of transport operators in integrated system could be done through tendering or negotiation with transport authority. In RMV, both practices have been done. Most of the services are tendered out based on criteria of open European tendering process. Therefore, the natures of transport operators in RMV are fairly international. Anyhow, there some lines and small networks especially for train are not tendered and contracts were individually negotiated case by case. The contract length could range from 5-8 years for buses and 8-12 years for trains²⁾. The rights of operation that are contracted are in terms of route or network. Thus, in one route or network there will be only one operator without mixed operation with other operators

For Transmilenio, the all services are tendered out based on the criteria defined by Transmilenio S.A. The tenders are opened internationally. One of the rationales behind this practice is that city of Bogota would like to turn fierce competition in the market, the Penny war, to competition for the market. According the defined criteria, Transmilenio S.A. could select transport operators with desirable qualifications and good resources like qualified buses and drivers. Moreover, the defined criteria also contributed in reducing numbers of traditional bus operators and old vehicles.

However, the assignment of right of operation for feeder bus operator and trunk bus operator are quite different. Rights of operation of feeder operators are in terms of area. So far there are 6 areas independently operated by different 6 operators. On the

contrary, rights of operation in trunk line are assigned in terms of bus-trip. Therefore, within the same route, there are many operators operate together distinguished by time. Both trunk and feeder contract last for 10 years.

In Seoul, mixture of involvement through bid and negotiation could be found. 10 Major trunk route axes were tendered to local transport operators in terms of route⁵. Then, the operation of the rest routes are based on negotiation between SMG and transport operators. It is expected that all of routes should be tendered in the near future.

(2) Remuneration

The most important factors to maintain sustainability of system falls on providing attractive incentives to transport operators. In the integrated system, fare revenue would be firstly collected in fare box then distributed to relevant parties. In RMV, financing division of RMV GmbH does budget planning, controlling and allocation of revenue to transport operators, local partners, and RMV GmbH. The source of revenue comes from fare revenue (43%), and subsidy from state of government of Germany (24%), municipal authorities (17%) and federal state government of Hessen (16%)². Distributions of revenue to operators are based on distribution key that calculated from operation result, previous fiscal year payment, and result of passenger satisfaction survey. For commuter rail, there is an additional incentive payment for operators that could pass quality examine from RMV GmbH.

For Transmilenio, fare box is managed by a private third party to avoid influences from politics. The trunk operators are paid by number of vehicle-kilometer operated. Feeder operators are paid by number of passengers served except for one operator that receives payment by the combination of number of passengers served and vehicle-kilometer operated³. Source of revenue are solely from fare revenue without any subsidy. This is the most proud strength of Transmilenio.

For Seoul, fare box is operated by SMG. Transport operators are paid based on number of vehicle-kilometer operated⁵. Besides, SMG also pay a certain profit (proportional to transport earning) to assure the operator a contracted operation cost without relating to deficits or gains of the bus operation.

4. CONCLUSION: MERIT OF INTEGRATION, CHALLENGES AND ROOMS FOR IMPROVEMENT

It could be seen from all of three cases that integration of public transport provided a practical solution for chaos suffered from segregation, uncoordinated, and too much competition among transport operator entities. Integrated system contribute in simplifying passenger journey by eliminate the burden of uncoordinated public transport system through uniform system of routes, timetable, and fare. The integrated system results in increasing of public transport patronage, decreasing of private vehicle us, and finally enhance social welfare. In operator sides, improvement in both quality of operation and financial status could be seen. In short success of integrated system seen from these examples could be model for public transport in other regions.

However, there some issues should be highlighted. To integrate the system from independent operation need high attempt, power, and cooperation from all relevant parties; administrator, transport operator, and passenger. And since the operational plans are provided by administrators, transport operators are pushed tightly to run their service according to the plan and do not have much gap to improve their performance by themselves. The issue of how to inspire motivation in maintaining and improving operational performance should be highlighted. Finally is about financing source. Except for Transmilenio, RMV and Seoul have to subsidize public transport service. Mechanism of maintain profit of public transport would be worth to studied.

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