What the GTX and Grand Paris projects can learn from each other

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Abstract

Paris has one of the world's oldest metropolitan railway systems and was also a pioneer when it introduced the RER in the 70s. With planning objectives comparable to the GTX, the RER aimed at serving outer suburbs while fully crossing the city center at higher speeds than the Metro. Maybe more relevant is the comparison between the planned Grand Paris Express and GTX projects, in terms of their planning ambitions and their development framework. This article will introduce the main planning ideas behind the Metro and the RER in Paris, and try to draw relevant comparisons with the GTX plan. It will also present the plans and financing framework for the Grand Paris Express and compare it with the BTO scheme contemplated for GTX, and draw some recommendations for successful implementation.

Keywords : *BTO scheme, Grand Paris Express project, GTX project, Financing model, Paris Metro, Réseau Express Régional*

1. Introduction

As the major capitals of the world compete head to head to attract investment, foster growth and provide employment and well being to their citizens, they fully recognize that an efficient public transport infrastructure is of critical importance [1]. It is in this context that the Seoul and Paris capital regions, two of the world leading metropolis, have engaged in the recent years in ambitious railway development plans that share a number of similarities, the Grand Paris and the GTX projects. The Grand Paris Express plan follows the diagnosis that the Metro and RER network are congested and do not properly address the commuting needs of the suburban dwellers, which now constitute the majority of the population in the Paris capital region. At time of widespread financial constraints for local authorities, it becomes even more critical to honestly review the true economic feasibility of such massive projects, and to make sure the implementation is designed for the projects to deliver their full long term potential. International benchmarking and review of historical examples is a way to critically assess the objectives.

2. Development of the Metro and RER in Paris

In the developed world, few metropolitan areas are as dependent as Paris on their public transportation networks. Of mechanized trips within and into the central city, public transport holds a mode share of over 60%. The Metro system (14 lines, 384 stations, 220 km) was mostly developed in the early 20th century and addresses most of the demand within the central city; while the RER (Réseau Express Régional – 5 lines, 257 stations, 587 km) was developed from the 1970s to link the booming suburban population centers to the central city [2].

The Paris Metro was designed to provide local, point-to-point service in Paris City proper and service into the city from some close suburbs. Except the driverless Line 14 and some extensions, all lines were already built before World War II. Stations within Paris are very close together to form a grid structure, with the objective of always being able to find a metro station within a 400m walking distance. This structure ensures that every point in the city is conveniently close to a metro station, but also keeps the speed of service at a relatively slow 20 km/h, except on Line 14 where the stations are farther apart and the trains travel faster. The low speed precluded extending services to farther suburbs, which were instead serviced by the RER.

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Fig. 1 Metro and RER map

Table 1. Comparison of Existing RER Network with the Plan for GTX

	RER	GTX

Number of lines	5	3
Total Route (km)	586.4	174
Number of station	257	25
Number of transfer station (with metro)	29	5
Average interstation Distance (km)	2.3 (1.7-2.7)	9 (6 in downtown)
Average headway time (min.)	2.5 (A-C) / 5 (D-E)	5-10
Average speed (km/h)	53 (E line : 71)	100-120 (max.200)
Annual ridership	782,889,815 (present)	278,419,810 (2016-forecast)

RER is often described as an inspiration for the GTX plan; and it is true in terms of planning objectives and network shape: providing quick connections to the downtown from the main population centers in the suburbs; crossing through the city center and providing seamless connections with the Metro system. The “E” of RER stands for “Express” – as at the main objective was to provide faster connections than the Metro, with fewer stops and greater distance between stations. To optimize the budget, it was decided to use existing suburban railway lines outside of Paris; but to go build new underground tracks that run below the Metro network in the central city, with unusually spacious, deep stations. The first under-

ground section of the RER opened in 1977; and the last line (Line E) was added in 1999.

The social and economic impact of the RER is difficult to overstate. Journey times, particularly on east-west and north-south routes, have been cut spectacularly. As a result, the network has been an extraordinary popular success since its opening. Lines A and B reached saturation relatively quickly, exceeding by far all traffic expectations: up to 55,000 passengers per hour in each direction on Line A, and over 2 million passenger day on the network. The RER's value to the economy of Île de France cannot be in doubt. By bringing far-flung suburbs within easy reach of central Paris, the network has also significantly aided the regional integration.

This backbone rail system is complemented by a network of buses, BRTs and tramways.

But as the population of the suburbs continued to expand (Paris City proper now houses only about 20% of Île de France's 11.5 million inhabitants) and secondary activity centers developed, the travel patterns changed dramatically; with 70% of the trips in the Île de France region now going from suburb to suburb. These circumferential flows are inadequately served by the “Paris-centric” RER and Metro network, which results in an over dominance of car usage for these suburb to suburb connections.

3. The Grand Paris Express: A New Driverless Metro Network for the Paris Capital Region

With the planned Grand Paris Express project, however, that situation is set to change. Altogether, 3 new lines totaling 155 km will be built in the Paris capital region, for a total investment of around €20.5 billion (\$29.5 billion).

Fig. 2. Grand Paris Express network as approved by the law of Aug 24, 2011 [4]

With an expected two million daily riders, the Grand Paris Express will transform the commutes of a huge percentage of the region's inhabitants by offering far faster connections between suburbs, allowing people to avoid transferring trains in the central city. Commercial operations on the first sections will start in 2017, and the network will be fully operational by 2023. Trains will be driverless and some sections will run 24 hours a day, a first for Paris. In total, 57 stations are to be built, 44 of which will provide transfers to the existing system and seven of which will offer links to the high-speed TGV rail network [3].

The economic and demographic impacts of the project are very ambitious, since the hope is to create 1 million jobs and generate population growth of 1.5 million inhabitant, the vast majority of which in the immediate surroundings of the new stations.

The project was first launched in 2007 under the leadership of President Sarkozy; and was finally rubber stamped by a law on August 24, 2011, after a broad consensus was built between the French central government, the regional government (Île-de-France region) and local authorities; despite central and local power being shared between the right and the left. Thanks to this hard-fought cooperation

Table 2. Comparison of plan for Grand Paris Express with plan for GTX

	Grand Paris Express	GTX
Number of lines	3	3
Total Route (km)	155 (new)	174
Number of station	~57	25
Average interstation Distance (km)	~3	~9
Average headway time (min.)	1.5 to 3 min	5 to 10 min
Average speed (km/h)	65	>100
Annual ridership	~750 million	~280 million
Planning Shape	Circular, suburb to suburb	Radial, Suburb to Downtown
Phasing	Incremental	"all at once"

between the regional and the national government, funding is assured for most of the project, and the result will be a tremendously improved transit system for the region's inhabitants, especially those who live outside of the center city [4].

Fig. 3 Development framework of grand paris express [7]

4. Financing and Framework for the Grand Paris Express

To conduct the project, the government incorporated Societe du Grand Paris (Greater Paris Company) a public-owned Special Purpose Company (“SPC”), which will receive equity injections from the Central Government (€4 billion) and from Regional and local governments (around €1.5 billion). With this capital base, the public SPC will finance the rest of the project by contracting loans and emitting bonds (around €15 billion in total). To repay this debt the SPC will be allowed to levy taxes on commercial activity and real estate; and will use eminent domain to redevelop land around each of the stations. It will use the funds it accumulates through sales and added-value taxes to help pay off debt [4,5].

The SPC will essentially be a planning and financing body with no day to day operational responsibility. It will thus tender out Engineering, Procurement and Construction works on one side, and Operation and Maintenance services on the other side.

As in most cases in France, infrastructure will thus be fully publicly funded [6], but the system will be operated by private companies under a contract with clear performance objectives and a limited duration. It has been demonstrated that this model of regulated competition allows operating costs to be cut significantly and ridership to be stimulated. This “French model” of tendering and contracting operations has been replicated in other countries with similar success and since 2010 has become the legal

framework for urban transport in all the European Union (EU Regulation 1370/2007,[8]).

5. Discussion on the Financing Model for GTX

While the Grand Paris Express is thus developed under the “public finance / private operate” model; the GTX is following another route and will involve significant private sector financing under the PPI model. Today the main argument surrounding the GTX development is which of “solicited” or “unsolicited” BTO model is best suited. Yet the current fate of a number of rail BTO projects in Korea could give a pause for thought; especially since we are talking of such a massive and critically important project.

Korea is probably the country in the world with the greatest number of rail BTO projects under construction or implementation; and benefits from efficient and capable regulatory authorities, strong implementation capabilities, competitive construction companies and quick adaptability. Despite this, the first feedbacks on the rail BTOs projects are mixed; with AREX being taken over by KORAIL after only one year of operation in 2009 (and still having a usage far below initial forecasts even with a very low fare), Yongin LRT being stuck in a legal argument, and serious concerns being raised on the ridership forecasts of Busan-Gimhae LRT and Uijeongbu LRT, which also suffer significant delays [9].

These difficulties are mostly linked to the specificities of

the rail sector, which have to be recognized if one wants to develop sound and sustainable projects:

- Urban rail transport is never profitable, because it also has a major social, environmental and economic role, and because its fares are very much impacted by political decisions. All metro operators in Korea suffer of major operating deficits (ranging from 30% to 60%) – and there is not one single example of urban rail project in the world whose fare revenues cover operation costs AND financing costs [9].

- Urban rail projects are highly complex and highly political projects, whose success depends on operation more than on construction (unlike a bridge, a road or a power plant).

So the truth is that even if BTO projects do bring real efficiencies (mostly through more cost-efficient operation), they cannot change fundamentally the economic imperatives of a project and it would certainly be unrealistic to expect them to “magically” turn lead into gold.

6. Some Recommendations to Make GTX Work

Most countries who have engaged in ambitious PPI programs have faced difficulties in the early stages, as the participants are still untested and optimism prevails. The experience of failures usually brings more balance and a better appreciation of risks. GTX will be the biggest rail BTO in the world and it cannot be afforded to fail; as a failure would have disastrous financial, political, and social consequences. Ultimately taxpayers and commuters would have to pay the price if promises are not stood by. More than ever the lessons from the recent failures have to be learnt so that behaviors change and a truly realistic project assessment is made. The experience of PPIs both in Korea and overseas leads to the following recommendations to achieve better stability for this massive project:

- The presence of an experienced Operator before the bid submission must be mandatory; operator knowledge should be central to the whole process and its role should be established contractually.

- Qualifications requirements for PPI tenders should emphasize a successful track record in similar projects

- The Concession contracts should focus on operational and commercial performance more than on construction

- A level playing field should be created so that international and domestic private operators actively participate, not only public corporations with questionable economic record.

- Fares shall be decided by the Public Authority in any case – but compensations have to be provided if fares are

set below economical levels; and predictable adjustment mechanisms that reflect affordability and costs (wages, energy etc) are needed

- The “over-optimism” bias should be reined in – by bringing more long term accountability

- Termination payments are necessary; but they should reflect genuine risk transfer. Equity investors should be fully at risk, and even lenders should not be fully protected or they lose their incentive for thorough due-diligence.

- All forecasts should be “reality checked” with comparable operational projects; especially for demand and operating costs. Many obvious exaggerations could have been avoided.

- It is good for private bidders to have an incentive in the commercial success of the project, but ultimately transport demand depends mostly on Public sector decisions (fares, competition of other lines and modes, urban developments, parking policy, fuel price etc); so this risk is better shared.

7. Conclusion

In a sense the GTX plan is at the crossroads of the RER and Grand Paris Express. In terms of planning it draws from the RER, with radial routes aiming at connecting the central City with growing population centers in the metropolitan area. Technically, in terms of scale and financing framework, the comparison with the Grand Paris Express is much more relevant; both projects have similar scale and ambition, and will be developed in the same time horizon. GTX and Grand Paris Express have thus much to learn from each other to ensure that these extremely capital intensive projects deliver their promises. In particular, both projects follow different routes when it comes to the development and financing process. While the potential benefits of PPI are clear, it has to be recognized that GTX would become by far the biggest BTO project ever in the world. More than ever, it has to be reviewed pragmatically and realistically, in the light of recent Korean and international BTO experiences. This project is simply “too big to fail”.

References

1. Madies, T. and Pager, JC (2008). “Innovation et compétitivité des régions – Rapport,” La Documentation française.
2. Official website of RATP, www.ratp.fr
3. Societe du Grand Paris (2011). “Le dossier du maître d’ouvrage,” La Documentation française.
4. Societe du Grand Paris’ official website, <http://www.societe->

dugrandparis.fr/

5. CARREZ, G. (2009). "Grand Paris, financement du projet de transports," La Documentation française.
6. French Law (2010). "LOI n° 2010-597 du 3 juin 2010 relative au Grand Paris," legifrance.
7. VIVANT, E. (2011). "From RER to the Grand Paris Express – What the GTX project can learn from Paris," proceedings of GTX conference in Gwachon June 2011.
8. European Union (2007). "Regulation (EC) No 1370/2007 of the European Parliament and of the Council of 23 October 2007 on public passenger transport services by rail and by road and repealing Council Regulations (EEC) Nos 1191/69 and 1107/70," Official Journal of the European Union
9. VIVANT E. (2011). "Appraising PPPs as a viable model for developing MRT system," proceedings from Modern Railways conference in Bangkok May 2011.

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