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# PRIVATE SECTOR PARTICIPATION IN LIGHT RAIL-LIGHT METRO TRANSIT INITIATIVES

BY CLEDAN MANDRI-PERROTT



THE WORLD BANK





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**THE WORLD BANK**



**PPIAF**

PUBLIC-PRIVATE INFRASTRUCTURE ADVISORY FACILITY

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# Foreword

Cities across the globe are looking to improve transportation in response to ever-expanding urban populations. Planners must find affordable, environmentally friendly, and socially responsible transportation solutions that can support further development in urban areas. When appropriately planned and properly implemented, light rail–light metro transit (LRMT) systems can provide rapid urban mobility and vital access to city centers from surrounding districts. Attractive LRMT services can help reduce both traffic congestion and vehicular emissions. Such systems also have the potential to drive urban renewal and increase local investment when supported by enabling policies. Improving transportation enhances quality of life by giving citizens greater access to employment opportunities, urban amenities, and neighboring communities.

This book aims to help governments and public authorities to establish effective LRMT systems, and focuses on use of Public-Private Participation (PPP) arrangements. Rather than identify a single approach, we present options and discuss practical issues related to preparing and implementing new LRMT PPP schemes. The approach is focused on providing information that can be used to make informed decisions, adapted to local policy and objectives. The material presented is intended as a practical guide to developing LRMT PPPs in both developed and developing countries. This work endeavors to provide answers to readers' questions regarding how to successfully incorporate private sector participation in LRMT with a lesser emphasis on why LRMT and the private sector may be beneficial. The primary focus of this text is guiding the reader from design through to project implementation. It starts from the premise that underlying transport policy decisions will have already been made and that LRMT has already been identified as the appropriate transport solution. We have included some limited discussion of policy and technical issues where these directly impact the LRMT PPP approach.

The approach is presented in nine sections, and in preparing it the author drew on current international LRMT PPP experience, through a series of interviews and case studies. The sections covered are

- 1. Urban Transport and light rail–light metro transit (LRMT):** *An overview of urban transport policy, the characteristics of LRMT schemes and the influences on LRMT policies.*
- 2. Technical Issues:** *A brief review of some key technical issues inherent in LRMT schemes and their potential impact on PPP design and implementation.*
- 3. Incorporating Private Sector Participation in LRMT Initiatives:** *What PPP has to offer, and an overview of the issues and stages public authorities follow to establish successful LRMT PPP arrangements.*
- 4. Understanding and Managing Risk:** *Analyzing and allocating risks and responsibilities among stakeholders in the LRMT scheme and practical ways of designing risk allocation rules.*
- 5. Public-Private Partnership, Design, Specifications and Performance Management:** *Setting service standards and specifications and establishing associated costs; developing of performance and payment indicators and managing compliance.*
- 6. Funding and Finance:** *Large LRMT capital and system maintenance requirements require strong financing arrangements. The practical use of public and private financing mechanisms under PPP arrangement is reviewed.*
- 7. Developing a PPP Agreement:** *Looking at the main types of PPP agreements, an outline framework for developing the contractual arrangement is developed through re-view of key issues.*
- 8. Procurement:** *Reviewing the approaches that the public authority can use to select the private partner.*
- 9. Conclusions**





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We believe that this book is a useful contribution to the development of urban rail services. Much work has already

been done on general urban transport issues to which this book is intended to be a complement. The book should be of considerable value to government officials and managers of urban rail enterprises, whose strategy for improving urban rail services includes using the private sector and aims to help them design arrangements that lead to better services. It should also be a useful source for private sector specialists working on urban rail transport solutions.

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*September 2009*

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Tram in Dresden, Germany.  
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# Acknowledgments

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Light Train in Barcelona, Spain.  
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# Glossary

**Authority:** A public body charged with tasks that may include

- Formulating policy
- Procuring assets or private partners
- Regulating contracts
- Monitoring and evaluating project performance
- Operations

The role and responsibilities assigned to authorities may differ depending on individually specific mandates or charters.

**Availability payment:** Financial compensation payable to the developer by the grantor to an agreed satisfactory availability of a service or asset.

**Balance sheet:** A statement showing an organization's financial assets, liabilities, and equity.

**Bankability:** A measure of a project's suitability for commercial financing that typically includes factors related to transport policy, integration, ticketing, and macroeconomic conditions, among many others.

**Basis point:** One hundred basis points are equivalent to 1 percent. Basis-point differentials (spreads) are often used to describe interest rates on private debt relative to public debt.

**Best and final offer (BAFO):** A final round of bidding where selected firms (typically two) improve on their original bid submissions in an effort to achieve the best combined technical and financial proposals for final consideration.

**Cash flow:** A stream of liquid assets (that is, cash). The term free cash flow is often used in the context of a project company to describe its ability to service debt, pay dividends, and invest in assets.

**Commercial close:** The point in time when project parties formalize and sign contractual agreements. Commercial close does not necessarily coincide with financial close, at which time all financial arrangements are in place and the project company of the developer is ready to draw on the funding available for the project.

**Commuter rail:** Systems that typically have greater distances between stations, allowing them to achieve high revenue speeds. These systems are particularly effective at creating rapid links between urban centers and periphery communities. Electric commuter rail links in dense urban areas may involve complex civil works to achieve grade separation.

**Concession payment:** A payment made by a concessionaire to a contracting authority.

**Consortium:** A group of companies assembled to bid and eventually realize a light rail–light metro transit project through a public-private partnership agreement.

**Consumer price index (CPI):** A measure of inflation commonly used in a number of countries.

**Contingent liability:** An uncertain obligation to pay or perform some service at a future date.

**Contracting authority or grantor:** The public counterparty to a public-private partnership agreement (most often a signatory to the contract). Contracting authorities may have some or all of the roles and responsibilities discussed under the definition of authority.

**Cost of capital:** The opportunity cost of scarce resources invested in a project.

**Counterparty risk:** One party's risk that another party will fail to meet its obligations as agreed in a contractual arrangement.

**Creditworthy:** Likely to repay a debt as agreed.

**Debt service:** The total amount of interest and principal payments required to satisfy the conditions for repaying debt.

**Demand risk:** Risks associated with uncertain levels of passenger or customer numbers using the light rail–light metro transit services.

**Depot:** A maintenance and storage facility for light rail–light metro transit vehicles. Depots can be relatively large and may be above ground or underground, as spatial constraints require.

**Developer:** The private company or consortium of private companies contracted through a public-private partnership agreement to perform some combination of the following: financing, design, construction, commissioning, maintenance, and operations.

**Discounted cash flow (DCF):** A form of analysis whereby future cash flows are valued at their present-day equivalent.

**Drawdown:** The process of incrementally receiving funding or financing committed to a project.

**Due diligence:** A process of examining and analyzing every aspect of a project (financial, technical, legal, market, and so on) to fully understand its risks, cash flows, and overall sustainability.

**Eurodollars:** U.S. dollar–denominated deposits held in banks outside the United States.

**Expansion:** Typically refers to increasing the customer capacity of existing light rail–light metro transit service routes, including

- Increasing the number of trips between stations
- Adding rolling-stock carriages to train configurations
- Increasing the capacity of stations and platform infrastructure
- Extending operating hours

**Extension:** Implies the creation of new routes to areas previously not served, typically including constructing new track infrastructure in addition to stations.

**Farebox ratio:** A measure of operating costs that are covered by fare revenues (that is, what customers pay for light rail–light metro transit service).

**Financial close:** The day when the project's financial structure is finalized, all investors commit funds, and those funds are ready to be used by the developer.

**Force majeure:** An event beyond the control of any project party that significantly (and often adversely) affects a project. Examples of force majeure events include natural disasters, terrorism, armed conflict, and riots.

**Forward contract:** An agreement between two parties to exchange some form of consideration at a future date. Unlike futures contracts, forward contracts may involve counterparty risk because they are not typically traded on regulated exchanges.

**Futures contract:** An agreement between two parties to exchange some form of consideration at a future date. Futures contracts are traded on regulated exchanges and involve mark-to-market reconciliation of daily gains or losses. The exchange-traded feature of futures contracts eliminates the counterparty risk associated with forward contracts.



**Gearing:** The relative proportion of debt to equity in the capital structure of a project company. Highly geared companies have greater proportions of debt relative to equity financing.

**Grade-separated heavy metros:** Systems that are typically found in areas with high population densities and limited physical space and that require highly complex civil works—often including substantial investments in underground construction. Grade-separated heavy metros use relatively large rolling-stock configurations (that is, many linked cars) and have high revenue speeds when stations are sufficiently spaced apart. These systems offer the greatest passenger capacities but also require the largest upfront investments of any light rail–light metro transit solution.

**Grade-separated medium-capacity “light” metros:** Systems that use rolling-stock technology similar to light rail trains but typically incorporate greater complexity in their civil works to achieve full segregation from general traffic. Increased segregation allows for higher revenue speeds, improved service reliability, and greater passenger capacity. Many grade-separated medium-capacity metros are inappropriately labeled as “light rail” on account of their similar rolling stock.

**Guarantee:** One party’s agreement to endure the consequences of risks otherwise born by some other party.

**Hedge:** A position taken to offset some exposure to uncertainty. For example, project companies may enter into forward contracts to “hedge” against unfavorable changes in foreign exchange rates that could otherwise adversely affect project costs and revenues.

**Leverage:** An alternate term for debt and the degree of debt a project involves. Highly-leveraged projects involve greater amounts of debt relative to equity.

**Liability:** An uncertain obligation to pay or perform some service at a future date.

**Light rail trains:** Most light rail systems include a mix of segregated and nonsegregated rights of way. Light rail systems often serve downtown areas in addition to neighboring suburbs. Common light rail train systems use two-car rolling-stock configurations with articulating joints between cars. This arrangement provides for greater passenger capacity while still allowing for tight radius-cornering capabilities.

**Linkage:** A route between two or more stations.

**Net present value (NPV):** The value (at current time) of future cash flows net of expenses.

**Operational control center:** The “nerve center” that supervises, manages, and controls light rail–light metro transit system operations. Such facilities are typically connected to all applicable signaling and monitoring systems of the system and have direct communications with light rail–light metro transit vehicle drivers, station managers, security forces, and emergency services.

**Opportunity cost:** The forgone benefit of not pursuing a next-best alternative.

**PPP reference model:** A financial model that describes the risk-adjusted cost to the public sector in pursuing a public-private partnership (PPP) approach for a project.

**Passengers per hour per direction (pphpd):** The number of customers a light rail–light metro transit system can transport per hour in a single

direction along its route.

**Pax/sqm:** A measure of passenger density equivalent to the fractional number of passengers occupying a square meter of free, open floor space in a light rail–light metro transit vehicle.

**Performance management system:** An agreed set of assessment criteria tied to a regime of penalties and possibly rewards designed to align private operator incentives with public interest.

**Pro rata:** Division according to some proportional allocation between participants.

**Public sector comparator (PSC):** A financial model that describes the risk-adjusted cost to the public sector of realizing a project using only traditional procurement methods (without a public-private partnership approach).

**Reference design:** A nondetailed, conceptual design provided to prospective developers on which their detailed designs will be based. Reference designs typically offer generalized guidance for major civil works, such as track alignment, conceptual station architecture, and location of major civil works.

**Reserve account:** A separate pool of funds set aside to pay a future expense (for example, debt service or maintenance).

**Risk adjusted:** Term that implies that the overall value assigned to some consideration includes a valuation for uncertain outcomes that may occur.

**Rolling stock:** A collective term for light rail–light metro transit vehicles. This broad definition can be subdivided into

- Revenue rolling stock (vehicles that carry customers)
- Nonrevenue rolling stock (vehicles that are used for maintaining system assets, including revenue rolling stock)

**Route:** The path that a light rail–light metro transit system’s track follows.

**Shadow fare:** An additional amount of compensation paid to a private operator by a public authority for each customer fare collected. Shadow fares can bridge differentials between service costs and actual customer payments, thereby allowing for lower fares in support of policy goals.

**Sinking fund:** A pool of funds (accumulated through regular payments) that is designated to pay for a future expense.

**Streetcars and trams:** Services that are typically not segregated from general traffic and carry proportionally fewer customers at slower speeds over shorter distances. Streetcars and trams are commonly found in and around downtown areas and often use a single-car configuration for rolling stock.

**Subordinated (junior) debt:** Debt with a priority for repayment. Subordinated or junior lenders receive repayment only after senior lenders have been repaid in full.

**Tenor:** The life of a loan (typically in years).

**Tranche:** A distinct portion of an overall financing package.

**Value for money:** A measure of the additional value created for public institutions through successful partnerships with private firms. The term value for money (with some good or bad qualifier) is often used as a measure of other investments as well.

# Abbreviations

<b>AP</b>	availability payment
<b>ATC</b>	automatic train control
<b>AVL</b>	automatic vehicle location
<b>BAFO</b>	best and final offer
<b>BBBEE</b>	Broad-Based Black Economic Empowerment
<b>BC</b>	British Columbia (Canada)
<b>BEE</b>	Black Economic Empowerment (South Africa)
<b>BLT</b>	build-lease-transfer
<b>BMA</b>	Bangkok Metropolitan Authority
<b>BOOT</b>	build-operate-own-transfer
<b>BOT</b>	build-operate-transfer
<b>BRT</b>	bus rapid transit
<b>BTO</b>	build-transfer-operate
<b>BTS</b>	Bangkok Transit System
<b>BTSC</b>	Bangkok Mass Transit System Corporation Limited
<b>CCTV</b>	closed-circuit television
<b>CEN</b>	European Committee for Standardization
<b>CLCO</b>	Canada Line's contracting authority (under TransLink)
<b>CMC</b>	control and maintenance center
<b>CP</b>	condition precedent
<b>CPI</b>	consumer price index
<b>CPIX</b>	consumer price index, excluding mortgage interest payments
<b>CSFB</b>	Credit Suisse First Boston
<b>DBFM</b>	design-build-finance-maintain
<b>DBFO</b>	design-build-finance-operate
<b>DBOM</b>	design-build-operate-maintain
<b>DCF</b>	discounted cash flow
<b>DFID</b>	Department for International Development (United Kingdom)
<b>DfT</b>	Department for Transport
<b>DLR</b>	Docklands Light Railway (London)
<b>DLR Ltd.</b>	Docklands Light Railway Limited (DLR's contracting authority)

<b>DoT</b>	Department of Transportation (various countries)
<b>DoTC</b>	Department of Transportation and Communications (Philippines)
<b>DSCR</b>	debt-service coverage ratio
<b>ECA</b>	export credit agency
<b>EDSA LRT</b>	The consortium that built Manila's MRT3
<b>EIB</b>	European Investment Bank
<b>ESDA</b>	Epifanio de los Santos Avenue (Philippines)
<b>Euribor</b>	euro interbank offered rate
<b>Ex-Im</b>	Export-Import
<b>FDBOM</b>	finance-design-build-operate-maintain
<b>GMPTA</b>	Greater Manchester Passenger Transport Authority
<b>GMPTe</b>	Greater Manchester Passenger Transport Executive
<b>GVAA</b>	Greater Vancouver Airport Authority
<b>GVRD</b>	Greater Vancouver Regional District (Canada)
<b>HBLR</b>	Hudson-Bergen Light Rail
<b>HM</b>	Her Majesty's
<b>IABC</b>	International Association of Business Communication
<b>ICC</b>	Investment Coordination Committee (Philippines)
<b>IFC</b>	International Finance Corporation
<b>IFI</b>	international financial institution
<b>IP</b>	intellectual property
<b>IRR</b>	internal rate of return
<b>ISO</b>	International Organization for Standardization
<b>JEXIM</b>	Japan's Export-Import Bank
<b>KfW</b>	Kreditanstalt für Wiederaufbau (the German government's development bank)
<b>KL</b>	Kuala Lumpur, Malaysia
<b>KPI</b>	key performance indicator
<b>LDDC</b>	London Docklands Development Corporation
<b>LIBOR</b>	London interbank offered rate
<b>LRMT</b>	light rail-light metro transit
<b>LRSP</b>	Livable Region Strategic Plan (Canada)
<b>LRT</b>	Light Rail Train
<b>LRTA</b>	Light Rail Transit Authority
<b>LTFRB</b>	Land Transportation Franchising and Regulation Board (Philippines)

<b>MRG</b>	minimum revenue guarantee
<b>MRT</b>	Mass Rapid Transit (network, Singapore)
<b>MRT3</b>	Manila Metro Rail Transit System line 3 (Metrostar Express)
<b>MRTC</b>	MRT3's project company
<b>MTR</b>	Mass Transit Railway (Hong Kong, China)
<b>NAO</b>	National Audit Office
<b>NCCI</b>	net-cost contract with investment
<b>NEDA</b>	National Economic Development Agency (Philippines)
<b>NPV</b>	net present value
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>OSA</b>	Official Secrets Act (Malaysia)
<b>O&amp;M</b>	Operations and Maintenance
<b>PFI</b>	private finance initiative
<b>PMS</b>	performance management system
<b>pphpd</b>	passengers per hour, per direction
<b>PPIAF</b>	Public-Private Infrastructure Advisory Facility
<b>PPP</b>	Public-Private Partnership
<b>PQQ</b>	prequalification questionnaire
<b>PSC</b>	public sector comparator
<b>PSP</b>	private sector participation
<b>PUTRA</b>	Projek Usahasama Transit Ringan Automatik (Kuala Lumpur)
<b>QMS</b>	quality management system
<b>RA</b>	Republic Act (Philippines)
<b>RATP</b>	Régie Autonome des Transports Parisiens (France)
<b>RBS</b>	Royal Bank of Scotland
<b>RER</b>	Réseau Express Régional (France)
<b>RFP</b>	request for proposals

<b>RFID</b>	radio frequency identification device (Phillipines)
<b>RPI</b>	retail price index (United Kingdom)
<b>RPIX</b>	retail price index, excluding mortgage interest payments (United Kingdom)
<b>SMME</b>	small, medium, and micro enterprise
<b>SMS</b>	safety management system
<b>SMTp</b>	strategic metropolitan transport planning
<b>SNPB</b>	Syarikat Prasarana Negara Berhad (Kuala Lumpur's publicly owned national infrastructure holding company)
<b>SPV</b>	special-purpose vehicle
<b>SRT</b>	Thailand State Railway
<b>STAR</b>	Sistem Transit Aliran Ringan (Kuala Lumpur)
<b>STU</b>	special technical requirements
<b>TfL</b>	Transport for London
<b>TVM</b>	ticket vending machine
<b>VAL</b>	véhicule automatique léger
<b>VfM</b>	value for money
<b>VIAA</b>	Vancouver International Airport Authority
<b>YVR</b>	Vancouver area's international airport

Currency symbol	Expanded name
<b>Can\$</b>	Canadian dollars
<b>€</b>	Euro
<b>FF</b>	French franc
<b>RM</b>	Malaysian ringgit
<b>₱</b>	Philippine peso
<b>ZAR</b>	South African rand
<b>B</b>	Thai baht
<b>£</b>	U.K. pound sterling
<b>US\$</b>	U.S. dollars

## SECTION A

# UNDERSTANDING LRMT

## Chapter 1:

### Urban Transport and Light Rail–Light Metro Transit

- Broad overviews of urban transportation, relevant policy considerations, and alternatives analysis
- Characteristics of LRMT schemes (scope, choice as urban transport solution, value for money, and budgetary policy issues)

## Chapter 2:

### Technical Issues

- Various key characteristics of LRMT that influence policy, design, and contractual arrangements of PPP schemes (complexity and size, route, segregation, integration, rolling stock, service, and ticketing and barriers)

## SECTION B

# STRUCTURING PRIVATE SECTOR PARTICIPATION

## Chapter 3:

### Incorporating Private Sector Participation in LRMT Initiatives

- Discussion about what the private sector can offer and some ideas about the effect of PPP on LRMT schemes, investment, and operations and policy enforcement
- Discussion of the various PPP structures used in developing LRMT schemes
- The four stages of PPP development and implementation (policy development, arrangement design, developer selection, and arrangement management)

## Chapter 4:

### Understanding and Managing Risk

- Risk as an important factor in determining the type, design and effective implementation of LRMT PPP projects
- Analysis and allocation of responsibilities and risks in LRMT PPP projects, including macroeconomic risks, sector-specific risks, and project risks

## Chapter 5:

### Public-Private Partnership Design, Specifications, and Performance Management

- The relationship between setting service requirements and consequent capital and operating cost needs
- The balance between fares and subsidies, and the effect on financing
- Discussion of how key performance indicators define specified service qualities and provide the contractual mechanism for obtaining them

SECTION  
C

## IMPLEMENTING AGREEMENTS

### Chapter 6:

#### Funding and Finance

- Descriptions of various funding sources, their advantages, and unique considerations
- Detailed discussion on both project and corporate finance structures and their implications
- Brief overviews of refinancing gains, valuing of contingent liabilities, and “sinking funds”

### Chapter 7

#### Contractual Arrangements

- The legal framework for LRMT PPP schemes
- Methods for analyzing contractual needs, including contractual and financial links, term sheets, and use of a layered contract approach
- A checklist approach (following a concession example) to key contract clauses

### Chapter 8:

#### Procurement

- Choice of a suitable method for LRMT PPP procurement and selection of a developer
- Management of the bidding process, including use of transaction advisers, specialist advisers, and award committees
- Choice and implementation of effective developer selection criteria and evaluation of bids
- A practical view of bidding, evaluation, selection, and negotiation to contract close with the chosen developer

SECTION  
D

## CONCLUSIONS

### Chapter 9:

#### Conclusions

- Summary of material discussed
- Conclusions on key points covered

#### Annexes

- Detailed information on project case studies, together with supporting material on LRMT PPP issues

# Case Studies



## Manchester Metrolink-United Kingdom

- System Type: Light Rail Train
- Contract Structure: O&M franchise (current) full DBOM concession with capital grant (previous)



## Kuala Lumpur STAR / PUTRA-Malaysia

- System Type: Light Metro
- Contract Structure: Full FDBOM concession



## Gautrain-Gauteng Province-South Africa

- System Type: Electric Commuter Rail
- Contract Structure: Full DBOM concession (with substantial capital grant)



## Canada Line-Vancouver, British Columbia

- System Type: Light Metro
- Contract Structure: Full DBOM concession (with substantial capital grant)





### **MRT III-Manila, Philippines**

- System Type: Light Metro
- Contract Structure: Full DBOM concession with leaseback to public operator



### **Docklands Light Railway-United Kingdom**

- System Type: Light Metro
- Contract Structure: De-layered concessions and O&M franchise



### **Bangkok Skytrain-Thailand**

- System Type: Light Metro
- Contract Structure: Full DBOM concession

*All photographs publicly available*





Tram in Berlin, Germany.  
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of Rainer Hesse.



# Overview

This book has been developed to address the growing worldwide interest in the use of light rail–light metro transit (LRMT) schemes to provide urban transport solutions and, in particular, to review the potential use of public-private partnership (PPP), or private-public participation, models to support LRMT schemes. This work, funded by the World Bank and the Public-Private Infrastructure Advisory Facility, is based on extensive industry consultation and the development of case studies from recent major LRMT schemes, all involving some form of PPP arrangement.

The approach begins with the basic premise that the need for an LRMT scheme has already been justified and that there is a need for a systematic approach for assessing and developing the scheme while making use of some form of public-private participation. The work draws heavily on current case studies, both in major international LRMT schemes as well as in current PPP

best practice. The book has been structured to follow the expected course of development of major LRMT schemes, from policy issues through procurement of a viable and sustainable arrangement. The approach is to show how to make use of PPP effectively and how to incorporate the necessary checks and balances in the evaluation, development, and long-term operation of the project.

The book is arranged in nine key subject chapters, and the sequence has been chosen to follow, in general terms, the way that these issues are developed during the project life cycle, from policy setting through procurement and long-term management of the LRMT scheme (see figure 0.1). Each chapter gives a broad overview of the key issues involved, but there is sufficient depth to be of practical use in effective selection, design, and implementation of a PPP arrangement for an LRMT scheme.

## Chapter 1: Urban Transport and Light Rail–Light Metro Transit

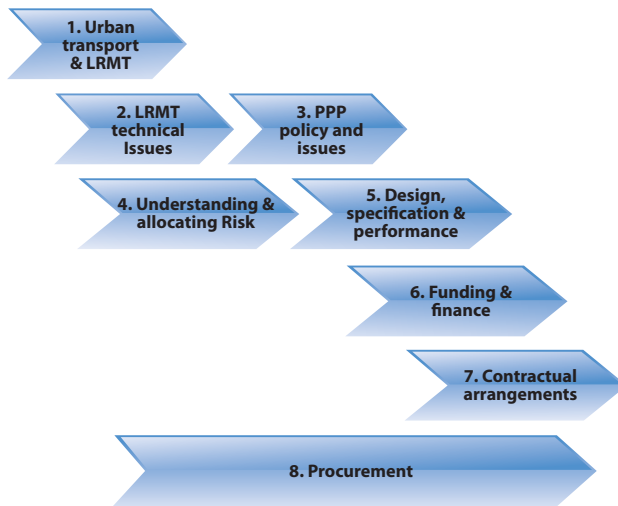
We start by looking at LRMT schemes in the context of the general urban transport sector. Then issues related to the complexity and capital needs of such schemes lead into consideration of the ways to fund the large capital investments needed and the potential role of private participation in achieving this funding. The nature of urban transport—and of LRMT schemes in particular—raises particular and key questions of policy and operation; some of these overarching issues are discussed.

The decision to implement new LRMT services and the subsequent decision to incorporate the private sector are most effective when part of a larger coordinated transport planning effort aimed at improving urban transportation through a variety of suitable transport

modes. The most successful planning efforts seem to be those that incorporate an unbiased evaluation process for selecting transport solutions. On that basis, compelling arguments for use of LRMT—or indeed any other transport mode—need to be presented before making or implementing any investment decision. Such preparatory thinking is of particular importance for LRMT schemes, because they generally have major capital investment requirements.

We look at several important transportation policy topics that will have a direct influence on key decisions related to project choice and implementation. The primary focus is to note the steps toward scheme implementation, but on the assumption that policy decisions have been made and unbiased transport mode assessments have already identified LRMT as the appropriate transport solution.

FIGURE 0.1  
LRMT PROJECT LIFE CYCLE



Source: Author's representation.

*A brief summary of the key issues  
that are covered in each chapter follows.*

## Chapter 2:

### Technical Issues

LRMT PPP projects have a unique “footprint” that is particularly influenced by the physical and technical characteristics of LRMT. In this chapter, we review some key technical issues that influence all aspects of developing any LRMT PPP scheme. Following the philosophy of our overall approach, we give the background to some of these issues and draw conclusions on some of the key consequences of a PPP scheme. We do not explain all technical design points in this work or provide a technical design primer, but we show the importance of technical design issues in the PPP context. In other chapters, we link technical design into detailed PPP policy, design, and contractual issues.

LRMT schemes vary in size and complexity, making the projects extremely capital intensive, which is one of the main drivers to using some form of PPP. This aspect, together with other key issues, has a particular effect on the financing, construction, and operation and maintenance of the PPP scheme, all of which must be reflected in the policy approach, design, and contractual form of the scheme. Some of the key issues include the following:

- Complexity and size of projects
- Route selection
- Segregated versus nonsegregated systems
- Integration
- Selection of rolling stock and asset management planning
- Capacity and service reliability
- Ticketing and barriers

For each of these key issues, we describe their importance in LRMT design and implementation and their particular relevance in relation to the choice and design of the most effective long-term PPP arrangement.

## Chapter 3:

### Incorporating Private Sector Participation in LRMT Initiatives

This book focuses on the successful introduction and design of arrangements for private participation in LRMT schemes through a PPP arrangement between the public sector (we use the terms government, grantor, and contracting authority interchangeably) and a private sector partner (the terms developer and private operator are also used interchangeably).

In this chapter, we first consider what private participation can be expected to achieve. The successful use of private sector partners in establishing LRMT schemes, as well as other public sector infrastructure and service provision, is well documented. Through a PPP, the government, as the contracting authority or grantor on behalf of the public sector, can draw on resources, expertise, and capital from the private sector.

Starting from the premise that the decision to involve the private sector in LRMT has already been made, we review some of the key issues that relate to the provision of LRMT services in urban situations and the ways that private participation might address those problems. A major issue is the need to ensure value for money, particularly where use of scarce public resources is involved. Considerable international experience has been used to assess PPP schemes, and some effective models are given as examples.

Partnering with the private sector can deliver substantial value by augmenting limited government capacity (both operational and financial) to the benefit of transport customers. However, formulating complementary relationships between public and private entities is important, because failing to “get it right” can have severe consequences for taxpayers, investors, and customers. The approach given in this book addresses this problem through the development of a viable and well-structured PPP arrangement.

Then, we discuss some of the main forms that private participation takes and how they might be used. These forms, which are assessed as a measure of the risk taken by the private and public parties, vary in range from management contracts to full net-cost contracts with investment (NCCIs)—more commonly known as concessions or build-operate-transfer arrangements. We have taken these models from international experience and also make comparisons with recent European Union practice. Again, no one model fits all schemes, and we

introduce the approach and describe how it will need to be tailored to the actual needs and market conditions of the specific LRMT scheme.

It is important to understand that the PPP arrangement is an integral part of the LRMT scheme, not just a contractual arrangement that can be bolted on at the end. It has important implications for the development of policy, as well as for procurement and viable operation over an extremely long contract period—perhaps 20 or 30 years. We, therefore, look at four stages of LRMT project development and note that PPP issues will need to be addressed at each stage:

**1. Developing policy.** We describe how to set objectives, identify a reform leader, and determine the ground rules for the development and operation of LRMT within the structure of the sector.

**2. Designing the arrangement.** We discuss how technical and service standards are set, how the tariff is designed, and how risk sharing is defined and allocated between the parties. We look at how to set roles and responsibilities for the parties in the PPP agreement and how to manage them. Contractual arrangements have to be developed, as do the institutions to manage them.

**3. Selecting the developer.** The process to attract and select the best private partner or developer is described, and useful advice is given for success. This topic is covered in more detail in chapter 8.

**4. Managing the arrangement.** Project design and management are covered, as well as the importance of transaction management and overall long-term contract management. Effective and comprehensive management of the PPP agreement is necessary from the earliest policy-making stages and continues, although with varying emphasis, through all stages of the project cycle, through to monitoring and regulation of the long-term service provision under the PPP agreement.

# Chapter 4:

## Understanding and Managing Risk

Proactive risk identification and allocation are essential planning tools in the successful delivery of major infrastructure projects. This chapter explores methods of allocating the risks and responsibilities between the grantor and the developer and discusses managing demand risk and the implications that risk has on the structure of the proposed PPP agreement.

At each stage, from design and construction to operation, LRMT systems face risks. The grantor and the developer must identify all project risks and the ways that they are managed. For example, LRMT projects face standard project risks such as country, sector, and project risks. Forecasting operational scenarios and the interplay of the risk variables that compose an infrastructure project is not an exact science. Accordingly, effective risk allocation will be an integral part of a project's success. Risks should be categorized into those that the grantor or developer will retain, transfer, or share. In this chapter, risks are described as macroeconomic risks, sector risks, and project risks, as well as risks involving the public and private parties' ability to perform. Risks associated with managing the PPP agreement are discussed in some detail, including issues such as payment mechanisms, fare risks, and inflation, as well as the question of how to deal with the assets, particularly at the end of the contract period.

Managing the demand or farebox risk is crucial to the viability of a long-term arrangement. Demand, ridership-flow measurements, and travel times and vehicle speeds are fundamental inputs to the appraisal of any LRMT PPP project and may be seen as having high associated risk levels. Given the problems of reliability of demand forecasts, the grantor may choose to provide either availability payments or minimum revenue guarantees to help mitigate farebox risk. These useful mechanisms are described in some depth.

# Chapter 5:

## Public-Private Partnership Design, Specifications, and Performance Management

In designing the LRMT PPP arrangement, the grantor needs to arrive at a final design that balances the provision of public services against a bankable technical and economic solution. Additionally, once the contract has been established, the grantor needs a mechanism by which it can ensure that the public service objectives are met during the life of the contract.

In this chapter, we look at some of the key steps in the process of establishing and maintaining the PPP arrangement (figure 0.2). The process starts with the grantor's defining the scope of works for the service to be provided and the standards to be met. This definition will directly affect the overall cost of the project. Generally, the cost of providing the LRMT service exceeds the cost that can reasonably be recovered from fares collected from the riders (the farebox income). Therefore, capital grants and project subsidies (through availability payments, performance payments, minimum revenue guarantees, or similar mechanisms) generally have to be provided. Once the final balance among services, costs, and subsidies has been established, the grantor can proceed to establish the final design, financial approach, and the contractual basis of the PPP arrangement. In the long term, the services to be provided by the developer need to be monitored and controlled, and they need to be linked to some form of performance payment mechanism. This task can be done through a limited number of key performance indicators (KPIs). KPIs must be practical, easily measurable, and achievable. They must be relevant to the contractual obligations and should be linked to the performance management and reporting systems. KPIs can also serve as a means of assessing the developer's level of performance and may be used as a tool for implementing incentive schemes in areas where the developer could be expected to perform above the basic contractual terms.

# Chapter 6:

## Funding and Finance

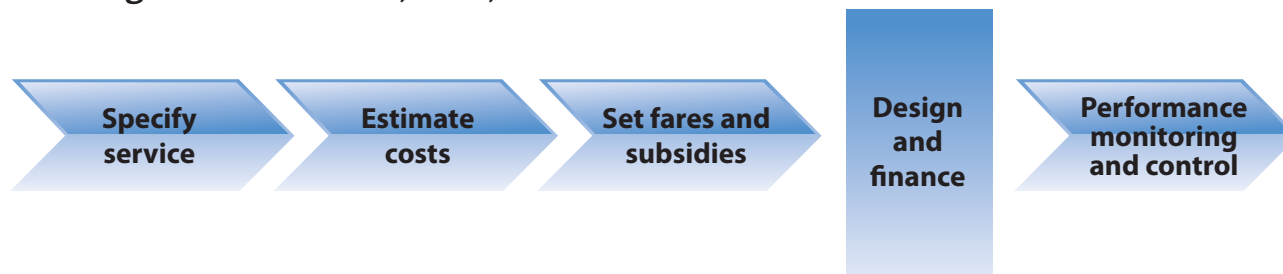
Different contractual arrangements for private sector participation can effectively prescribe the funding and financing mechanisms for LRMT projects. The majority of project financiers will look at the proposed transaction structure and try to find the funding structure that best fits. This effort, in turn, can have significant effects on other important considerations, such as affordability, value for money, risk transfer, and overall project feasibility. Because financial close usually occurs later in a project's development cycle, planners will inevitably be challenged to anticipate the implications of their decisions before receiving final investor feedback. Indeed, it should be borne in mind that sometimes the project may need to be restructured to suit funding requirements. Understanding the basic financial considerations of LRMT projects is therefore essential when seeking to align financing implications with public interests during early planning stages.

It is also important for public authorities to appreciate that private capital comes with an expectation of reasonable return. Rational, profit-maximizing developers and investors are prepared to take risks only if they expect to earn commensurate rewards. Planners must consider how private investors will recover normal returns throughout project development and implementation. Public-private partnerships are never free, and failing to understand the need for reasonable rates of return can render projects financially nonviable or result in underinvestment during subsequent stages of operation and maintenance.

This chapter discusses the more important funding and finance issues that are likely to arise in LRMT PPP projects. They are described in sufficient detail to allow the reader to obtain an understanding of their importance to the success and viability of the overall scheme.

FIGURE 6.2

### Balancing Service Standards, Fares, and Subsidies



Source: Author's representation.



Light Rail in Barcelona, Spain.  
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# Chapter 7:

## Contractual Arrangements

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This chapter looks at some of the major issues to be considered when formulating the contractual arrangements for an LRMT PPP scheme. By their nature, PPP arrangements are complex, and each arrangement has its own set of interlinking contracts and agreements that are needed to establish allocation of risks and responsibilities, as well as to deal with financial obligations and cash flows. We use a PPP agreement structure based on the NCCI to illustrate some of the main contractual issues to be considered. We also detail some of the associated contracts that would typically be used by the grantor as a means of sharing the risk among the project participants. We also look at the importance of the overall legal regime of the host country in which the potential PPP will take place and explore the importance of ensuring that the grantor has the legal rights to enter into the PPP agreement.

Finally, given that it is impossible to give one “standard” contract form, this chapter is designed to outline the key issues to be considered when designing and applying a new LRMT PPP contract. The majority of the new LRMT PPP projects reviewed in preparation for this book have involved major project investment, with investment commitment by the private sector as well as the public sector. It should be noted that many of the points covered here (that is, those not specifically related to investment) will also apply to the other noninvestment contract forms, such as operations contracts.

We will look at the basic needs for contracts and their subsidiary agreements, specifically to gain an appreciation for the potential complexity of a complete contract structure and the interlinking of the various contracts (for example, land leases, lenders’ direct agreements, and technical annexes). Although the detailed contracts will vary from scheme to scheme, the level of detail given here in a generic format provides a very useful checklist when one is assessing the adequacy and suitability of proposed LRMT PPP contractual arrangements.

# Chapter 8:

## Procurement

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This chapter presents an overview of the key issues to be addressed in selecting and awarding a contract to a suitable developer. Given the size and complexity of LRMT projects, the chosen procurement method not only needs to meet local procurement standards but also generally will need to be adapted to satisfy international norms and standards, to ensure effective involvement of financing institutions and developers. The overall goal is to establish an effective method for selecting a developer that is financially, technically, and operationally capable of the development and long-term operation of an effective LRMT system under the PPP agreement.

We focus on competitive bidding but note some key issues of other procurement approaches. The selection criteria and assessment methods are issues to be established early in the process.

Given the nature of the development of LRMT PPP schemes, it is beneficial to have continuing stakeholder consultation—particularly with potential private partners and financiers—throughout the procurement process, with the aim of development of the optimal scheme. We show how the procurement process can be managed from an initial survey of interest through to final bidding, negotiation, and award of the contract.



Source: <http://www.sxc.hu/>

# Chapter 9:

## Conclusions

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In this last chapter, we revisit some of the key issues for success encountered through our research, and we develop some thoughts related to their importance. We start with some ideas about the need to establish value for money in PPP scheme design and implementation, as well as the value that private finance can bring.

Another common thread in successful schemes seems to be the use or development of an effective transport strategy, with the role of LRMT clearly defined. In parallel with this aspect is the ability to manage fares intelligently, including a clearly defined mechanism for any subsidy (taking into account incentives for the private sector) and a clear and fair method for dealing with demand or farebox risk.

The structure of public support, including grants and subsidies, has an important effect on the scheme design. Many PPP schemes have mechanisms to provide for capital subsidies, because capital development costs are often far in excess of the capacity of the fare revenue to fund them. Even when the outcome of LRMT investments is less than ideal, substantial interest in maintaining services will almost always exist because of the numerous stakeholders involved. Consequently, the likelihood of a

publicly sponsored bailout for failed projects is quite strong. Abandoning a functioning LRMT system would simply be politically unacceptable in most cases, making the strong case for trying to get it right from the earliest stages.

The complete process requires careful systematic management, with resources and focus adapted to suit the specific project stage. The process of procurement has to be comprehensive, with the PPP procurement issues being considered at the earliest stages of feasibility and design. Early and continued consultation with the stakeholders—particularly the private developers and the organizations providing private funding and financing—during the feasibility and design stages offers a very productive way of achieving an optimal scheme outcome.

Finally, an overarching conclusion of this research is that incorporating private sector participation in LRMT initiatives can offer good value for money, but achieving this objective requires carefully managed planning and implementation. The complex and massive nature of LRMT investments has a direct effect on the type and form of private sector involvement, and ensuring adequate public and private sector funding requires a major investment by the grantor in commitment, time, and resources. Developing LRMT schemes through PPP arrangements requires the rigor of a structured approach that will satisfy both public and private sector objectives. We hope this book will give some practical assistance in meeting this goal.





# CHAPTER 1

## URBAN TRANSPORT AND LIGHT RAIL— LIGHT METRO TRANSIT



*Tramvia Blau Tram in Barcelona, Spain.  
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Rainer Hesse.*



# Urban Transport and Light Rail–Light Metro Transit

Around the world, interest is growing in the use of light rail–light metro transit (LRMT) schemes to solve increasing urban transport problems. As the number of LRMT projects increases and a track record for these projects begins to grow, a similar growth has occurred in the use of public-private partnerships (PPPs) to support provision of public infrastructure projects. This book was developed from research that was funded by the World Bank and the Public-Private Infrastructure Advisory Facility (PPIAF) and is based on extensive industry consultation and development of case studies from recent major LRMT schemes, all involving some form of PPP.

The aim of the research was to develop a practical assessment of the way that PPPs could successfully be used to support modern LRMT schemes and to present effective methods for design and implementation. The book starts from the premise that the need for an LRMT scheme has been justified, typically through the undertaking of a comprehensive and rigorous feasibility study of options, impacts, and value-for-money assessments. It covers the key issues to be considered in designing, developing, and implementing an LRMT PPP and offers a practical approach to be followed. Case studies of recent LRMT schemes involving PPPs have been developed from interviews with leading industry specialists and managers directly involved in a number of major benchmark schemes worldwide. Lessons and conclusions have been drawn from this study of current practice and were used directly to develop our work.

## 1.1 INTRODUCTION

In this chapter, we start by looking at LRMT schemes in the context of the general urban transport sector. Issues related to the complexity and the capital needs of such schemes lead into consideration of the ways to fund the large capital investments needed and the potential role of private participation in achieving this funding. The nature of urban transport—and of LRMT schemes in particular—raises important specific questions of policy and operation, and some of these overarching issues are discussed here.

The decision to implement new LRMT services and the subsequent decision to incorporate private sector involvement are most effective when they are part of a larger coordinated transport planning effort aimed at improving urban transportation through a variety of suitable transport modes. The most successful planning efforts seem to be those that incorporate an unbiased evaluation process for selecting transport solutions. On that basis, compelling and rational arguments for using LRMT—or indeed any other transport mode—need to be presented before making or implementing any investment decisions. Such preparatory thinking is of particular importance for LRMT schemes, which generally have major capital investment requirements as well as an effect on urban transport policy.

This book is intended to be a useful guide to LRMT PPPs in both developed and developing countries. It is intended to show how to successfully incorporate private sector participation in LRMT rather than discuss why such an approach may be beneficial.<sup>1</sup> As a step toward this objective, we look briefly at several important transportation policy topics that will have a direct influence on key decisions related to project choice and implementation. The primary focus of this book is to guide the reader on the steps toward scheme implementation, but it assumes that policy decisions have been made and unbiased transport mode assessments have already identified LRMT as the appropriate transport solution.

### 1.1.1 Case Study Approach

This book is based extensively on case studies (see annex 1), which were selected from recent major international LRMT PPPs and represent a diverse range of scheme options, from which the most relevant and practical lessons learned can be drawn. The book draws heavily on the case studies, as well as on other industry examples, to illustrate the issues covered. Some of these LRMT initiatives yielded outcomes that diffe-

<sup>1</sup> Such benefits could include cost and time savings. See, for example, Duffield (2008).





red substantially from what was originally envisaged. For example, several of the LRMT PPPs studied terminated before their planned completion dates. One main reason was that the challenges encountered were typically more complex than originally envisaged (often including political and macroeconomic factors outside the project's scope). Nevertheless, there appear to be specific lessons that can be learned and that, when applied, have the potential to improve the chance that future LRMT schemes will succeed.

### 1.1.2 Terminology

A number of terms are used throughout the chapters of this book. The public sector or government entity that buys the service to be developed under any given form of PPP is referred to indistinctly as the grantor, contracting authority, or government. With respect to general policy issues, the reference may be made to the government because the grantor or contracting authority is not the same government entity that is able to enter into the PPP contract. The counterparty to the public sector is referred to as the developer. The developer is considered to be the private sector party and may be one of or a combination of the following: the operator; the train manufacturer and rolling-stock provider; the construction company; or any other stakeholder that has a financial, technical, or commercial stake in the execution of the PPP project. The contractual arrangement detailing the roles and responsibilities between the grantor and the developer is referred to as the PPP agreement.

## 1.2 URBAN TRANSPORT POLICY

To facilitate the introduction of PPPs in urban transportation, policy makers need to consider formalizing the links between PPPs and urban transport planning.<sup>2</sup> A PPP is a cooperative partnership between the private sector and the government that can contribute to the economic growth of urban centers and the quality of life of people living there. Efficient, cost-effective, and sustainable transportation systems require long-

term planning systems and government support to promote the benefits of public transportation.

Delivering an efficient transportation system through PPPs can be effective if incorporated into an overall strategic plan. In India, for example, the National Urban Transport Policy defined the parameters that guide federal financing and private participation in urban transport investments (see box 1.1). In an urban context, the environmental, social, and economic

#### Box 1.1

### Linking Public Policy and the Characteristics That Contribute to Viable Transport Systems

India's National Urban Transport Policy (launched in 2006) was the result of a tacit admission of the link between public policy and the characteristics that contribute to viable transport systems. The policy was focused on reducing the reliance on cars in urban transport and included a number of reorienting objectives, including

- Incorporating urban transportation as an important parameter at the urban planning stage
- Encouraging greater use of public transport and nonmotorized modes by offering central financial assistance for this purpose
- Establishing quality-focused and multimodal public transport systems that are well integrated
- Raising finances through innovative mechanisms that tap land as a resource for investments in urban transport infrastructure

A complementary funding initiative, the Jawaharlal Nehru National Urban Renewal Mission, was launched to improve urban infrastructure, enhance governance, and provide facilities for the poor. Under this initiative, the national government provides support of up to 20 percent of the capital costs of public transport projects (up to 50 percent under a public-private partnership arrangement). In some cases, in exchange for the funding, the cities must undergo reforms, create a city development plan, and obtain financing for the remainder of the required investment through a combination of state, city, or private sector resources.

<sup>2</sup> Numerous resources are available to help planners pursue nonrail urban transport solutions. For example, PPIAF has recently published a bus toolkit designed to help planners implement bus-based transportation networks. This resource is available free of charge at <http://www.ppiaf.org>.

pressures for introducing new public transport schemes can be high. Governments and policy makers are faced with choices on how best to meet their transport needs. Customers' ability and willingness to pay, as well as competition with alternative transport modes, low fares, and consequent revenues, mean that the government's financial resources are constrained. Additionally LRMT services have characteristics that create special issues for public policy. Among them is the fact that LRMT services can create benefits for people not receiving the services (that is, externalities), such as reduction in traffic congestion, improvement in environmental conditions, and general improvement in local workplace and economic conditions, including stimulus to development. These externalities can bring major benefits to a community that individual customers may not be willing to pay for.

Other issues facing policy makers may arise from the fact that LRMT schemes generally have to be considered within the context of the overall urban transport sector, and the relative influence of each element of the sector (such as buses, cars, taxis, and rail) on the LRMT scheme may not be easily evaluated. This circumstance makes it harder for private companies to make informed bids for providing LRMT services and harder for the government to set appropriate prices. Still more problems are created by the fact that various levels of central and urban governments may have overlapping responsibilities and policies, and this situation will be worsened if there is no comprehensive public transport policy.

Cities across the globe are looking at ways to improve transportation services in response to ever-expanding urban populations and growing motorization. Planners must find affordable, environmentally friendly, and socially responsible transportation solutions that can support further development in urban areas. When appropriately planned and properly implemented, LRMT systems can provide rapid urban mobility and vital access to city centers from surrounding districts. Attractive LRMT services can help reduce both traffic congestion and vehicular emissions. Such systems also have the potential to drive urban renewal and increase local

investment when supported by enabling policies. Improving transportation enhances quality of life by giving citizens greater access to employment opportunities, urban amenities, and neighboring communities.

### 1.3 DEFINING LIGHT RAIL–METRO TRANSIT SYSTEMS

Broadly defined, LRMT systems are urban rail transportation solutions that use electrically powered coaches (known as rolling stock) to transport customers between fixed stations. There are many subclassifications within this broad definition, although differentiating between them is often difficult. In this text, the abbreviation LRMT has been used to cover the broad categories of light rail trains, electric commuter rail, and grade-separated medium-capacity “light” metros. For reasons of relevance to our approach, we chose not to include two associated transport forms: streetcars or trams and grade-separated heavy metros. Later in this chapter, we describe in some detail the characteristics of all the various LRMT modes. Another critical division between modes is whether they share the public realm or are segregated from it. For example, trolley buses, streetcars or trams, light rail, and interurbans, even if they operate on separate rights of way on parts of their routes, tend to share space with other transport modes. Segregated systems include, for example, electric railways and metros.

Segregated systems in urban centers are difficult because new surface-level alignments in cities are hard to find. Even if they can be found, community severance and access problems may occur. In addition, a large number of grade-separated crossings will be needed, which means that all modes that cannot share the public realm will need to be elevated or underground.

Understanding private sector participation in LRMT investments first requires an appreciation of the basic concepts and policy considerations underlying such projects. The following sections provide a brief summary of some of these concepts and basic policy considerations and describe some of the unique challenges of LRMT PPPs.



## 1.4 PLANNING AND SELECTING TRANSPORTATION SOLUTIONS

Decisions to pursue LRMT or any other large infrastructure investment cannot be made without considerable initial preparation and study on behalf of the government, which acts as the grantor of the proposed PPP agreement. Many texts and other useful aids can guide readers through the various processes of analyzing and selecting appropriate transportation solutions.<sup>3</sup> However, three factors may create serious obstacles—under both public and private operation—to achieving a government’s goals in establishing successful LRMT schemes:

- In many unplanned and unregulated transport markets, individual LRMT routes will be in competition with other public (or private) transport services serving similar areas.
- In planned transport markets, technologically inferior modes of transport are likely to be replaced by improved systems, and the replaced system may be converted into feeder services.
- The investments required to provide the services are high and almost by definition long lived and irreversible. Once made, they cannot be reversed should the returns to the investment prove less than expected.

This first factor means that customers having alternative modes of transport typically resist price increases even when prices are lower than costs. The impact of this factor is often compounded by large concealed subsidies in, for example, road use. As a result, governments face strong pressure to keep prices below costs and to make up the difference between prices and costs with subsidies or grants. The biggest challenge for governments, with systems that are either publicly or privately operated, is to address these problems in a way that will encourage investment to improve services.

### 1.4.1 Selecting Appropriate Transport Solutions

Choosing between options without bias is no easy task in a universe of transportation solutions. Urban rail initiatives seem particularly prone to selection for reasons not solely resulting from sound analysis (Pickrell 1992). In this respect, it is important to recognize that any cost-benefit analysis will depend on which items are monetized and the weighting that is applied to each item. Such judgments are inevitably influenced by socioeconomic considerations. Unfortunately, when one is selecting the most appropriate solutions, there is no simple, objective yardstick by which to measure all schemes. Given the high price tag that LRMT projects often carry, this consideration is important. Nevertheless, there are instances where LRMT will be an optimal solution for urban transport. Even then, successful implementation, as with all major transportation projects, will require proper planning, including a thorough consideration of the following:

- Available public budgets (current and future)
- Technical feasibility of different modes
- Important customer criteria (such as comfort, speed, safety, any confirmed biases)
- Estimated customer volumes (along with their uncertainty)
- Fare/demand price elasticity
- Upfront costs and operating expenses
- System life and continuing investment needs
- Environmental impacts of various solutions
- Ability to integrate with other modes
- Ability to integrate with the built form of the city
- Lead time for implementation

<sup>3</sup> The World Bank specifically offers resources for this purpose at <http://www.worldbank.org/urbantransport>.

### 1.4.2 Conducting Meaningful Alternative Analysis

Meaningful analysis of alternative transport solutions is essential to ensure the best use of scarce public resources. Different transportation modes offer different advantages and disadvantages, and it is important that rigorous alternative analysis be conducted before making any firm decisions on which transport solution to pursue. Rigid performance specifications can require inappropriate application of certain solutions while ignoring the beneficial effect of others. In evaluating the various LRMT alternatives available to governments, the government, as grantor, should ensure that it does not rigidly use standard technical specifications, but rather advocates a thorough examination of alternative transport options and allows all modes to compete in their best possible form for a given amount of public subsidy (Kain 1992).

Different transport modes will have dissimilarities regarding their cost, complexity, and construction times. It will be necessary to develop comparison factors to allow for a uniform analysis of all considered alternatives. These comparison factors could include the agreed opportunity cost of public funds and the value of customer commuter time. Furthermore, the grantor should ensure that alternative analysis also considers robust estimates for mode-specific parameters such as upfront construction expenses, customer use, and planned operating costs.<sup>4</sup>

### 1.4.3 Alternative Analysis Guidelines

Alternative analysis can be conducted according to the following process (Zimmerman 2008):

- **Establish the goals and objectives.** A key element will be ensuring that each stakeholder understands the alternative analysis process and remembers that the analysis is not a feasibility study.
- **Evaluate current problems and future challenges.** Analyze current and expected future conditions under a scenario in which no project is developed at all. Identify the underlying causes of the current transport issues and not just the symptoms.

- **Establish evaluation criteria.** Develop criteria that measure cost-effectiveness and affordability as well as criteria that consider nontransport concerns, such as environmental, social, land, and economic development effects and health and safety considerations. Efforts should be made to make the criteria as simple as possible for decision makers and the general public to understand.
- **Identify and collect information.** Analytical forecasting tools can be used to assist decision makers. Data should be gathered about the current situation in the geographic area in which a transport solution is being discussed. Data on issues such as population size, land use, demand, and financing will be critical. Analytical models should be used to produce forecasts for each of the key evaluation criteria, such as
  - o Travel demand
  - o Network performance analysis (travel times, number of transfers)
  - o Environmental impact assessment (emissions and noise levels)
  - o Costs (implementation, operating, maintenance, recapitalization)
- **Evaluate alternative transport solutions.** Concerted effort should be made to consider the “right” alternatives and to recognize that there is more than just one rapid transit transport solution. Guidelines can be developed that can ensure that each alternative proposal is developed to a competitive level where the proposal can be considered operationally feasible and reasonable both physically and financially. Various policy options can be tested within these proposals to see how they handle the stress (for example, tolls, traffic management, fares).
- **Develop complete, objective, and reliable information.** The evaluation team should endeavor to maintain full

<sup>4</sup> Poor-quality inputs will yield similarly poor-quality results. It should be noted that LRMT projects (along with most other types of transport PPP projects, such as toll roads and toll bridges) have historically been prone to significant overoptimism regarding both ridership and costs.





transparency and to fully disclose an honest and objective assessment of the benefits, costs, impacts, and risks of each alternative proposal. Identified risks should be subjected to sensitivity analyses, and the credibility of these evaluations could be enhanced if conducted by an independent assessor.

- **Make the case for the selected alternative.** The case should tell a clear, coherent, and concise story about how the current transport problems will be addressed by the selected alternative. It should explain the relative effectiveness and costs of the other alternatives being evaluated in addressing the same transport problems. Finally, the case should be made as to why the selected alternative is the best.
- **Make the decision.** On the basis of research and information, policy makers should now be in a sound position from which to make an informed decision.

#### 1.4.4 Centralizing Planning for Metropolitan Regions

Designing properly integrated, intelligently planned, and well-operated public transportation networks typically requires a centralized transportation or transit authority. Ideally, this group should have a mandate reaching across all modes of urban transport and should also have the budgetary resources and legal authorization to implement new transport initiatives. In the near term, a centralized planning body should work to rationalize the following:

- Route layout (for both trunk and feeder networks)
- Service schedules
- Fare levels for different services
- Regulation of complementary and competing transport developers (such as private bus companies)
- Ticketing and ticket integration between modes
- Incorporation of nonmotorized transport (such as bicycles)
- Parking costs and related policies

- Congestion pricing and other tolls on private transport
- Access for transport customers with disabilities

For LRMT systems to realize the most positive outcomes, their size, scope, and cost require special consideration, and high levels of integration must occur between various transportation modes. LRMT links often form the “trunks” of urban transportation infrastructure. These trunks require support from feeder networks to realize efficiencies through greater passenger volumes. Similarly, distribution networks must carry passengers from trunk services to their final destinations. Integrating with feeder and distribution networks (and other trunk links) can be a daunting task, especially when various services fall under different government entities. Many LRMT systems have opened to lower-than-expected ridership as a result of poor integration with feeder and distribution services or poor coordination with the public entities that oversee them. Centralized transportation planning for entire metropolitan regions can help to prevent this outcome by eliminating the artificial obstacles to service coordination imposed by administrative boundaries.

#### 1.4.5 Strategic Metropolitan Transport Planning

In addition to focusing on near-term system improvement, centralized transport authorities also need to carry out effective strategic metropolitan transport planning (SMTP), which focuses on long-term policy goals and the investments needed to realize them. Good SMTP requires the following:

- **Consideration of—and coordination with—all modes of transport in the urban environment.** Seamless integration between modes enhances the service quality of public transportation.<sup>5</sup> It creates additional value for customers, which results in greater ridership, increased satisfaction, and improved system sustainability.

<sup>5</sup> Such consideration should also include the manner in which the proposed LRMT system will integrate with road and vehicle usage.

- **Planning for entire metropolitan areas across administrative and political boundaries.** At the very least, such planning implies dialogue between stakeholder institutions. Legislative acts may even be necessary to empower selected institutions to champion projects through to implementation.
- **Meaningful stakeholder consultation and involvement.** Incorporating feedback from citizens, businesses, agencies, labor organizations, and other groups is absolutely critical to SMTP.
- **A structured yet continuously evolving methodology for analyzing the role of private sector participation.** Many countries have established dedicated PPP units that perform both supervisory and technical assistance functions. Concentrating expertise in one national unit can help to ensure consistency and provide valuable guidance for subsovereign institutions.
- **Formal processes for planning, project evaluation, approval, and implementation.** Legal requirements should ensure that all planning and decision making take place within these processes. Transparent reporting and public disclosure should also occur at each stage of a project's evolution.
- **A long-term vision for transportation and quality of life in the urban environment.** All decisions and processes should support the goals articulated within this vision. Planning, implementation, and assessment must be part of a continuous cycle of action aimed at achieving policy goals.
- **A decision to implement a new LRMT service and a subsequent decision to incorporate private sector involvement.** These decisions should be part of a larger coordinated SMTP planning effort aimed at improving urban transportation through a variety of modes.
- **A bias-free evaluation process.** The process leading up to the selection of LRMT must remain free from bias toward any one mode of transport. Choosing transport solutions should not involve predetermined outcomes or unreasonably inflated projections designed to bias decisions in one direction or another (Kumar and Zimmerman 2008).

Box 1.2 illustrates the importance of SMTP.

#### Box 1.2

### Integration and Bangkok's Skytrain

Bangkok's Skytrain project illustrates the need for integrated planning among various levels of government. During Skytrain's development and construction period, several public institutions (including the Ministry of Transport, the Bangkok Metropolitan Authority, and the State Railway of Thailand) were each implementing transportation solutions in Bangkok. Coordinated planning between these entities was deficient or lacking entirely, and little consideration was given to integrating the systems. Unfortunately, this oversight contributed to disappointing Skytrain ridership levels at opening. Preliminary estimates suggested that somewhere between 600,000 and 700,000 people per day would ride the system. Actual ridership levels at opening were in the range of 150,000 passengers per day. System revenues were so low that the concession company eventually became unable to meet its financial obligations.

Skytrain's services offered clear value to customers by enabling them to avoid Bangkok's extreme traffic at a reasonable cost. However, without supporting modes of transportation, many of Bangkok's citizens could not access the system effectively. More recent improvements in service integration (including the incorporation of dedicated feeder buses) have helped increase Skytrain's ridership to approximately 460,000 passengers per weekday. For more information about Skytrain, see annex 1.



Train of Bangkok, Thailand.

### 1.4.6 Urban Development Public Transport and the “Peripheralization” of the Poor

Rapid urban development can exacerbate disparities between affluent and poor households, where increased real estate values and correspondingly high rents result in geographic separation of different socioeconomic classes. Gentrification can displace the urban poor to the peripheries of developing cities or into densely packed slums where basic infrastructure services may be deficient or entirely lacking. Greater urban incomes can increase personal vehicle ownership, which decreases demand for public transportation services and also produces additional negative externalities (such as pollution and congestion). Paradoxically, urban development can actually harm poor populations if they become isolated from desirable jobs in developed urban areas because of poor transportation access (Barone and Rebelo 2003).

Planners and policy makers need to pay special attention to public transportation for the poor, because mobility is essential to providing opportunities for development. However, serving poor populations can be challenging given lower affordability limits and greater displacement from urban centers. Providing financially viable rail-based access can be especially difficult given higher upfront capital costs and the potential requirement for large operating subsidies. Nevertheless, there are cases where rail-based solutions have been successfully implemented to serve poor populations (for example, the São Paulo Metro Line 4 extension project).

Some further issues relating to peripheralization of the poor also merit consideration:

- Cities that are transit poor can impose additional cost penalties on low-income households. A recent report by the U.S. Federal Transit Administration (2006) shows that low-income households have a much higher rate

of transit dependency than the general population and that low-income households in urban, walkable, transit-oriented neighborhoods spent just 9 percent of their incomes on transportation, while those in car-oriented neighborhoods spent 25 percent.

- Urban displacement can be beneficial when it allows the poor to move from congested districts close to polluting employment to cleaner neighborhoods. It has been argued that urban displacement was one of the main contributors to the improvement in public health in developed industrial nations from 1890 to 1940. Such displacement depends on attractive, affordable transport.
- A good public transport system should serve both the poor and the rich. The rich will be disproportionately large transferees from private car use and will give the political credibility for a subsidized service. Their aspirations will drive the quality of provision above the minimal provision for a social service for the poor, thus spreading operating costs over a wider customer base. The higher quality will prevent the aspirant poor from transferring to private car use at the first economic opportunity.

Annex 2 gives more thoughts on targeting the poor and access for all.

Finally, planners should realize that access to public transportation is not de facto access to high-quality transportation. Lackluster services characterized by long transit times, unreliability, numerous transfers, or excessive costs represent a virtual tax on both the income of poor transport customers and their quality of life. Whichever mode planners use to reach poor customers, it should deliver high-quality service at reasonable cost.

1.5 CHARACTERISTICS OF LRMT SYSTEMS

LRMT systems come in a variety of forms (see table 1.1). Differentiating between types of services can be difficult, even for experienced experts. The one-off nature of projects often introduces a high level of subjectivity that complicates precise classification efforts. Inconsistent naming across systems further complicates this issue. For example, many LRMT systems labeled “Light Rail” are in fact medium-capacity metros. Unfortunately, there is no simple fix that can rectify a history of confused nomenclature, and readers may notice occasional discrepancies between classification and operational characteristics.

Table 1.1  
Characteristics of Various Types of LRMT Systems

System type	Revenue speed	Peak capacity (passengers per hour in peak direction)	Typical degree of segregation	Common technical traits
Streetcar or tram	Low	Low (5,000 or less)	<ul style="list-style-type: none"><li>• No significant degree of segregation</li></ul>	<ul style="list-style-type: none"><li>• Frequent street crossings</li><li>• Primarily at grade</li><li>• Single-car rolling-stock configurations</li></ul>
Light rail train	Low–medium	Low–medium (10,000–12,000)	<ul style="list-style-type: none"><li>• Partially segregated</li></ul>	<ul style="list-style-type: none"><li>• Mostly at grade</li><li>• Single- and double car rolling-stock configurations</li></ul>
Electric commuter rail	Very high	Medium (about 30,000)	<ul style="list-style-type: none"><li>• Completely segregated</li></ul>	<ul style="list-style-type: none"><li>• Greater distances between stations</li><li>• Mostly at grade</li></ul>
Grade-separated medium-capacity “light” metro	High	Medium–high (15,000–30,000)	<ul style="list-style-type: none"><li>• Completely segregated</li></ul>	<ul style="list-style-type: none"><li>• Either elevated or underground</li></ul>
Grade-separated heavy metro	High	High (60,000 or more)	<ul style="list-style-type: none"><li>• Completely segregated</li></ul>	<ul style="list-style-type: none"><li>• Either elevated or underground, involving complex civil works</li></ul>

Source: Author’s compilation.



For our purposes, definitions for different classes of LRMT systems and their typical applications include the following:

- **Streetcars and trams.** These services are typically not segregated from general traffic and carry proportionally fewer customers at slower speeds over shorter distances. Streetcars and trams are commonly found in and around downtown areas and often use a single-car configuration for rolling stock.
- **Light rail trains.** Most light rail systems include a mix of segregated and nonsegregated rights of way. Light rail systems often serve downtown areas in addition to neighboring suburbs. Common light rail train systems use two-car rolling-stock configurations with articulating joints between cars. This arrangement provides for greater passenger capacity while still allowing for tight radius-cornering capabilities.
- **Electric commuter rail.** Greater distances between stations allow electric commuter rail systems to achieve high revenue speeds or higher interstop speeds. These systems are particularly effective at creating rapid links between urban centers and periphery communities. Electric commuter rail links in dense urban areas may involve complex civil works to achieve grade separation.<sup>6</sup>
- **Grade-separated medium-capacity light metros.** These systems may use rolling-stock technology similar to light rail trains but typically incorporate greater complexity in their civil works to achieve full segregation from general

traffic.<sup>7</sup> Increased segregation allows for higher revenue speeds, improved service reliability, and greater passenger capacity. Many grade-separated medium-capacity metros are inappropriately labeled as “light rail” on account of their similar rolling stock.

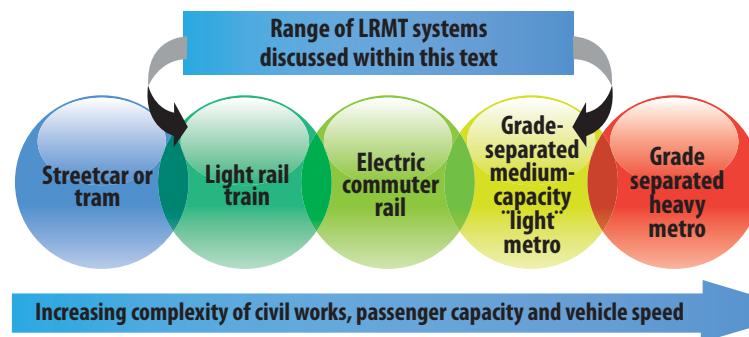
- **Grade-separated heavy metros.** High population densities and limited physical space require these systems to incorporate highly complex civil works—often including substantial investments in underground construction. Grade-separated heavy metros use relatively large rolling-stock configurations (that is, many linked cars) and have high revenue speeds when stations are sufficiently spaced apart. These systems offer the greatest passenger capacities but also require the largest upfront investment of any LRMT solution (Halcrow Fox 2000).

This broad spectrum of LRMT systems has been looked at because, despite significant operational or technological differences between modes, the issues of scheme development and investment requirements show considerable similarities, thereby allowing important lessons to be drawn.

The focus on LRMT within the range of urban rail systems is shown in figure 1.1. At one extreme, we consider urban rail systems that are only partially segregated from general traffic (such as the Manchester Metrolink). At the other extreme, the focus could apply to some rail initiatives best described as fully grade-separated medium-capacity metros (such as the Bangkok Skytrain).

Figure 1.1

### Scope of LRMT Schemes Considered



Source: Dominic Patella

<sup>6</sup> Electric commuter rail will have fewer stops and thus higher interstop speeds, but few passengers live or work at rail stations. Therefore, passengers will need a secondary mode of transport (walk, cycle, take a bus or taxi, use the “kiss and ride” or “park and ride,” and so forth) to access the station. Thus, the overall trip time and, hence, the generalized cost of a journey may be lower for a system that makes more stops and has a lower commercial speed than for a system offering higher commercial speed but with more widely spaced stops. The challenge is for the grantor or government to find the optimum balance within the given circumstances.

<sup>7</sup> It must be noted that the tendency in LRMT is to move transit to a second level to allow unfettered use of road space for the private car. This decision is political rather than economic. Given the greater space and energy efficiency of public transport, it may be more efficient to hold traffic up to allow rail vehicles to cross an intersection than to construct a grade-separated intersection.



Although tram and streetcar systems certainly qualify as LRMT systems, we do not focus on them because they do not show up as major PPPs in the territories we looked at. At the other end of the spectrum, we do not focus on grade-separated heavy metros because the technical complexity of these systems and their extremely high capital costs make them significantly different from the other systems.

## 1.6 INFLUENCES ON LRMT POLICY DECISIONS

### 1.6.1 Recommendations to Policy Makers

Policy makers should ensure that a concerted effort is made to conduct a rigorous alternative options analysis prior to making a definitive decision on whether to proceed with an LRMT transport solution. It is advisable to perform project planning in two distinct phases (Mitric 1998):

- 1. Economic and financial evaluation of multiple transport options.** The evaluation should be performed using a low to intermediate level of accuracy of cost and traffic forecasts and should be cross-referenced to the financial capacity of the city. The main point of the exercise is not to settle on one option but to decide which option should be studied in greater detail in phase 2 of the project planning cycle.
- 2. Financial feasibility study of preferred option.** The feasibility study should be configured to reflect the needs of the public and private sectors. The traffic and revenue model should focus on the local context (such as the current alternative modes of transport or potential threats to ridership forecasts from other new services). If, after conducting the second phase, the government finds that it cannot afford the proposed system or that forecasts suggest the tentatively preferred option is unsuitable, the government can either repeat the stage and focus on another option or scale down the proposals for the preferred option.

### 1.6.2 Choice of LRMT versus Other Transport Solutions

Public transportation investment decisions are in many instances political in nature and are made within the context of existing policy, legislative, and economic realities (Edwards

and Mackett 1996). Influences from a multitude of factors may affect the decision to select or pursue certain investments rather than others. For example, funding arrangements between local and national governments can create incentives for local planners to pursue riskier, higher-cost investments when national governments pay the majority of upfront costs and project overruns (Pickrell 1992). Prestige associated with different transportation modes can also be a major factor influencing the decision-making process. There are many examples of project promoters championing LRMT solutions because they are seen to support the image of a modern “European-like” city. Some would argue that such advocacy efforts may not necessarily be a bad thing, because many mainland European cities are physically attractive, environmentally responsible, and attractive to inward investment.<sup>8</sup> Politics and other influences will inevitably affect any public transportation investment decision and any decision to pursue a PPP. Planners need to take care to minimize the impact of these influences on PPP policy or investment decisions.

Some LRMT proponents have also argued that customers naturally prefer rail over bus transportation, thus limiting the selection process between transportation alternatives to either rail or nothing. However, this preference often assumes disparities between bus and rail services that depend largely on system design (degree of segregation, quality of rolling stock, dependability, and so forth) rather than any mode-specific differences. Presumptions about service quality can create formidable challenges, especially for bus-based transportation solutions, which may be seen to involve major issues, including traffic congestion, poor scheduling, environmental pollution, and possibly limitation of service provision to only the poor.

These issues are at the core of frequent debates on the choice between bus rapid transit (BRT) and LRMT options. For example, the Maryland Transit Authority recently decided to proceed with a 16-mile LRMT project for the northern suburbs of Washington, D.C. (the Purple Line), after evaluating a number of BRT and LRMT options. Table 1.2 summarizes the reported advantages and disadvantages of these options for this particular transit corridor project.

<sup>8</sup> In many cities of the United Kingdom and United States, there has been a tendency toward urban decay and middle-class flight, resulting in suburban sprawl and an automobile culture.



Table 1.2

**Comparison between LRMT and BRT**

LRMT	BRT
<p>Pros:</p> <ul style="list-style-type: none"><li>• Is seen as more permanent</li><li>• Is viewed as superior at promoting economic development around stations</li><li>• Attracts more riders because considered faster and more reliable</li></ul>	<p>Pros:</p> <ul style="list-style-type: none"><li>• Is less expensive to introduce</li><li>• Is easier to implement in pieces</li><li>• Has greater route flexibility</li><li>• Allows bus use of designated lanes on local streets has greater route flexibility</li></ul>
<p>Cons:</p> <ul style="list-style-type: none"><li>• Is more expensive than BRT</li><li>• Faces strong competition from government construction grants</li><li>• Deals with tight government transportation funds</li></ul>	<p>Cons:</p> <ul style="list-style-type: none"><li>• Has less proven track record on attracting development around stations</li><li>• Faces greater developer reluctance to invest because bus routes are viewed as less permanent than rail</li><li>• Attracts fewer riders because viewed as second-class system</li></ul>

Source: Washington Post, January 8, 2009.

Developing an effective information strategy is often necessary to show the various options for quality and dependable urban transport services for both rail and alternative modes. In the case of the proposed Purple Line, a Web site (<http://www.purplelinemd.com>) was established for the project. The Web site disclosed, among other things, the Alternatives Analysis/Draft Environmental Impact Statement, which evaluated a number of alternative transit options, including the following:

- A no-build alternative
- A transportation systems management alternative
- Three BRT technology–build alternatives
- Three LRMT technology–build alternatives

A recent study conducted by researchers from the Massachusetts Institute of Technology and Japan’s Nagoya University sought to test for a customer bias toward rail services (Ben-Akiva and Morikawa 2002). Results from the study suggest that public transportation customers do not have an inherent preference for either rail or bus when quantifiable service-quality metrics were equal between the systems (that is, similar travel times, dependability, number of transfers, and so forth). The study also found that a bias for rail emerged only when such systems delivered superior service at appropriate fares levels. The lesson for policy makers is therefore quite clear: LRMT must deliver superior price-adjusted performance to offer value and attract customers. Relying on some inherent affinity for LRMT is unlikely to be a strategy for successful implementation.

Integration of LRMT with other transport services needs to be considered under local or national transport plans. In chapter 2, we discuss some of the technical and related policy issues that need to be considered. See also box 1.3 for a case study.



## Box 1.3

### Encouraging Switching with the Gautrain Rapid Rail Link

South Africa's Gautrain has been designed with the view to attract customers who would otherwise drive between Tshwane (Pretoria) or O. R. Tambo International Airport and Johannesburg. Traffic congestion along South Africa's N1/M1 highway corridor increased 7 percent each year between 1995 and 2005. Estimates accounting for direct costs, lost work time, and expenses related to increased accident rates value the ill effects of this increased congestion at R 300 million annually (€26 million). Commutes along the 50-kilometer route between Tshwane and Johannesburg can average as long as two hours. By comparison, Gautrain's service should reduce travel times to a more manageable 42 minutes. The grantor has taken into account the cost of driving the N1/M1 corridor and priced Gautrain's fares accordingly. Similarly, tariffs for riding Gautrain from O. R. Tambo airport to Sandton reflect the costs of competing taxis that travelers would otherwise take.

The grantor foresaw problems with integrating Gautrain with other transportation services early in the project's development stages: coordination between municipal governments, national agencies, and independent bus transportation authorities had historically been poor. Spatial planning in South Africa has also resulted in low population densities, which would eventually limit Gautrain's walk-on ridership. Furthermore, market analysis showed that Gautrain's target customer group viewed existing public transportation as "a transport mode of last resort" on account of long travel times, poor timeliness, security concerns, and generally poor perceptions. Together these considerations suggested that simply integrating Gautrain with existing public transportation services would not compel significant conversion from private transportation.

To avoid initial integration issues and to improve ridership demand, Gautrain's PPP agreement includes its own cobranded feeder-distribution bus service. The Bombela consortium (Gautrain's private concessionaire) will operate this network alongside rail services. A bus-specific performance management system will help to ensure high-quality bus links and will include key performance indicators emphasizing both safety and security. Selected Gautrain stations will also feature "park-and-ride" and "kiss-and-ride" facilities aimed at complementing private vehicle transportation and allowing customers to reduce personal vehicle use. For more information about the Gautrain Rapid Rail Link, see annex 1.

### 1.6.3 Environmental Issues

Increasing environmental awareness is leading many institutions to pursue transport solutions aimed at reducing emission and traffic congestion in densely populated city centers. Clean transport policies fall within the wider environmental aims of the Millennium Development Goals (World Bank 2008). It is now generally accepted that global climate change is occurring and that the transport sector is responsible for about 15 percent of emissions of the gases contributing to global warming in industrial countries (Gwilliam 2002). The high growth in transport demand means that emissions attributable to transport will increase: forecasts suggest that expected energy use in developing countries will increase from 32 percent of the global transport total in 2000 to 46 percent in 2030 (World Bank 2008). This increase in motorized transport is concentrated in urban areas and should be a vital consideration in the design of urban transport policies.

The energy efficiency of specific transport modes is crucial not just for economic reasons, but also for reducing overall environmental impact. In many instances, the case for LRMT services relies heavily on potential improvements in urban vehicular emissions, with the knowledge that rail is a more efficient mode of transport than road in terms of carbon emissions per tonne or passenger-kilometer. Research by the U.K. Office of Rail Regulation has demonstrated that electrically powered trains emit one-fifth of the carbon dioxide emitted by petrol-using cars (figure 1.2).



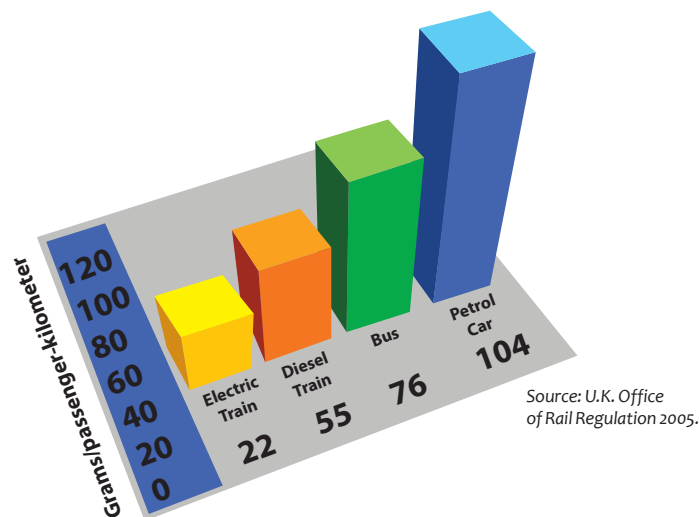
Gautrain, Gauteng Province, South Africa.





Figure 1.2

## Carbon Dioxide Emissions in the United Kingdom, by Passenger Mode



Electrically powered rolling stock can help lower emissions in the urban environment by reducing the reliance on motorized personal transportation. Rail technology itself contributes to reduced greenhouse gas emissions through regenerative braking, which uses the motors as brakes. Rather than being wasted as heat, the motors act as generators and convert the surplus energy into electricity, which is then returned to the overhead wire or supply rail. Studies have shown that trains making frequent stops can save around 20 percent in energy consumption.

At the same time, the environmental advantages implied by LRMT schemes rely on attracting a sufficient number of customers who would otherwise have relied on motorized personal transportation. As noted earlier in this chapter, some proponents have argued that customers have a natural preference for rail over bus transportation—an important

consideration if the transport policy is based on a desire to convince drivers to leave their cars at home and use public transportation. Although the actual magnitude of any emissions savings ultimately depends on methods used for power generation and the comparable efficiency of automobiles, many public authorities have pursued LRMT expressly seeking to realize environmental benefits.

Clearly transport policies should not be predicated on the basis of the environmental benefits alone, because such a basis does not reflect the reality of the economic, social, and political considerations that preface major policy decisions and programs. Good policies will take into account local circumstances and capabilities. In the richest countries, which are responsible for two-thirds of transport-related emissions, and in the large, fast-growing middle-income countries, adopting policies aimed primarily at reducing greenhouse gas emissions is essential to tackling the global problem. Many small, poor countries need to explore the synergies between local and global benefits with a view to avoiding carbon-intensive growth by shifting policy direction early and taking advantage of carbon financing or financing related to climate change (World Bank 2008).

## 1.7 ACHIEVING VALUE FOR MONEY

It is important for procuring authorities to ensure that any LRMT PPP project is a suitable procurement route that represents good value for money (VfM). We use the term VfM in this book in the same way that it is used by Her Majesty's (HM) Treasury in the United Kingdom: "VfM is defined as the optimum combination of whole-of-life costs and quality (or fitness for purpose) of the good or service to meet the user's requirement" (HM Treasury 2006: 7). In other words, procurement should not be based solely on the lowest-cost bid. According to HM Treasury the key drivers of VfM are as follows:

- Optimum allocation of risks between the various parties (see chapter 4).
- Focus on whole-life-cycle costs of the asset rather than on only the upfront costs involved.
- Integrated planning and design of facilities-related

services through an early assessment of whether the possible integration of asset and nonasset services should deliver VfM benefits.

- Use of an outputs specification approach to describe the grantor's requirements, which, among other things, allows potential bidders to develop innovative approaches to satisfying the service needs of the grantor (see chapter 5).
- Rigorously executed transfer of risks to the parties that are responsible for them, thus ensuring that the allocation of risks can be enforced and that the costs associated with the risks are actually borne by the parties in the manner allocated and agreed (see chapter 4).
- Sufficient flexibility to make certain that any changes to the original specification or requirements of the grantor and the effects of changing technology or delivery methods can be accommodated during the life of the project at a reasonable cost to ensure overall VfM (see chapter 7).
- Sufficient incentives within the procurement structure and the project contracts to ensure that assets and services are developed and delivered in a timely, efficient, and effective manner, including both rewards and deductions (see chapters 5 and 7).
- Contract term determined with reference to the period over which the grantor can reasonably predict the requirement of the services being procured. This element will require careful consideration of, among other factors, potential changes in end-use requirements, public policy changes, design life of the asset, number of major asset upgrades or refurbishments during the period of the contract, potential changes in the way services could be delivered (such as technical advances), and arrangements for the asset at expiry of the contract (see chapters 5 and 7).
- Sufficient skills and expertise on the part of both the public and the private sectors and the effective use of this expertise during the procurement process and subsequent delivery of the project.
- Management of the scale and complexity of the procurement to ensure that costs are not disproportionate to the underlying project (see chapter 8).

The procurement process must be well planned, managed, and executed and must be transparent for these VfM drivers to be effective and for overall VfM achieved (see chapter 8).

### 1.7.1 Affordability

Determining the affordability of LRMT PPPs requires considerations beyond upfront capital subsidies and project development costs. Providing appropriate rates of return for private partners while keeping fares affordable will often require ongoing operating and maintenance subsidies, which are paid for by public sources. Even if public authorities have access to initial funds, later funding requirements can exceed public budgetary capacity. The quality of LRMT services will inevitably suffer substantially when public institutions must forgo continuing investment requirements on account of insufficient funds. Planners must accordingly consider the long-term affordability of new services. Later chapters will discuss mechanisms for public support and their relative merits in more detail.

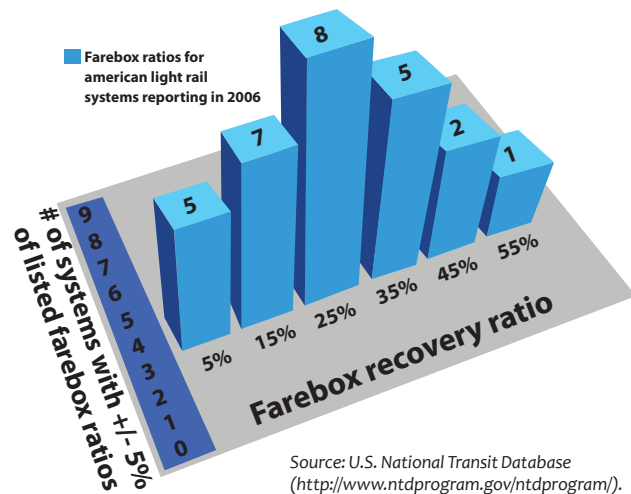
Very few public transportation services collect sufficient fare revenues to cover system operating costs. Although other sources of income (from property development and advertising) can offset operating losses, most initiatives require some form of operating subsidy to keep fares low and attract ridership. Differences between customer fares and actual operating costs are one way to gauge the level of public support received. Comparisons across systems require some normalizing factor to account for differences in size and locality. Accordingly, the farebox ratio is a common industry metric used to consistently assess the proportion of operating costs covered by customer fares as follows:

$$\text{Farebox Ratio} = \frac{\text{Farebox Revenues}}{\text{Operating Costs}} \times 100\%$$

As an indication of how much operating subsidy new services might require, figure 1.3 shows the distribution of farebox ratios for U.S. light rail systems that reported to the National Transit Database in 2006. The average farebox recovery ratio for the data shown here is approximately 22 percent. It is worth noting that even the most “profitable” U.S. light rail systems reported farebox ratios of around 40 to 50 percent.

Figure 1.3

### Distribution of Farebox Recovery Ratios for U.S. Light Rail Systems Reporting to the U.S. National Transit Database in 2006



The United States is somewhat unique given its higher rates of automobile ownership and lower urban population densities relative to other developed nations. By contrast, U.K. tram systems operate at ratios greater than 100 percent. However, U.S. light rail farebox ratios do offer an important lesson regarding the subsidies that rail-based public transportation often requires. Planning efforts for new LRMT services should include thorough examination of tariff shortfalls—and hence operating subsidies—necessary to achieve policy goals such as affordability or greater system ridership. Institutional budgets must be robust enough to accommodate additional recurring expenses from new LRMT initiatives. Beyond the obvious need for balancing budgets, private investors will seek assurances that public partners can meet their obligations throughout an LRMT project's life.

### 1.7.2 Contingent Liabilities

Contingent liabilities represent commitments to future expenditure if certain events occur (HM Treasury 2003). Many of the risks associated with private sector participation in infrastructure create sizable contingent liabilities for public institutions. Because such liabilities are uncertain and do not correspond to definite cash-flow events, simply relying on cash-based budgetary analysis will fail to take into account their potential impact on affordability. For example, a public guarantee on an LRMT project's debt will not result in a direct cash outflow, but nevertheless, the value of such a guarantee has potentially enormous future budgetary implications that should be considered. The challenge for planners is valuing and accounting for such contingent liabilities appropriately. Typical methods used for this purpose include actuarial or statistical techniques, econometric models, and contingent claims analysis (Lewis and Mody 1997).

Contingent liabilities and the opportunity cost of cash reserves established to cover their potential impacts should form an important component of affordability analysis. Later sections of this book will discuss valuing risks and contingent liabilities in greater detail.

### 1.7.3 Budgetary Implications

The budgetary implications of LRMT initiatives have a major effect on public sector finances. The massive nature of LRMT expenditures has to be justified against the opportunity cost of scarce public funds. Planners should also closely consider contingent liabilities associated with private sector participation to ensure that LRMT services do not require future bailouts at great cost to public institutions and taxpayers.

### 1.7.4 Competitiveness of LRMT Systems

Transportation is a competitive business (see box 1.4). Unlike the case with other infrastructure sectors, such as water and electricity, exclusive rights to operating public transportation systems such as LRMT are not pure monopolies. Customers

make daily choices between various services on the basis of myriad factors, including accessibility, price, speed, reliability, comfort, safety, and overall convenience. Many LRMT initiatives intentionally compete with other modes of transport (most notably private automobiles) in an effort to realize some of the policy goals discussed in this chapter. Policy instruments such as subsidies, taxes, and capital grants can alter the competitive landscape and influence LRMT's relative attractiveness. Considering the effects of these interventions is especially important when developing integrated transportation policy and contracts for private sector participation. In some of the cases discussed here, planners have chosen not to allocate demand risks to private partners given that public policies exert such large influences on the relative attractiveness of LRMT. Later sections will discuss this aspect in more detail. Ridership levels for any public transportation system signal

the benefits and value that customers derive from service (Kumar and Zimmerman 2008). LRMT planners must realize that ridership is never a given, despite the amount of money spent on new routes. To attract ridership, LRMT must offer some compelling value proposition to potential customers. Systems that rely heavily on tariff revenues for support should also consider customers' willingness and ability to pay for given levels of investment.

Planning for competitive LRMT services goes beyond shrewd one-time tariff setting. Although fare levels can clearly affect ridership, factors such as comfort, safety, and convenience, as previously discussed, will also influence system customer use. In addition, planners should consider contractual mechanisms that will allow LRMT developers to shape demand through price adjustments in accordance with appropriately designed

#### Box 1.4

### Competitiveness and France's Orlyval System

The Orly VAL system (also known as Orlyval) linking Paris's Orly Airport to the Réseau Express Régional (RER) train network demonstrates the importance of accounting for competition when planning public transport initiatives. Orlyval was an early attempt at full private financing for LRMT-like infrastructure. The project eventually achieved infamy when actual ridership was so low that the concession company required financial restructuring and public bailout shortly after opening for revenue operations. Most references to Orlyval mention the project's high leverage ratio (roughly eight to one at financial close) as one reason for the concession's failure.

Greater leverage certainly contributed to Orlyval's insolvency by requiring substantial cash flow to support debt service. However, Orlyval's financial troubles also resulted from insufficient project income on account of unexpectedly low ridership. Initial ridership estimates may have been entirely unreasonable. However, several sources also mention that Orlyval's planners simply failed to sufficiently account for competition from other public transport services. Choices for accessing Orly Airport at the time included

- The Orlyval, which departed from Antony station on the B Line of the RER, cost approximately FF 55 (at opening), and took approximately eight minutes to reach Orly Airport.
- The Orlybus, which departed from Denfert-Rochereau station (six stops before Antony station on the RER B line), cost FF 21, and took approximately 25 minutes to reach Orly Airport.
- The Jetbus, which departed from Villejuif Métro station, cost roughly FF 18, and took approximately 15 minutes to reach Orly Airport.
- Orlyrail, which combined RER C Line services with a shuttle bus link to Orly Airport from Rungis–La Fraternelle railway station. In 1992, the Orlyrail services were ferrying more than 1 million passengers per year to Orly Airport.

In addition to lost revenues resulting from competing transportation services, Orlyval also suffered from improvements in airport access for private vehicles. The new A86 road—along with a 30 percent increase in parking spaces, provided by Aéroports de Paris—further reduced demand for Orlyval's services. Orlyval eventually carried approximately 1.5 million passengers per year shortly after entering service instead of the 4 million or more originally expected. Following the concession's termination, operations were transferred to France's publicly owned Régie Autonome des Transports Parisiens.



incentive structures. In many cases, fare regimes are less than optimal on account of politicization or poorly considered tariff controls. Fares for some LRMT systems around the world may actually be regulated too low, preventing developers from exploiting pricing power to increase farebox ratios (and reduce public support) without overly adverse effects on ridership levels.

### 1.7.5 LRMT Service for Poor Populations

Many LRMT initiatives receive criticism for catering largely to middle-class customers while failing to gain ridership among lower-income groups. Targeting LRMT services and subsidies toward poor populations can be an intelligent strategy for reducing poverty and increasing development. However, planners must realize that these subsidies may be better spent elsewhere—especially if the poor lack other basic infrastructure services (see box 1.5).

Box 1.5

#### Opportunity Cost of Public Funds and St. Louis's MetroLink

When considering the appropriateness of using LRMT to serve poor populations, planners should be cognizant of the opportunity costs associated with subsidies required to make services affordable. As an example of this situation, one economist examined the annual operating and capital subsidy provided to the MetroLink system in St. Louis, Missouri in the United States (US\$133 million in 2001). On the basis of this estimate, MetroLink's annual subsidies would be enough to purchase new Toyota Prius hybrid vehicles every five years for each poor customer riding the system! Leftover subsidies following initial vehicle purchases could also provide each new Prius owner with an annual operating and maintenance allowance of US\$6,000 while still leaving enough money to give every other nonpoor MetroLink customer US\$1,045 per year to use on other transportation services in lieu of LRMT.

This analysis has, however, drawn criticism for not taking into account the cost of highway space and environmental costs, and it should also be borne in mind that the operating and capital costs of the LRMT system in St. Louis are lower than those of the bus operation for the city. Although the alternative of purchasing hybrid vehicles for poor transportation customers is an extreme (and somewhat insincere) example, this analysis does demonstrate the challenge of serving poor populations with LRMT access. LRMT's great expense requires thoughtful consideration and a sound business model for actually delivering benefits at reasonable costs.



Tram in Bucharest, Romania.  
Photo by and reproduced by kind permission of Rainer Hesse.

### 1.7.6 Ensuring Access for All

Planners, developers and policy makers have a moral obligation to ensure that persons with disabilities enjoy good access to LRMT services. Indeed, in many jurisdictions, it is now a legal obligation (see box 1.6).

Public-private partnership agreements in LRMT should recognize this fact and include provisions addressing basic accessibility features such as the following

- Lift access to underground or elevated structures
- Designated dropoff points with ample room for specialized vehicles
- Ramps where appropriate
- Accessible lavatory facilities
- Directional signage
- Tactile guidance systems
- Wider fare gates for accommodating wheelchairs (also helpful to passengers carrying baggage or parcels)
- Generally barrier-free facilities
- Appropriately designed gaps between platforms and rolling stock

Box 1.6

#### Accessibility and Singapore's Mass Rapid Transit Network

The government of Singapore has recently enhanced accessibility throughout its Mass Rapid Transit (MRT) network in response to the needs of an aging population. Beginning in 1995, 48 existing MRT stations have undergone upgrades to comply with the Code of Barrier-Free Accessibility in Buildings. Total costs for these upgrades exceeded US\$80 million. Along with improvements to its MRT stations, Singapore has also made substantial efforts to incorporate low-floor buses throughout its road-based public transportation network.

The full content of this report is available at <http://www.worldbank.org/urbantransport>.

Ensuring good access also includes working to improve transport services that integrate with LRMT. For example, feeder networks should include low-floor buses with extendable

ramps or raised boarding platforms at bus stops. Providing good access to customers with disabilities requires important consideration when evaluating proposals and crafting PPP specifications for new LRMT services. Failing to properly incorporate such considerations can result in substandard facilities or large retrofitting expenditures later on (Takamine 2004).

Accessibility is a wide-ranging subject, and annex 2 contains further thoughts on the issue.

### 1.8 THE CUSTOMER APPROACH

Our approach takes the philosophy that LRMT provision is driven by the need to provide good and effective transport services. Therefore, our focus is on customers, and we use this term throughout, instead of users. Simply put, customers (unlike users) have rights, including

- The right to safety
  - The right to be informed
  - The right to choose
  - The right to be heard
  - The right to satisfaction of basic needs
  - The right to redress
  - The right to education
  - The right to a healthy environment
- (United Nations 2003)

In the planning and implementation of LRMT systems, planners and developers alike need to ensure that customers' rights (as well as those of other stakeholders) are protected.



Source: <http://www.sxc.hu/>



# CHAPTER 2

## TECHNICAL ISSUES



Tram in Strasbourg, France.  
Photo by and reproduced by kind permission  
of Rainer Hesse.

## Technical Issues

Light rail–light metro transit (LRMT) public-private partnership (PPP) projects have a unique “footprint” that is particularly influenced by the physical and technical characteristics of LRMT. In this chapter, we review some key technical issues that influence all aspects of developing any LRMT PPP scheme. Following the philosophy of our overall approach, we give the background to some of these issues and draw conclusions on some of the key consequences for a PPP scheme. We do not explain all technical design points in this work or provide a technical design primer, but we show the importance of technical design issues in the PPP context. In other chapters, we link technical design to detailed PPP policy, design, and contractual issues.

LRMT schemes vary in size and complexity, making the projects extremely capital intensive, which is one of the main drivers to using some form of PPP. This aspect, together with other key issues, has a particular effect on the financing, construction, and operation and maintenance of the PPP scheme, all of which must be reflected in the policy approach, design, and contractual form of the scheme. Some key issues include the following

- Complexity and size of projects
- Route selection
- Selection rolling stock
- Segregated versus nonsegregated systems
  - Integration
- Capacity and service reliability
- Planning for asset management
- Ticketing and barriers

### 2.1 COMPLEXITY AND SIZE OF PROJECTS

New LRMT schemes are typically complex in terms of construction and operation. They often involve a variety of infrastructure elements (such as roadways, bridges, tunnels, and stations); rolling stock; and mechanical and electrical equipment (including traction power distribution systems, signaling, barriers, and ticketing), together with the need to ensure effective long-term operation and maintenance of these elements. Additionally, the LRMT

scheme must be designed and constructed to meet physical local conditions, and the construction and operation must be arranged to allow existing urban activities to continue with a minimum of disturbance.

The resulting complex construction works have particular characteristics and needs, including the following

- A number of specialist contractors
- Coordination of complex design and construction
- Subsequent effect of complexity on cost and program
- A variety of contractual issues, including
  - Different contract terms for various contract elements
  - Long-term guarantees, which must be enforced
  - Elements with varying construction life and subsequent renewal needs
  - Varying maintenance requirements
  - Integration issues with other systems
  - Closures and delays because of problems in existing systems, such as the effect of segregated versus nonsegregated LRMT systems (discussed later)
  - Land purchase and wayleaves

The very scope and complexity of these projects result in schemes requiring a major investment in capital infrastructure, although associated long-term operating and maintenance costs (operating costs per passenger kilometer) are often lower than for other modes. Annex 1 includes a summary table that gives some financial details of recent schemes.<sup>1</sup>

<sup>1</sup> The figures are from published budget data and are offered to show order of magnitude, but care should be used in extrapolating these results because it has not been possible to make a rigorous comparison of the base data used nor to validate against a common content, price, or time basis.



2.1.1 Effect on LRMT

Complexity of construction brings complexity of design, contract management, and long-term operation. The size of projects directly affects the need for high levels of long-term investment and associated public subsidy.

Construction and construction risk are generally a major part of scheme costs. The complexity and size affect the program, and the intensive due diligence that is normally carried out by investors and lenders reflects this complexity. Contract monitoring and control, both at the construction and the long-term operation stages, must be well designed and implemented to accommodate a project of this size and complexity.

2.1.2 Budget Estimation of System Costs and Influential Factors

A study commissioned by the United Kingdom’s Department for International Development and the World Bank (Halcrow Fox 2000) offered the approximations shown in table 2.1 for the cost of new metro-like systems depending on their vertical alignment. This same study also assessed and qualitatively ranked the effects of a variety of factors on the total costs of these systems, as shown in table 2.2.

Also of note is evidence placed before the U.K. Parliamentary Select Committee in 1999 to 2000 that showed costs as illustrated in table 2.3.<sup>2</sup>

Table 2.1  
Cost of New LRMT Systems, Based on Vertical Alignment

Vertical alignment	All in cost (US\$ million per route-kilometer at year 2000 prices) <sup>a</sup>	Ratio
At-grade	15–30	1.0
Elevated	30–75	2.0–2.5
Underground	60–180	4.0–6.0

Source: Halcrow Fox 2000.  
a. These costs are order of magnitude costs for comparison purposes only.

2 Information was provided by Scott McIntosh, technical director, Light Rail and Trams, Mott MacDonald.



Source: <http://www.sxc.hu/>

Table 2.2

**Effect of Physical, Financial, and Other Factors on Cost**

Factor	Effect on cost
<b>Physical</b>	
• Whether the project was a new system or a progressive extension to an existing system	Dominant
• Ground conditions (related to underground construction and foundations for elevated viaducts)	Very large
• Urban constraints, topography, and natural factors (related to need for utilities diversion, proximity of route alignment to existing buildings and thoroughfares, seismic considerations, and environmental constraints)	Large
• System features (length or weight of trains, desire to use stations as civil defense shelters, air-conditioning requirements, special access, and so forth)	Small–moderate
• Design and safety requirements	Large
• Financial and other factors	Very large
<b>Financing</b>	
• Land costs	Moderate
• Competition in the equipment supply and construction market	Moderate
• Labor costs	Small–moderate
• Taxes and duties	Small
• Freight costs	Small
• Quality of management or organization of implementing body	Dominant

Source: Halcrow Fox 2000.

Table 2.3  
**Costs of LRMT Systems in the United Kingdom**

Location	System length (kilometers)	Type	Cost (£ million) <sup>a</sup>	Cost per kilometer (£ million)
Manchester	28	Surface LRMT	152	4.9
Croydon	28	Surface LRMT	200	7.1
Birmingham	20	Surface LRMT	144	7.2
Sheffield	30	Surface LRMT	240	8.0
Toulouse Metro B	13	Underground	523	64.7
Turin Metro	9	Underground	442	78.8
METEOR Paris	9	Underground	706	117.6
Singapore NE Line	20	Underground	2,118	169.4
London Jubilee line	16	Underground	3,600	225.0

Source: Evidence placed before the U.K. Parliamentary Select Committee in 1999 to 2000, as provided from Scott McIntosh, technical director, Light Rail and Trams, Mott MacDonald.  
a. Final costs at end of construction, costs not inflated, between 1992 and 1999.



A wider range of data (see table 2.4) inflated to fiscal year 2007 gives the following results:

- Average over all tramways: £15.6 million per kilometer
- Average over all tramways after discarding highest and lowest figures: £15.1 million per kilometer
- Average over all underground systems: £170.6 million per kilometer
- Average over all underground systems after discarding highest and lowest figures: £133 million per kilometer

Table 2.4

### Costs of LRMT Systems in Various Cities Worldwide

System	Type	Length (kilometers)	Cost (£ million)	Cost per kilometer (£ million)	Inflated cost to end-2007
Manchester (1992)	Surface LRMT	28	152	4.9	10
Croydon (2000)	Surface LRMT	28	220	7.1	10
Midland Metro (1999)	Surface LRMT	20	144	7.2	11
Sheffield (1994)	Surface LRMT	30	240	8.0	15
Nottingham (2003)	Surface LRMT	14	180	12.9	16
Athens (2004)	Surface LRMT			13.4	16
Dublin (2005)	Surface LRMT			30.0	32
Barcelona Trambaix (2004)	Surface LRMT			14.2	17
Barcelona Trambesos (2004)	Surface LRMT			13.8	16
Zurich extension (2008)	Surface LRMT	5.2	124	23.8	24
Rotterdam Tram and extension	Surface LRMT	12	56	4.7	5
Toulouse B Underground (2007)	Mini Metro	13	523	64.7	65
Copenhagen (2004 estimate)	60% underground mini Metro	16	1,200	77.5	88
Turin extension (2000)	Underground full metro (rapid rail transit)	9	442	78.8	115
METEOR Paris (1998)	Underground full metro (rapid rail transit)	9	706	117.6	172
METEOR Paris extension (2003)	Underground full metro (rapid rail transit)	0.487	88	180.7	220
Singapore Northeast line (2003)	Underground full metro (rapid rail transit)	20	2,118	169.4	205
London Jubilee line extension (1999)	Underground full metro (rapid rail transit)	16	3,600	225.0	329

Source: Evidence placed before the U.K. Parliamentary Select Committee in 1999 to 2000, as provided from Scott McIntosh, technical director, Light Rail and Trams, Mott MacDonald.





Most important, this analysis concludes that one kilometer of an LRMT system costs from 9 to 11 percent of the cost of one kilometer of an underground system.

Data used for the preparation of an elevated railway in Europe show that although the cost of preparing the formation for laying a twin track line on the surface was approximately £400 per linear meter, the cost of a viaduct to support the twin track was from £9,300 to £13,100 per linear meter—a ratio of 1:23 to 1:33 on this single element.<sup>3</sup> Similar figures would probably apply to stations and other infrastructure.

## 2.2 ROUTE SELECTION

Route selection is at the core of any LRMT project. For example, in Kuala Lumpur, the STAR (Sistem Transit Aliran Ringan) LRMT scheme ran along an existing rail track that connected areas already served by other forms of public transport. In contrast, the PUTRA (Projek Usahasama Transit Ringan Automatik) scheme, also in Kuala Lumpur, was designed to attract car users to LRMT by serving commercial and other areas more attractive to these higher-income riders, with a secondary objective of bringing an associated reduction in overall traffic congestion and environmental benefits. Many politicians push for the use of existing or disused railway formations for LRMT, believing that this approach will arouse less controversy. Although this perception may be true, the corridors are useful only if they serve significant traffic objectives. Kuala Lumpur's STAR system shows the disadvantage of this approach (box 2.1).

<sup>3</sup> Information was provided by Scott McIntosh, technical director, Light Rail and Trams, Mott MacDonald.

### Box 2.1

#### Route Alignment and Kuala Lumpur's STAR and PUTRA Lines

Kuala Lumpur's STAR line began as an unsolicited proposal by a private developer (Taylor Woodrow/AEG Schienenfahrzeuge GmbH). The STAR system's original route took advantage of existing heavy rail rights-of-way that had become unused. A build-operate-transfer concession with a 60-year lease provided the contractual mechanism for private sector participation in the system's initial design, construction, operation, and maintenance. STAR's sister system, PUTRA, was awarded as a concession to Renong Bhd, a Malaysian conglomerate with significant experience building toll road concessions.

Since opening in 1996, the STAR system has approximately doubled its ridership. Even with this increase in ridership, STAR still operates only at approximately 60 percent of its original designed capacity. PUTRA has achieved greater ridership and currently operates near 140 percent capacity. Whereas STAR's original route layout followed an existing unused industrial rail line, PUTRA's route was intentionally designed to serve densely populated middle-class neighborhoods where LRMT offered an attractive transportation alternative over private car use. This difference in route alignment is often cited as a reason for the dissimilarities in ridership performance of the two lines.

LRMT structures are unique because they do not represent a full monopoly and happen to compete with other modes of transport. Optimal route selection is crucial to ensure that the grantor's overall objectives are met. As a result, the grantor usually takes the main responsibility for selecting the route. However, under some PPP arrangements, the exact alignment may be subject to a detailed agreement with the developer based on technical and other considerations. The public entity in charge of transport policy should have route location in mind when deciding to grant an LRMT PPP arrangement. Route location directly affects the demand for LRMT services. Market testing and integration with other modes of transport as well as evaluation of possible feeder systems and network connections all affect the potential outcome of the PPP arrangement.



### 2.2.1 Effect on LRMT

Route selection is at the heart of any LRMT scheme design and implementation. Not only does routing affect demand and ridership objectives, but also it has a direct effect on the overall cost of the capital scheme and thus the level of funding required.

## 2.3 INTEGRATION

The level of integration is the extent to which the planning and operation of the individual urban transport services are linked. This concept is an important consideration in the development and implementation of an LRMT scheme, because in many ways, the individual alternative urban transport systems can be seen as potential and direct competition for ridership on the LRMT system. In more defined urban transport systems, the LRMT system is developed within a full master plan for urban transport. The individual subsystems, such as buses, taxis, and LRMT, can be integrated to ensure that the overall system works in the most effectively planned manner. This integrated approach can be achieved either by direct ownership and control of the individual elements by the public sector or by regulation.

Without a level playing field among private vehicles, buses, and rail, the LRMT system's financial performance will be more difficult to ensure.<sup>4</sup> However, it should be noted that the level playing field arises either from removing the hidden subsidies for private cars and making private road transport meet all its external costs or from adding to the revenue of the public transport so that fares can be set at the marginal cost of driving. In Singapore, the government also used other transport policy elements: establishing road-use pricing, implementing high import duties on automobiles, and requiring that potential owners of private vehicles demonstrate that they possess an off-road parking space for each vehicle before purchase. For new LRMT systems, the level of integration has a direct implication on the effective ridership and use of the new system. Integration has a direct effect on a number of LRMT issues.

### 2.3.1 Competition with Other Forms of Transport

Although in other sectors, competition (and thus competitive tension) within the sector is sought as a means of promoting increased efficiency, it would be impractical to establish two LRMT systems to compete for the same route and traffic. It could be possible to establish separate developers for different sections of the route (for example, for system extensions) on large systems. Competitive benchmarking would then allow comparison of long-term operation, and some measure of the relative effectiveness of each developer could be made. Separate operation might also be considered where local or national procurement rules prohibit awarding system extensions. However, the consensus on this issue is that it would create additional investment, construction, and management and operational costs, and the added complication would be difficult to justify.

In the urban transport sector, the direct competition for LRMT ridership includes the existing bus, taxi, and train services, as well as private car use. The level of integration of the urban transport services influences the ridership and economics of the LRMT system. A well-designed transport plan balances the needs of these services and service developers, with the aim of creating a level playing field for all. Such aims can be accomplished through licensing and tariff setting or through traffic priority and operation rules (for example, LRMT priority lanes).

Some surveys on willingness to use alternate transport modes have shown that the customers' choice is theoretically equal for equal levels of service on each mode (Ben-Akiva and Morikawa 2002). However, when fares are comparable, the customer is more likely to choose to use a new LRMT service rather than an existing bus or taxi service, given that the LRMT service is generally less influenced by road conditions and more likely to arrive on time.

<sup>4</sup> Halcrow Group Limited (2004) writes that the Singapore government's focus on a long-term land-use and transportation strategy has proved remarkably effective, with a single tier of government and a single organization with sector authority. The strategy creates a level playing field between cars, buses, and mass rapid transit–LRMT systems within an integrated strategy. It has required constant monitoring and adaptation in light of experience. Integration has been the cornerstone of the LRMT strategy, and improvements have been made in this strategy, as well as land use, over time.





Source: <http://www.sxc.hu/>

### 2.3.2 Connections and Feeder Systems

The route of the LRMT system and the ease of connection to the centers that it serves directly influence the level of ridership on the system. The initial routing will be a balance of the need to link the chosen demand centers, some of which may be poorly served by existing transport systems, against the constraints of acquiring an acceptable route. In addition, customers must have convenient access to the LRMT service and onward to their final destination.

Systems designed to integrate the different transport services must take into account the effectiveness of the connections between the different services. In some cities, the workforce may travel for some considerable time on different forms of transport each way every day. The route and station locations of the new LRMT system may be constrained by construction, economic, or environmental needs. If these locations do not link conveniently for potential customers, then they may choose not to change their travel routes to use the LRMT for part of the way. It is important to ensure that the LRMT design includes effective interchange with other transport modes, car parks at outlying stations for suburban commuters, taxi parking areas, and shuttle bus feeder links to LRMT stations to and from existing transport stops. Examples of systems with such facilities include Washington, D.C.'s Metrobus system and Bangkok's Skytrain shuttles (see box 2.2).

Box 2.2

#### Feeder Systems: Bangkok, Thailand

On Bangkok's Skytrain, passengers make considerable use of the car parks available at some of the stations. For bus users, not all the stations are near the main bus routes, and a series of shuttle bus services was developed by the Skytrain operator to transport customers between Skytrain stations and local bus lines.

### 2.3.3 Integrating Fares with Other Modes of Transport

One of the major issues with LRMT projects (in common with other transport projects) is the difficulty of accurately predicting ridership. These forecasts are inherently unreliable, being influenced by demographic changes, shift in demand, effect of competition, cost increases, customer willingness to use the system, and customer willingness to pay. Nevertheless, some sophisticated demand prediction models have achieved good results. The problem for developers is that certain things that are entirely out of the control of the transport operator can have a significant effect on demand. These factors include business booms and recessions, changing government policy, and changing taxation policy. Experience has shown that private investors seek to avoid these unmanageable risks.

The willingness of investors and developers to be involved in an LRMT project is directly related to the level of certainty that they see in the ridership and fare forecasts. One key element affecting ridership is the customer fare. If the level of pricing and the services provided by the various competing forms of public transport are controlled in some way, then more certainty can be applied to the LRMT forecasts and fare setting. In the next section, we discuss demand forecasts and fare setting in more detail. However, the level of integration can directly affect the viability of the LRMT project through the ability to control price setting.



Strasbourg, France.

Good interchange from feeder bus is vital to success of public transport. Photo by and reproduced by kind permission of Scott McIntosh.



### 2.3.4 Physical Integration

The integration of a new or extended LRMT system with existing systems will bring technical benefits in common operation methods, maintenance, and spare parts, in addition to improved journey experiences for customers. However, these benefits have to be balanced against the cost of carrying out all the necessary work to meet the required common standard. The choice of technical approach must take into account the possible need for future growth—and the cheapest technical solution at an early stage may bind future stages of development to a limiting technology. In the United Kingdom, for example, integration of new schemes with original station platform design of the Manchester Metrolink later restricted the choice of rolling stock.

### 2.3.5 Master Plans for Achieving Technical Integration

The need for integration of LRMT within the different transport solutions may appear obvious, but definite benefits result from preparing master plans that work toward technical integration. LRMT design and development must have sufficient support at a high enough level to ensure a rational and integrated planning approach. Frequently, the government or public sponsor is faced with other priorities and resource constraints that must be balanced within this plan. Elements to take into account include

- Technical standards
- Passenger service
- Fares and ticketing
- Through operations between different LRMT lines (extension or joining)
- Design of multitransport service nodes, stations, and plazas
- Shuttle bus routing to stations

If it is not possible to plan for full technical integration, then a possibly effective method is to concentrate on those aspects of integration that are important and cannot be retrofitted at a later stage.<sup>5</sup> The benefits and effects of these key aspects must then be demonstrated to decision makers and planners to ensure that any necessary collateral work or services are provided to support the LRMT development.

## 2.4 SEGREGATED VERSUS NONSEGREGATED SYSTEMS

A segregated LRMT system is one that runs on tracks dedicated solely to the system. Segregated systems are possible in new schemes where a clear right-of-way is available. Advantages include no delays caused by other traffic and the ability to schedule closely. A disadvantage is the possible involvement of additional land purchase and roadway construction costs. For an example of a segregated system, see box 2.3.

### Box 2.3

#### Segregation: New Jersey, United States

The Hudson-Bergen Light Rail system uses a combination of old rail and new (private) rights-of-way for most of its length, with some grade separation in certain areas. It shares a lane with automobiles on a portion of Essex Street in downtown Jersey City, but for the most part, it does not operate with other traffic. Special signals at the at-grade crossings automatically change traffic lights in favor of the light rail to minimize stopping.

In contrast, a nonsegregated system shares a road system with other transport forms (common with traditional LRMT systems in dense urban areas). Although it may be possible to have sections of track on lanes isolated and dedicated to LRMT, the LRMT is subject to traffic flow influences on the shared system and on dedicated lanes where they enter the general traffic flow.

Advantages of such systems may include more economical construction, because maximal use is made of existing roadbed and structures. It is possible to reduce the effect of other road traffic (such as congestion) on LRMT performance through

<sup>5</sup> For the Manchester Metrolink, the traditional platform design was maintained for system-wide continuity, but this design had a major impact on rolling-stock acquisition on new LRMT lines because the modern international rolling-stock design standards favor low-floor vehicles. This constraint reduced additional rolling-stock purchases to a smaller selection of vehicles and manufacturers. However, a large number of high-floor LRMT Stadtbahn systems, chiefly in Germany, will continue to renew their fleets. Although high-floor light rail vehicles will form a declining proportion of overall deliveries in the future, they will still be available from most of the principal car builders.

the creation of priority rules and signaling to improve LRMT operational performance. Access along existing routes allows direct connection with other transport systems and thus makes transferring easier for customers.

A disadvantage is that such systems may increase the pressure on existing traffic flows. They may require additional construction to accommodate rail access and to widen or strengthen existing roadway or structures. The disadvantages of not running in or adjacent to the highway for parts of the route include

- The inability to reach traffic objectives
- The high cost of tunnels and viaducts
- The visual intrusion of viaducts
- The possible negation of higher service speeds because of additional station access times
- A less attractive journey experience
- Less exposure of passengers to commercial offers by frontager businesses

#### **2.4.1 Segregation: Construction Issues**

LRMT projects raise particular issues related to construction. If a nonsegregated system is used, access for construction will be somewhat limited by the need to keep other traffic operational on the same roadway. In this case, construction closures are generally limited, and night construction or construction with limited traffic restriction may be necessary to complete work on, for example, signaling and infrastructure. Nevertheless, many of the construction problems associated with nonsegregated systems in developed urban areas will also affect segregated systems. Constructing viaducts is difficult and disruptive, and constructing bored tunnels means dealing with excavated material and land settlement. Underground stations necessitate significant utility diversions and the provision of station sites—all requiring road closures and disturbance. Constructing cut-and-cover tunnels can be even more destructive (for example, as occurred with Amsterdam Metro Line 1).

The more restrictions on free access that are faced by the construction contractor, the more time will be required to complete the work. Construction work must be designed to take into account the specific requirements of signaling and control systems and their integration with existing traffic signaling, as well as the specific requirements of rolling stock and management and operation of the LRMT system.

In addition, although a new segregated line will have these access constraints only where it crosses other transport routes, the issues of land acquisition and new roadway and support structure construction (bridges, tunnels, and so forth) will continue to add cost and time.

#### **2.4.2 Effect on LRMT**

The construction issue is largely about economics and land use. Whereas the segregated system would be able to run most effectively in terms of operation in the long term and have little direct effect on existing traffic flows, these advantages must be weighed against the potential savings of a nonsegregated system through adapting existing roadway and infrastructure. Nonsegregated systems face potentially fewer land acquisition issues but may experience an increase in existing traffic flows or congestion.

### **2.5 CAPACITY AND SERVICE RELIABILITY**

The design (economic as well as technical) of the LRMT system revolves around the likely ridership levels. The forecasting and fare-setting issues dealt with in later chapters have a direct effect on the design capacity of the system. Ridership forecasts are notoriously difficult to establish with accuracy. Many are revised in the first few years of the project's operation.

The ridership forecasts define the system capacity required and thus the numbers of rolling stock. The modeling of the physical capacity required for ridership and service levels is complex, being related not only to ridership levels, but also the number of trains on the track and the timing of train service.



As a simple concept, the initial service can be established with a minimum number of cars in each train to provide the desired service levels. As the ridership levels increase with time, then additional cars can be introduced. The system can finally reach its maximum capacity by using the maximum numbers of cars per train and increasing the frequency of service, until the negative effects of the higher-volume traffic (increased effect of “bunching,” increased maintenance, downtime, and so forth) have a limiting effect.

Ridership forecasting raises the question of how much rolling stock and how many cars are needed. When ridership is low, the limiting factor is the minimum levels of service and the timetable, with some allowance made for potential future growth. Some care is needed at a contractual level to ensure that any increases in rolling stock are provided by the contractor in a timely manner (for instance, on the basis of either a planning timetable or some trigger linked to increasing ridership levels) to ensure that the future service levels are met (see box 2.4).

#### Box 2.4

### Increasing Rolling Stock: Western Europe

In a western European LRMT concession, the grantor made a transport plan that assumed that when ridership reached a certain level, the number of rolling stock would be increased by a planned amount to ensure continuing good service levels. This stipulation was made as a contractual obligation for the concessionaire developer.

However, the concessionaire developer also controlled fare setting. If the developer increased fares, ridership levels would drop, but with the right choice of increased unit fare, the profit level could remain the same. By increasing fares and decreasing ridership, the developer could avoid making the major capital investment in additional rolling stock. Of course, this situation did not meet the grantor’s objective of increasing ridership on the LRMT system, and for this reason, an amendment to the contractual terms was necessary.

Adherence to the timetable is one possible measure of the quality of service provision. In this context, “bunching” happens when the difference in headway between trams can lead to two or more trams following one another more closely than expected. This situation can result from a combination of different effects, such as other traffic conditions (a shared roadway or roadwork or track maintenance delays), dwell time at stations (different passenger loading times), schedules and operational plans with very little recovery margin to accommodate lateness, and varying speed tendencies of individual drivers. The general effect is a level of service reduction with more irregular service. A number of techniques may be used to mitigate bunching, including rerouting, adjusting departures at terminals, or directly managing individual units against the timetable. Increasingly, in more sophisticated systems, automatic vehicle location (AVL) systems linked to system management and signaling are used (see box 2.5).

#### Box 2.5

### Automation: Copenhagen, Denmark

In Copenhagen, the entire Metro system is run by a fully automated computer system called ATC (automatic train control). By letting a computer run the system, the developer has reduced the number of human errors, and a low time interval between the trains can be maintained because of precise acceleration and braking. The system is monitored at all times by five operators at the control and maintenance center (CMC). In the event of an ATC system failure, the trains can be controlled either remotely by the operators at the CMC or by Metro stewards on the trains.



Copenhagen Train, Denmark





This issue is relevant in the PPP context in that if, for instance, headway between trams or adherence to the timetable is set as a developer's contractual obligation, then the management plan must provide for some way of mitigating these issues and for suitable technology, if necessary.

## 2.6 SELECTING ROLLING STOCK AND PLANNING FOR ASSET MANAGEMENT

### 2.6.1 Selecting Rolling Stock

The rolling stock is a key element of the LRMT system, and selection of a rolling-stock contractor has a major influence on long-term system operation and maintenance and design and construction of infrastructure components (see box 2.6). Typically the rolling-stock contract will be let not only for supply, but also for installation and initial commissioning and maintenance. The rolling-stock contract is a key element of the overall contractual arrangements (chapter 7).

Box 2.6

#### Rolling-Stock Compatibility and the Manchester Metrolink's Legacy Stations: United Kingdom

The Manchester Metrolink system incorporates three different models of rolling stock. Although intelligent design has enabled Metrolink to avoid purchasing from any one supplier, selecting compatible rolling stock still remains challenging. The system's original route incorporated stations from a legacy electric train that had elevated platforms. All Metrolink stations and rolling stock now include this feature to allow rolling-stock compatibility throughout the network. Requiring elevated platforms presents additional cost when constructing new stops. Similarly, the need for rolling stock with elevated doors limits the number of available models because many manufacturers have concentrated on more popular low-floor trams.

Given that the rolling stock is to be procured under a PPP scheme, a rolling-stock performance specification is a necessity. The PPP approach concentrates on performance and output, rather than on the traditional public procurement approach of prescriptive design. Generally, a rolling-stock performance specification should include, but not be limited to, the following high-level criteria

- Design life
- Capacity
- Interface requirements
- Operational requirements (including maintenance regimes)
- Performance requirements
- Tram and tram system requirements
- Spares and special tools
- Fire and safety issues

### 2.6.2 Planning for Asset Management

The complex physical nature of LRMT projects requires continuing attention to maintaining assets, both physical infrastructure and rolling stock and equipment, in good condition over the life of the project. In LRMT schemes, the individual project components have varying replacement lives and varying maintenance requirements. It is important to take this point into account in the design and maintenance of the projects. Scheme and contractor selection will be made on output issues such as

- Whole-life project costs (capital, operating, and maintenance)
- Maintenance programs
- Replacement times and costs such as rolling stock, signaling, and mechanical and electrical equipment

At the bid stage, it is helpful to ask the developer to provide an asset management plan for the life of the project. Such a plan will show the developing company's intentions in this regard; indeed, it can be part of the contract requirements. Given that

the life of rolling stock and of some mechanical and electrical equipment is often shorter than the life of the contract, this plan should also include for potential replacement of those elements.

We talk later about procurement issues, but an important point to note here is that the whole-life costs and project implications of the rolling-stock purchase must be taken into account when comparing various rolling-stock supply options. Maintenance and renewal on operational characteristics, such as reliability, level of comfort, and so forth, affect ridership. A contract let solely on least cost supply price for rolling stock (even if to common high technical standards) should not ignore the long-term costs incurred in operations, maintenance, and possibly infrastructure. Also, the contract should take into account the replacement life costs of the rolling stock. In the final years of any long-term PPP arrangement, the contracting company has a tendency to limit expenditures—such as maintenance and replacement—that do not increase its income in the short term, with the risk that the physical assets will deteriorate. At the end of the contract, the public sponsor should take over the physical assets in good running order so that it can continue providing the service itself or with another PPP arrangement. This matter of ensuring maintenance and renewal in the last years of the long-term PPP project can be covered by special contract provisions.

### 2.6.3 Effect on LRMT

Asset management has major policy implications, particularly in the level of freedom given to the private operating partner or developer. Constraints on the type of rolling stock or other technical equipment that the developer can use on the project may limit the level of effective operation the developer can achieve and the level of risk the developer is prepared to take. The choice of rolling stock has major implications at all levels of design, and the implications for risk, procurement, and contract form are considered in later chapters.

## 2.7 TICKETING AND BARRIERS

It is important to note that, for LRMT systems, ticketing and fare setting constitute an important marketing tool; note the extremely successful marketing of public transport in Zurich, Switzerland, and Freiburg, Germany.

The selection and design of ticketing and barrier systems are important and complex issues with major operational, contractual, and financial links. In chapter 1, we discussed the “farebox” concept (the ratio of fare revenue to operating costs). In PPP arrangements, the farebox concept may be used as a performance indicator affected by a variety of elements, including the level of fares set and the ways of ensuring the most effective collection of fares. In general, we assume that under PPP arrangements, services are subject to a minimum paid fare (unlikely to be a free service). Ticketing of some sort is necessary for all arrangements. Various ways of ticketing for different fare structures include

- Single fare or fare according to distance or zones
- Fares for different times of the day or year
- Ticketing for varying classes of riders
- Ticketing for interconnection or transfer to other lines or services
- Use of electronic ticketing systems<sup>6</sup>



<sup>6</sup> Such systems include the Calypso network.  
See [http://www.calypsonet-asso.org/index.php?rubrique=main\\_10](http://www.calypsonet-asso.org/index.php?rubrique=main_10).



In Ireland, for example, the integrated ticketing system approach is built into law. Under the legislation, which is known as the Transport (Railway Infrastructure) Act 2001 (Additional Functions) (Integrated Ticketing) Order 2002, integrated ticketing is “a system of ticketing which enables a passenger to use a single ticket on one or more public transport services by road or rail or both for a single trip or multiple trips on such transport, irrespective of the number of public transport modes or operators involved in making that trip or those trips.”<sup>7</sup> The regional Tarifverbund concept in Germany and the national Strippenkart system in the Netherlands are also good references for successful integrated ticketing systems. A higher level of automation may be required for such a system. A Europe-wide protocol (see box 2.7) specifically covers this need.

Box 2.7

### Calypso: An Electronic Ticketing Standard

An electronic ticketing standard is the secured dialogue between cards and terminal. It was developed by a group of European partners from the cities of Brussels, Belgium; Lisbon, Portugal; Konstanz, Germany; Paris, France; and Venice, Italy. The 10-year development program adapted the smartcard contactless technology to public transportation uses. Some functional choices have been taken into account to answer the transit operators' needs:

- Contactless technology.
- Fast, safe transaction (decentralized security).
- Communication within the transaction time.
- Flexible transport application to build the system step-by-step.
- Targeted products to address all users and new services.
- Upgradable technology that takes into account current standards.
- Microprocessor, contact, and contactless interface or contactless interface only.
- Compliance with International Organization for Standardization (ISO) and European Committee for Standardization (CEN) standards (ISO 14443; ISO 7816-1, 2, 3, 4; and CEN 1545).

The technology was made accessible to all manufacturers on a fair and nondiscriminatory basis to ensure

- The birth of this technology, suited to the urban public transport needs.
- Full product compatibility.
- Fair market competition.

<sup>7</sup> According to the legislation, the Railway Procurement Agency has the following functions in relation to integrated ticketing systems:

- "(a) to secure the provision of, or to provide, such integrated ticketing systems as may be determined, from time to time, by the Minister, and  
(b) to enter into agreements or arrangements with other persons in order to secure the provision of such systems, whether by means of a concession, joint venture, public private partnership, or any other means".



Photo showing a typical electronic ticket vending machine.  
Source: <http://www.sxc.hu/>



Linked with the need both to control passenger entry and exit and to ensure safety, the system for barriers typically goes hand in hand with ticketing arrangements. Some systems allow for “free access,” whereas others require “proof of purchase” (see box 2.8).

Where barriers are used, physical arrangements may vary from the most complex, automatic, full-barrier systems to simple turnstile arrangements. Use of ticketing and barriers may assist in defining the legal implications of access to the LRMT system and payment for use of the service. The system

Box 2.8

### “Proof of Purchase”: Hudson-Bergen LRMT, United States

The Hudson-Bergen LRMT service operates on a “proof of purchase” system in which riders must present their tickets upon request during random checks. Passengers purchase tickets at local transit ticket vending machines (TVMs). One-way and 10-trip tickets must be validated at automated validators near the TVMs. The validator will date- and time-stamp the ticket for 90 minutes of use. Fare inspectors perform random ticket inspections on vehicles and at stations. This method is similar to the system used in Europe for many light rail lines. The fine for fare evasion on the light rail is US\$100.

A one-way adult fare is US\$1.90; 10-trip tickets are US\$16.25. A monthly unlimited pass is US\$58 (US\$98 with parking included, except at Liberty State Park, where a pass costs US\$108). Holders of monthly passes can transfer to adjacent New Jersey Transit buses without an additional fare. Senior citizens (age 62 and older) and passengers with disabilities travel on the light rail at a reduced fare of US\$0.95 (valid identification may be requested). Customers who purchase one-way tickets can purchase Hudson-Bergen Light Rail (HBLR) “tickets with transfer” from HBLR TVMs for US\$2.55. When validated, these tickets may be used for travel on the light rail system, plus a one-zone transfer to any connecting New Jersey Transit intrastate bus. Customers also may purchase a transfer on board any intrastate bus that connects with HBLR. Valid current New Jersey Transit weekly and monthly train tickets are also good for travel and do not need validation.

must be policed to ensure that ridership obligations are met, including fare payment. The barrier and ticketing designs must ensure that policing can be done effectively—that is, not only limiting access to only those people who have paid, but also ensuring that there is some proof of purchase to enable enforcement.

In determining the allocation of farebox risk, the following issues must be considered:

- Bidders have limited ability to assess traffic and to produce reliable predictions of ridership.
- Overly aggressive and overly conservative traffic forecasts are likely to be to the grantor’s detriment.
- Issues that affect customer ridership levels and that are outside of the developer’s control include competing transport issues (such as regulation of competing transport systems), traffic priority at junctions, connecting transport links, and establishment of interchange arrangements with other public transport system operators (management of the interface through ticketing and scheduling issues).

### 2.7.1 Effect on LRMT

Ticketing policy is directly linked to potential revenue. The policy on interline ticketing must be implemented through the LRMT system. The level of actual revenue will be affected by the effectiveness of the physical methods of ticketing that ensure that fares are paid. Efficient barrier systems (complex and automated systems may be involved) and enforcement methods support higher levels of revenue. The legal aspects of enforcement must be addressed in the bylaws and implemented under the LRMT PPP arrangement. The issue of who is responsible for ticketing, fare collection, and enforcement must be clearly set out in the contractual LRMT arrangement, with suitable operational arrangements in place.



# CHAPTER 3

## INCORPORATING PRIVATE SECTOR PARTICIPATION IN LRMT INITIATIVES



Barcelona Light Rail, Spain.  
Photo by and reproduced by kind  
permission of Rainer Hesse.



# Incorporating Private Sector Participation in LRMT Initiatives

This book focuses on the details for introducing and designing arrangements for private participation in light rail–light metro transit (LRMT) schemes. First, we will consider what private participation can be expected to achieve. The successful use of private sector partners in establishing LRMT schemes, as well as other public sector infrastructure and service provision, is well documented. Through a public-private partnership (PPP), the government, as the contracting authority or grantor on behalf of the public sector, can draw on resources, expertise, and capital from the private sector. We start with the premise that the decision to involve the private sector in LRMT has already been made. In this chapter, we review some of the key issues that relate to the provision of LRMT services in urban situations and the ways that private participation might address those problems. Then, we look at some of the main forms of private participation and how they might be used.

## 3.1 KEY REQUIREMENTS FOR A SUCCESSFUL PPP

When deciding whether to involve private sector participation, governments have to assure themselves that it is cost-effective. Compared with public entities, private firms usually have higher costs of capital as well as profitability requirements that

significantly affect the cost of infrastructure initiatives. A well-designed PPP arrangement should, in principle, enhance value for money (VfM) through a combination of factors, including financing, operational efficiencies, superior risk management, greater implementing capacity, and enhanced service quality.

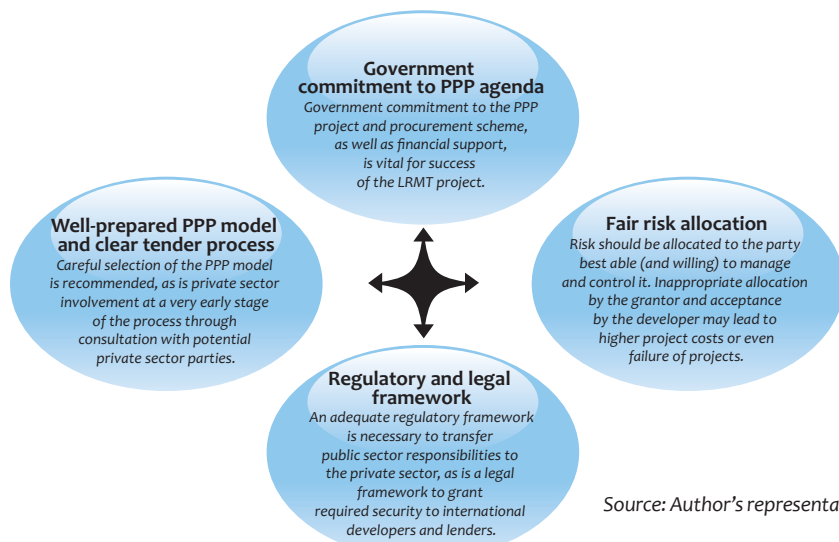
The design, construction, operation, and maintenance of LRMT systems are complex and require substantial resources. Public institutions may lack the capacity required to implement traditional public procurement of LRMT system components. The value added to the design and contractual integration of LRMT systems may justify the additional costs of private sector participation.

### 3.1.1 A Conducive Framework toward PPP

Successful PPPs require a combination of factors that will lead to a process that is conducive to attracting the private sector while ensuring that the grantor can meet its development objectives. Figure 3.1 represents the four fundamental factors that should be considered in developing the framework for the PPP process and the PPP agreement.

Figure 3.1

*The Four Fundamental Factors of a PPP Framework*



Source: Author's representation.



The starting point is to ensure that the grantor and ultimately the government are committed to the PPP agenda. LRMT schemes are an integral part of the government's transport policy and will require specific support for the procurement of a developer to undertake all or some parts of the LRMT scheme. Underpinning any PPP program is the concept of a fair risk allocation (this concept is discussed in detail in chapter 4), which ensures that risk is allocated to the party that is best able to take, manage, and accept such risk. The overall legal framework—and to a lesser extent the regulatory environment<sup>1</sup>—will be important because any PPP agreement that is developed will be enshrined within it. The less those are developed, the more the PPP agreement will rely on the conditions of the agreement itself. However, it is likely to increase the perceived risk of any such transaction and will require providing protection to the developer and the lenders within the PPP agreement itself. This issue is discussed later in the section titled “The PPP Arrangement: Four Stages of Development and Implementation.” All these issues should lead the grantor to select the most suitable form of PPP (see discussion under “Models of Private Participation”).

### 3.1.2 Achieving Value for Money

As discussed in chapter 1, when considering PPP options, the grantor needs to ensure that the scarce public resources available to it are used in the most effective way. Governments with experience with PPPs (for instance, Australia, Canada, the Netherlands, South Africa, and the United Kingdom) have developed analytical tools to inform policy makers in this process (see box 3.1 for a South African example).<sup>2</sup>

Quantitative analysis is needed to assess the VfM proposition of an LRMT PPP agreement. This analysis usually involves a comparison of net costs associated with public service provision with those under the PPP scenario. It is often captured within a public sector comparator (PSC) model vis-à-vis a PPP reference model. Together with qualitative assessments, this quantitative analysis can help public institutions make rational choices regarding infrastructure procurement.

<sup>1</sup> The regulatory environment is important because it sets out the rules of the game. However, some countries may not have a fully developed regulatory environment specifically for LRMT schemes. Having a fully developed regulatory framework is not a precondition for PPPs, but it is clearly beneficial.

#### Box 3.1

### South Africa: Assessing PPP Transactions

South Africa's Treasury Unit contains a dedicated group that oversees all public-private partnership transactions in the entire country and has jurisdiction over the Gautrain project (see annex 1). Before approving new projects, the PPP unit will verify the following:

- **Affordability.** Any public institutions involved must be able to meet their financial obligations under the PPP agreement throughout the life of the project. Current and anticipated budgets must be able to support any PPP-related expenses, including the costs of public oversight.
- **Value for money.** Incorporating private sector participation must offer additional value to the public sector through risk transfer, increased quality, or some combination thereof. In the absence of value for money, traditional public procurement would be the preferred method for realizing new infrastructure services.
- **Substantial risk transfer.** Private parties must assume meaningful risks as part of their participation in a proposed PPP arrangement. Value for money often results when private partners can manage project risks better than their public counterparts.

South Africa's Treasury Unit uses a series of reviews and approvals throughout the project development process. In some cases, funds from a special project development facility can help local and regional planners engage additional resources to aid in planning projects that meet Treasury Unit standards for PPPs. To learn more about South Africa's PPP unit, visit <http://www.ppp.gov.za>.

However, when using the quantitative models, the grantor should consider a number of issues, including the following:

- **Completeness and accuracy.** Both PSC and PPP reference models may omit or incorrectly value critical risks. In the case of LRMT PPPs, these mistakes may involve
  - o Contingent liabilities
  - o Contract negotiation risks
  - o Explicit but variable liabilities, such as operating subsidies and minimum revenue guarantees

<sup>2</sup> For links to many government Web sites, visit the World Bank Institute's Global Public-Private Partnerships in Infrastructure Web portal at <http://info.worldbank.org/etools/PPPI-Portal/links.htm>.

- **Model inputs.** Selecting appropriate inputs for project models is always a difficult task. The subjectivity of inputs can provide an avenue for manipulation and undesirable biases. Many developed nations now use sophisticated databases to check on modeler discretion. However, this approach is often not possible in developing countries where data from previous projects may be unavailable or lacking in quality. Discount rates for the opportunity costs of funds are particularly influential model inputs and may be especially contentious. Small alterations in discount rates can inordinately affect analyses because values are typically compared on a net present value basis.<sup>3</sup>
- **Development costs.** Conducting thorough quantitative analysis of a project's value can require time and considerable costs—especially where institutional capacity is lacking and public authorities rely on external advisers.
- **Timing.** Determining the initial VfM of a PPP-based procurement approach requires some indication of final project costs. However, those costs are not entirely “knowable” until the later procurement stages and financial close. Even when PPP reference models are well crafted, their results may still differ substantially from actual procurement costs.
- **Reasonableness.** Constructing PSC models may not make sense when public authorities cannot conceivably implement a project because they lack funds or institutional capacity. Traditional financial and economic analysis assuming private sector participation may be the only quantitative analysis available to assess projects when that is the case (Leigland and Shugart 2006).

In the United Kingdom, the concept of value for money is defined as the optimum combination of whole-life-costs and quality (or fitness for purpose) of the goods or service to meet the grantor's requirements. VfM is not the choice of goods or service based on the lowest cost (see box 3.2).

<sup>3</sup> Net present value is the sum of future cash flows discounted to the present by some opportunity costs of capital.

Box 3.2

### Generic Factors Driving Value for Money

- **The optimum allocation of risks between the various parties.** VfM requires that risks be allocated on the party—or parties—that are best placed to manage and minimize risks over the relevant period.
- **A focus on whole-life-costs.** VfM is achieved by focusing of the whole-life-costs of an asset rather than only the upfront costs involved.
- **Integrated planning and design of the facilities-related services.** An early assessment should be made of whether integrating asset and nonasset services (for example, “soft” services) could deliver VfM benefits.
- **An outputs specification approach.** Use of such an approach to describe the authority's requirements, among other things, allows potential bidders to develop innovative approaches to satisfying the service needs of the procuring authorities.
- **A rigorously executed transfer of risks.** Transferring risks to the parties that are responsible for them ensures that the allocation of risks can be enforced and that the costs associated with the risks are actually borne by the parties in the manner originally allocated and agreed.
- **Sufficient flexibility.** Flexibility is necessary to ensure that any changes to the original specification or requirements of the procuring authority, as well as the effects of changing technology or delivery methods, can be accommodated during the life of the project at reasonable cost to ensure overall VfM.
- **Sufficient incentives within the procurement structure.** Incentives within the procurement structure and project contracts ensure that assets and services are developed and delivered in a timely, efficient, and effective manner, including both rewards and deductions, as may be appropriate.
- **A reasonable term of the contract.** The contract's term should be determined with consideration to the period over which the procuring authority can reasonably predict the requirements of the services being procured. Determining the term of the contract will require careful considerations of factors such as potential changes in end-use requirements, policy changes, design life of the asset, number of major asset upgrades or refurbishments during the period of the contract, potential changes in the way services could be delivered (such as technical advances), and arrangements for the asset at expiry of the contract.
- **Sufficient skills and expertise.** These skills can be found in both the public sector and the private sector and must be used effectively during the procurement process and subsequent delivery of the project.
- **Management of the scale and complexity of the procurement.** The scale and complexity of the project must be managed carefully to ensure that procurement costs are not disproportionate to the underlying project.

### 3.2 PARTNERSHIPS BETWEEN PUBLIC AND PRIVATE INSTITUTIONS

Refining and improving how LRMT systems can incorporate private sector capital and expertise make good sense given the size and scope of such projects. There is a clear need for increasing the long-term sustainability of private sector participation in LRMT PPPs, considering the large amount of money at risk (both public and private), as well as the lengthy duration of contractual relationships. Partnering with the private sector can deliver substantial value by augmenting limited government capacity (both operational and financial) to the benefit of transport customers. However, the mechanics of actually formulating complementary relationships between public and private entities are never simple. Failing to “get it right” can have severe consequences for taxpayers, investors, and customers alike.

Preserving private incentives for performance, while linked to contributions of substantial public funds toward new services, requires delicate management. In some instances, public authorities have rejected traditional concession models in favor of management-style contracts for publicly procured assets (for example, Manchester Metrolink Phase 3). Other initiatives have chosen instead to incorporate substantial capital grants for new construction while still requiring meaningful upfront contributions of private investment (for example, the Gautrain Rapid Rail Link and Canada Line systems, which are discussed later as case studies; see also box 3.3). Both models have had successful results, illustrating that there is no single best way to incorporate public support. Understanding the justifications for and the implications arising from public support mechanisms used in previous LRMT PPPs will help future project promoters make sensible choices for their own projects.

Box 3.3

#### Airport Link: Canada Line and Vancouver International Airport

Vancouver’s Canada Line includes a spur connecting the system’s main trunk route with Vancouver International Airport. Three Canada Line stations will provide services on airport land. Travel between these three stations is free as part of an agreement with the Vancouver International Airport Authority (VIAA). VIAA contributed a substantial capital grant (Can\$245 million) to the Canada Line project and accordingly will use the free services to shuttle airport customers and employees between the main airport terminal, long-term parking lots, future rental car facilities, and other airport support businesses located near the airport’s Canada Line stations.

For its part, TransLink (Canada Line’s contracting authority) will also derive benefits from increased pricing power provided by this link. Customers will pay a premium fare for traveling to Vancouver International Airport from stations not on airport land. Canada Line’s links with the Vancouver SkyTrain and Westcoast Express rail services will also help the system attract airport commuters from a relatively large geographic area.



Achieving the possible benefits of a PPP arrangement for LRMT schemes requires getting two important aspects right:

- Giving the developer the ability and the incentives to make good operating and investment decisions. This means giving the developer enough freedom to make decisions while exposing it to the related business risks—so that it gains when making good decisions and loses when making bad ones.
- Protecting the developer from the risk of losing from the government’s changing the rules of the game rather than from bad operating and investment decisions. This means protecting the developer from the risk that the government will opportunistically cut prices after the developer has invested (or will take similar actions that undermine the investor’s profitability).



Neither goal is easy, but protecting the developer from policy risk is especially hard. The challenge is to embody the proposed policy objectives in a functional PPP contractual arrangement. A good PPP arrangement will be reflected in a PPP agreement (contractual terms) that matches risks and rewards and establishes adequate controls for both the grantor and the developer. This subject is covered in more detail in chapter 7.

### 3.2.1 Investment and Financing Decisions

LRMT schemes are very capital intensive for both development and construction. On balance, the government as the contracting authority or grantor can generally obtain capital with better terms than private investors can. As well as being able to mobilize the private sector to share part of the project risk, the PPP approach may also help to define a stronger overall project and allow the government to obtain the best external financial support. At the heart of the challenge facing LRMT PPPs is the issue of balancing the need for project revenue derived through customer fares against the large capital investments required to build, operate, and maintain systems over their lifetimes. Private partners can recover the cost of obtaining the financing (including a reasonable profit) only by charging some fee for services. At the same time, however, customer fares must be affordable to meet public transport objectives, including access for poor customers.

LRMT systems typically require greater upfront capital costs than private partners (including the developer and its lenders) can reasonably recover through fare revenue-supported financing alone. Accordingly, much of what determines success for LRMT PPPs depends on how policy makers structure public support that would be payable through the grantor to the developer. Public support can be channeled through a number of possible mechanisms, depending on the type of LRMT PPP scheme chosen. If, for example, the developer cannot control fares and takes no farebox risk, the grantor will have to provide direct financial support. At the heart of any financing decision is the fact that if the developer has some responsibility for

determining and financing investment, the developer can be expected to invest in system maintenance and operational improvements, provided that suitable incentives are included in the arrangement.

### 3.2.2 Operating Performance

The profit incentive of a private developer may cause it to operate more efficiently than its public counterpart. For example, it may provide the same level and reliability of services with fewer staff and may be more diligent in fare collection. Ensuring that a private developer operates more efficiently than a publicly managed LRMT system depends on the details of the PPP arrangement. For example, if the private developer can keep at least part of the increase in profits resulting from better ridership and fare collection, it will have a direct incentive to increase revenues. However, if the rules governing fare setting are out of the developer's control, then the incentive to improve revenues may be limited.

Perhaps a key element in private operation is the technology and equipment used. It is important to take advantage of the benefit of the private developer's experience in provision, management, and operation of modern LRMT systems. This information can be gained at the initial design and development stages, through market consultation, or at the bid stage through contractual arrangements that include appropriate degrees of responsibility for the equipment and rolling-stock design and operation.

Finally, although private developers typically can bring skills to improve services through more effective management and operation of services, it is important to realize that there is a limit to what can be achieved in operational improvements without the necessary capital investment for refurbishment or new infrastructure. A key part of any PPP arrangement is establishing how this capital investment will be funded, who will be responsible for carrying it, and how it will be linked to sustaining or improving levels of service.



*Photo by and reproduced by kind permission of James Dwyer.*

Charlotte, North Carolina, USA. Example of where the line crosses major roads or highways: Tracks are elevated to increase safety and eliminate traffic delays. Stations are provided with parking as well as artwork and other visually attractive features.

3.2.3 Policy and Enforcement

The presence of independent profit-motivated private developers influences the sector policy and the way it is enforced. Like other stakeholders, a private developer will tend to seek to shape the arrangements in its favor, irrespective of the benefits for society as a whole. Overall, private participation may improve policy and its enforcement. For example, the government may enforce compliance with safety standards by private firms more rigorously than it enforces compliance by public agencies.

For successful private participation, the government needs to set clear objectives and conditions. If a private firm finances the investment, it cares deeply about the rules for setting prices and subsidies because those rules determine whether it gets its money back. The private developer will therefore insist, before investing, that the government establish clear and prospectively stable rules for setting prices and subsidies. And thereafter, it will try its best to hold the government, through the grantor, to its promises. Stable rules for pricing and subsidies will encourage investment and thus help the government achieve its objective. In all these cases, the advantage of private participation is indirect: The benefits come from good rules and enforcement, which, in turn, are a necessary prerequisite of a good PPP arrangement.

3.3 MODELS OF PRIVATE PARTICIPATION

We do not set out to describe the exact form for a private participation arrangement for an LRMT scheme; the precise arrangement details will depend on the specific requirements of the scheme. However, it is useful to understand the nature of some of the important models and the implications of these models for the challenges of private participation. Subsequent chapters give more details of these models where they affect other aspects of the private sector participation arrangement. Terms used in discussing the main PPP contract models are those developed from a transport study for the European Commission (Colin Buchanan and Partners 2002)

- Management contract
- Gross-cost contract
- Net-cost contract, more commonly known as a lease
- Net-cost contract with investment (NCCI), more commonly known as the concession, build-operate-transfer (BOT) form or finance-design-build-operate-maintain (FDBOM)

These contract types are differentiated largely by the extent to which they transfer risk from the public authority to the developer, as outlined in table 3.1.

Table 3.1 Risk Bearing by Contract Type

Contract type	Who bears the risk?		
	Cost	Revenue	Investment
Management	Authority	Authority	Authority
Gross cost	Developer	Authority	Authority or Developer
Net cost (lease)	Developer	Developer	Authority or Developer
NCCI (BOT or concession)	Developer	Developer	Developer



We provide these PPP contract models to show the key characteristics of each. However, readers should bear in mind that in practice, variations on each model may be necessary to accommodate specific project requirements.

### 3.3.1 Management Contract

The public authority retains ownership and control of all depots and vehicles, retains all revenues, and pays for all capital and recurrent expenditures. The public authority may also be the employer of most or all of the staff members engaged in providing the services. Developer involvement is confined to the professional management of operations on behalf of the public authority. Normally, these services are provided for a fixed, negotiated period and for an agreed price. The contract term is established to allow sufficient time to achieve the desired operational effectiveness, and it is typically of short duration.

### 3.3.2 Gross-Cost Contract

The public authority relinquishes control of the vehicles and rolling stock and possibly also control of the depots and other infrastructure (although it may retain ownership or transfer ownership to a separate body). It requires the developer to operate—and perhaps also to provide—the required rolling stock to specified quality-of-service standards for an agreed price. Under gross-cost contracts, all revenues (from fares and other sources) are transferred to the public authority, and the risks absorbed by the developer are confined to those associated with the cost of operations.

### 3.3.3 Net-Cost Contract (Lease)

The public authority relinquishes control of the vehicles and rolling stock and possibly also the depots and other infrastructure (although it may retain ownership or transfer ownership to a separate body). It requires the developer to

operate—and perhaps also to provide—the required fleet of vehicles and rolling stock to specified quality-of-service standards for an agreed subsidy or premium. The developer is normally entitled to all revenue (from fares and other sources) and could bear a number of additional risks. Those risks typically concern disturbances to traffic, fluctuations in revenue, and changes to the regulatory regimes. Negotiated risk-sharing clauses in the contract may, however, limit the developer's exposure to those risks. If required, these contracts allow for lease payments to the grantor for use of facilities or services. These contracts are typically longer term—usually 10 to 14 years.

### 3.3.4 Net-Cost Contract with Investment (Concession or BOT variants)

The Net-Cost Contract with Investment (NCCI) may also commonly be known as a Concession type contract or a form of build-operate-transfer contract with many of its variants such as design-build-operate (DBO) amongst others. In these contracts the public authority contracts with an outside organization (developer) to provide services to specified quality-of-service standards. The developer must, consequently, provide the required inventory of fixed and movable assets from its internal resources or through external financing. The developer will also retain all revenues and will absorb either all or a contractually agreed portion of traffic and revenue risks, as well as the risks associated with construction. Risk sharing may also extend into the areas of regulatory risk.

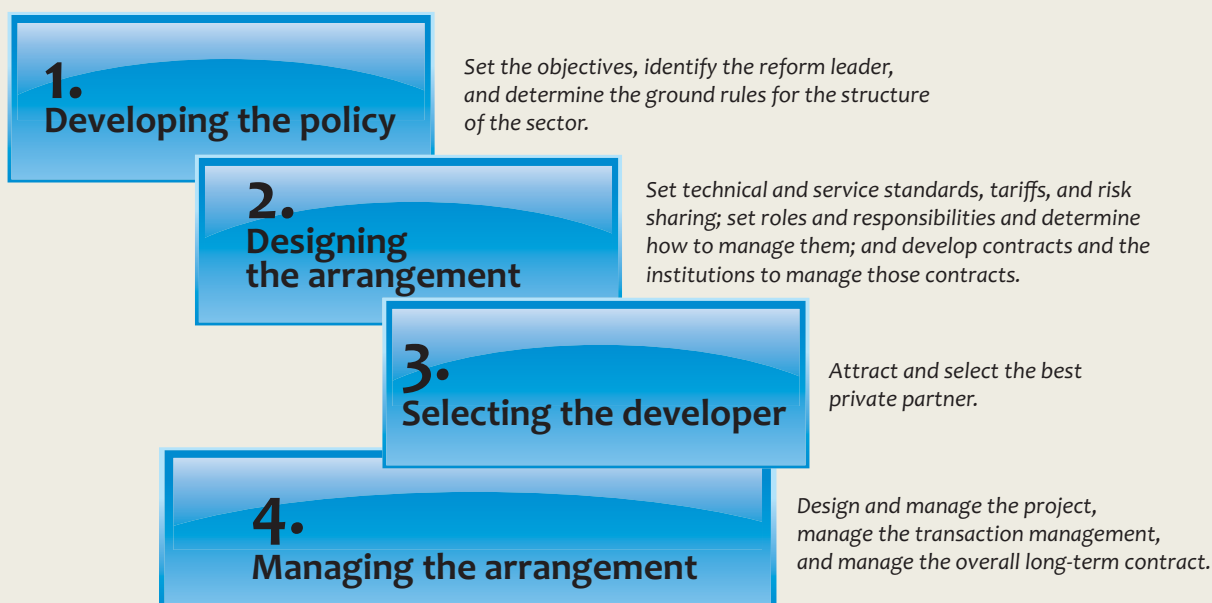
A concession, in the form of some type of BOT or design-build-operate arrangement, is often the most appropriate type of contract for situations with no previous services and with a requirement to provide depots or other infrastructure. New light rail schemes are often covered by long-term contracts of this nature. To ensure enough time for recouping investment costs, NCCI arrangements are generally long term, with contract periods of 20 to 30 years.

### 3.4 THE PPP ARRANGEMENT: FOUR STAGES OF DEVELOPMENT AND IMPLEMENTATION

The preparation and implementation of an arrangement usually involve four stages, which may overlap each other in time (figure 3.2). The time required to complete the preparatory stages varies by country and by the arrangement being pursued. Countries with laws that support private participation in transport services and that have good-quality information on the system may proceed relatively rapidly. In addition, a management contract usually takes less time to prepare and implement than does a concession. With strong political commitment, a management contract could typically be designed and implemented in fewer than 12 months, whereas a concession and its associated financing could easily require two or more years.

Figure 3.2

#### Stages of Development and Implementation



Source: Author's representation.

To ensure the successful development of the LRMT scheme, governments may, with benefit, choose to allow more time initially to consider the issues and to establish the upstream sector strategy and policies, as well as to manage social and political concerns. Generally, this additional time will produce a more effective design and management of a PPP arrangement. As an example, an established transport sector policy could remove much uncertainty about issues such as potential cross-sector competition or the degree of integration affecting the potential LRMT scheme.

Financing LRMT PPP projects is always an important, complex, and time-consuming process. Chapter 7 provides more details on the issues and possible approaches involved.

### 3.4.1 Stage 1: Developing Policy

The first step in developing policy is to decide whether private participation will be used as a tool for achieving the government's objectives. The government will need to determine what the scheme is intended to achieve and its link to the overall plan for the sector. This determination begins with setting objectives and recognizing the trade-off between different objectives.

Clearly articulating and agreeing on objectives at the start of the process will allow everyone to work toward a similar end and provide a solid framework for choosing among options and resolving disputes during the design process. Several key issues will need to be considered at this stage, including external constraints, budgetary constraints, local policy, service planning, pricing, integrated ticketing, and quality of service.

#### External constraints

When considering the type of PPP arrangement, the grantor needs to take into account any overriding legal and physical restrictions on the operating environment. The following are two examples:

- **Legal and regulatory environment.** The choice of contract type will be determined (and in some cases limited) by the legal environment under which the

LRMT scheme operates. For example, the European legal environment ranges from full deregulation to cases where public authorities have full control over transport issues. The implications of the legal regimes are discussed further in chapter 7.

- **The business environment.** The business environment, including the structure of the existing transport industry, will affect the LRMT PPP scheme. For example, competing transport sectors will have effects on the LRMT system. Relationships with third parties and the effect of responsibilities of others (such as ownership of existing track) on provision of services under the PPP contract will need to be clearly established. The business environment will also affect the monitoring regime that is developed.

#### Budgetary constraints

LRMT schemes are capital intensive for both the public and the private sectors. Through its grantor (and depending on the chosen form of PPP), the public sector may have significant financial exposures to the proposed scheme. Working within its budgetary limits, the grantor must assess the level of subsidy that it is able and prepared to pay. Accordingly, the grantor must, from the outset, establish good overall cost estimates to ensure that the resulting likely ultimate project values that will be bid do not exceed the available budget for subsidy. Furthermore, in some cases, and depending on the legal environment, certain government authorities (grantors) may not be allowed to make financial commitments that exceed their respective budgetary cycles. If that is the case, adequate alternative arrangements (including suitable protections for the developer) will need to be made and specified in the PPP agreement.



Freiburg, Germany, has achieved excellent commercial results by means of well thought-out ticketing and marketing, rather than expensive infrastructure. Photo by and reproduced by kind permission of Scott McIntosh.



### Local policy

As noted earlier, the goals and objectives of the private developer may differ from those of the public transport authority and the grantor of the PPP agreement. Such differences may determine the type of contract chosen and its details. An example might be a requirement to carry out integrated ticketing between different transport sectors and the implications that requirement will have for the PPP agreement, as well as the associated responsibilities allocated to the developer and the grantor.

### Service planning

Although the public authority may be expected to define the type of public transport services required, detailed service planning can be carried out by the grantor, the developer, or some combination of both (such as details of routes, frequency, timetables, and hours of operation). The PPP contract must clearly set out each party's role. In some cases, the public authority carries out the entire service planning function, even down to timetabling and use of rolling stock. At the other extreme, the developer may operate a fully deregulated service. The more common approach is somewhere in between, where the grantor specifies minimum service levels and offers incentives for further improvement.<sup>4</sup>

### Pricing

Pricing is politically sensitive. Public transport is often the only means of transport available to the poorer sections of the community, and other political objectives, such as environmental issues, add to this sensitivity. It is possible to present a fully controlled price system that the private developer has to bid against, and the PPP agreement can then be awarded on the minimum subsidy that the developer is prepared to accept. At the other extreme, pricing can be fully deregulated—but with the risk that the public authority's own policy issues may not be met. As an approach between these two extremes, the developer can be given a maximum price level together with free rein to introduce lower fares or special offers. It must be noted, however, that giving the developer an increased degree of freedom to set prices may influence the developer's decision to accept revenue risk under PPP arrangements (see chapter 4).

<sup>4</sup> The control of the planning function has a major effect on the design of the PPP agreement. If developers are expected to bear some of the revenue risk (for example, under a net-cost contract or an NCCI contract), then they can normally expect to have suitable input to this planning function.

### Integrated ticketing

When major cities have more than one public transport mode, the acceptance of integrated ticketing across transport modes maximizes the efficiency of the transport network as a whole (box 3.4). When the proposed LRMT scheme is not the only transport scheme and passengers are allowed to use a single ticket to ride on various forms of transport, the PPP agreement (and any other appropriate related agreements) will have to establish the arrangement for reimbursement of revenue sales between the different operators. The methodology and auditing of these arrangements must be clear, fair, and established before the bidding process for the LRMT PPP agreement.<sup>5</sup>

Box 3.4

#### Manchester Metrolink Ticketing Arrangements

The Manchester Metrolink is an open system, but passengers must purchase tickets before boarding trains. A schedule of escalating fines serves to dissuade potential fare evaders and is based on the number of offenses they commit within a 12-month period:

- First offense: £10 on the spot or £15 within 21 days
- Second offense: £20 on the spot or £30 within 21 days
- Third offense: £40 on the spot or £60 within 21 days
- Fourth offense: £80 on the spot or proceed to prosecution

Stagecoach Group (Metrolink's current developer) employs and manages ticket inspectors on the system's trains. Although Stagecoach does not accept any revenue risks, revenue security does form one basis for its performance assessment and ultimate compensation. More information about Manchester Metrolink can be found in annex 1.

### Quality of service

A key issue in PPP contracts is how to maintain quality of service. As an example, in the net-cost contracts (lease), the developer may have no direct incentive to increase demand and ridership but would benefit from reduced operating costs from a lower level of service. Most quality issues can be specified and measured (such as technical specification, service reliability targets, and customer satisfaction). Later, we discuss the potential use of contractual performance indicators to ensure that quality-of-service targets are met, but some detailed thought on this issue is needed at all stages of project development, because it is at the heart of the long-term LRMT PPP operation.

<sup>5</sup> This issue will affect the LRMT PPP scheme design directly in that the returns and costs to the LRMT scheme must be estimated, and its effect on the LRMT pricing policy must be determined.

### 3.4.2 Stage 2: Designing the Details of the Arrangement

Once the objectives, vision, and structure for the sector are set, the details necessary to make it work need to be developed. In particular, the following should be considered as integral activities in designing the PPP arrangement and how it is reflected in the PPP contractual agreement:

- **Stakeholder consultation and communication.** Knowing what stakeholders want is important because their contribution to the reform is necessary to make it sustainable.
- **Level of service.** The heart of the arrangement is the level of service to be provided and the tariffs and any subsidy that will have to be paid. This activity involves technical and financial work and a large degree of consultation (see chapters 4 and 6).
- **LRMT infrastructure.** The technical and physical determination of the LRMT infrastructure requirements must be made, and the costs and the resulting investment plan must be established (see chapter 3).
- **Risks and costs.** The entities (both private and public) that will bear the risks and costs of the chosen arrangement must be determined, and these decisions may influence the type of contract chosen (see chapters 4 and 6).
- **Institutions.** Entities must be established to oversee the development and management of the PPP agreement, as well as to supervise and adjust service standards and tariffs.
- **Legal frameworks and contracts.** Documents must be drafted to ensure an effective legal arrangement (PPP agreement). The documents must reflect all the design points and ensure stability of the long-term arrangement (see chapter 5).

### Analytic and advisory work required

Designing and implementing an arrangement require economic, financial, technical, and legal expertise and the coordination of that expertise. Detailed work is needed to refine the option to be implemented, to identify the legal measures to support it, and to prepare complex documents, such as laws, bidding documents, and draft contracts.

Governments or municipalities usually lack the full range of expertise<sup>6</sup> within the civil service to carry out these tasks and so will need advisers to provide some of these skills and specialized expertise. Managing transactions of major LRMT schemes with private sector involvement requires specialized expertise, and it is likely that transaction advisory support from specialist advisers will be needed to help lead the whole process.

There will be times when more or less work is needed, and the appropriate combination of advisers will always depend on the particular circumstances. The cost of advice always needs to be weighed against its benefits. Annex 3 contains a checklist of typical issues to be considered when employing advisers.

<sup>6</sup> A useful work addressing the appointment and use of advisers in PPP and infrastructure development is "A Guide for Hiring and Managing Advisers for Private Participation in Infrastructure" by the PPIAF (<http://www.ppiaf.org/content/view/236/485/>). This toolkit provides a comprehensive and thorough guide to the issues surrounding the hiring of advisers to support government officials involved in increasing private participation in infrastructure. The toolkit focuses on hiring advisers to increase private sector participation in the following sectors: electricity generation, transmission, and distribution; natural gas transmission and distribution; water and sewerage; solid waste; telecommunications; railways, ports, and airports; and roads.



### 3.4.3 Stage 3: Selecting the Private Service Developer

Selecting the developer involves both ensuring that the opportunity is attractive to potential private service developers and using good processes to determine which developer will be the best partner.

Involving private service developers early in the process is usually a good idea because it increases the likelihood that developers will be interested in the arrangement. The government will also need to consider the kind of developers it wants and can expect to attract. The possibilities range from large international investment groups with experience in private participation in transport schemes to small local firms, alternative providers, and individual entrepreneurs. Chapter 8 describes ways to involve private service developers and investors during the development process in a structured fashion that limits the risk of any developer's receiving an unfair advantage or otherwise affecting competition for the arrangement.

After having decided on an arrangement, the government needs a suitable private partner. Processes to select and reach agreement with a private sector developer can be divided into three broad types

- Competitive tendering
- Competitive negotiation
- Direct negotiation

Often, the best result can be achieved by competitive tendering, with prospective developers competing in a formal, structured process. However, sometimes other approaches are suitable, for example, when bidder interest is limited or when innovative solutions are needed that are hard to define in advance. We address these processes in some detail in chapter 8.

### 3.4.4 Stage 4: Managing the Arrangements

#### *Importance of a reform leader*

Early on, the government may wish to choose a reform leader—that is, a government entity that has appropriate skills, capacity, and responsibilities and that can champion and coordinate the overall process. Choosing the right entity is sometimes difficult. For example, if local transport services are a municipal responsibility, should the reform leader be the municipal administration (which has the appropriate responsibility) or a central government agency (which has more power and capacity)? It is advantageous to establish the reform leader at the earliest stage, while policy is still being developed. Other tasks under policy development are addressed in later sections, including the following

- **Allocating responsibilities to different tiers of government.** For example, which level of government should have responsibility for transport services?
- **Deciding on the market structure.** What level of competition or control of tariffs and fares will be provided, and how will the LRMT scheme operate within the local transport sector?

#### *Setting up institutions to manage the process*

To manage the process, the government needs to do the following:

- Clarify which level of government is responsible for managing the process in the long term.
- Set up a streamlined management structure with strong analytic capacities and a reporting structure that brings powerful decision makers into the process in an effective way.



## Setting up a transaction management structure

A number of factors are involved in setting up a transaction management structure:

- **Project team with suitable skills.** For reform to proceed smoothly, the public authority leading the transaction (for example, the grantor) may need to establish a project team (box 3.5). The team could consult with interested stakeholders or representative forums, while viewing the process from a broad social perspective that focuses on achieving the government's objectives. The project team's skills are crucial. The team typically includes senior individuals drawn from the grantor agency and other agencies with a particular interest or area of responsibility related to the project.
- **Effective delegated powers.** The project team will typically have an advisory role, with the grantor's approving all key decisions. The project team's delegated powers should allow the reform process to proceed in a timely, efficient, and transparent manner with appropriate checks and balances.
- **Responsibility to an effective political decision-making group.** The project team needs to report to a suitable political decision-making group, generally a steering group. The steering group may be a cabinet subcommittee, a committee of municipal leaders, or a combined local and national-level committee. The steering group should make decisions, with recommendations from the project team.

Box 3.5

### Project Team Members

Project team members might include the following

- A high-ranking official from the contracting authority
- A legal official with applicable policy and procurement experience
- A technical officer with appropriate engineering knowledge and experience
- A representative with expertise in communication skills
- A representative of the local transport authority
- A finance officer with experience in the financial management and funding of public utilities and, if appropriate, in the negotiation of financing arrangements with private investors and public-private lenders
- Political representatives such as municipal councilors

The project management and decision-making structure can be arranged in many ways. Characteristics of a successful structure will likely include the following:

- A competent, dynamic, and focused project team, with a mandate to develop options and proposals and to describe them clearly.
- A decision-making group that includes enough influential people to ensure that the group's decisions are not undermined, while being sufficiently focused to provide clear and rapid responses to proposals from the project team.
- A reform champion a senior individual who is committed to moving the process along and overcoming inertia.

The composition of the project team and steering group may change during the process. For example, different structures may be suitable for the policy development and transaction implementation phases. Following selection of a preferred bidder, the grantor may form a separate negotiation team, and following contract implementation, the grantor may form a long-term contract management team.

## Implementing the PPP transaction, including negotiating the PPP agreement

After the arrangements have been designed, the emphasis shifts to marketing the transaction. Marketing requires a transaction manager who knows the potential developers well.

Technical, financial, and economic specialists will all be involved in putting together a request for proposals and information memorandum. Lawyers will help ensure that the legal aspects of the procedure are in order and that the transaction is not challenged on procedural grounds. Communication with different stakeholders during this process is vital, and communications and human relations specialists may be brought in to assist.<sup>7</sup>

<sup>7</sup> Adequate stakeholder consultation is essential, especially given that the alignment (route) of the LRMT scheme will likely go through heavily congested urban areas.

Prequalification of potential developers typically involves assessing their financial and technical strength and experience, and specialists with good judgment in those areas will be needed. Similarly, once bids have been received, it may be necessary to assess the bids from a technical and financial perspective, depending on the bidding procedures used. The grantor and its team will lead the negotiations with the developer. Lawyers and financial specialists will be involved in negotiations to ensure that all the necessary documentation is executed to make the arrangement legally effective and binding.

### *Managing the arrangement in the long term*

No matter how well designed the rules and institutions governing the arrangements are thought to be, it will take time and experience for the parties to truly understand each other and to work together—something that should be taken into account when the arrangements are designed.

After the developer is selected, the hard work of managing the relationship starts. If the design stage was done well, the rules and institutions created should keep the relationship on track and serving the public interest. During most arrangements, there will likely be fare and tariff reviews and other adjustments. At the end of the initial contract period, the government needs to decide on the next steps.

Once the developer starts work, performance under the contract needs to be monitored to ensure that agreed standards are met and also to ensure that all parties meet their contractual and financial obligations. Tariffs and service standards may eventually need to be adjusted, and disputes may arise that need to be resolved.

### *Setting up institutions to manage the long-term arrangement*

Financial close (that is, when the lender is able to start drawing down on its loans) marks the beginning of the relationship between the grantor and the developer. Good institutions

and rules for maintaining and governing the relationship will be needed. Chapter 7 provides advice on how to develop contractual arrangements with suitable rules and mechanisms for maintaining and managing the relationship and adjusting aspects of it over time. The institutions set up to manage the arrangement may already have the capacity necessary to carry out these tasks. They may need assistance, especially early on, to augment the skills required to manage and monitor the developer. Technical specialists can help monitor service performance and assess operating efficiency. Financial analysts and economists will be needed for tariff resets, and lawyers for enforcement and dispute resolution. While the PPP agreement and the associated arrangements are being planned, it is worth thinking about what assistance will be needed during the operational phase.

To manage the process, the government needs to do the following:

- Clarify which level of government is responsible for managing the process in the long term.
- Set up a streamlined management structure with strong analytic capacities and a reporting structure that brings powerful decision makers into the process in an effective way.



*Hanover Light Rail, Germany.  
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of Rainer Hesse.*





# Checklist

## Incorporating Private Sector Participation in LRMT Initiatives

<input type="checkbox"/> Ensure government commitment to PPP agenda.	<input type="checkbox"/> Define and establish an adequate regulatory and legal framework: <ul style="list-style-type: none"> <li>o Ensure that the existing framework provides adequate legal protections for all parties (investors, developers, and so forth).</li> <li>o Ensure that the LRMT operation legislation and regulations are in place, and, if not, identify the “rules of the game” that are to be included in the PPP agreement.</li> </ul>
<input type="checkbox"/> Use the four stages of development and implementation to guide preparation: <ul style="list-style-type: none"> <li>o Developing the policy</li> <li>o Designing the arrangement</li> <li>o Selecting the developer</li> <li>o Managing the arrangement</li> </ul>	<input type="checkbox"/> Define and establish a fair risk allocation to allocate responsibilities and risks to the party best able to manage it.
<input type="checkbox"/> Define procurement schemes and ensure that sufficient financial support is available to support the project.	<input type="checkbox"/> Ensure that the developer has incentive to make smart operating and investment decisions.
<input type="checkbox"/> Ensure that the grantor has a thorough understanding of the nature of models of private participation and the implications of those models (for example, ensuring that a management contract has the least transfer of risk to developer)	<input type="checkbox"/> Protect developers from the risk of government expropriation or rule changes.
<input type="checkbox"/> Grantor staffing: <ul style="list-style-type: none"> <li>o Determine what expertise the government has in house and what it needs to hire.</li> <li>o Establish a project team with suitable skills.</li> <li>o Select a reform leader to champion and coordinate the process.</li> </ul>	<input type="checkbox"/> Perform quantitative analysis to determine the VfM of the project.
<input type="checkbox"/> Create a well-prepared PPP model and tendering process: <ul style="list-style-type: none"> <li>o Involve the private sector at an early stage.</li> <li>o Establish the type of developer the government wants and can expect to attract.</li> </ul>	<input type="checkbox"/> Develop the grantor’s strategy to manage the PPP agreement (including bidding and negotiations).

# CHAPTER 4

## UNDERSTANDING AND MANAGING RISK



## Understanding and Managing Risk

Proactive risk identification and allocation are essential planning tools in the successful delivery of major infrastructure projects. This chapter explores methods of allocating the risks and responsibilities between the grantor and the developer and discusses managing demand risk and the implications that risk has on the structure of the proposed public-private partnership (PPP) agreement. According to Partnerships Victoria (2001),

"Risk is the chance of an event occurring which would cause actual project circumstances to differ from those assumed when forecasting project benefits and costs."

### 4.1 ANALYZING RESPONSIBILITIES AND RISKS

Commercially viable and cost-effective risk sharing is at the heart of all successful PPP projects. Responsibilities and risks should be viewed as two sides of the same coin. Effective risk allocation is an integral part of a project's success and is one of the most complex elements of a project arrangement. Although decisions on risk allocation have important efficiency and distributional implications, the real challenge is to reduce risks so that they no longer constitute a significant impediment to private financing of infrastructure projects. The precise allocation of risks among various parties is typically defined after considering a number of factors, including the public's interest in the project's development, as well as that of other investors and lenders, and the extent of their ability and readiness to absorb those risks at an acceptable cost (UNCITRAL 2001). All parties involved in the PPP arrangement have an interest in identifying all the risks that a project may face and an equal stake in ensuring that these risks do not threaten the project.

Financing of large infrastructure projects requires a good projection of capital costs, revenues and expected costs,

expenses, taxes, and liabilities of projects. Predicting these numbers over long time frames (generally 20 years or more) requires the use of a base case to establish values of revenues, costs, and expenses. This base case is then used to determine the amounts of debt and equity that the project can sustain. Critical to this base case are the identification and quantification of risks.<sup>1</sup>

Effective risk allocation is premised on the notion of allocating responsibility for dealing with the consequences of each identified risk either to one of the developer or contracting authorities or through a system of shared responsibilities (see box 4.1). Risks and responsibilities are usually allocated with the following in mind:

- Project risks and threats to project costs are minimized by allocating particular risks to the party in the best position to reduce the probability of the risk being realized and in the best position to manage the consequences of the risk after it has materialized.
- One party may be better placed to diversify or absorb the risks than the other parties involved in the arrangement.
- Allocating a risk to a party should provide incentives for the party to spend time and resources in delivering the expected outcomes.
- Not all risks can be foreseen within a PPP agreement, and therefore the agreement must allow for mechanisms that deal with unpredictable, unforeseen, or unmanageable events. These mechanisms are best handled in the contract using force majeure and other clauses for unforeseen events.

<sup>1</sup> These projections are not an exact science. Developers and lenders make assessments of the various capital costs, revenues and expected costs, expenses, taxes, and liabilities for the project on the basis of their experience and their appreciation of country, sector, and other risks associated with undertaking the project.



Box 4.1

## An Example of Risk Allocation between a Grantor and a Developer

During the design stage for a regional project in the Russian Federation, which was not to be funded by the Russian federal government, the grantor began by allocating the design, construction, and commissioning risks to the party granted construction responsibility—the developer. The entire risk of completing the construction within the agreed timetable, budget, and specifications—and of being capable of operating to minimum threshold levels—was envisaged to be transferred from the grantor to the developer. Good industry practice suggests that it is in the interest of the grantor to transfer this risk to the developer, because the developer is best placed to assess the feasibility of the project design, to construct the project, and to manage any subcontractors to ensure timely and complete delivery. However, in this particular case, because the authorities did not grant the required approvals for the design, the grantor had to develop a different strategy whereby certain protections were included in the PPP agreement that would insulate the developer against nonapproval from some government entities not under the responsibility of the grantor but nevertheless still part of the government. Not allowing for this mechanism would have meant either that the bidding developers would have had to price such approval risk into the project, thus resulting in a greater cost to the grantor, or that the grantor would run the risk that the bidding developers would simply not bid.

Accepting risks involves costs, and in this case, the developer required incentives to take on any substantial risk. At the same time, a grantor should be prepared to pay a premium based on the premise that the party best placed to control and mitigate the risk should be allocated the responsibility.



Krasnodar, Russia.

Photo by and reproduced by kind permission of Rainer Hesse.

It must be noted, however, that risks are sometimes allocated on the basis of commercial and negotiating strength, with the stronger party seeking to allocate unwanted risk to the weaker party. In such circumstances, the grantor must ensure that, when developing the PPP agreement, it foresees such a situation and plans accordingly. The grantor must not find itself with a counterparty that is unable to mitigate a particular risk, which could lead to an unsuccessful PPP project.

The grantor of a light rail–light metro transit (LRMT) project can use a number of strategies to allocate risk. For example, the grantor may seek to have a single developer that has various partners within it. Although each partner is responsible for a given portion of the PPP agreement—for example, construction of infrastructure, mechanical and electrical work, procurement of rolling stock, operation, and maintenance—the project is implemented as a single PPP agreement with a single counterparty: the developer. The developer is ultimately responsible for the full and timely delivery of the PPP agreement regardless of the internal risk allocation among the different parties. This arrangement is known as a unified approach to the PPP agreement. An alternative to this approach may be the layering approach, in which the project may be split among two or more separate PPP agreements addressing the construction of infrastructure, the procurement of rolling stock, and the operation of the system. The choice and form of PPP agreements is further discussed in chapter 7. An example of the format for a risk analysis matrix developed for a recent major LRMT scheme is given in annex 4. This matrix was developed early in the design and development of the project to bring out the key risk allocation issues and was used as an important and practical tool for effective decision making in a complex situation.

At each stage, from design and construction to operation, LRMT systems face risks. The grantor and the developer must identify all project risks and the ways that they are managed. For example, LRMT projects face standard project risks such as country, sector, and project risks. Forecasting operational scenarios and the interplay of the risk variables that compose an infrastructure project is not an exact science, and effective risk allocation is an integral part of a project's success. Risks should be categorized into those that the grantor or developer will retain, transfer, or share.

In practice, risk allocation is often a product of policy considerations and the negotiating strength of the parties. In allocating project risks, the parties must analyze the strengths of each party to which a specific risk is allocated and that party's ability to manage the consequences of the risk if it should occur.

## 4.2 COMMON RISKS AND RESPONSIBILITIES

Risks can be divided into four broad categories (Mandri-Perrott 2009):

- Political and macroeconomic risks refer to the possibility that changes in the political and macroeconomic environment will occur that reduce the profitability of doing business in a country. These changes can adversely affect operating profits and asset value.
- Sector risks are risks that the sector will be affected by economic or other factors that pertain specifically to that sector more than other sectors.
- Project risks refer to those circumstances that may have an effect on the responsibilities of each party to the PPP agreement and the benefits they may achieve from the project. Project risks may be related to financing, design and construction, or operation and maintenance.

- Counterparty risks are specific risks arising from the counterparties to the PPP agreement not being able to meet their agreed responsibilities.

Risk magnitudes vary depending on the project phase: Some risks can be allocated early in the bidding process, and some will exist until the end of the project life. The magnitude obviously affects the optimum risk allocation. The four distinct periods in projects during which risks are allocated are

- Before bid submission
- Between bid submission and financial close
- During construction
- During operation

Each category contains specific risks connected to responsibilities within the project environment. Variations in specific risks can have positive or negative effects on the cash flow of the project and on the total value of the business.

## 4.3 POLITICAL AND MACROECONOMIC RISKS

We turn now to the major responsibilities and risks involved in delivering LRMT services.

### 4.3.1 Political Risks

The developer and the financier face the risk that the project may be negatively affected by acts of the grantor, other government agencies, or the legislature. Traditional political risks include nationalization, new tax regimes, and other events that affect debt service and profits. Regulatory risks include the imposition of new standards or the introduction of competition, whereas quasi-commercial risks include breaches by the grantor or interruptions because of changes in the grantor's plans (UNCITRAL 2001). Other political risks include acts of war, rebellion, default, and failure of public sector entities. The grantor is normally the project participant with the greatest ability to manage the risk of change in the political climate and therefore often takes this responsibility.



In some instances, the risks of disruption of construction or operation by individuals or groups against the project will be borne by the grantor unless the disruption was caused by the developer itself through a specific act or omission.<sup>2</sup> The same risk allocation normally applies in the case of legal challenges against the developer that inhibit the developer's ability to meet project objectives.<sup>3</sup>

### 4.3.2 Change of Law Risk

Changes in law, including adoption, modification, or repeal, may happen at any time after a PPP agreement has been signed and become effective. Developers are particularly wary of future changes in any law that might have an effect on the development and operation of an LRMT system (including construction and renovation). It is essential to have an effective mechanism to deal with the consequences of any change of law after the bid date (not only after the effective date),<sup>4</sup> particularly if this change requires the developer to incur costs or if it results in a decrease in profits.

Accordingly, change of law provisions that are included in the PPP agreement should determine which party should be responsible for the costs arising from changes in law and how such costs should be funded. This situation is further discussed in chapter 7.

Significant changes in law include

- Currency or capital repatriation limitations
- Nationalization of developed assets
- Import and export prohibitions
- Deprivation of the developer rights

<sup>2</sup> In the case of disruption to construction, given the urban nature of LRMT projects, the grantor may wish to give this protection to the developer on the assumption that all stakeholder consultations and so forth have been undertaken by the grantor prior to the construction.

<sup>3</sup> Conventional insurance coverage by the developer may not cover this risk or may be so costly that it is not a practical alternative.

<sup>4</sup> The effective date is the date on which the contract's obligations become effective.

### 4.3.3 Contingent Liabilities

Contingent liabilities represent commitments to future expenditures if certain events occur (HM Treasury 2003). Many of the risks associated with private sector participation in infrastructure create sizable contingent liabilities for public institutions. Because such liabilities are uncertain and do not correspond to definite cash-flow events, simply relying on cash-based budgetary analysis does not take into account their potential impacts on affordability. This issue is important for the grantor, and a more detailed review of contingent liabilities and their impacts is given chapter 6.

### 4.3.4 Risk of Change in Interest Rate

Private investors and local and provincial governments have almost no control over prevailing interest rates, which are affected by central government actions. Typically loans are quoted in relation to a floating interest rate (based on some reference value such as LIBOR or Euribor),<sup>5</sup> and such interest rates change with time and are not controllable by bidders or developers. Usually, governments are not willing to compensate developers for changes in interest rates during construction or operation.

Because revenues cannot usually be adjusted in conjunction with interest rate variations, equity holders, lenders, and governments usually prefer that the winning bidder-developer source a significant portion of debt at fixed rates through an interest rate swap.<sup>6</sup>

<sup>5</sup> The London interbank offered rate (or LIBOR) is a daily reference rate based on the interest rates at which banks borrow unsecured funds from banks in the London wholesale money market (or interbank market). The euro interbank offered rate (or Euribor) is the rate at which euro interbank term deposits within the euro zone are offered by one prime bank to another.

<sup>6</sup> A swap is an agreement between two parties to exchange future cash flows according to a prearranged formula. Swaps can be regarded as portfolios of forward contracts. The streams of cash flows are called legs of the swap. Usually, when the contract is initiated, at least one of these series of cash flows is determined by a random or uncertain variable such as an interest rate, foreign exchange rate, equity price, or commodity price.



This financial derivative product is used by the developer to manage its exposure to the interest rates it is being charged for the loans in the project. The swap exchanges a floating rate loan to a fixed rate loan.

However, given that the bidder-developer does not know precisely when financial close of the PPP agreement will occur, it cannot enter into a swap agreement. Bidders must then use assumptions about applicable swap rates as part of their bids even though they cannot control the swap rate until they enter into a swap contract. More than likely, the swap rate at financial close will differ from that at the time of bidding, and this variation can be positive or negative for the bidder-developer. Who, then, should take the risk related to the underlying movement in interest rate swaps? This question arises in any country and is a typical risk associated with project financing. Countries experienced in PPP transactions have generally opted for the grantor to take the risk of changes in swap rates between bid submission and financial close.

### 4.3.5 Risk of Change in Inflation Rate

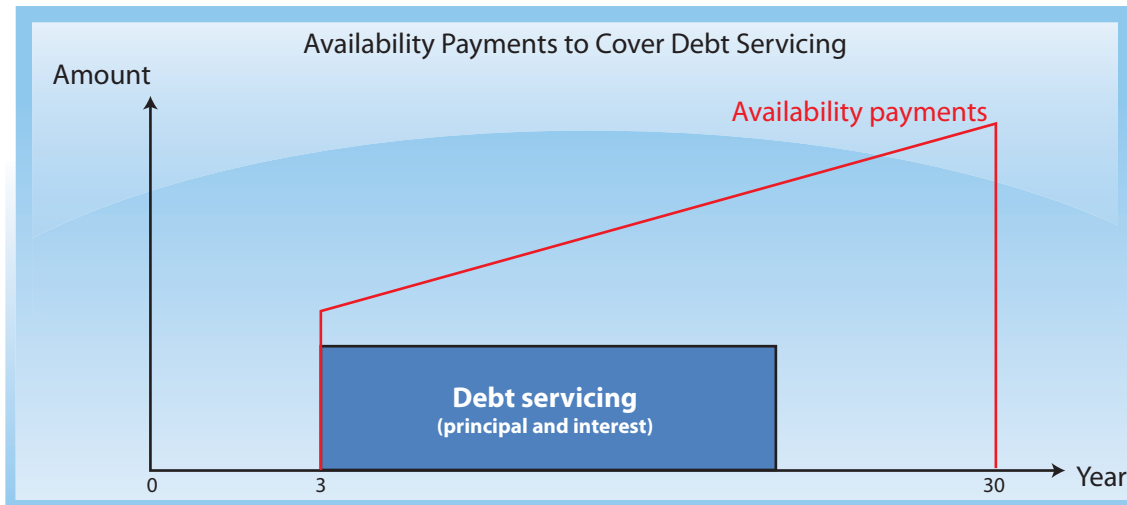
Under PPP arrangements, the construction and operational risks are mainly borne by the developer. However, inflation can have a serious impact on the costs (both construction and operational) of a project. To lenders, covering this risk is extremely important to limit their financial exposure and to maintain the project cover ratios and the net benefit anticipated from the revenue stream. For a typical PPP project, the time period between bidding and operating is long, and the cumulative impact of inflation over time will be significant.

Because bidders have no way of managing inflation risk, if asked to bear such risk, they will either refuse to bid (the risk is too high) or make very conservative inflation assumptions (risk pricing), which will push project costs up significantly. In the latter case, it would probably have been far cheaper for the grantor to have compensated the developer for actual cost inflation. For this reason, inflation risk is typically passed through to the end user or the grantor through the indexation of capital grants and other contract payments (for example, availability payments and fares). Typically, a transparent indexation formula is applied: It may refer simply to general inflation (for example, a consumer price index or retail price index) or preferably to a basket of inflation indexes that better reflect specific project costs, such as construction materials, power, and labor. It is important that the indexes used are from public sources to ensure transparency and minimize bias.

Figures 4.1 through 4.4 illustrate the effects of trying to transfer inflation risk to the bidder. The cash-flow projections are for a hypothetical LRMT project with an availability payment arrangement. Figures 4.1 and 4.2 (showing the base case scenario) assume full cost indexation. In figures 4.3 and 4.4, capital cost inflation is doubled, but everything else is kept constant. This scenario would be equivalent to telling bidders that they will receive an availability payment but also be responsible for any increase in inflation. Under this second case, bidder-developers would need to run their analyses with higher inflation rates and derive higher availability payments.

Figure 4.1

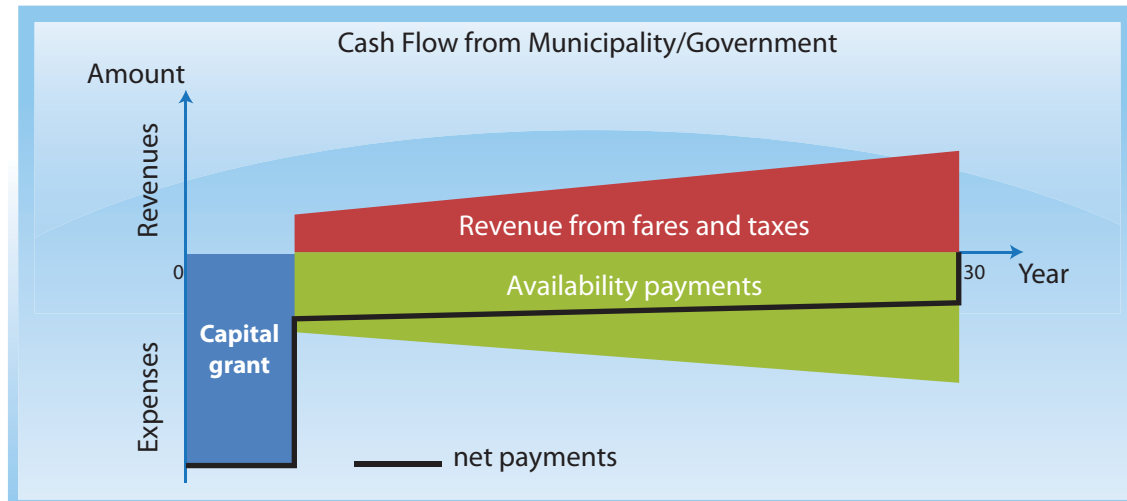
**Base Case Scenario with Full Inflation Indexation**



Source: Simulation and graph done by Vickram Cuttaree

Figure 4.2

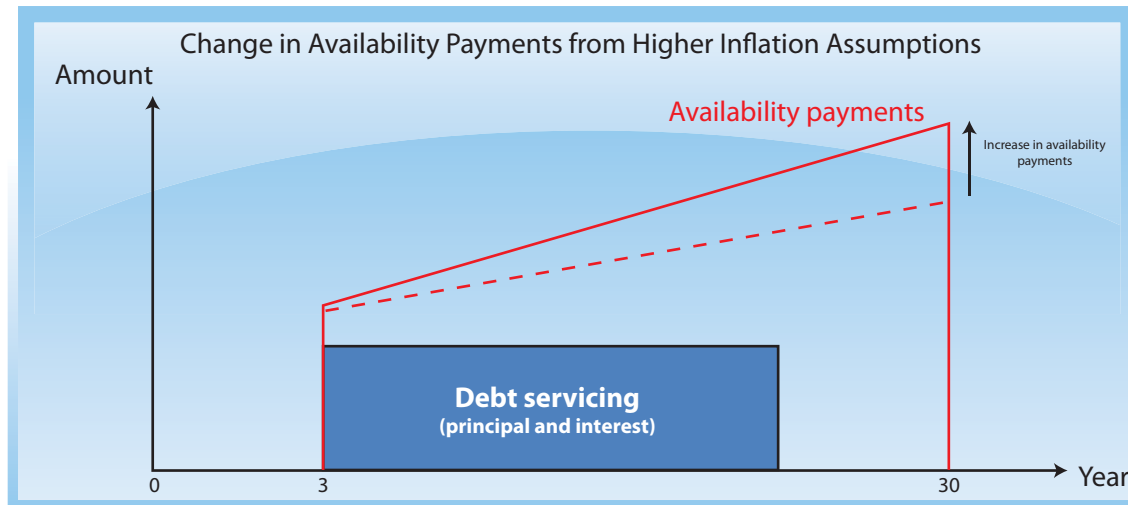
**Base Case Scenario: Cash Flow from Grantor**



Source: Simulation and graph done by Vickram Cuttaree

Figure 4.3

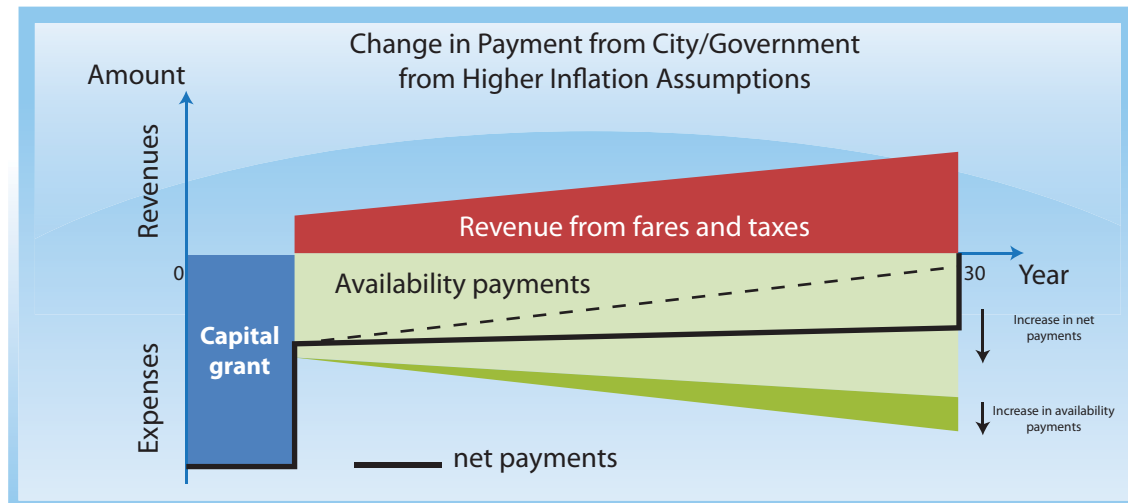
**Base Case Scenario but with Capital Cost Inflation Doubled and No Increase in Tariff or Fares**



Source: Simulation and graph done by Vickram Cuttaree

Figure 4.4

**Doubled Capital Cost Inflation Scenario: Cash Flow from Grantor**



Source: Simulation and graph done by Vickram Cuttaree



### 4.3.6 Risk of Change in Foreign Exchange Rates

LRMT schemes are of such size and complexity that they typically involve funding and procurement structures that depend on a variety of currencies:

- LRMT PPP projects are often financed with significant amounts of foreign capital in the form of, for example, syndicated bank loans, bond issues, bridging, and standby facilities, with multilateral and export credit agency loans and guarantees
- The project participants may have revenues in one or more currencies, but costs in several others
- Some of the capital and operating costs might be denominated in a currency other than that of the country in which the project is being constructed
- Project financing involving more than one currency exposes the project to changes in exchange rates
- Changes in exchange rate of local currencies will affect the level of planned revenues and profit taken offshore by the developer

As a result, foreign exchange is a significant issue. Grantors and developers may mitigate this risk by aiming to reduce reliance on imported inputs or foreign currency borrowing. However, in practice, foreign exchange risk is a significant part of most LRMT PPP schemes.

In some instances, it is generally impractical for the grantor to take all the foreign exchange risk. Additionally, the fiscal effects of taking this risk must be carefully considered. It is possible for the developer to purchase protection against movement in project costs caused by foreign exchange fluctuations. This protection can be bought through a currency swap, which involves exchanging principal and interest payments on a loan in one currency for principal and interest payments on an equal loan in another currency.

## 4.4 RISKS SPECIFIC TO THE LRMT SECTOR

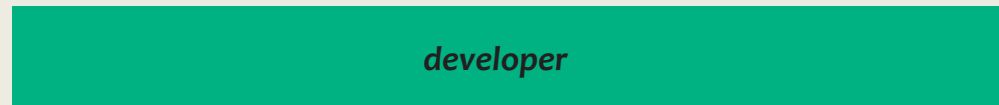
### 4.4.1 Interface Risk

Depending on the type of LRMT PPP agreement and its risk allocation, the design, construction, integration, installation, testing, commissioning, operation, maintenance, and ultimate performance of the assets procured or developed (including rolling stock) are the responsibility of the developer. A “joint and several liabilities” approach is generally required to ensure that interfaces between parties are tackled and that the grantor bears no residual risk. However, if two parties are jointly and severally liable, each party will charge a premium for bearing the risk that the other defaults. If consortium parties have very different roles within a project (for example, the infrastructure contractor is responsible for building assets, and the operator is responsible for providing the services), these risk premiums will reflect the maximum risk borne because no party will feel capable of remedying the other’s default.

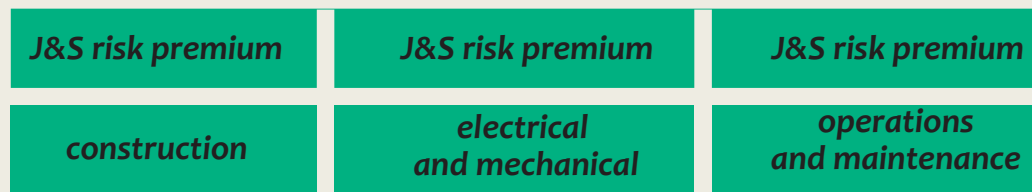
In developing the risk allocation of a proposed PPP agreement, the grantor should be mindful that these high-risk premiums will increase the total project price. It is usually more cost-effective to properly allocate the interfaces between the consortium parties. Figure 4.5 is a stylized example of the types of risk a developer would have under an integrated contract and the implications of the risks among the parties within the developer.

Figure 4.5  
**Implications of Risk under an Integrated Contract**

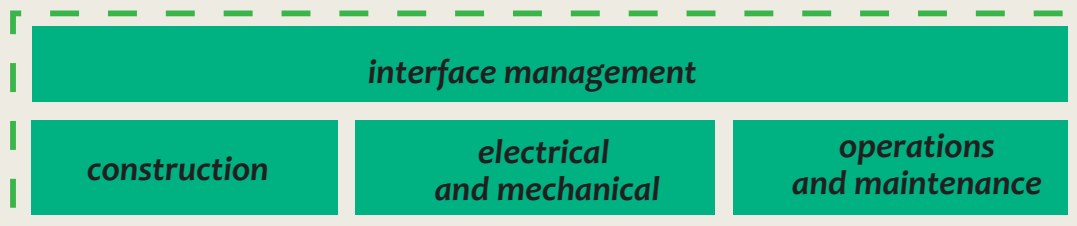
What the grantor believes it has because it has only one contract:



What the grantor really has (that is, various parties that do not necessarily talk to each other):



What the grantor should have is a fully integrated contract/agreement that has as part of its obligations the integration of the construction, electrical and mechanical, as well as the operation and maintenance aspects of on an LRMT scheme



Note: J& S = joint and several. If parties within a PPP agreement have joint and several responsibility, a risk premium will be added.

Source: Adapted from a diagram developed by François Boulanger.

#### 4.4.2 Demand Risk

Demand forecasts form a key input to the economic appraisal of any LRMT project. In a demand assessment, ridership measurements, travel times, and vehicle speeds are required for calculating operating costs and benefits. Future demand forecasts are a fundamental input to any economic appraisal (Mackie, Nellthorp, and Laird 2005 a). However, demand forecasting is typically a complicated process. As an example, when ridership is lower than forecast, the revenue is reduced. However, when demand is higher than expected, more services are required, potentially affecting the quality of service.

Historically, demand forecasts have proven unreliable, often failing to be sensitive to demographic changes, demand shift, competition, cost increase, and willingness to pay (box 4.2). Public transport passenger volumes are difficult to obtain, and such flows vary daily and seasonally. Often partial datasets are used as a basis for estimation.

Box 4.2

#### Difficulty of Forecasting Demand: United States Experience

Examples from rail transit projects in the United States demonstrate how local governments used overestimated ridership and underestimated construction and operating expense forecasts to support their bids at the expense of less capital-intensive options. Alleviating traffic congestion, making people swap their automobiles for public transport, and reducing pollution levels are some of the main arguments used to support LRMT projects. Ridership forecasts were used to support these arguments, but in many cases, actual ridership can differ significantly from forecast levels, thereby nullifying the proposed traffic and environmental impacts that may have convinced decision makers of the efficacy of the project. A major problem has been the difficulty of predicting the number of people who would be drawn from their cars.

Source: Pickrell 1992.

Demand is vulnerable to factors such as the following (Mackie, Nellthorp, and Laird 2005 b):

- Economic shocks, including fuel price shocks and economic booms or recessions
- Changing demographics
- Shifting preferences and growth of competing facilities (for example, roads in competition with rail)
- Political intervention
- Random error in forecasts
- Overselling by the developer or grantor to increase project scope

The critical inputs in forecasting ridership include three basic categories: demographic factors, such as employment and population in the corridors where lines are to be located; number of transit service lines expected, including integration with existing services and fare amounts to be charged; and, finally, speed, cost, and convenience of operating and parking a car (Pickrell 1992).

Specifically, traffic volume responsibilities and risks include

- **Ridership risk.** Projected demand is less than forecast. The risk allocation should be discussed because the developer does not have the same level of control over demand drivers as the grantor or the government.
- **Revenue risk.** Risk levels may be shared depending on the agreed payment mechanism (box 4.3). The developer may opt to receive guaranteed revenue in which all fares received are paid directly to the grantor. Or the developer may take the farebox revenue and pay the grantor a revenue stream.
- **Demand for service.** Integration with other forms of transport (buses, park-and-ride systems) along with regulatory changes (taxation policies, road provisions) will all have large effects on the demand for LRMT services. The grantor will bear the majority of this risk because it has greater control over demand drivers.



- **Fare levels.** Depending on the type of PPP agreement and the structure chosen, the grantor and the developer face the responsibility and risks of setting fare structures and levels. The main risk lies in the fare structure being set at levels insufficient to achieve the revenues anticipated.
- **Fare collection strategy.** The ticketing technology, provision of locations, power supply, and monitoring systems are usually the main responsibilities of the developer. The primary risk is that the ticketing collection technology and strategy are not the most efficient. In that case, the risk allocation will differ if the developer uses a ticketing collection technology and strategy stipulated by the grantor. If the developer is allowed to choose the technology, then the responsibility and risk will lie with the developer.

## Box 4.3

### Rationalizing Risk Allocation and the Docklands Light Railway

The Docklands Light Railway (DLR) has implemented two “infrastructure-only” concessions (Lewisham and London City Airport), with a third set to open in 2009 (Woolwich Arsenal) and a fourth in development (Dagenham Dock). DLR’s first concession (Lewisham) was the first transportation private finance initiative in the United Kingdom. It was structured such that the concessionaire (City Greenwich Lewisham Rail) would be paid an availability fee for the first 10 years and then would take farebox risk for the final 11 years of the concession period. Planners later realized that this approach to risk allocation did not offer good value for money because the concessionaire had little or no influence over ridership-related factors. Under the infrastructure-only contract structure, the concessionaire was not involved in system operation and could not influence the quality of services beyond ensuring that infrastructure assets were in good order. Consequently, subsequent infrastructure-only concessions have been based entirely on an availability payment system, which aligns assessment and payment criteria more closely with the factors under private control.

Source: Author from various sources.

### 4.4.3 Risk of Increased Project Costs

Given the high capital cost of LRMT schemes, errors in forecasting can have a major effect on the real economic cost of construction of infrastructure, financial planning, and project management. Unanticipated escalations in construction costs and higher-than-expected inflation rates are factors that may lead to potential overruns.<sup>7</sup> Clearly, determining which party bears this risk depends on the type of PPP agreement. For example, under a net-cost contract with investment (see chapter 3), the developer would be exposed to such escalations, which may affect the grantor. The two main causes of bias in capital cost estimates are as follows (HM Treasury 2007):

- Inadequate definition of scope and objectives of projects in the business case: grantor risk
- Inadequate management of the project during the implementation phase so that costs are not controlled and contractual risk mitigation instruments are not adhered to: developer risk

Bias in capital costs can be managed by improving the estimation of the capital costs of each option, adjusting these estimates on the basis of empirical evidence, and reducing these adjustments on the basis of confidence in the capital cost estimates and the risk management and mitigation systems (box 4.4).

## Box 4.4

### Possible Limits on Use of Capital

In projects where the central government is providing grant funding, it may decide to limit funding to an agreed ceiling. Any cost overruns are borne by the developer. This arrangement provides a direct incentive for the developer to place more effort into ensuring the accuracy and the reliability of the forecasts used. A degree of uncertainty is to be expected when forecasting ridership and capital costs, and such uncertainty cannot be eliminated. Nevertheless, when assessing the bids, the grantor needs to ensure that the developer has made suitable contingency allowances.

Source: Author

<sup>7</sup> For example, in the U.S. study (Pickrell 1992), it was found that most cost overruns were the result of critical errors in forecasting either the volume of materials and services required to build and equip projects or the future costs of purchasing inputs.

Demand forecasting has a direct effect on establishing capital and operating costs. When evaluating bids, the grantor must carefully evaluate the forecasting techniques used by the developer to establish project costs. For example, reducing the forecasting horizons used to predict ridership would reduce the time frame within which unanticipated demographic changes, demand shifts, and changes in the legal environment could affect the forecasts (Pickrell 1992). Additionally, the grantor may wish to perform its own engineering studies to develop a comparator estimation of the project's capital costs and future operating expenses.

#### **4.5 PROJECT-RELATED RISKS**

Grantors and developers face a large number of project-related risks. To an extent, certain sector risks (such as demand risk) can overlap as project risks. However, at its core, an LRMT project is a partnership. The grantor has the difficult task of managing price certainty versus price minimization. Accordingly, the following key risk allocation rules should be kept in mind to balance transferring full risk against creating the right incentives for the parties to the PPP agreement:

- If a developer perceives a risk to be outside its control, it will tend to price this risk on a worst-case basis—especially now that corporate boards are aware of difficult LRMT projects.
- Economically, it does not make sense for the grantor to pay the same price when a problem might happen as would be payable were the problem certain to happen.
- For such risks, if the grantor is not itself capable of managing those risks, the emphasis should be shifted toward incentivization (for example, “cost + fee + pain/gain” approaches).
- The optimal incentive is such that the “pain/gain” is commensurate with the cost of doing one's best.



Source: <http://www.sxc.hu/>





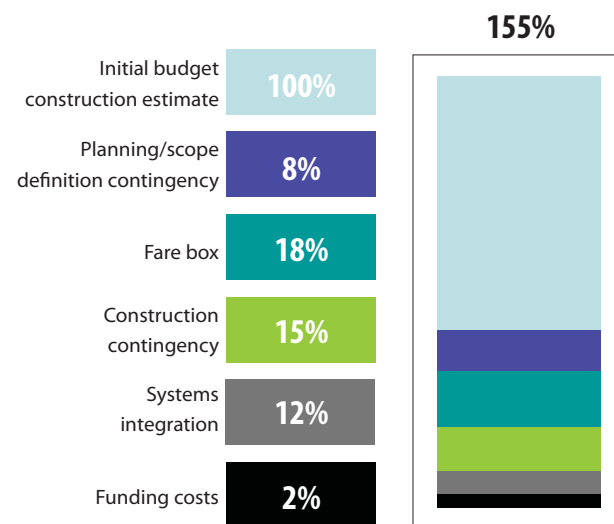
### 4.5.1 Development Risk

The development phase involves the preparation and procurement of the project up to financial close of the PPP agreement. This phase includes the invitation to tender and bidding, the negotiation of the PPP agreement and various project documents, and the effort to obtain debt and equity funding. Given the nature of LRMT PPP projects, both the developer and the grantor will expend significant time and resources negotiating the PPP agreement.<sup>8</sup> The costs during this phase are understood to be normal development costs, and generally each party bears its own risk. Occasionally, depending on the way the bidding process is designed and what is allowed in the tender documentation, the grantor may cover some of the developer's bidding costs.

In figure 4.6, we show the typical composition of an LRMT project cost. It is important that the grantor be mindful of the possible changes in costs that occur once the PPP agreement is implemented.

Figure 4.6

#### Typical Cost Composition of an LRMT Project



Source: Adapted from a diagram developed by François Boulanger.

<sup>8</sup> Financial close means that the loan agreements are in place, and the first drawdown can be made on the loans.



### 4.5.2 Design and Construction Risk

Design and construction risks relate to responsibilities associated with the design, procurement, engineering, construction, completion, testing, and commissioning of the tracks and stations and with any integration that must take place with existing systems. Depending on the type of PPP agreement chosen, the grantor will usually provide specifications—or sometimes reference designs—for the proposed LRMT scheme, and the bidding developers will base their bids on these specifications. The risk allocation during the design and construction phase is complex, as follows:

- **Design.** Whichever party takes responsibility for the design generally takes the risk of errors in design that may lead to the failure of the project to satisfy contractual requirements or laws. The risk of faults or changes in design, latent defects, and asset life expectancy would have to be specified and responsibilities allocated. If the grantor requires variations, it typically bears that risk.
- **Permits and access.** The grantor is responsible for providing support to the developer in obtaining the permits and licenses necessary for the construction and operation of the LRMT project. However, the developer has ultimate responsibility for obtaining such permits and licenses. The grantor is also responsible for guaranteeing the timely delivery of land required for the development of the project, free of legal or physical encumbrances, and will bear the costs of dealing with these encumbrances.
- **Construction.** The developer is responsible for constructing the project to the agreed specifications, including construction, integration, installation, testing, commissioning, operation, and maintenance tasks. The developer carries the risk of increases in construction costs (price of labor or materials) and is also responsible for the performance of all sub-contractors. The developer also generally bears the risk of delays.

### 4.5.3 Performance Standards Risk

The norms and standards that are to be applied during both construction and operation in the LRMT PPP agreement need to be established early. Generally the developer will take risks on the basis of established norms and standards (for example, European Union standards). In many countries, rules and standards for such systems do not exist, and in such situations, the absence of applicable laws will require special technical requirements to be developed and approved by the appropriate governmental department.

### 4.5.4 Existing Services

If the developer is taking over existing services and infrastructure in addition to delivering new services, the payment mechanism should be structured to incentivize the developer to deliver the new services on time and not limit its outputs to existing service levels. A critical question must be asked: When does the developer take over the responsibility for existing service delivery? There are three general options (HM Treasury 2007):

- Following financial close, responsibility for all sites is taken over by the developer. This approach provides for a clean, uncomplicated arrangement and is recommended in most cases. Where there are concerns over the condition of assets, the grantor may have to take on additional risks, which may prove unacceptable.
- A phased handover is used, in which the developer takes over responsibility for sites at the same time that it begins work on them. Under this scheme, the grantor will retain responsibility over some sites between financial close and the start of construction.<sup>9</sup>
- The grantor takes responsibility for bringing existing sites up to a basic specification standard before handing them over to the developer.<sup>10</sup>

<sup>9</sup> It must be noted that this scenario may add greater complexity to the PPP arrangement.

<sup>10</sup> This arrangement is especially complicated because additional contractors will be party to it, thereby increasing the scope for disputes between developers and contractors.

The grantor must define an expected service level for existing services during the period in which sites are handed over to the developer but before the full service commencement stage has been reached.<sup>11</sup> Limiting such risk requires a common understanding of services, including financial management services and maintenance services. Furthermore, the grantor should specify the level of repair services needed to maintain existing standards. Two options are available to the grantor to manage this risk:

- Run the existing services according to the specifications defined for the new service commencement during the transitional period but with a more relaxed payment and performance regime. The concern with this method is the risk of performance failures if the existing facilities are in bad condition.
- Create a tailored expected service-delivery specification that sets out required services, taking into account the conditions of existing assets and what can reasonably be expected. If the developer cannot meet expected delivery requirements for the transition period, a tailored delivery agreement will be required.

#### 4.5.5 Financing Risk

Depending on the level of capital grant and subsidy, the developer will be responsible for raising the private financing necessary to complete the project. For the portion of funding that is to be privately financed, the risk of increases in the interest rate or inflation rate should be borne by the developer after financial close. This concept is discussed in further detail in chapter 6.

<sup>11</sup> In specific LRMT PPP agreements, the service commencement date is the date on which the PPP agreement is signed and comes into force. After that date, the construction or development obligations are undertaken by the developer, and the operation of service is due to commence, provided that the grantor has accepted the infrastructure that has been developed for the purpose of providing the LRMT services.

#### 4.5.6 Government Guarantees

Guarantees are provided by the government to support infrastructure investments and to transfer risks from the developer to the government to make an arrangement more attractive to the private sector developer. During the construction phase of a project, developers may be using inputs whose costs depend on the exchange rate, and the value of these inputs rises and falls with the local currency. In such cases, the government may provide an exchange rate guarantee to mitigate the effects of depreciation in the currency (for example, fare dollarization).

Developers face reduced incentives to improve performance levels when government guarantees cover a risk that the developer is capable of managing and controlling better than the government (Irwin 2007).

When government guarantees are provided, the contingent nature of the guarantees makes valuing them difficult, and this situation raises issues about how they are to be accounted for within the government's financial and budget reports (Ter-Minassian 2005).

#### 4.5.7 Operational and Maintenance Risks

Operational risks refer to the responsibilities associated with operating the existing and new assets and maintaining them to required standards. Depending on the type of PPP agreement, the grantor may take less or more of the ridership and revenue risk. The grantor and developer must determine who will take the risk of integrating the system with existing modes of transportation. The developer will be responsible for the standard of performance in accordance with whether the service provided to users meets the standards set out in the PPP arrangement. Typically, the developer is responsible for costs of operations and maintenance, including any costs related to latent construction defects for which the developer is responsible.

### 4.5.8 Environmental Risk

The developer will be considered responsible for meeting environmental norms and standards, such as those related to noise pollution and emissions. However, the grantor will retain certain responsibilities related to specific issues such as preexisting conditions or special compliance waivers.<sup>12</sup>

*12 In some instances, the developer may be granted special waivers that have been allowed to the grantor with respect to, for example, European environmental directives. Such waivers do not mean that the developer does not have the ultimate responsibility to, against an agreed timetable, meet the standards. In such situations, the PPP agreement must specify a schedule for the phase-out of the waivers.*

### 4.6 RISKS ASSOCIATED WITH MANAGING THE PPP AGREEMENT

The mechanism for implementing and monitoring risk allocation rules must balance the required certainty of the PPP agreement in the future with a need for possible adjustment if there are unanticipated changes in laws, indexation, and value testing—critical factors in operating cost risk (box 4.5). Developers will be more willing to take on risks related to unforeseen changes in the operating environment if they are given assurances that they can quantify through value testing in order not to be disadvantaged (HM Treasury 2007).

Box 4.5

#### Risk Allocation and Compensation Paid to Canada Line's Developer

The Canada Line rail rapid transit system is part of an integrated transport network for the entire Vancouver metropolitan region. This system includes commuter rail, light rail, bus, and marine transportation services all under the supervision of a regional transportation authority (TransLink). TransLink has full responsibility for fare setting and structuring, service modal integration, and other policy-related decisions across the entire network (including Canada Line). In structuring risk allocations for Canada Line's concession agreement, planners accordingly decided that TransLink would be best suited to endure the majority of demand and revenue risks, given the effect that nonoperating decisions had on system ridership. Nevertheless, planners also wanted to align some portion of the concessionaire's interests with TransLink's ridership-related goals. Accordingly, Canada Line's contract ties 10 percent of the concessionaire's payment to the system's customer volume. Calculating this volume payment involves:

- a. A base forecast credit ridership estimate (excluding airport-only ridership).
- b. An agreed base volume payment.
- c. An agreed shadow fare per paying customer.

During the system's operating phase, this information determines three possible payment scenarios:

- a. If ridership equals forecasts, the concessionaire receives the base volume payment.
- b. If ridership exceeds forecasts, the concessionaire receives the base volume payment plus the difference between actual and forecast ridership, multiplied by the agreed shadow fare.
- c. If ridership falls below forecasts, the concessionaire receives the base volume payment minus the difference between forecast and actual ridership, multiplied by the agreed shadow fare.

Independent consultants prepared Canada Line's initial ridership study, which formed a basis for the system's base credit ridership estimate. However, Canada Line's contract specifies automatic revisions to this forecast at the commencement of services, two years after service commencement, and every five years thereafter. In addition, both TransLink and the concessionaire can trigger a forecast reassessment if any of the following events occur:

- The system's service plan changes.
- Planners expand services by adding stations along the existing route.
- Bus services change.
- Changes occur in the region's traffic demand management initiatives (for example, changes in road pricing or tolls).
- TransLink increases fares more than 5 percent (in real terms) over the average fare during the previous five years.
- Changes occur in the system's fare structure.
- Average morning peak hour ridership during a three-month period exceeds a certain level near the system's maximum designed capacity.

Source: Author interview with Canada Line



### 4.6.1 Payment Mechanisms

The financial implications of a PPP agreement will depend on its type. Put simply, the payment mechanism contained within the PPP agreement details the payments that the grantor will make to the developer and also sets out the framework of incentives used to encourage the developer to provide an efficient service at a cost that provides value for money.

How a grantor contributes financial support to a PPP arrangement and how much it contributes are often dictated by what is necessary to attract private sector financing and to promote the success of the project (Torres de Mästle and Izaguirre 2008). Some of the mechanisms used by the government to reduce the risk of private financing for LRMT schemes follow:

- Shadow fares are paid to the developer by the government on the basis of ridership or passenger throughput. Fares are not charged to users. Financing is based on a long-term agreement in which the grantor makes regular payments that are based on ridership throughput and other performance measures over the long term of the PPP agreement.
- Availability payments are paid to the developer by the grantor on the basis of the availability of service and required capacity of infrastructure, including rolling stock, regardless of actual ridership volumes.
- Capital grants cover part of the infrastructure construction costs. Where ridership revenues would not be enough to recover the full construction cost of a project, reducing the privately financed construction costs can make the project more financially attractive to the private sector.
- Minimum revenue guarantees are payments made by the grantor to the developer if the ridership or revenue falls below a specified minimum. Conversely, if revenues are higher than forecast, the developer will share these revenues (at an agreed level) with the grantor.

LRMT systems tend to use availability payments and performance payments as the basis for the arrangement's structure; that is, the developer will receive payments for providing an available service and will incur penalties or no payment when the service is unavailable or if certain performance indicators are not met. The specifics of these arrangements are discussed later in this chapter.

### 4.6.2 Use of Bonuses and Penalties

The grantor can use bonuses and penalties as part of a mechanism for enforcing the risk allocation rules. Additionally, bonuses and penalties can be used to enhance the developer's incentive to carry out its general responsibilities under the terms of the contract and to meet agreed performance targets. Penalties and bonuses should reflect the economic costs and benefits of the behaviors that they are trying to prevent or promote. Without such incentives, the grantor reduces its ability to influence the developer and to demand any improvements that may be required.

### 4.6.3 Price Variations

The regulations for adjusting the payment structure are a critical component in the risk allocation architecture. Throughout the life of the contract, a number of variables, such as inflation, input costs, and legal regulations, are likely to change in unpredictable ways. To reflect these uncertainties, the PPP arrangement should allow adjustments to the payments over time. Such adjustments will ensure that the developer continues to earn a reasonable rate of return and that incentives are maintained (Kerf and others 1998). The developer should always be encouraged to control costs, but mechanisms to control unanticipated increases can go a long way toward reducing excessive contingency risk pricing in the developer's bid.



#### 4.6.4 Risk of Inflation: Indexation

A chief concern for the developer is the risk of costs inflating over the life of the PPP agreement, thereby rendering the payments made insufficient to cover the operating and financing costs. The availability payment should be indexed, and the proportion of the payment to be indexed should be determined at an early stage. The choice of indexes or proportion should be determined by the grantor, not the bidding developer, to facilitate comparison of rival bids. The developer is protected by the use of benchmarking or market testing. Value for money is achieved by indexing the proportion of the availability payment that matches the proportion of total costs represented by any of the components of the developer's underlying costs that are not fixed. Indexations that reflect the underlying cost exposures faced by the developer can reduce the cost risks and provide large savings over the duration of the contract (HM Treasury 2007).

#### 4.6.5 Cost Pass-Through

Cost pass-through is usually used to cover the cost of risks over which the developer does not have any control. As may be applicable depending on the type of LRMT agreement, when input costs rise, the fare adjustment rules agreed upon between the developer and the grantor will allow for the changes in the costs to be passed through to passengers. Changes in inputs for LRMT projects can include changes in tax structures or regulations governing the operation of the LRMT system.

#### 4.6.6 Fare Risk: Indexation Formulas

Fare indexation formulas alter fares to reflect changes in an index of prices and do not necessarily reflect changes to a developer's costs. Instead of changing in response to specific events, fares are adjusted at regular intervals, such as every

six months. The indexation process aims to compensate the developer for the effect of exogenous cost increases on the developer's inputs. More important, indices reduce the risks faced by the developer without blunting the performance incentives (Kerf and others 1998). The indexation formulas automatically adjust fares according to agreed rules. Specific indexation formulas can adjust fares according to changes in the rate of inflation, consumer price indexes, or a consumer price index related to changes in the system's likely costs, such as a basket of prices, exchange rates, or specified inputs.

#### 4.6.7 Residual Value Risk

If an asset still has value (not fully depreciated) after the PPP agreement has expired, the grantor should agree on how this residual value should be treated. Under PPP financing, assets will typically be depreciated against a given depreciation schedule. In most long-term PPP agreements, there will be a residual value at termination, especially if significant investments have been made toward the end of the contract period. If the grantor wishes the assets to be transferred on expiry at zero value, accelerated depreciation would be required. Alternatively, if the assets are transferred at expiry at net book value (that is, the residual value), the grantor would pay this residual value to the developer at expiry, but would not have to suffer large availability payments in the final years of the PPP agreement. This residual value would easily be audited from the financial project accounts of the developer; it is a transparent and fully auditable transfer value. Other issues that the grantor should consider are as follows:

- Is the grantor likely to require use of the assets after expiry?
- How will the residual value transfer affect any termination payments when the PPP agreement ends?





Source: <http://www.sxc.hu/>

## 4.7 MANAGING THE DEMAND OR FAREBOX RISK

Given the problems of reliability of demand forecasts, the grantor may choose to provide either availability payments or minimum revenue guarantees as a means of mitigating the demand or farebox risk.

### 4.7.1 Availability Payment Structure

An availability payment is a payment made by the grantor to the developer. The grantor must define the conditions that must be met by the developer for the service to be classified as available. Given the link between this classification and the payment mechanism, the developer (and, as appropriate, its constituent members) must ensure that these conditions are reasonable, measurable, and achievable under the PPP agreement.

The provision of core functions lies at the heart of the definition of availability, and the arrangement should determine a simple mechanism for measuring whether these core functions are being satisfactorily provided. In the case of LRMT services, the core function is for the developer to operate and maintain the LRMT system to the specifications determined in the PPP arrangement.<sup>13</sup> This requirement means providing an LRMT system that delivers commercially attractive service patterns capable of carrying riders at a minimum level of comfort. Unavailability should be measured in a simple way to avoid excessive monitoring costs. Unavailability means that the developer is not able to meet the core service provisions set out in the PPP agreement.

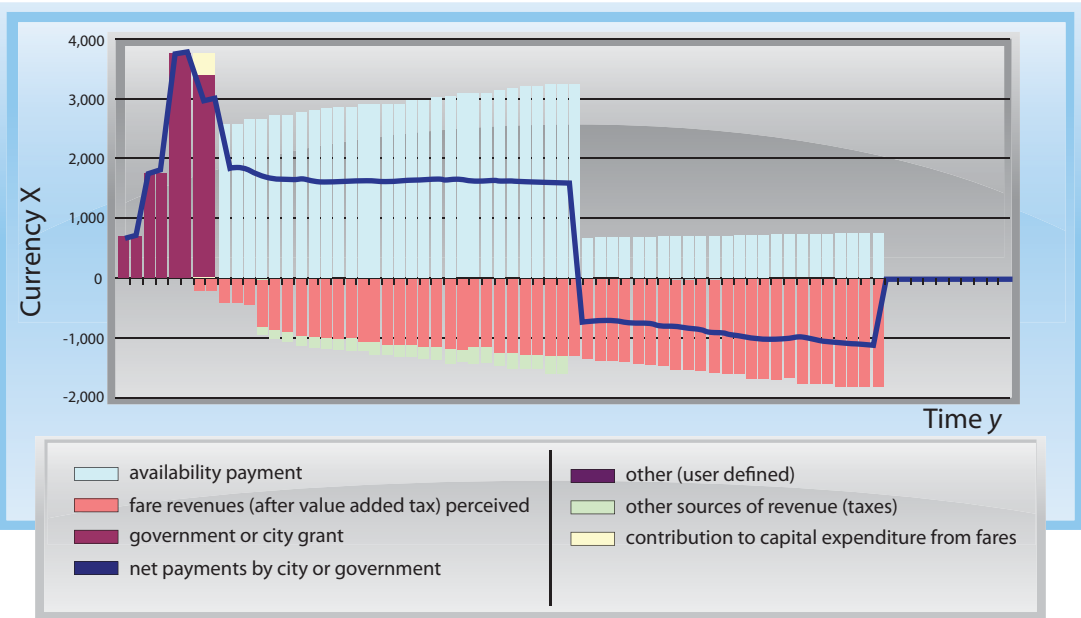
<sup>13</sup> In countries with significant perceived risks, an availability payment is likely to be more attractive to the private sector developer and will allow cheaper financing because the weighted average cost of capital will be reduced. Additionally, an availability payment grants the city greater control over tariffs, and it generally leads to a shorter tendering period.



How is an availability payment usually set?

Depending on the type of PPP scheme chosen for the LRMT project—and assuming that the developer has no other cash flows or means of paying its costs or debt service (that is, the developer is not taking any farebox risk)—the availability payment should be calculated, adjusted, and paid in a manner that enables the developer to meet its financial commitments. Typically, the availability payment begins in the first year of operation and will be set at a level that will achieve the desired internal rate of return (IRR) or debt-service coverage ratio (DSCR). The availability payment can be optimized to reduce the total contribution from a grantor through indexation to inflation and other payment factors. The user defines the project’s target IRR or DSCR, and the revenue is collected by the grantor. The availability payment is then made during the operating years and indexed to inflation and payment factors. The availability payment can be reduced in duration or level after a negotiated number of years. Figure 4.7 represents a sample LRMT project where a capital grant together with an availability payment is paid by the grantor. It shows the revenues expected from passenger ridership and indicates when payments from the grantor should reduce as capital costs are repaid and the system starts generating greater revenues.

Figure 4.7  
**Cash Flow of Simulated LRMT Project with an Availability Payment and Capital Grant Payable by the Grantor**



Source: Simulation and graph done by Vickram Cuttaree.

In this example, the level of ridership (and thus revenue) is the main risk taken by the grantor. Project cash flows are shown in six monthly periods. The blue line represents the net cash flow for the grantor. When the line is above the horizontal axis, it shows cash flows from the grantor to the developer; when it falls below the horizontal axis, it shows cash received by the grantor.

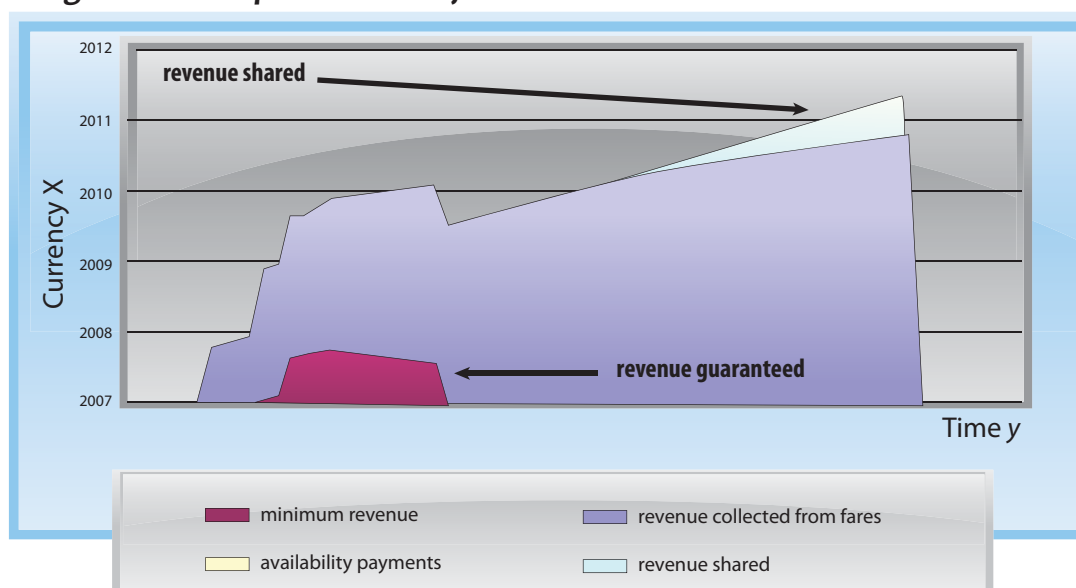
As the figure indicates, during the first 36 months, there is a net cash payment from the grantor to the developer. This payment is meant to cover the capital grant and the period during which the availability payment exceeds farebox revenues. This period corresponds to that when the project finance loans must be repaid. After the developer has repaid these loans, the availability payment requirement will be much lower (mainly to cover operation and maintenance costs). During this subsequent period, farebox revenues are forecast to considerably exceed the availability payment, and there will be net income to the grantor from the project until the PPP agreement expires. The total amount to be paid by the grantor will be highly dependent on revenue and cost assumptions.

#### 4.7.2 Minimum Revenue Guarantee Structure

The minimum revenue guarantee (MRG) is a payment by the grantor to the developer that reflects the developer's appetite for farebox risk and the lender's minimum sustainable cash-flow requirements (for example, minimum DSCR and debt-service funding requirements). The level of MRG payment may vary each year according to costs and revenues. However, after full debt repayment, the level of the MRG is likely to fall significantly. The main difference between an MRG and an availability payment is that under an MRG, the developer does take some demand or farebox risk. See figure 4.8.

Figure 4.8

#### Diagrammatic Representation of a Minimum Revenue Guarantee

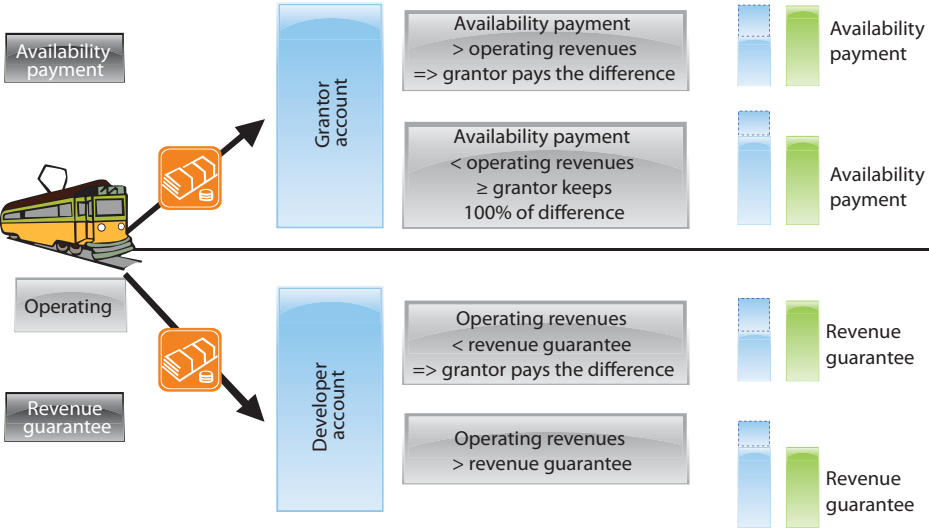


Source: Simulation and graph done by Vickram Cuttaree.

4.7.3 Revenue Guarantee versus Availability Payment

Availability payment and minimum revenue guarantee mechanisms both seek to manage demand risk in an LRMT scheme. The choice will depend on the specific conditions, and there is no right or wrong answer to the usage of either mechanism. Figure 4.9 and table 4.1 show a representation of the main differences between the two systems and compare the revenues under each.

Figure 4.9  
Revenue Guarantee versus Availability payment: Similar Mechanisms  
Creating Similar Exposure to the Grantor



Source: Diagram by Raymond Bourdeaux and Vickram Cuttaree.

Table 4.1  
Availability Payments and Minimum Revenue Guarantee Structures

Availability payments	Minimum revenue guarantee
<ul style="list-style-type: none"><li>• Developer defines the project’s minimum DSCR.</li></ul>	<ul style="list-style-type: none"><li>• Developer defines the project’s minimum DSCR.</li></ul>
<ul style="list-style-type: none"><li>• Revenue is collected by the grantor.</li></ul>	<ul style="list-style-type: none"><li>• Revenue is collected by the developer.</li></ul>
<ul style="list-style-type: none"><li>• Availability payment is paid during operating years and indexed to inflation.</li></ul>	<ul style="list-style-type: none"><li>• Payment is triggered only when DSCR for period is not achieved.</li></ul>
<ul style="list-style-type: none"><li>• Availability payment can be reduced in duration or level after x years (usually after the debt has been repaid).</li></ul>	<ul style="list-style-type: none"><li>• Level of payment each year varies depending on cost and revenue. It can be reduced after the debt has been repaid.</li></ul>

Source: Author.



# Checklist

## Risk Allocation

<input type="checkbox"/>	Identify all responsibilities required to successfully deliver the project.
<input type="checkbox"/>	Identify all risks associated with these responsibilities: <ul style="list-style-type: none"><li>o Macroeconomic risks</li><li>o Sector risks</li><li>o Project risks</li></ul>
<input type="checkbox"/>	Create detailed risk matrix at design and development stage.
<input type="checkbox"/>	Categorize risks into those that the grantor/developer will retain, transfer, and/or share.
<input type="checkbox"/>	Allocate risks to the party best able to manage them during the life of the project.
<input type="checkbox"/>	Develop risk and responsibility allocation framework.
<input type="checkbox"/>	Define the payment mechanism upon which the arrangement between the grantor and developer will be based.
<input type="checkbox"/>	Determine the level of government/grantor support of a PPP arrangement (if applicable) as basis of attracting private sector support.
<input type="checkbox"/>	Establish whether an availability payment or minimum revenue guarantee will provide the basis for the arrangement's structure.
<input type="checkbox"/>	Define the risk allocation rules framework, which will determine the mechanisms for enforcing the rules.
<input type="checkbox"/>	Establish bonuses and penalties for enforcing the risk allocation rules.

# CHAPTER 5

## PUBLIC-PRIVATE PARTNERSHIP DESIGN, SPECIFICATIONS, AND PERFORMANCE MANAGEMENT



Sofia, Bulgaria.  
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of Rainer Hesse.

# Public-Private Partnership Design, Specifications, and Performance Management

In designing the light rail–light metro transit (LRMT) public-private partnership (PPP) arrangement, the grantor needs to arrive at a final design that balances the provision of public services against a bankable technical and economic solution. Additionally, once the contract has been established, the grantor needs a mechanism by which it can ensure that the public service objectives are met during the life of the contract.

In this chapter, we look at some of the key steps in the process of establishing and maintaining the PPP arrangement. The process starts with the grantor’s defining the scope of work for the service to be provided and the standards to be met.

This definition will directly affect the overall cost of the project. Generally, the cost of providing the LRMT service exceeds the cost that can reasonably be recovered from fares collected from the riders (the farebox income). Therefore, capital grants and project subsidies (through availability payments, performance payments, minimum revenue guarantees, or similar mechanisms) may have to be provided. Once the final balance among services, fares, and subsidies has been established (figure 5.1), the grantor can proceed to establish the final design, financial approach, and contractual basis of the PPP arrangement. In the long term, the services to be provided by the developer need to be monitored and controlled, and they need to be linked to some form of performance payment mechanism.

Figure 5.1  
Balancing Service Standards, Fares, and Subsidies



Source: Author’s representation.



## 5.1 SETTING SERVICE STANDARDS

In this chapter, we are interested in establishing the first step of the project design, where the grantor sets the service standards targets to be achieved and the specifications and standards that will be used to achieve them.

### 5.1.1 Specifications and Standards

The different roles of specifications and standards in PPP contracts must be clear:

- Specifications represent contractual obligations to perform. In the case of LRMT PPPs, performance typically requires the delivery of particular outputs. Specifications serve to describe those outputs and their allowed variability.
- Standards are criteria used to fairly and objectively measure the acceptability of performance. Transport authorities use standards to ensure that outputs meet required needs (such as safety, punctuality, functionality, and longevity). Private partners also derive a measure of protection from standards because their outputs cannot be expected to exceed agreed standards without additional compensation.

Specifications and standards together form integral components of an LRMT PPP's overall allocation of risks and responsibilities. Specifications set out the "rules of the game" for both developers and private partners. The relative precision of contractual specifications should always do the following:

- Fairly articulate expectations to prospective bidders.
- Establish output-based design, operational, and maintenance requirements—limiting their acceptable variability in accordance with public needs and expectations.
- Ensure long-term system reliability.

- Reasonably minimize disturbances (during both construction and later operational phases).
- Provide for safety (during both construction and later operational phases).
- Protect environmental resources.
- Ensure accessibility for customers with disabilities.
- Guarantee the acceptable hand-back condition where private partners own or lease system assets for some period.
- Protect private partners from subjectivity in application of the contract.

### 5.1.2 Setting a Service Goal

The trend with modern LRMT PPP arrangements is a design based on output, rather than on input. Under a traditional approach, every aspect of an LRMT scheme is designed in detail, and the contractor must provide inputs exactly as specified. This arrangement results in an expensive, intensive, heavily detailed effort by the grantor. Effectively, the grantor has a high level of risk because it assumes that any changes it makes to the detailed design are warranted. In the case of Edinburgh, Scotland, the grantor went to great lengths to provide a warranted design for the scheme before the bidding process, taking on considerable effort and cost.

An output-based approach is well suited to making the best use of the private developer's ability to provide the most economic and practical solutions within defined technical standards, to meet defined policy objectives, and to attain defined levels of service. The service goals are defined contractually (see the "Performance Management and Control" section 5.6), and the developer must meet or exceed those goals. In addition to the technical issues (for example, construction and provision of rolling stock and equipment), a number of key issues will be set as service goals that must be met through the life of the

PPP arrangement. These service goals need to be defined early in the design process and must be chosen to ensure that achieving those levels of service will accomplish the long-term goals of the PPP arrangement.

A full list of service-level goals can cover most aspects of the LRMT scheme, but for successful contractual implementation, it is more practical to consider the fewest “overarching” levels of service goals that will ensure that the project meets the overall scheme objectives. Key level-of-service issues (given for illustration purposes) could include extent of route served; investment, rehabilitation, or renewal programs; reliability of service; availability; punctuality; and timetabling. Key “soft” issues could include passenger comfort, customer service, interline management and ticketing, ridership levels, and financial and operational business measures.

### 5.1.3 Selecting Standards

LRMT schemes have a set of acceptable sector standards that define the basic characteristics of the system and how it should perform. As an example, there are comprehensive international standards for most aspects of rolling-stock specifications, and suppliers, contractors, and developers could reasonably be expected to conform to those standards. An indicative list of some of the standards is provided in annex 5.

Implementing LRMT systems involves trade-offs between efficiently using resources and providing for safety, functionality, and longevity. At one extreme, overdesign would be wasteful and would result in excessive cost, delay, and disturbance. At the other extreme, underdesign could jeopardize the quality of LRMT services or, in the most extreme case, public safety. Standards guide designers in striking a reasonable balance between those extremes. However, some considerable effort may be needed to specify standards suited to the needs of particular LRMT PPPs. Local standards may be limited or nonexistent in countries with no experience in implementing modern LRMT systems. In that

case, planners should consider (a) drafting new standards, (b) using standards from other countries or jurisdictions, or (c) using standards proposed by the private partners or developers. These options are detailed in the paragraphs that follow.

### Drafting new standards

Creating new standards specifically for LRMT systems is demanding and time consuming, but allow planners to incorporate both local norms and leading international best practices and can be used for current and future projects. A procedure needs to be developed to ensure that these new standards are kept up to date and relevant. It should be noted that this process needs to include a way to manage the involvement of various stakeholders.

### Using standards from other countries or jurisdictions

Adopting standards used in other countries is one option for quickly acquiring the benefits of international expertise. However, it is not without risks, because standards from other countries often reflect different underlying considerations. For example, issues may include dissimilar climates, material availability, legal codes, and manufacturing practices (box 5.1).

Box 5.1

### Standards and South Africa’s Gautrain

Planners for the Gautrain Rapid Rail Link faced challenges regarding design standards for the system’s viaduct structures. Existing South African standards were originally intended to accommodate heavy freight rail loads—far in excess of Gautrain’s needs. Resulting overdesign would have significantly increased system costs unnecessarily.

Design specifications for Gautrain’s contract therefore deferred to “international standards” for comparable rail systems. This issue became particularly contentious when the concessionaire proposed a construction design (with only one reference source) that would have potentially limited the system’s ability to accommodate heavier train sets. Although this design technically met specifications, Gautrain’s grantor had doubts regarding the design’s capacity for accommodating future development. Negotiations eventually led the concessionaire to adopt higher design standards, albeit at a greater cost to the public.



### Using Standards Proposed by Private Partners

Allowing private partners to propose their own standards can offer economic and service advantages. However, the grantor will need to verify the appropriateness of the proposed standards to ensure their adequacy and sustainability. In accepting the developer's standards, the grantor is implicitly accepting a higher level of risk. Additionally, verifying and controlling those standards will be a time consuming and possibly costly process, and further protections will need to be established within the PPP agreement.

## 5.2 COSTING

After the initial objectives have been set, the grantor should estimate the cost of providing the service. However, much confusion still surrounds the definitions of cost of service and cost recovery. This section focuses on average costs as the starting point for determining the level of project investment and income required, as well as some issues about the role of fares in LRMT PPP schemes.

### 5.2.1 A Definition of Cost of Service

The cost of service has three elements:

- **Operating and maintenance expenses.** These are the day-to-day expenses involved in providing services and keeping the system functioning. They include labor, electricity, materials, repairs to equipment, and the like.
- **Depreciation.** Depreciation is the reduction in value of system assets over time. It is roughly equivalent to the amount of money needed to replace assets as they wear out.
- **Rate of return on investment.** Sponsors and lenders will require a return on the debt and on the equity that they raise for the project. The return is the amount of money gained or lost on an investment relative to the

amount of money invested. It includes money earned (a return) on both debt and equity. Typically, the cost of debt is the interest that lenders charge, whereas the cost of equity is the return to the sponsors of the project, stripping out the return committed to debt servicing. The so-called weighted average cost of (debt and equity) capital is usually considered an appropriate measure of the return on capital.

### 5.2.2 Capital Costs

The capital costs of building the infrastructure for an LRMT system are significant. Those costs depend on many factors, a dominant one being the vertical alignment of the LRMT system (that is, the portion of the system that must be elevated), because vertical alignment typically requires more expensive structures than when the system is at grade.

The grantor should recognize that costs also depend on some of the following physical factors:

- Design of a new system or progressive expansion of an existing system.
- Ground conditions that may require special construction, increased foundations for elevated viaducts, and so forth.
- Urban constraints and topography, including, for example, utilities (water, electricity, gas, telecommunications, and so forth) that may need to be diverted; proximity to buildings; ability to divert traffic (both pedestrian and road traffic); environmental constraints; and earthquake protection.
- Specific system features, such as longer stations that may be required given rolling-stock specifications; stations that have a dual purpose as civil defense shelters; air-conditioning or sound requirements to deal with specific weather conditions; and special access to stations and trains.
- Design and safety requirements.





Furthermore, a number of financial factors should also be considered, including the following:

- Financing costs that may be affected by the willingness of the private sector and other lenders, as well as the capital markets, to provide debt to the project
- Interest rates and maturities available for such debt
- The debt-service coverage ratios that the lenders will require and other associated conditions imposed by the lenders, including the developer's level of debt and equity
- The availability of bilateral, export credit, government, and other funding sources for the project
- Exchange rates between the local currency in which debt will be made available, including the cost of any currency exchange<sup>1</sup>
- Land costs
- Labor costs
- The tax and accounting regime, which will influence such issues as the level of asset depreciation allowable, tax treatment of financing and interest payments, and so forth

### 5.2.3 Cost Recovery

LRMT systems differ from many other public service models in that the ideal of full cost recovery is not often met; the fare income is often insufficient to fund operating and maintenance costs and the major investment costs of new construction, renewal, and renovation. Full cost recovery requires fares to yield enough revenue to recover all these costs. However, even though full cost recovery may not be achieved, it is important that the total costs of the scheme be assessed when the LRMT scheme is designed. One approach is described in box 5.2.

#### Box 5.2

### The Capital Maintenance Approach to Costing

The capital maintenance approach focuses on measuring the expenditure needed to maintain assets at their current level of serviceability. This approach recognizes that assets such as track or rolling stock do not generally wear out and then get replaced all at once, but rather they are maintained and renewed in a continual process. Measuring expenditure on capital maintenance for an asset can thus be an alternative to including depreciation of the asset in the measurement of cost of service.

In any particular period, capital maintenance expenditure and depreciation can differ. When the asset base is relatively new, depreciation is likely to be higher than the capital maintenance expenditure because the new assets will require little maintenance. When the assets are old, capital maintenance costs might exceed depreciation. When the assets are in a steady state, one would expect depreciation and capital maintenance expenditure to be generally equal. The corollary is that depreciation charges can provide a guide to the appropriate long-term level of capital maintenance expenditure necessary to maintain the light rail–light metro transit project's asset base.

Source: Tynemarch Systems Engineering and Stone & Webster Consultants 2002.

Accurately estimating the cost of service is onerous and technical. We do not look at the techniques for cost estimation here, but note its importance. The essential point is that the grantor will want a good estimate of the full cost of providing any level of service so that it can establish and monitor an operationally and financially viable project. Simply put, for the LRMT system to be viable, the sum of tariffs and subsidies must add up to the total cost of service.

<sup>1</sup> In some jurisdictions, limitations are imposed on the level of foreign currency that may be used for a project, or a cap is imposed on the amount of profit that may be repatriated.

## 5.3 DETERMINING FARES AND SUBSIDY REQUIREMENTS

### 5.3.1 Farebox Income, Subsidies, Availability Payments and Shadow Fares, and Capital Grants

After the cost of providing the LRMT service has been estimated, the next step is to check how much of that amount should be recovered through farebox income and how the balance of capital and operating costs can be recovered through the funding arrangement for the LRMT project (figure 5.2).

Figure 5.2

#### Balancing Income with Cost of Service

*For project to be viable, fares + subsidies = total cost of service*



Source: Diagram by David Stiggers, 2009

### 5.3.2 Fare-Setting and Cost Recovery Issues

In setting the income that the LRMT system must earn, the grantor needs to consider not just the full cost of service as described previously but also the annual cash needs of the developer and the financial ratios required by lenders. Some possible implications are described in chapter 6.

LRMT services may also have external costs, such as the costs to relocate people and businesses on the chosen route. At a social level, these are real costs. However, they need only be incorporated in the cost-of-service calculation if the government has decided to impose these costs on the LRMT system. There are three reasons riders' fares that recover the full cost of service might be considered too high:

- **Willingness to pay.** People are unwilling to pay the full cost of the service. An assessment of willingness to pay for various levels of service, together with traffic and demand forecasts, will be useful preparation for the LRMT system design. Willingness to pay is greatly affected not only by service levels and comfort but also by route choice and competitive transport alternatives.
- **Social acceptability.** People are willing to pay, but it is considered socially unacceptable to require them to pay the full cost of service. Even when riders have indicated a willingness to pay for improved service levels, authorities sometimes refrain from raising fare levels for fear of unpopularity. Similarly, this response to raising fares in advance to fund later improvements is also understandable. There may be justification for charging customers less than the actual cost initially in order to attract ridership to new lines, with the aim of a gradual fare increase to cover the actual cost as riders become committed to the new lines. However, that approach runs the risk, as illustrated in the case studies, that it may be difficult for the transport

authority—or even the private developer—to allow the planned increase through fear of social or political unpopularity.

- **External benefits.** Transport or environmental policies make it socially beneficial to charge people less than cost (for example, to attract ridership from other transport forms). A variety of issues associated with the LRMT scheme may benefit the community at large, rather than just the riders themselves, and these issues may be a further reason to subsidize the tariff system. For instance, transfer of other traffic to the LRMT system can (a) reduce road congestion, (b) effectively reduce pollution, (c) improve social economic measures through reduced journey times, and (d) foster planned urban development. As an example, the Kuala Lumpur LRMT project was originally conceived to serve the Pan-Asian Games and was required as a key part of the new urban infrastructure, although without government subsidy it would not have been practical. In such situations, a case can be made that subsidies are justified to support these external benefits.



Amsterdam Light Rail, Netherlands.  
Photo by and reproduced by kind permission of Rainer Hesse.



### 5.3.3 Deciding on Subsidies

Having considered the cost of service, willingness to pay, social acceptability, externalities, and subsidy options, the government will face a choice of the farebox level that should be applied. In some instances, the grantor may decide to set fares below costs and to provide a subsidy to make up the difference (box 5.3). Another option is to lower the cost of service and, hence, fares. This approach could be achieved by changing service levels or by changing or reducing routes to reduce capital or operating costs.

Box 5.3

#### **Fares, Populism, Public Affordability, and Manila's MRT3**

Manila's MRT3 (Metro Rail Transit System line 3, also called the Metrostar Express) was developed as a negotiated contract between the Department of Transportation and Communications (DoTC) and the Epifanio de los Santos Avenue Light Rail Train (EDSA LRT) consortium. EDSA LRT was the only bidder to pass an initial prequalification phase involving four other prospective bidders. Following a lengthy process of negotiations and legal challenges (noted in chapter 7), a revised concession contract was signed in 1993 and construction of MRT3 began in 1997.

#### **Terms of the Contract**

Under the terms of MRT3's concession contract, EDSA LRT would finance, design, construct, and maintain the MRT3 system in exchange for regular lease payments to service debt, provide equity returns, and fund maintenance. Because of unique legal considerations, EDSA LRT was forbidden from operating the system and instead leased MRT3 back to the DoTC for operations. As part of this contractual arrangement, DoTC accepted all foreign exchange and demand and revenue risks while guaranteeing the project's debt along with a 15 percent return on equity to the EDSA LRT consortium.

#### **Lower-than-Expected Initial Ridership**

An initial segment of MRT3 opened in December 1999, charging fares of between P\$17 and P\$34, depending on distance traveled. Ridership on this section ranged from 17,000 to 45,000 passengers per day during its first months of commercial service—well below expectations. In its first six months of operations, MRT3 earned P\$150 million (roughly US\$3.6 million in 2000), requiring substantial subsidies to cover the DoTC's first semiannual lease payment of US\$40 million to its private partners.

#### **Discounted Fares**

In July 2000, Joseph Estrada, then president of the Philippines, directed the DoTC to reduce MRT3 fares to between P\$9.50 and P\$15.00 in celebration of MRT3's full operational debut. This discount has lasted considerably longer than the six months originally intended. Although reduced fares helped increase MRT3's ridership, they have also created additional budgetary challenges for DoTC.

#### **Inability to Increase Fares**

In 2005, the DoTC petitioned to increase fares to between P\$16 and P\$25 to reduce subsidy requirements. President Gloria Macapagal-Arroyo's administration denied this increase, reaffirming her administration's sensitivity to the plight of commuters. As of 2008, MRT3's fares have not changed other than rounding ticket prices up to the nearest peso (that is, P\$10 instead of P\$9.50) in the interest of efficient vending.

#### **Budgetary Implications**

Widening operating losses and delays in providing subsidy funding from the national government have since prevented DoTC from regularly meeting its financial obligations under the concession contract. For example, in January 2007, DoTC had fallen behind on US\$35 million in equity rental payments, in addition to US\$8 million in maintenance payments to the concessionaire.

MRT3 revenues did enjoy a boost during the EDSA II Revolution of January 2001, when MRT3 transported thousands of protesters who were demanding President Joseph Estrada's impeachment for corruption. During the height of those protests, fare revenues were nearly double the daily average of P\$2.5 million to P\$2.7 million. However, even unusually high ridership during that period still did not enable MRT3 to cover its operating and maintenance costs, which were reportedly P\$8 million per day.

#### **Current Status**

Fares ranging between P\$10 to P\$15 per trip are affordable to most income levels in Manila and are only slightly greater than "jeepney" fares (approximately P\$8.50 in 2008 plus additional distance charges beyond 4 kilometers). MRT3 currently attracts roughly 400,000 passengers per day—near the upper limit of its designed capacity. Despite currently robust ridership figures, the system's fares still do not allow DoTC to generate sufficient revenue to cover lease payments without subsidy funding.

The national government is currently working to buy back the MRT3 concession in an effort to reduce future subsidy burdens associated with MRT3's private financing. Purchase prices under discussion range between US\$865 million and US\$1 billion.

These decisions may involve consultation with customers and other stakeholders. It may be necessary to develop a range of options and negotiate a solution, until finally an acceptable trade-off among fares, service, routes, and subsidies is reached.

#### 5.4 PPP AGREEMENT DURATION: FACTORS TO CONSIDER

The PPP agreement duration is a function of several factors that should result in the most suitable project for the grantor. The length of the contract should reflect considerations driven not only by the length of time required by the developer and its financiers to recover their investment,<sup>2</sup> but also by such issues as the period within which the grantor would like the services to be delivered, the services that will be delivered, and the grantor's ability to forecast the quality and quantity of the expected output in the longer term. As part of its design process, the grantor should clearly identify the duration of the PPP agreement before going to the market.

The following are some factors to consider when deciding the duration of the PPP agreement:<sup>3</sup>

- The types of services that are required from the grantor. For example, the grantor may wish to enter into separate agreements or a single PPP agreement (discussed in detail in chapter 7).
- What possibility exists that the grantor may want to extend the term of the original PPP agreement.
- What is the life of the assets needed to provide the service, including the timing of major maintenance and renewals. For example, a PPP agreement may envisage a major refurbishment within a given period of the agreement, in which case the grantor will need to decide (and potentially trade off) the benefits between certainty of service provision and a pricing risk premium that the developer may add to allow for costs 20 to 30 years in the future.<sup>4</sup>
- What is the ability of the developer to accurately forecast the costs it will incur and the mechanisms that will need to be included in the PPP agreement to

protect against any changes in the developer's costs. For example, shorter contracts may be required if there is significant cost volatility.

- What is the importance of continuity in the delivery of the service. The grantor needs to bear in mind that under an LRMT system, services are likely to be required continually. Accordingly, it will need to weigh the level of difficulty or inefficiencies that may result from a change in contractors or from the way in which the incumbent contractor can be incentivized in the run-up to the change of contractor.
- What is the mechanism available to ensure that the developer is incentivized throughout the life of the PPP agreement. For example, the grantor will need to ensure that if it chooses to have an agreement over a long period (say, 20–30 years), the grantor must develop the necessary incentives within the PPP agreement to ensure that the developer continues to be incentivized to provide services at an acceptable minimal level.<sup>5</sup>

The debate about linking the term of the PPP agreement to the life of the assets should be carefully understood. A balance must be struck between the agreement or contract term and the nature of the assets being considered and whether they retain some residual value. If a given asset (such as rolling stock) retains residual value after the expiry, the price the developer should charge should be lower because the developer should not expect to recover the full cost of financing the investment (that is, debt and equity return).

**2** The grantor must ensure that the length of the debt or loan instruments available to it in the capital debt markets does not dictate the contract length.

**3** See HM Treasury (2006). These factors have been based on this resource but modified to include LRMT sector-specific issues.

**4** Whenever a developer is required to price the construction, goods, or services for a future project for it will need to “cost in” the risk of any price differential between the moment it prices that project and the time in the future when it may be required to provide such construction, goods, or services.

**5** One important situation that the grantor must avoid in long-term arrangements and contracts is “asset sweating”—that is, the developer is obliged to continue to maintain and refurbish assets in the later periods of the PPP agreement.

Another important consideration related to the term of the PPP agreement refers to the changes in technology and service issues (for example, growth in passenger demand). The grantor should ensure that the PPP agreement is sufficiently flexible to allow for changes to the services under the PPP agreement. Furthermore, if the grantor feels that radical changes in technology may occur that could, for example, result in early obsolescence or redundancy, the grantor may choose to have shorter agreement or contract durations.

## 5.5 PPP PROJECT FINANCIAL STRUCTURE AND DESIGN

### 5.5.1 PPP Project Financial Structure

Private participation is possible even if fares do not cover costs. LRMT schemes are extremely capital intensive. To thrive, they need capital for investment, as well as good management. The value and timing of the capital investment and operating capital requirements and how they will affect the funding of the LRMT project are important subjects that are covered in detail in chapter 6.

The whole subject of costs, fares, and subsidies needs considerable thought during the project design stage. The issues raised can have major implications on the way that the project is implemented in the long term. It is important to consider the practical implications when designing the chosen PPP agreement model. For example, who determines fare levels and future investments and who takes the collection risk will both have a major effect on the successful outcome of the PPP arrangement.

In the author's opinion, the financial structure of the LRMT project will be determined by five main factors:

- The capital cost, including the time of construction.
- Operating costs.
- Passenger traffic or ridership—and hence the revenues that can be generated, including subsidies
- Other commercial opportunities that may support the revenue stream of the project.
- The terms of finance.

### 5.5.2 Implications for Designing the Arrangement

As part of its public transport policy, the grantor needs a long-term vision of its transport needs, the factors that affect those needs, the ways demography will change, and so forth. LRMT schemes will require both the grantor and the developer to think about parameters that may change over time and that may affect the system design. Clearly, how some of these issues are addressed will depend on the structure that is developed in the PPP agreement and the level of risk that is transferred to the developer.<sup>6</sup> We offer the following nonexhaustive list of the main parameters that may change over time:

- **System capacity.** This parameter is heavily dependent on accurate ridership forecasts. For example, a study (Halcrow Fox 2000) on mass rapid transit provided examples of overestimation of capacity and thus overprovision of infrastructure and systems built. Of nine developing city systems for which information existed, five had actual ridership volumes lower than the forecast of 50 to 90 percent and another three had ridership volumes that were 0 to 50 percent lower than the volumes forecast. Overestimating demand sometimes results in infrastructure being underused. The system capacity should be designed on the basis of ridership forecasts that are benchmarked against reality and similar systems, as applicable. Incorporating a factor of safety to guard against future capacity constraints should also be considered.
- **Access to the system.** The grantor should consider how comfort standards for accessing the system may change over time. For example, escalators rather than stairs may be required. The Manila MRT<sub>3</sub> project did not originally provide escalators.

<sup>6</sup> The manner in which some of these factors will be handled will depend on, for example, the level of ridership that the developer has selected.



- **Comfort standards.** For LRMT rolling stock, these standards should include heating or air-conditioning systems or should allow for a reduced level of overcrowding, which may require the system to run more trains.
- **Access by the travel impaired.** Travel-impaired passengers include individuals with disabilities and encumbered travelers, such as women with children and people with shopping bags.
- **Ticketing equipment.** Over time, the grantor may wish to introduce sophisticated ticketing systems or an integrated systemwide method that combines LRMT with other modes of transport. Similarly, the developer may wish to upgrade the ticketing equipment (for example, introduce modern ticketing equipment with barriers and tickets readers).
- **Aesthetics.** The visual effect of the structures should be considered at the outset because future changes may be difficult or impractical (for example, an LRMT system's requiring elevated sections).

### 5.5.3 Infrastructure Reference Designs

The responsibility for the design of the required LRMT infrastructure can be allocated in various ways. In some cases, responsibility for design is allocated mainly to the developer. At the other end of the spectrum, the grantor specifies (and warrants) the full design.

At some intermediate level between these two extremes, the grantor proposes a reference design that serves to specify general technical details for the developers to follow in their proposals. The grantor typically assumes some limited liability for the information provided in the reference design. For example, authorities often take responsibility for relocating public utilities in areas designated by the reference design. The reference design often includes the following information:

- Site conditions and land survey data
- Location of public utilities or locations that will be free of public utilities
- Conceptual architecture (that is, overall appearance, not detailed designs)

- Rights-of-way and corridors for system alignment
- Site locations for construction activities (for example, precast yards, locations for material and equipment storage)
- Availability and condition of publicly provided infrastructure, land, or rights-of-way

When developers deviate from the reference design, a contractual acceptance procedure must be established.<sup>7</sup> The grantor may need to retain qualified technical and legal advisers to help manage any liabilities related to developer deviations from the reference design.

The following are some benefits of the reference design approach:

- It provides a way to convey the general shape, alignment, and functionality of the system.
- It provides some base level of consistency between competing technical proposals and allows objective bid comparison.
- It clearly establishes the interface between any publicly provided assets (such as existing infrastructure, rights-of-way, or land) and privately provided assets.
- For example, a reference design may specify exclusive locations where contracting authorities will provide unencumbered land for building LRMT structures.
- It provides information that mitigates developer risks and reduces associated risk premiums. For example, reference designs may include site studies, such as land surveys, ground borings, and environmental studies. This information reduces the bidding costs for prospective developers.
- It provides transparent criteria against which the grantor can assess the technical capacity of prospective bidders during the prequalification phases of the procurement process.

<sup>7</sup> It is important to note that in some jurisdictions, there is a distinction between acceptance and approval. Approved designs carry certain warranties from approvers. In contrast, acceptance represents something closer to a statement of no objection, which permits the design without warranting it.



As part of its bidding strategy, the grantor will need to decide whether to allow deviations from the reference design. Generally, if bidding developers are allowed to offer deviations from the reference design, they may potentially add value to LRMT through innovative solutions, resulting in greater quality, decreased costs, or faster project completion. However, deviations may also increase project risks or compromise desired outputs. Grantors need to carefully consider the implications of allowing deviations from the reference design. Thorough review processes will be needed to determine both the technical feasibility and the value for money associated with suggested modifications to the reference design.

## **5.6 PERFORMANCE MANAGEMENT AND CONTROL**

After the structure and desired outcomes of the PPP LRMT scheme are designed, there is a need to monitor and control the performance of the resulting contract. Contract management and control involve verifying that construction is operational and functional and that performance against all contractual norms and standards is met in the long term.

### **5.6.1 Contractual Compliance against Specifications**

The grantor has an interest in ensuring that the developer implements processes to ensure that it can comply with the specifications contained within the PPP agreement. This aspect is especially important given the public nature of the provision of service (for example, safety or environmental protection). Accordingly, the PPP agreements should require the developer to propose systems for managing its own compliance to the standards specified by law and within the PPP agreement. The proposed systems should include adequate review and acceptance procedures (table 5.1).

Table 5.1

**Commonly Specified Systems for Managing Compliance**

Commonly specified LRMT elements	Details and explanation
Quality management system	Quality management systems ensure that activities such as design, construction, testing, commissioning, operations, and maintenance meet agreed specifications and standards. Quality management systems often extend to any subcontracted system components as well.
Safety management system	Safety management systems ensure safe practices during construction, operation, and maintenance activities. Contracts may require unique safety management systems during a project’s construction phase to reflect the different hazards involved.
Environmental management	Requirements for environmental management may specify practices to control impacts on the <ul style="list-style-type: none"><li>• Natural environment</li><li>• Built environment</li><li>• General urban environment</li></ul>
Management of branding and visual amenity	Branding and visual amenity will influence customer perceptions of LRMT services. Specifications regarding branding and visual amenity may include requirements for consistently managing <ul style="list-style-type: none"><li>• Station, depot, and civil work architecture</li><li>• Vehicle design schemes (interior, exterior)</li><li>• Station furniture and other amenities</li><li>• Product design features of ticket vending machines, information displays, and gates</li><li>• Graphic design elements of logos, employee uniforms, Web site materials, and so forth</li></ul>
Other management systems	Contract specifications may also include requirements for implementing systems to manage other elements, including <ul style="list-style-type: none"><li>• Project documents</li><li>• Public information</li><li>• Operations and maintenance</li><li>• Testing and commissioning processes</li><li>• Engineering processes</li><li>• Spare parts inventory</li><li>• Corporate governance and financial management</li><li>• Integration between system components</li><li>• Construction activities</li><li>• General project activities</li></ul>

Source: Author’s compilation based on recently developed specifications.





In Germany, a 100 m LRMT near the Hannover exhibition grounds.

## 5.6.2 Operations and Maintenance Compliance

To meet the policy goals, the developer must deliver a reliable, high-quality service that provides a good overall customer experience. Although the developer has a contractual obligation to achieve relevant performance targets, it is generally considered necessary to include a system of incentives and penalties to ensure that the developer meets or exceeds agreed targets. Although ridership is the ultimate measure of LRMT's attractiveness, much of what determines demand resides outside the scope of system operations. Attributing the entirety of this risk to the developer may be inappropriate, considering the impact that planning and policy decisions have on ridership. Nevertheless, realizing many of the advantages of private operations and maintenance requires some method for aligning public interests in quality services with private incentives to perform (box 5.4). Specifications within the PPP agreement can offer a means of accomplishing that goal. Some of the criteria that should be considered for inclusion in the PPP agreement include the following:

- Base operating days
- Service frequencies
- Journey times
- Minimum required service capacities
- System cleanliness
- Customer service functions
- Service reliability
- Service availability

However, managing compliance with operations and maintenance specifications can prove challenging. The dynamic nature of LRMT operations requires frequent oversight and rapid feedback to adjust performance.

## 5.6.3 Performance Management and Control

Most LRMT PPPs involving private operations use performance management systems (PMSs). PMSs include mechanisms

### Box 5.4

## Operation and Service Obligations and Their Relationship to Demand Risk

If the developer does not assume demand and revenue risk, there are few self-incentives to deliver and maintain a system of customer service or operation that will increase demand and passenger growth. It may not be possible to cover this issue solely through the use of key performance indicators, and in this case, the solution is to be prescriptive about minimum technical and operational requirements and standards and to link performance payments to demand levels.

that link performance assessment criteria to compensation on the basis of agreed formulas. Depending on the form of the contractual approach decided on, there will be a need to establish several level-of-service indicators that can be used to monitor the progress of the LRMT PPP arrangement in the long term.

Although a whole range of levels-of-service parameters will have been set in establishing the design of the scheme and may form part of the technical obligations of the contract, there is generally the need to limit the number of key performance indicators (KPIs) to be established. Table 5.2 includes examples of common KPIs that are often included within PMSs. They are chosen to allow the monitoring of the key performance areas of the contract. They must be definable, significant, quantifiable, and able to be monitored and verified. Used to ensure compliance with major contractual objectives, they can also serve as a means of assessing the developer's level of performance and are frequently used as a tool for implementing incentive schemes in areas where the developer may be expected to perform above the basic contractual norms.

There is a strong trend toward increasing the role of quality measures in determining the rewards paid to developers in this way. It should be noted that some developers (public and private) argue that the key indicator of quality is the number of passengers, which is far easier to measure than the factors described in table 5.2.

Table 5.2

**Examples of Common KPIs for LRMT Systems**

KPI	Details and explanation
Reliability and punctuality	
Daily or monthly system reliability	Number of actual trips compared with number of scheduled trips
Early departures	Number of trains leaving earlier than some specified window of time
Late departures	Number of trains leaving later than some specified window of time
First or last trains departing early	Number of first or last trains departing earlier than the time tolerance applied to early departures
Customer satisfaction	
Performance on satisfaction surveys	Annual, independent, published survey, with remedial actions and delivered improvements
Received customer comments	Number of responses to customer comments not made within some allowable window of time
Availability of real time information	Number of hours when displays were unavailable
Timetable availability and accuracy	Number of designated timetable locations missing timetables or displaying outdated information
Availability of customer-facing staff	Level of availability of customer-facing staff relative to some agreed benchmark (typically measured as a percentage of total staff-hours per station per period)
Cleanliness and general upkeep	
Cleanliness of LRMT vehicles	Number of complying cleanings made
Removal of graffiti from LRMT vehicles	Number of incidences removed within some period of reporting
Repair of damaged LRMT vehicles	Number of incidences reported and repaired before returning to service
Station cleaning	Number of complying cleanings made
Station graffiti removal	Number of incidences removed within some time period of reporting
Repair of general damage to stations	Number of incidences repaired within some time period of reporting (can often include some number of unreported instances)
Availability of ticket vending machines, offices, and gates	Number of devices and hours unavailable or nonoperational

KPI	Details and explanation
Access and security	
Passenger alarm system availability	Number of hours unavailable
Closed circuit TV availability	Number of hours unavailable
Lighting availability	Number of defects not repaired within some time period after first reported
Elevator or escalator availability	Number of hours unavailable
Revenue security (fare evasion)	Achievement of some specified level of revenue security (often measured through a comparison of collected revenues with automated passenger counter figures)
Ride quality and noise emission	
Ride quality index	Performance on periodic assessments of LRMT vehicles
Noise and vibration (within LRMT vehicles)	Performance on periodic tests of noise and vibration levels inside each LRMT vehicle over the entire system route
Noise and vibration at (within) stations	Performance on periodic tests of noise and vibration levels inside of system stations
Noise and vibration (at locations on route)	Performance on periodic tests of noise and vibration levels generated by each LRMT vehicle at locations along the system route
Overcrowding	Compliance with standing passenger density limits set out in performance specifications

Source: Author's compilation based on recently developed specifications.



### 5.6.4 Specifying Performance Targets and Weighting KPIs

Effectively applying information gathered through continuous KPI monitoring requires some system for consistently normalizing data into a usable form. Normalizing data allows combinations of KPIs that have dissimilar units of measurement (for example, number of occurrences, time, and qualitative rankings) to be used. Measuring the percentage of achievement level for KPIs is one method. A continuous scale for the percentage of achievement may resemble something similar to

$$\% \text{ Achievement} = \frac{\text{Measured Value}}{\text{Target Value}} * 100\%$$

Using this example, the grantor may choose to cap achievement at 100 percent or some greater value when performance in excess of targets would be desirable. Alternatively, measuring achievement for KPIs could involve a stepwise series of thresholds similar to

$$\% \text{ Achievement} = \left( \begin{array}{l} X\% \text{ when measured KPI value} \geq \text{target value A} \\ Y\% \text{ when target value A} > \text{measured KPI value} \geq \text{target value B} \\ Z\% \text{ when measured KPI value} < \text{target value B} \end{array} \right)$$

When KPIs involve subjective assessments, or when the grantor prefers to provide tolerance bands around a given metric, a stepwise methodology may be preferable to continuous measurement.

The grantor may elect to assign different weights to certain KPIs that have greater effects on the quality of LRMT services. One method for incorporating weights into a total KPI adjustment factor applied by a PMS is

$$\text{KPI Adjustment factor} = \sum \frac{(\% \text{ Achievement for each KPI}) * (\text{Weighting Factor that KPI})}{\sum (\text{Weighting Factors for all KPIs})}$$

where

$$* 100\% = \sum (\text{Weighting Factors for all KPIs})$$



Views of Light Rail system in Charlotte, North Carolina, USA. The Operations Control Center is under the direction one person. The system was opened in November 2007 and currently carries 14,000 passengers per day on 9.6 miles of double track. Photo by and reproduced by kind permission of James Dwyer.



### 5.6.5 Tying Performance Specifications to Payments

Much of the value associated with PMSs comes from their ability to affect compensation paid to the developer. Adjusting compensation is a delicate balance (box 5.5). Establishing an appropriate level of sanctions either as a penalty payment or a deduction needs to be sufficiently high to force an expected behavior by the developer, but at the same time, it must not be so high that it introduces revenue uncertainty. Reducing the certainty of cash flows can increase risk premiums, reduce financial viability, and jeopardize project bankability. Conversely, too little value at risk may not provide sufficiently strong incentives for performance. PPP agreements for LRMT operations generally solve this conflict by limiting the reach of PMSs to some reasonable fraction of total developer compensation. For example, a PPP agreement structured around an availability payment may determine total developer compensation using a formula similar to

$$\text{Compensation Payment} = AP_{\text{Fixed}} + AP_{\text{Variable}} * (\text{KPI Adjustment Factor})$$

where

- $AP_{\text{Fixed}}$  is the portion of availability payment guaranteed by simply meeting minimum, easily attainable standards for LRMT services
- $AP_{\text{Variable}}$  is the portion of total availability payment subject to the terms of the project's performance management system
- *KPI Adjustment Factor* represents the combined performance on key performance indicators as weighted in the system's operating agreement

Box 5.5

### Key Performance Indicators, Performance Management, and the Docklands Light Railway, United Kingdom

The Docklands Light Railway (DLR) involves a delayed contractual structure with separate public-private partnership agreements for different components of light rail–light metro transit services. Only one of the DLR's contracts allocates substantial demand risk to private partners (that is, the Lewisham Extension infrastructure-only concession). Accordingly, the Docklands Light Railway Limited (DLR's contracting authority) relies heavily on performance management systems to incentivize private partners.

For example, DLR's recent infrastructure concessions involve daily availability payment–based compensation schemes along with corresponding penalty regimes. On weekdays, 1,000 performance points are allocated (500 are allocated on weekends). A concessionaire's points affect compensation paid; points deducted for nonperformance can lead to deductions in availability payments. For particularly important performance measures, failure can lead to a 100 percent deduction of daily availability payments.

Similarly, DLR's operating and maintenance franchise uses a number of key performance indicators related to service reliability, facilities availability, and customer satisfaction (each with a target performance level). When the private partner outperforms targets, bonuses may apply. Conversely, penalties apply when targets are not met.

Given high levels of satisfaction with private partners to date, DLR's future procurement processes will consider provisions for guaranteeing certain levels of payment after periods of problem-free performance. The recent Woolwich Arsenal Concession contract, due to open in January 2009, includes such a feature. Guaranteeing some (importantly not all) of the availability payment once concessionaires demonstrate satisfactory performance aims at reducing the risk premiums included within private bids. Planners believe that this new system will increase the value for money of private sector participation through lower costs without sacrificing substantial amounts of risk transfer.

Determining an appropriate fraction of developer compensation at risk to a PMS should involve sound analysis and continuous dialogue with prospective developers. Plan-ners should specifically consider three factors:

- Cash requirements for servicing any project debt, covering operation and maintenance expenses, and funding required investments
- Minimum sums that developers will consider meaningful
- Level of KPI performance targets that the developer should be able to regularly achieve

### 5.6.6 KPI Ratcheting Mechanisms

Weighting KPIs differently depending on their relative influence on service quality is a useful technique for aligning performance incentives with public interests. However, weights may also have undesirable consequences when the developer neglects KPIs that have proportionately smaller effects on compensation. Although underweighted KPIs would likely correspond to less important factors, the grantor may still have an interest in compelling the developer to meet every KPI target specified.

Ratcheting penalty regimes can address these needs by effectively making every KPI significant. Ratchets work by targeting habitually neglected KPIs and increasing their relative importance during current assessment periods. For example, a ratchet mechanism could increase the relative weighting of a KPI by 5 percent (500 basis points) during each consecutive period of failure until the developer takes remedial action to correct lagging performance. The grantor may also choose to specify accelerated schedules for altering weights attached to KPIs (for example, exponential increases).

Ratcheting penalty regimes are certainly not without limitations. In setting up these regimes, the grantor should consider the following factors:

- Bidders' (developers') willingness to accept greater risks associated with increased penalties and the additional costs this approach could create for public authorities
- The wisdom of potentially assessing large penalties for relatively insignificant criteria
- Increased potential for bribes that may result when subjective criteria can significantly affect compensation





*In Birmingham, UK, the LRT terminus is integrated with the mainline railway station.*

# Checklist

## PPP Design Specifications and Performance Management

<input type="checkbox"/>	Define the scope of work in terms of service to be provided (for example, construction, rolling-stock selection).
<input type="checkbox"/>	Define the standards to be met (for example, safety, punctuality, functionality, longevity).
<input type="checkbox"/>	Have a long-term vision of transport needs and how they will evolve with changing parameters (such as demography).
<input type="checkbox"/>	Obtain a good estimate of the full financial implications of the PPP arrangement.
<input type="checkbox"/>	Consider the practical implications of costs, fares, and subsidies and who takes the lead role in setting these elements of the PPP arrangement.
<input type="checkbox"/>	Consider the developer's cash needs and the investor's requirements in calculating fares and subsidy requirements.
<input type="checkbox"/>	Set the duration of PPP agreement, ensuring that it details <ul style="list-style-type: none"><li>o How developers and investors will recoup their investment</li><li>o The period during which the grantor wishes services to be delivered, the types of services that will be delivered, and the longer-term quality and quantity of output</li></ul>
<input type="checkbox"/>	Define how the PPP agreement will be managed (for example, ensure that sufficient contract management and control systems are created that can verify that the construction is operational and functional).
<input type="checkbox"/>	Ensure that sufficient performance management and control systems are created that can verify that performance complies with contractual agreements and standards.



# CHAPTER 6

## FUNDING AND FINANCE



Dublin, Ireland.  
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## Funding and Finance

Different contractual arrangements for private sector participation can effectively prescribe the funding and financing mechanisms for light rail–light metro transit (LRMT) projects. The majority of project financiers will look at the proposed transaction structure and try to find the funding structure that best fits. This effort, in turn, can have significant effects on other important considerations, such as affordability, value for money, risk transfer, and overall project feasibility. Because financial close usually occurs later in a project’s development cycle, planners will inevitably be challenged to anticipate the implications of their decisions before receiving final investor feedback. Indeed, it should be borne in mind that sometimes the project may need to be restructured to suit funding requirements. Understanding the basic financial considerations of LRMT projects is therefore essential when seeking to align financing implications with public interests during early planning stages.

It is also important for public authorities to appreciate that private capital comes with an expectation of reasonable return. Rational, profit-maximizing developers and investors are prepared to take risks only if they expect to earn commensurate rewards. Planners must consider how private investors will recover normal returns throughout project development and implementation. Public-private partnerships (PPPs) are never free, and failing to understand the need for reasonable rates of return can render projects financially nonviable or result in underinvestment during subsequent stages of operation and maintenance.

This chapter summarizes the more important funding and finance issues that are likely to arise in LRMT PPP projects.

### 6.1 SOURCES OF FUNDS FOR LRMT INITIATIVES

LRMT projects are expensive. Project costs exceeding US\$1 billion are relatively common. Obtaining funds of such magnitude can be an onerous task, and failure to attract such funding is one reason many projects fail to develop beyond initial planning phases. There are three primary sources for funding LRMT PPP projects:

- **Debt.** Through commercial bank loans (local and international banks), publicly traded bonds, private debt placement, loans from project sponsors, supplier credit, export credit financing, loans from international financial institutions (IFIs), or development organizations.<sup>1</sup>
- **Equity.** Typically sourced from consortium partners; passive investors; investment funds (for example, emerging market, infrastructure, or sector-specific equity funds); domestic public entities; local property developers; IFIs; or development organizations.
- **Grants.** Often provided by public institutions (local, national, or supranational); local property developers; international donors; or other groups benefiting from project implementation.

Decisions made on policy, technology, and commercial issues during the development of LRMT projects may affect the availability of some of these funding sources. For example, grant funding may be available only to LRMT projects that aim to accomplish selected policy goals. Similarly, large amounts of private debt financing may not be available where private concessionaires must assume the entirety of certain major risks (for example, ridership risk). Understanding the implications that project structure has on funding and finance is a critical component of effective planning.

<sup>1</sup> Terms such as *leverage* or *gearing* describe the relative proportion of debt in a project’s capital structure. Highly geared or leveraged projects involve greater proportions of debt to equity, which has the effect of increasing lender project risk and reducing the sponsor or equity investor’s project risk.

## 6.2 FUNDING THROUGH CAPTURED EXTERNALITIES

One dimension of rail projects is that their benefits often accrue to those who do not pay fares. In many cases, revenues and other financial benefits derived from sources outside of system operations have been sizable enough to fully support operating losses associated with implementing and delivering rail services.

### 6.2.1 Property Development

Property development around stations is a common example of an external benefit that results from investments in rail. One particular type of development right that can often arise in planning rail projects is “air rights,” whereby a developer, through owning or renting land or a building, gains the right to use and develop the empty space above the property. Building over tracks, platforms, depots, or stations is potentially very profitable and has been tried in developing a number of LRMT systems. Several LRMT projects have attempted to internalize the value of property development in order to offset operating losses resulting from insufficient farebox revenues. In New York, for example, the Metropolitan Transportation Authority attempted to sell air rights over rail yards in Brooklyn for a basketball arena for the New Jersey Nets and on the west side of Manhattan (as part of the Hudson Yards Redevelopment Project near Penn Station) for a football stadium for the New York Jets (New York Times 2004). In Hong Kong, China, the development of sites above stations, depots, and associated transit interchanges, in partnership with private developers, generated revenues crucial to the financing of the Airport Railway and all other MTR (Mass Transit Railway) lines (Budge-Reid 1999).

Other LRMT projects have successfully obtained upfront funding (equity or grants) from local developers whose other investments stand to benefit from new transport services (box 6.1).

Property developers themselves have also been active in a number of private developer consortiums. For example, the Tanayong Company, one of Thailand’s leading residential and commercial property developers, led efforts to build Bangkok’s Skytrain system.

#### Box 6.1

### Funding Contributions from Property Developers

The Docklands Light Railway (DLR) was originally part of a wider initiative to revitalize London’s Docklands area. However, DLR’s initial route layout terminated some 300 meters from the nearest London Underground station, thus presenting integration difficulties between transportation services. When planners proposed a design-build extension to the Underground station, property developers with interests in the Docklands area were willing to partially fund project costs to increase the attractiveness of their real estate investments in the area.

Manchester’s Metrolink system has also benefited from local developer funding. Metrolink’s phase 2 expansion cost £160 million, of which £12 million (7.5 percent) was funded by local property developer contributions.



Hong Kong, China. The Tuen Mun LRT has exploited air rights development over its depot.  
Photo by and reproduced by kind permission of Scott McIntosh.





Real estate development, however, is not a panacea for LRMT's funding challenges and should not be seen as a substitute for carefully thoughtout, well-structured projects and sound operations. Planning for new LRMT projects should focus on providing intelligently designed, quality public transportation services—not on development of new venues for consumer shopping. Overreliance on external development revenues can result in reduced scrutiny of system operations and service delivery. In some instances, project partners whose interests lie primarily in real estate may have perverse incentives to promote LRMT with little regard for sound transport planning.

### 6.2.2 Advertising Revenue

Well-implemented LRMT systems involve large passenger volumes and can therefore take advantage of associated economies of scale and lower marginal operating costs. High passenger densities and the regularity of services present an opportunity for marketing to captive audiences through well-placed advertising messages. Advertising space provided on vehicles (internal and external) or in stations can offer opportunities for LRMT systems to capture additional revenue from external sources. Where LRMT stations service a particular demographic or economic activity (for example, retail or business development), there may be additional marketing potential. For example, the Metro system in Washington D.C., includes a stop at the Pentagon building (the administrative headquarters of the U.S. military). Billboards throughout this station regularly feature advertisements from various aerospace contractors aimed at Pentagon employees with procurement-related responsibilities. It should be borne in mind, however, that even in well-developed markets, such revenues are likely to be relatively small compared with farebox revenues. If such advertising revenues are to be considered an element of project feasibility, such revenue assumptions should be thoroughly market tested.

## 6.3 CONSIDERING BANKABILITY

LRMT planners face a daunting challenge when planning for project funding and financing requirements. Finalizing a project's financial structure usually occurs during later stages of planning and procurement—after many key decisions have already been made. Revisiting public approval processes along the way can result in substantial delays and lost confidence when amending earlier decisions. Therefore, it is imperative that early decision making take into account such requirements and their effect on a project's future financial and commercial structure. Road shows and other events designed to test market interest can help planners get a sense for the market's perception of proposed risk allocations and other project features. The term “bankability” summarizes the sentiments of investors and lenders and their willingness to commit debt or equity capital to a project. It is important to realize that considering bankability goes beyond financial analysis alone and should include much larger project considerations.

Bankability generally depends on four broad criteria:

- Creditworthiness
- Legal viability
- Economic viability
- Technical feasibility

Table 6.1 summarizes many of the key questions investors and lenders will ask in assessing a project's bankability and determining their level of interest in a project. Concepts discussed in chapter 4 relate to many of these issues.



Seville, Spain.  
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Table 6.1

**Factors Influencing Project Bankability**

Project aspects	Questions for determining bankability
<b>Creditworthiness</b>	<ul style="list-style-type: none"> <li>• Are project cash flows sufficient to support envisaged levels of debt?</li> <li>• How risky are project cash flows? How certain are project revenues? Who bears ridership or farebox risk, and how realistic are ridership forecasts? Is there potential for regulatory “clawback” if actual ridership numbers exceed estimates and revenues are well above forecast?</li> <li>• Can the grantor meet its financial obligations to the project?</li> <li>• Does the project benefit from any grantor or sovereign guarantees or insurance on its debt (for example, partial risk or credit guarantees, political risk insurance)?</li> <li>• Is there sufficient equity cushion to protect lenders if the concession’s value decreases? Do project developers have sufficient value at risk?</li> <li>• In the event of termination, what mechanisms guarantee debt repayment, and what proportion of the debt will be covered?</li> <li>• Do project developers have adequate capacity and incentives to deliver sustainable long-term operational performance? Do they derive significant value from ancillary activities outside the concession company (for example, local property development, turnkey construction contracts)?</li> <li>• Do the project’s financial ratios meet lender expectations (for example, principal and interest cover ratios, debt-service cover ratio, loan-life ratio, debt-to-equity ratio)?</li> </ul>
<b>Legal</b>	<ul style="list-style-type: none"> <li>• Does the grantor have the authority to grant the concession?</li> <li>• Will the project require any additional legislation (for example, sector law, PPP law)?</li> <li>• How strong are the project’s contractual arrangements with input suppliers (that is, rolling-stock suppliers)?</li> <li>• What legal protections or channels for recourse do investors have in the project’s jurisdiction (for example, access to international arbitration)?</li> <li>• Are legal decisions enforced in the project’s jurisdiction (rule of law)?</li> <li>• How strong are property rights in the project’s jurisdiction?</li> </ul>

Project aspects	Questions for determining bankability
Economic	<ul style="list-style-type: none"> <li>• Is there a market for the project's services? Does LRMT offer sufficient value to transportation customers?</li> <li>• Are there threats from competing services (for example, buses) or technological obsolescence (for example, ticketing systems)?</li> <li>• Is the system's route aligned with target markets or population centers?</li> <li>• Does regulation protect against the threat of new market entrants? How stable is that regulatory environment?</li> <li>• Are project inputs (for example, electricity, rolling stock) available at reasonable prices? How stable are input supplies? Will new LRMT services require dedicated input suppliers (for example, a dedicated power plant)?</li> <li>• How stable is the project's macroeconomic environment? How would changes in inflation, foreign exchange, interest rates, and so forth affect project cash flows? How will such risks be mitigated in the LRMT contract? Have any standby credit facilities been arranged to deal with potential lags between financial shocks and tariff adjustments?</li> </ul>
Technical	<ul style="list-style-type: none"> <li>• Does the project use proven technology?</li> <li>• Are construction costs reasonable and realistic?</li> <li>• Is the construction and commissioning timetable realistic?</li> <li>• Does the project rely extensively on proprietary technology?</li> <li>• What standards govern the construction of civil works, rolling stock, signaling and communication systems, and so forth? Are local standards available, adequate, and appropriate?</li> <li>• How flexible is the systems design? Can simple alterations to rolling-stock configurations increase system capacity? Are stations and platforms designed for additional growth?</li> <li>• Is the proposed technological solution appropriate for local conditions and the availability (scarcity) of skilled labor?</li> </ul>

Source: Author's compilation based on various sources.

## 6.4 STRUCTURING FINANCE FOR LRMT PROJECTS

Financing for LRMT projects may take the form of either a corporate structure or, more commonly for large projects, a project finance structure. The primary difference between corporate and project finance is the means by which lenders derive security for repayment. Project finance structures will involve a special-purpose vehicle (SPV, an independent legal entity established for the purpose of undertaking the project) into which lenders and project sponsors contribute debt and equity to fund project costs. Because SPVs are legally separated from project sponsors, lenders are said to have limited or no recourse to sponsors regarding their debt investments. Limited recourse is the more usual variation and is used in financings where recourse either is limited to a fixed monetary amount (for example, US\$50 million) or is subject to certain performance criteria (for example, cost and time overruns during construction, revenue or cash shortfalls during operations when developers commit further capital toward debt service). For project financing, the loan structures rely solely on project cash flows for repayment, with the project's assets, rights, and interests held as secondary security or collateral. Project finance structures are very common for LRMT PPPs that require substantial upfront private investments; such investments exceed the capacity of developers' balance sheets.

Project finance has a number of key characteristics:

- **Cash-flow certainty.** This stability underpins the structure and risk allocation.
- **Credit intensive.** With the multitude of stakeholders and types of risk, project financing requires a multidisciplinary and rigorous approach to risk allocation and management.
- **International.** Most major projects in developing countries tend to have extensive international involvement

(lenders, investors, developers, contractors, operators, suppliers, and so forth).

- **Long term.** Repayments are usually over extended periods (10 years or more) to accommodate high capital costs and subsequent operating margins.
- **Highly structural.** Project financing risk allocation means rigorous and comprehensive structuring among the parties (see chapters 4, 5, and 7).
- **Large.** High development or transaction costs can usually be supported or justified only on large transactions.
- **Mature.** Particularly in developed countries, there are many experienced participants in the international PPP markets. Projects can, therefore, be smoothly structured by experienced financiers and advisers. For developing countries, the challenge is often to attract such experienced participants and financiers.

Other characteristics of project finance structures include

- Financing provided through a special-purpose legal entity whose only business is the project.
- Financing typically raised for greenfield development or larger extensions to existing systems.
- Greater leverage (typically in the range of 60–90 percent debt).
- Debt that is typically nonrecourse or limited recourse, meaning that lenders rely primarily on future project cash flows for repayment.
- Security for lenders from the concession contract or PPP agreement.
- Financing reflecting the concession contract's time-bound nature.<sup>2</sup>

<sup>2</sup> The tenor of project debt will be less than the concession's life, but usually linked to it (Yescombe 2002).





*Kenosha, Wisconsin, USA, has a small new LRT scheme that opens up a former industrial site for new urban development. Photo by and reproduced by kind permission of Scott McIntosh.*

In contrast to project finance, lending for corporate finance projects derives security for debt repayment from the sponsors' or shareholders' balance sheets or other nonproject security. Corporate finance lenders typically have rights to all the borrower's assets in the event of default. Characteristics of corporate finance include:

- Contractual arrangements between a grantor and a legal entity, which derives its financial strength directly from the sponsors' or shareholders' balance sheets.
- Generally smaller investment amounts compared with project-financed alternatives.
- Absent or substantially reduced lender due diligence on the project, because the lender is taking the sponsors' credit risk, as opposed to project risk: Lender security is outside of the investment being financed.

It is important to note, however, that this last characteristic applies only if the sponsor is considered to be a good credit risk. If not, project finance-type due diligence will still be needed.

The relative merits of either structure will depend on the size and risk profile of the project in question. Larger greenfield LRMT projects will almost always take on some form of project finance to limit the liability of developers and raise sufficient capital. Nevertheless, smaller LRMT projects such as minor extensions or refurbishments may draw on corporate finance, depending on their size and scope. For example, the provision and maintenance of rolling stock may be financed using a supplier's balance sheet (trade finance). Different financing techniques have relative merits and limitations, as summarized in table 6.2 (Mandri-Perrott 2009).

Table 6.2

**Project Finance versus Corporate Finance Structures**

Financing structure	Advantages	Disadvantages
Project finance	<ul style="list-style-type: none"><li>• Is off balance sheet</li><li>• Separates project’s credit profile from developers’ credit profiles—the project company is insulated from developer default. Similarly, developers are insulated from project liabilities.<sup>a</sup></li><li>• Can achieve high leverage ratios, which can provide greater rates of equity returns from smaller cash flows.</li><li>• Can create greater tax shields because of greater leverage—which can reduce the overall cost of capital.</li><li>• Reduces managerial discretion over free cash flows because of lender imposed constraints.</li><li>• Mitigates underinvestment bias.<sup>b</sup></li><li>• Provides additional mechanisms for risk spreading through syndication and securitization.</li><li>• Provides additional lender due diligence, which can improve project quality.</li></ul> <p>Lender reporting and control requirements can help achieve much greater transparency for the grantor with regard to project company operations and financial performance. This openness can be a very important implication when assessing performance-related payments and when setting or adjusting fare levels.</p>	<ul style="list-style-type: none"><li>• Requires greater transaction costs than corporate finance.</li><li>• In developing markets, is only available for larger projects (exceeding US\$100 million)—rarely a problem for LRMT initiatives).</li><li>• Requires additional due diligence and associated time when structuring.</li><li>• May be subject to changing bid prices when final price depends on prevailing credit market conditions, such as interest rates, because final financing terms may not be set until after preferred bidder selection.</li></ul> <p>Given the complexities of project finance structures and documentation, the time between (a) bid award and (b) financial close and project commencement may be lengthy (typically about 12 months, but may be much longer if the project structure is not bankable). This timeframe can conflict with grantor’s project timetable expectations and create political costs.</p>

Financing structure	Advantages	Disadvantages
Corporate finance	<ul style="list-style-type: none"> <li>• Has lower transaction costs because credit risk assessment is based on sponsor credit rather than complex project credit risk.</li> <li>• Is simpler, easier to obtain, and faster to structure than project finance.</li> <li>• Requires smaller amounts of due diligence and associated time because of additional security provided by sponsors' balance sheets.</li> <li>• Depending on sponsor's credit rating, may offer lower margins on debt.</li> <li>• Offers greater flexibility to accommodate changes (such as renegotiations).</li> </ul>	<ul style="list-style-type: none"> <li>• Places sponsors' assets and balance sheet at risk.</li> <li>• Involves lower debt-to-equity ratios.</li> <li>• Is typically available only for smaller investments (sponsor not willing to accept larger risk).</li> <li>• Does not allow isolation of project from sponsor credit profiles and vice versa</li> <li>• May limit public control over refinancing activities and prevent public sharing in refinancing gains.</li> <li>• May result in fewer benefits for public authorities related to project transparency than would a project finance structure.</li> </ul>

Source: Provided by Iain Menzies.

- a. The degree of protection afforded by project finance structures varies among legal jurisdictions.*
- b. Underinvestment bias means that a high proportion of debt increases management's reluctance to finance low-risk positive net present value projects because smaller returns belong almost entirely to lenders. Similarly, other high-risk positive net present value projects may be forgone because of the risks they pose to managers. Project finance can achieve higher leverage to enhance returns of smaller net present value projects and can also protect management's interests by partially insulating them from potential downsides of riskier projects (Yescombe 2002).*





### 6.4.1 Some Differences between Private and Public Project Finance Evaluation

The private sector approach to project evaluation is predominantly focused on the financial aspects of a project, whereas the public sector attempts to incorporate economic as well as financial criteria in its assessments. The differences can be categorized as follows (Mitric 1998):

- Economic evaluation uses first-year benefits as a timing indicator and takes into account the entire life of the project. Private sector investors are highly focused on the returns generated in the early years of a project for debt repayment obligations and for ensuring that the project lasts long enough to reach profitability.
- Public policy requirements and project economics can force a public authority to agree to a project with poor projected financial returns. The private sector would walk away from any project with poor return prospects unless provided with a guarantee in the project structure.
- Financial approaches as used by the private sector are concerned with costs and revenues, not costs and benefits.
- The private sector is more accustomed to using scenario projection techniques in its risk analysis strategies. The public sector tends to view scenario analysis with suspicion and uses it in a very limited manner.
- In the private sector, the division between analysts and decision makers is more defined. Analysts gather information on the trade-offs and consequences but do not produce conclusive evaluations. Managers are held responsible to make investment decisions on the basis of an analysis of the information provided. In the public sector, this division is not as black and white.

## 6.5 PRIVATE FINANCING FOR LRMT PROJECTS

Initial lender due diligence and subsequent monitoring can enhance project transparency and quality. Because banks or other lenders may require significant changes to a project's structure or agreed risk allocation before committing financing, these institutions should be consulted as early as possible in the procurement process. Although these changes can help rationalize risk allocations or enhance LRMT projects in other ways, they can take considerable time to negotiate, as well as damage project and grantor credibility. Hence, it is important to focus, from project inception, on developing a project structure that is bankable. In this respect, it will be invaluable for public authorities to hire experienced transaction and financial advisers who are familiar with taking PPP projects to market and financing them (typically investment or project finance banks or, in some cases, IFIs).

Project financiers will look to the balance between sponsor equity and debt financing (gearing) in a particular project. The project's gearing will reflect

- How much debt project cash flows can support
- How risky or uncertain the project's cash flows (market risk) are

Although many project financings aim to maximize gearing (debt is typically cheaper than equity), equity requirements are nevertheless usually substantial enough to ensure that the sponsor's commitment makes it too costly to withdraw support when the going gets tough. Debt-to-equity ratios of 75:25 or 70:30 have been common, although some more conservative export credit agencies have sought lower gearing (60:40). More risky project structures, such as farebox risk transferred to the developer, are also likely to induce lenders to insist on lower gearing, as well as to increase the cost of debt—a “double-whammy” effect on increasing project costs.

Risk allocation and the certainty of project cash flows will determine the nature and amount of debt that projects can support. Spreads on project debt will also reflect perceptions of riskiness in addition to general market conditions at the time of issuance. Higher leverage for LRMT projects with riskier cash flow characteristics is a recipe for disaster, assuming that sources of debt and equity are even available on this basis.

International commercial lenders are also increasingly conscious of the social and environmental impact of projects to which they lend. This issue is relevant to LRMT projects that run along extensive alignments in populous urban environments.

More than 60 of the world's leading financial institutions have now adopted the Equator Principles, a voluntary set of guidelines in the financial industry to determine, assess, and manage environmental and social risks in project financing. These financial institutions have adopted the Equator Principles to ensure that the projects they finance are developed in a manner that is socially responsible and reflects sound environmental management practices. To attract financing from such institutions, LRMT PPP projects must have been the subject of environmental and social impact studies and public consultation before their launch.

## 6.6 THE NEED FOR PUBLIC SUPPORT

As discussed, most LRMT services require public subsidy because the large development costs cannot be funded through private investment alone while maintaining sustainable fare policies. Previous attempts at purely private LRMT concessions do not have a good track record and the public sector was subsequently required to bail out insolvent projects (for example, France's Orlyval—see box 6.2). Modern LRMT PPPs have learned from these early mistakes, and all include some form of public support. Such support may take a variety of forms and often combines elements that may include capital grants, output-based subsidies, public “soft” loans, direct government procurement of infrastructure, exemptions from taxes and import tariffs, loan guarantees, equity contributions, in-kind grants, and export credit financing.

### Box 6.2

## Leverage and France's Orlyval

In the late 1980s, French planners sought to link Orly airport near Paris with the Réseau Express Régional (RER) train network. After competing with one other consortium, a group led by Matra Transport won a 30-year concession contract to implement an automatic VAL (véhicule automatique léger) light metro system. Of the project's FF 1.75 billion cost (including overruns), private banks financed FF 1.55 billion on FF 200 million of shareholder equity. At close, the Orlyval project company was completely privately financed and had a debt-to-equity ratio of roughly eight to one.

Orlyval's contract structure entirely allocated demand risks to the private concession company. After entering service, the system carried approximately 1.5 million passengers per year instead of the more than 4 million originally expected. Shortly thereafter the Orlyval Company became insolvent, and operations were transferred to France's publicly owned Régie Autonome des Transports Parisiens.



Attractive architectural station design in Charlotte, North Carolina, USA.  
Photo by and reproduced by kind permission of James Dwyer.

### 6.6.1 Capital Grants

The upfront capital costs required to construct new LRMT systems are typically in the hundreds of millions of dollars. However, the tariff revenues subsequently generated from fare-paying passengers are often too small to service the costs of project debt required to construct a system's infrastructure. Accordingly, most recent LRMT initiatives incorporate an element of capital grant designed to offset the private sector's initial construction costs and associated ongoing debt repayment obligations. Reducing debt service during operations enhances the stability of concession companies and helps to prevent default, which is often costly to public partners as well. Determining the appropriate level of capital grant and defining appropriate construction milestones are a challenge for project planners. Too much capital grant can reduce risk transfer to the detriment of value-for-money incentives when private partners do not have sufficient "skin in the game." Conversely, insufficient capital grants can result in potentially unstable concession companies and correspondingly large risk premiums (that is, poor project bankability).

### 6.6.2 Output-Based Subsidies

Structuring public support on the basis of measurable outputs can help align public and private incentives for accomplishing project goals (Irwin 2003). In the case of LRMT services, output-based subsidies are often "shadow fares" paid by public authorities on top of each fare directly collected from system passengers. Shadow fares can be used to lower passenger fares to socially acceptable levels while still enabling private partners to earn reasonable returns. This arrangement can provide a good solution for transferring ridership risk to the developer while decoupling private compensation from fare levels when the cost of public transport is a politically sensitive issue.

Payments based on system availability represent another output-based mechanism for structuring public support. Key performance indicators, as discussed in chapter 5, can provide mechanisms for adjusting availability payments linked to developer performance. Availability-based compensation schemes are also useful for insulating developer revenues from demand risks.

The effects of both explicit and contingent liabilities associated with output-based support mechanisms for LRMT services need to be considered. Such liabilities should be factored into initial affordability analyses as well as into future budgetary provisions.

### 6.6.3 Public "Soft" Loans

Lending public money to private partners at concessionary interest rates can help overcome disadvantages resulting from the private sector's higher cost of capital. Preserving appropriate risk transfer to the concession company requires careful consideration when projects incorporate public financing. It is sometimes argued that to protect public interests and ensure rational risk allocations, public loans should be senior in the project's capital structure and should benefit from appropriately large junior debt or equity cushions. Private lenders may, however, have an issue with such an approach to funding structuring. In this respect, it is important to clarify and agree whether the intention is that the public loan will be treated as a quasi-grant, which should be subordinated to senior debt. Ideally, substantial amounts of private financing should still accompany public loans to take advantage of private lenders' due diligence and subsequent oversight. Lastly, it is important to recognize that public soft loans cannot compensate for fundamental flaws in project risk allocation: A concession company may still be unable to service debt even at lower soft interest rates. For example, Kuala Lumpur's STAR and PUTRA concessions both incorporated government soft loans.





Separation barriers between train and vehicle traffic.  
Photo by and reproduced by kind permission  
of Rainer Hesse.

Nevertheless, ridership risk was fully transferred to the concessionaires, and subsequent ridership was so low that both companies became insolvent and required public bailout (Abdul-Aziz 2006).

### 6.6.4 Direct Government Procurement of Infrastructure or Rolling Stock for Use by Private Partners

Public provision of specific infrastructure or rolling stock assets can help reduce upfront costs to private partners. As in the case of capital grants, careful consideration should be given, in such an approach, to ensure that private partners still bear substantial risk when benefiting from this form of public support. Direct public procurement also brings challenges regarding asset ownership and integration between contracts and assets. Managing such contractual arrangements typically requires considerable public capacity or additional expenditures for engaging advisers to manage contracts on behalf of public authorities. Both the Manchester Metrolink and Docklands Light Railway use this form of public support (box 6.3).

Box 6.3

#### Public Support and the Docklands Light Railway

The Docklands Light Railway (DLR) has benefited from considerable public support while still incorporating meaningful investment from private partners. DLR's grantor actually contributes the bulk of funds toward new rolling-stock purchases and other major infrastructure upgrades. DLR's operating franchisee (Serco) is required to contribute funds to offset costs when improvements are mutually beneficial. Serco's franchise agreement also specifies some minimum level of investment over the contract's life. Each year, Serco and Docklands Light Railway Limited (DLR's contracting authority) agree on a list of capital projects in addition to Serco's contribution to those projects.

### 6.6.5 Exemptions from Taxes and Import Tariffs

Exempting developers from selected import and customs tariffs and local and national taxes (that is, tax holidays) can reduce costs to public institutions and passengers. In most cases, such waivers will require legislative acts or close coordination between public agencies (see box 6.4). Early planning for exemptions and their associated legal requirements is essential for ensuring timely project completion. Also, public institutions should carefully consider the value for money associated with long-term tax exemptions (especially on corporate income). Existing tax codes and accounting practices may already provide large tax shields in early years through depreciation and interest expense deductions. Providing tax breaks in later years as well may reduce incentives for further capital investments and reduce potential public revenues.

Box 6.4

#### Taxes and Gautrain's Capital Grant

South Africa's Gautrain Rapid Rail Link incorporates a substantial capital grant (approximately 87 percent) to fund upfront construction costs. Gauteng province disburses its capital grant through milestone payments to the system's private concessionaire at each stage of the construction process in accordance with a preagreed completion schedule. Prior to a special legislative act, Gauteng's capital grants would have constituted taxable income for the concessionaire. The additional cost of these taxes would have otherwise been charged entirely back to Gauteng province in the form of higher bid prices.



Source: <http://www.sxc.hu/>

### 6.6.6 Loan Guarantees

Public guarantees (sovereign, municipal, and so forth) aim to improve project bankability and to reduce the cost of debt for private concessionaires. In some cases, lenders may not finance a project without the provision of such guarantees, especially if the creditworthiness of the grantor is deemed deficient. However, wrapping project debt with the full faith and credit of public institutions comes with a measure of caution regarding risk transfer and private incentives. Planners should ensure that public guarantees on senior debt benefit from adequate cushions of equity capital at risk. Contingent liabilities associated with guarantees should also be priced into any value-for-money analysis and should be transparently disclosed.

### 6.6.7 Equity Contributions

Contributing public equity capital to LRMT concessions aims to align public and private interest in a system's financial success. Sharing common equity can also provide a mechanism for public influence on operating and investment activities. Public equity is often contributed in kind through public asset transfers for brownfield concessions or through capitalization of capital grants. However, the drawbacks of public equity ownership often outweigh its benefits. Reduced risk transfer and increased likelihood of political influence can harm LRMT operations and compromise private incentives to perform; the shareholders' agreement must specifically and explicitly address these issues if such a structure is being contemplated. Differences between public and private shareholders can result in conflicting strategies or incoherent company objectives.

### 6.6.8 In-Kind Grants

Public authorities can provide land, rights-of-way, and other in-kind grants to help support LRMT investments. Reference designs are a common means for public entities to define the locations of such granted assets, although the condition of such assets can be a significant risk transfer issue.

### 6.6.9 Export Credit Financing

Export credit agencies (ECAs) promote and facilitate the foreign investment and export of goods and services of their particular nation's companies. In LRMT projects, ECAs have commonly supported the financing of imported rolling stock and associated signaling or communication systems. A number of ECAs can provide project financing through banks or directly to the buyer through guarantees to the buyer's bankers. ECA financing can take the form of loan guarantees, political risk insurance, concessionary lending, or working capital guarantees. In some instances, ECAs require matching contributions from private lenders. Most ECAs from the Organisation for Economic Cooperation and Development (OECD) countries abide by the "Arrangement on Officially Supported Export Credits," which sets upper limits on the amount of assistance that foreign governments can offer in support of their exports. ECA financing may be particularly useful if local credit markets are underdeveloped or sovereign risks reduce the attractiveness of private finance.

## 6.7 MULTILATERAL AND BILATERAL FINANCIAL ORGANIZATIONS

Where local public resources are lacking, support may be available through multilateral or bilateral development institutions. Historically the World Bank, International Finance Corporation, Asian Development Bank, European Investment Bank, Multilateral Investment Guarantee Agency,

and European Bank for Reconstruction and Development have been active multilateral agency project financiers. Most of these organizations operate exclusively within developing countries. However, a select few also have mandates that allow work in developed nations as well. For example, phase 2 of the Manchester Metrolink (see annex 1) incorporated financing from the European Investment Bank. Multilateral and bilateral financial institutions may offer support through

- Loans (potentially to both projects and governments)
- Grants
- Equity investments
- Guarantees on debt and equity
- Advisory services

Multilateral and bilateral support can help to make LRMT investments more financially viable and provide developers and lenders with additional comfort on political and regulatory project risks. However, working with these institutions may also lengthen the project development process or constrain policy discretion. They may be very demanding in terms of environmental and social safeguard requirements or impose stringent requirements on procurement procedures. Multilateral and bilateral financial institutions with strong development mandates may also be able to help planners determine whether LRMT would be a sound transportation investment at all, as discussed in chapter 1.

## 6.8 SOURCES OF PUBLIC SUPPORT AND INCENTIVES

Sources of public support can heavily influence both the decision to pursue LRMT and the subsequent decision to incorporate private sector participation. In some instances, at least examining the potential for PPP-based procurement is an explicit requirement attached to national or regional government funding. Government funds exclusively allocated

for a specific purpose (that is, earmarked funds) can also influence or distort planning efforts and the analysis leading up to investment decisions.

Policy makers at all levels of government need to carefully assess the implications that different sources of public funding have on transportation planning functions. Local incentives for budgetary responsibility heavily depend on which levels of government fund items such as

- Upfront capital costs
- Construction cost overruns
- Operating costs
- Planning and feasibility studies
- Later expenses arising from contingent liabilities

When national or regional governments fund the bulk of project costs or the majority of cost overruns, local planning authorities may have perverse incentives to select capital-intensive, risky projects that otherwise would make little sense to pursue. Such incentives can also encourage overly optimistic estimates for elements such as ridership and operating costs. Earmarked budgetary allocations, as previously discussed, can reduce competition for funds and similarly encourage suboptimal investment decisions (Pickrell 1992).

## 6.9 FUNDING ONGOING INVESTMENT NEEDS

Expenditures required to maintain the condition and integrity of the LRMT system can be significant and periodic in nature. For example, rolling-stock refurbishment may occur only once every 10 to 15 years but will require substantial capital investment. Fare levels, however, are continuous in nature and will likely not cover the full costs of such large maintenance investments at the time they are required. When private partners assume responsibility for funding such investments, mismatches can arise between revenues and expenses—potentially jeopardizing the financial strength of project companies. To mitigate this risk, lenders or public authorities



may require special reserve accounts to pay for such irregular expenses. These “sinking funds” (for example, maintenance and rehabilitation reserves) continuously accumulate cash from project revenues for future specific expenditures and, as such, will increase upfront project costs.

Lenders will typically require rights over sinking funds as additional security against project debt. In the event of a borrower’s default, the assets of the sinking fund will help to offset any potential losses on project debt in the order of seniority. Public authorities would typically not specify sinking funds unless the responsibility for maintenance investments resides with a private partner whose value at risk is small relative to the envisaged expenditure (HM Treasury 2007).

## 6.10 DEVELOPING A PROJECT FINANCE MODEL

For the grantor to assess project value for money and PPP viability or bankability, it must develop a robust financial model for the project, capturing all the funding and finance issues previously discussed, as well as the effects of performance payments (chapter 5), risk allocations (chapter 4), and contractual arrangements (chapter 7). The financial model is also critical in determining

how many subsidies will be required during construction and operations and in the testing of key policy decisions (such as the tariff that can be applied while ensuring the viability of the project).

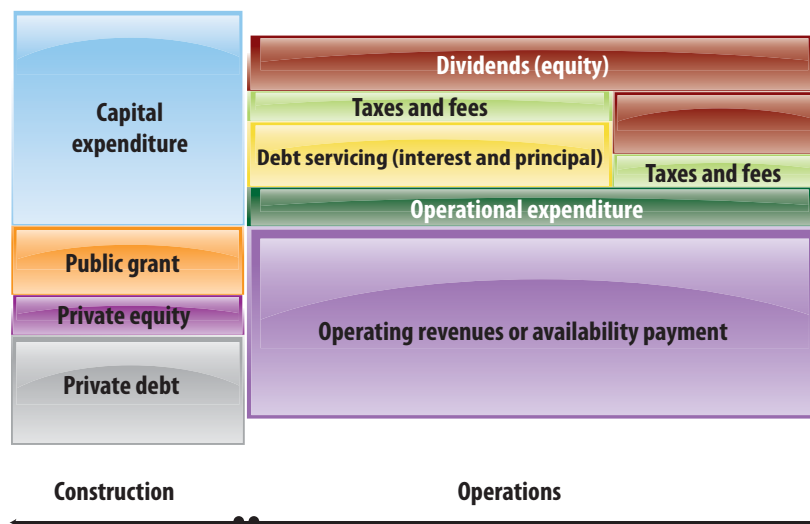
Financial advisers are usually tasked with developing and running such models for the grantor, and the model will be needed at all stages of the project life cycle

- To assess PPP project options and feasibility and affordability at the design stage
- To assess bidder feedback during the bidding stage
- To evaluate financial bids received
- To support negotiations with bidders and lenders up to contract signature
- To support negotiation of any contract variations after financial close

Figure 6.1 illustrates the cash-flow building blocks of a typical project finance model. The outputs of such a model will be cash-flow and income statements and project balance sheets. The model will allow the grantor to assess the effect of likely project costs and of passenger and revenue forecasts on public funding requirements (capital grant, availability payment, minimum revenue guarantee) and associated project affordability.

Figure 6.1

### ***Building Blocks of a Typical Project Finance Model: Financial Equilibrium of an LRMT Project***



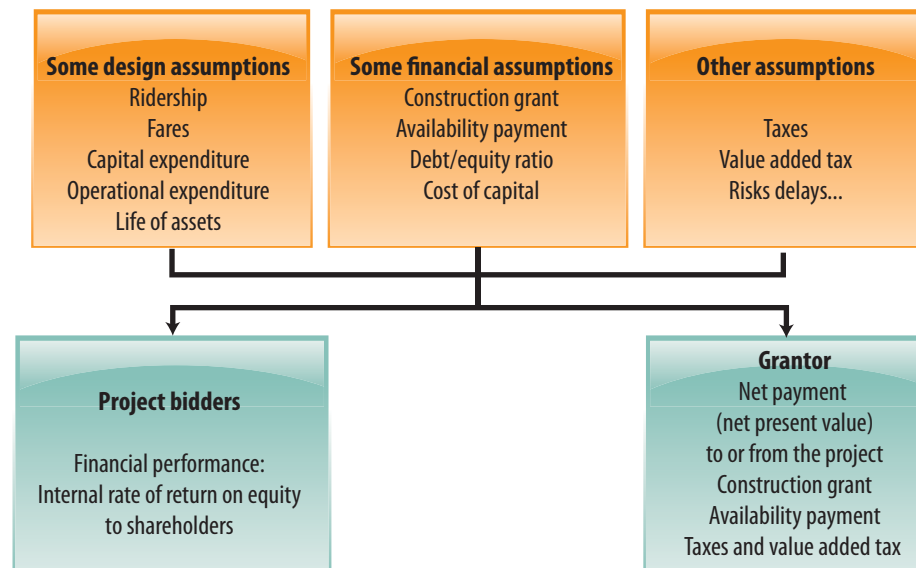
Source: Diagram by Vickram Cuttaree.

Sensitivity analysis is strongly recommended because any result from the financial model is based on a set of assumptions (figure 6.2). Differences between reality and the assumptions can compromise the viability of the project or directly result in a higher financial public contribution. Bidders are also likely to use different assumptions, which might result in a bid price different from the one estimated. Key sensitivities that should be run on the model (“stress testing”) should include

- Ridership forecasts (which are often optimistic)
- Fare levels
- Capital costs (which are often underestimated)
- Inflation
- Financing assumptions (tenor, interest rates)

Figure 6.2

### Articulation of the Financial Model



Source: Author's representation.



Source: <http://www.sxc.hu/>

## 6.11 CONSIDERING AND VALUING CONTINGENT LIABILITIES

Risks associated with private sector participation in LRMT projects invariably create contingent liabilities that can influence the amount of public support services may require. Contingent liabilities typically relate to the provision of public guarantees, but also reflect other potential public sector obligations that do not appear or are not accounted for in public budgets and accounts. Intuitively, public institutions should plan to cover the expected value of such liabilities as part of their efforts to budget for system affordability. This allocation can be accomplished either by verifying sufficient budgetary cushion in later years or by setting aside appropriate amounts of reserves when future budgets are uncertain. Proper budgeting is challenging to achieve in practice because contingent liabilities correspond to uncertain cash-flow events, and public funds have some opportunity cost associated with them. Allocating excessive reserves to cover such expenses may divert public funds from other important uses. Conversely, allocating insufficient reserves may strain future budgets in periods when expenses occur. This shortfall can prevent public authorities from meeting contractual obligations or from making necessary investments to ensure quality services. Correctly valuing contingent liabilities is therefore a critical funding consideration for public institutions. Methods for valuing contingent liabilities include:

- **Actuarial or statistical techniques.** These techniques use historical data and current trends to estimate future losses related to uncertain events. The application of actuarial techniques is limited by the availability of historical data and their failure to explain the patterns behind losses that they predict.
- **Econometric models.** Unlike actuarial techniques, this method identifies factors that drive future losses. By

forecasting future changes in those underlying factors, econometric models endeavor to predict future loss distributions. For example, econometric models can be used to calculate government exposure on a direct loan to a private developer by forecasting those elements that potentially drive default and the corresponding risk of loss or by predicting early repayment and associated reinvestment risk.

- **Contingent claims analysis.** This method can be particularly useful when historical data are lacking or when planners seek to evaluate a single specific element within a larger collection of risks. Contingent claims analysis employs many of the same techniques used to value financial options by identifying elements within larger risks that have options like cash-flow features. For example, the value of a direct loan with risk would be deemed equivalent to the value of a risk-free loan less the value of a put option on the borrower's default (Lewis and Mody 1997).

## 6.12 HEDGING

Hedging instruments provide mechanisms that help public authorities and private developers manage financial risks associated with specific liabilities (both contingent and otherwise). However, such instruments provide counterparties with certain rights and obligations at some future date. Hedging is a common feature of LRMT projects and is often used to offset exposures to

- Foreign currency movements (for example, swap and forward contracts or options).
- Large purchases of raw materials and other project inputs (for example, forward contracts for steel and concrete).
- Interest rate movements (for example, swaps).
- Counterparty risks (for example, credit default)





Deciding when and how to hedge certain project risks requires careful consideration of associated costs and benefits. Whenever projects procure hedging instruments from international markets, planners should ensure the following:

- Prices are fair and competitively obtained (see box 6.5).
- Purchased hedges offset a risky exposure.
- Hedging instrument covers are purchased in appropriate amounts.

#### Box 6.5

### Hedging and Gautrain's Capital Grant

Constructing South Africa's Gautrain Rapid Rail Link involved a substantial capital grant that private partners used to fund the majority of upfront system costs. Many of the expenditures covered by this grant were denominated in foreign currencies. Ensuring the project's financial viability therefore required some method to guard against potentially destabilizing fluctuations in foreign exchange rates.

Gautrain's concessionaire originally assumed foreign exchange risks during the project's construction period and passed associated hedging costs along to Gauteng province as a component of capital grant payments made at project milestones. However, this structure resulted in unfavorable forward currency pricing when the concessionaire's bankers were not forced to compete on the forward rates they offered and took full advantage of the pass-through nature of the project's hedging costs. In response to this situation, South Africa's national government intervened and decided to take capital grant-related foreign exchange risks back from the concessionaire during the construction period (effectively acting as a currency swap counterparty to Gauteng province). This solution eliminated the additional cost associated with unfavorably priced currency hedges and also insulated the province from foreign exchange exposure on its capital grant payments.

It should be noted, however, that hedging comes at a significant cost, with commercial lenders often earning as much from hedging instruments as they do from the project loans. Planners should, therefore, endeavor to construct natural hedges that eliminate risky exposures altogether when circumstances allow. For example, when lenders can provide loans in local currency, projects can match revenues with debt-service payments, avoiding the need for expensive currency swaps (Yescombe 2002) or the need for the public sector to bear foreign exchange currency risk. Chapter 4 discusses many of the risks that planners may want to consider hedging.

### 6.13 REFINANCING

The capital and debt structure of a project can significantly affect both investor returns and a concession's financial risk profile. Striking the balance between stability and appropriate rates of return usually occurs toward financial close, when lenders conduct extensive due diligence and also specify restrictive covenants on project debt to minimize default risk. However, market conditions and a project's credit profile are rarely constant throughout time. Favorable changes in either of these factors may provide for additional value capture by opportunistically altering elements in a project's capital or debt structure. For example, a concession company may be able to extend the maturity of project debt (within the constraints of the term of the PPP contract), reduce interest rate margins, or replace the hedging instruments. These actions could reduce the debt repayment profile, leaving additional cash free for paying dividends or making investments in service improvements.

The length of most LRMT concessions allows ample time for potentially valuable refinancing during a project's life as risk profiles or credit market conditions change. Postconstruction refinancing is relatively common and typically planned.

Recently, it is often built into the original financing as a margin ratchet. However, other opportunities for refinancing could be less predictable, especially in rapidly developing countries, where sovereign risk spreads, one hopes, contract over time to reflect improving governance, increasingly stable macroeconomic conditions, or developing local capital markets. Financing terms may similarly become more favorable when systems demonstrate several years of sound operations and timely debt service or when contracting authorities show competence at managing privately financed infrastructure projects. In practice, the opportunity for later-stage refinancing often arises from a combination of public and private efforts. When not originally planned, some structure for sharing these unexpected “refinancing gains” between public and private partners is therefore reasonable to include in a well-crafted concession contract (box 6.6).

Box 6.6

### Refinancing Gain: HM Treasury

The United Kingdom’s Her Majesty’s (HM) Treasury Department provides detailed guidance on refinancing and arrangements for sharing in version 4 of Standardisation of PFI Contracts (HM Treasury 2007). Specifically, in the October 2008 Amended Refinancing Provisions, HM Treasury states that the grantor (“Authority”) is entitled to between 50 and 70 percent of such refinancing gains, depending on the amount and kind of gains generated and subject to the Authority’s approval and value for money analysis. Transactions where sharing may be warranted include

- Reduction in interest margins
- Reduction or release of reserve accounts
- Release of contingent junior capital
- Extension of the maturity of debt
- Increase in the amount of debt
- Refinancing undertaken without the direct involvement of the contractor

HM Treasury also mentions that certain transactions should not require an authority’s consent and likewise would not require any form of sharing. These include

- Disposal of junior capital, which in terms of rights is equity in all but name
- Refinancing agreed in the project’s base case financial plan
- Transactions originally taken on a corporate finance basis
- Gains on interest rate hedging
- Changes in taxation or accounting policies
- Qualified banking transactions, such as syndication or securitization of loans

Considerable analysis should precede an agreement to refinance any portion of a project’s capital structure. HM Treasury recommends that contracting authorities diligently analyze how refinancing can potentially increase termination liabilities or otherwise affect the operational/policy flexibility of contracts. More information from HM Treasury can be found at <http://www.hm-treasury.gov.uk>.

Profit-maximizing developers and investors would naturally pursue refinancing whenever gains sufficiently exceed associated costs (for example, transaction fees, additional financial risk, and hedge breakage costs). However, the benefits of refinancing decisions for public institutions may be less clear given different policy objectives and reduced appetites for risk. In addition, refinancing may limit a project’s flexibility or

may create additional termination liabilities for contracting authorities. Value-for-money analysis should precede any agreement to changes in a project’s capital structure. Well-designed contractual arrangements should therefore also include mechanisms for dealing with refinancing opportunities that may be in both the public and the private interest.

# Checklist

## Funding and Finance

<p><input type="checkbox"/> Develop a robust financial model to successfully align financial implications with public interests during planning stages.</p> <p><input type="checkbox"/> Keep four factors in mind:</p> <ul style="list-style-type: none"> <li>o Is the project affordable and creditworthy?</li> <li>o Does it provide value for money?</li> <li>o Does it use a legally robust structure?</li> <li>o Is its risk allocation in line with local or international practice?</li> </ul> <p><input type="checkbox"/> Remember that private capital comes with an expectation of a reasonable return:</p> <ul style="list-style-type: none"> <li>o Demonstrate how private investors will recover normal returns throughout project development and implementation.</li> <li>o Consult with banks and other lenders early in the bidding process to ensure adequate due diligence, project transparency, and quality.</li> <li>o Calculate levels of debt and equity projected to be required.</li> <li>o Market-test the project with potential developers and investors.</li> </ul> <p><input type="checkbox"/> Understand the implications that the project's structure (policy, technology and commercial) will have on funding and finance sources:</p> <ul style="list-style-type: none"> <li>o Hire an experienced transaction/financial adviser familiar with PPP projects to assist in the marketing and financing of the project.</li> </ul> <p><input type="checkbox"/> Consider potential revenues and benefits that can be derived from outside the operation of the system.</p> <p><input type="checkbox"/> Consider the bankability of the project by exploring and understanding the following:</p> <ul style="list-style-type: none"> <li>o Creditworthiness</li> <li>o Legal viability</li> <li>o Economic viability</li> <li>o Technical viability</li> <li>o Suitability of project finance or corporate finance for the project's needs</li> </ul>	<p><input type="checkbox"/> Other questions to consider on bankability include</p> <p><input type="checkbox"/> Does the project require public support?</p> <p><input type="checkbox"/> Is a capital grant is required?</p> <p>Is operational cash-flow support required (for example, availability payment or minimum revenue guarantee)?</p> <p><input type="checkbox"/> Is a guarantee required (for example, municipal, state or sovereign, IFI, or partial risk/credit guarantees)?</p> <ul style="list-style-type: none"> <li>o Consider the suitability of output-based subsidies if there are concerns over the cost of the project to the public sector.</li> <li>o Ensure that all public guarantees on senior debt benefit from adequate cushions of equity capital at risk. Contingent liabilities associated with guarantees should be priced into any value-for-money analysis and be disclosed.</li> <li>o Carefully consider the implications that different sources of public funding have on transportation planning functions and incentives for budgetary responsibility and discipline.</li> <li>o Consider the use of special reserve accounts to cover the expenditures and capital investment required to maintain the system's integrity and condition over an extended period.</li> </ul> <p><input type="checkbox"/> Ensure that proper budgeting mechanisms are used to allow sufficient cover for contingent liabilities.</p> <p><input type="checkbox"/> Explore the use of hedging instruments to help manage the financial risks associated with specific liabilities.</p> <p><input type="checkbox"/> Ensure that the concession contract contains scope for refinancing opportunities that may be in the interest of both the public sector and the private sector.</p>
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# CHAPTER 7

## CONTRACTUAL ARRANGEMENTS



*The tram-train system in Kassel, Germany, with a diesel LRMT system.*

# Contractual Arrangements

This chapter looks at some of the major issues to be considered when formulating the contractual arrangements for a light rail–light metro transit (LRMT) public-private partnership (PPP) scheme. By their nature, PPP arrangements are complex, and each arrangement has its own set of interlinking contracts and agreements that are needed to establish allocation of risks and responsibilities, as well as to deal with financial obligations and cash flows. We use a PPP contract structure based on the net-cost contract with investment (NCCI, or concession contract) to illustrate some of the main contractual issues to be considered. We detail some of the associated contracts that would typically be used by the grantor as a means of sharing the risk among the project participants. We also look at the importance of the overall legal regime of the host country in which the potential PPP will take place and explore the importance of ensuring that the grantor has the legal rights to enter into the PPP agreement.

Finally, given that it is impossible to give one “standard” contract form, this chapter is designed to outline the key issues to be considered when designing and applying a new LRMT PPP contract. The majority of the new LRMT PPP projects reviewed in preparation for this book have involved major project investment, with investment commitment by the private sector as well as the public sector. It should be noted that many of the points covered here (that is, those not specifically related to investment) will also apply to the other noninvestment contract forms, such as operations contracts. We will look at the basic needs for contracts and their subsidiary agreements, specifically to gain an appreciation for the potential complexity of a complete contract structure and the interlinking of the various contracts (for example, land leases, lenders’ direct agreements, and technical annexes).

## 7.1 LEGAL FRAMEWORK

### 7.1.1 Authority and Enabling Legislation

No one project or its jurisdiction will be the same. It is essential that a government or government entity that enters into a PPP agreement or contract has the rights or the powers (*vires*) to enter into the obligations involved in the project and can undertake its roles and responsibilities. All the grantor’s actions must be allowable by law (*intra vires*). Acts that are outside the law or outside or beyond the powers of the party performing its duties (*ultra vires*) must be avoided. All the grantor’s decisions and acts must be enforceable and should not be subsequently rescinded or invalidated under applicable law. In some instances, particular administrative or legal requirements will need to be satisfied before the obligations set out in the PPP agreement can become binding. In many cases, major infrastructure projects will require special permission from either the central government or the governing authority.

These entities may differ from the entity that will enter into the contract. In other words, the grantor may differ from the authority that provides the right to enter into the PPP agreement. Given that LRMT PPP projects are in many cases greenfield operations, there is often no specific legislation for LRMT schemes. In this situation, it may be necessary to create enabling legislation before developing and entering into a PPP agreement, especially in the case of countries with civil law jurisdictions, as will be discussed in the next section. Box 7.1 describes issues that arose in the Philippines.



Box 7.1

## Legal Issues and Manila's MRT3

Legal factors can exert tremendous influences on the viability of light rail–light metro transit projects. The case of Manila's MRT3 system demonstrates how varying legislative interpretations by public institutions and elected officials can result in delays, additional complexity, and increased costs.

In July 1990, the Philippine government passed Republic Act 6957, which governs build-operate-transfer (BOT) concession agreements. This act authorized the country's public institutions to enter into contracts with private parties for the financing, design, construction, operation, and maintenance of financially viable infrastructure services through BOT or build-transfer concession schemes. Later, in 1993, the government passed Republic Act 7718 (known as the Philippine BOT law), which revised and expanded provisions included within the original 1990 act.

MRT3's planning and procurement progressed in parallel with the Philippine's new BOT legislation. In November 1991, the Department of Transportation and Communication signed a negotiated contract with the Epifanio de los Santos Avenue Light Rail Train (EDSA LRT) consortium, the only qualified bidder for the MRT3 project. Republic Acts 6957 and 7718 required a BOT concession structure because EDSA LRT was a foreign-owned entity and was therefore legally forbidden from operating infrastructure services under the terms of the two acts. Using this arrangement, the Department of Transportation and Communication would operate the system and make regular lease payments to the private concessionaire.



Halberstadt, Germany, features a new tram using the old tram lines. This is an example of using new trains on older tracks.  
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Source: <http://www.sxc.hu/>



### 7.1.2 Choosing Legal Instruments

The legal design of the PPP agreement must provide a sound legal basis for the transaction. Furthermore, the legal environment under which the PPP agreement is to be procured needs to be clearly specified. It is essential that the legal code that governs private participation be well understood, because it will set out the legal instruments that may be used. Thus, mechanisms can be developed to ensure compliance with obligations.

The choice of instruments in any particular case depends on the legal system, the practice of the country, and the instrument's purpose. There is no absolute structure or rule for choosing legal instruments. In fact, a PPP agreement may rely on several legal instruments. For example, the PPP agreement may be authorized by a statute or spelled out in an executive order, yet be given legal effect in the PPP agreement itself.

The PPP agreement is a contract that seeks to bind both the government through the grantor<sup>1</sup> and the developer. At first sight, the government may appear to be restricting its ability to act and thus may be reducing its flexibility. Yet one party's flexibility often equates to the other party's risk. If the grantor had complete freedom to change the PPP agreement during the course of the life of the contract, the developer would be unlikely to agree to such arrangement without receiving full protection. To obtain the benefits of private participation, the government must commit to certain behavior that will be regulated through the contract.

#### Civil law and common law

Civil law is used in France, Spain, and most of their former colonies, as well as a number of other continental European countries. Common law is used in the United Kingdom, most of its former colonies, and the United States.

In civil law countries, a separate administrative law usually governs relationships and contracts between the government

and a private partner. In common law systems, that is not the case, and there is no legal distinction between contracts that involve only private firms and contracts that involve a public authority and a private firm.<sup>2</sup> The same law and the same courts govern private participation contracts that businesspeople rely on for their transactions with each other. Common law contracts are very flexible, and almost any agreement can be put into a contract and can be enforced.

Under a civil law tradition, some important administrative rules seem to be common in many countries (for example, the rights of the grantor to unilateral modification and unilateral cancellation). Even if some of these issues are part of the background law that applies to a PPP agreement, it may still be necessary to spell out the relevance of these rules because the law may not be explicit enough about their application. Thus, writing clear rules into the contract is safest. It is generally a good idea to specifically outline in the contract the grantor's rights (for example, to demand unilateral changes in services) and to include provisions within the PPP agreement that explicitly address the circumstances under which the developer will be compensated. However, the legal validity of explicitly spelling out how an administrative law principle will be applied within the PPP agreement will need to be checked. For example, some civil law codes contain mandatory notice periods before termination for breach of contract; such rules cannot be avoided or overridden within the PPP agreement.

<sup>1</sup> When entering into a PPP agreement, the government must decide which institution it will use to represent it within the PPP agreement. For LRMT-type projects, signatories to the agreement or contract are the developer (representing the private sector) and the grantor (on behalf of the government), typically the government agency responsible for transport. In some jurisdictions, no PPP agreement may be entered into without the consent of the government entity that represents its public finances (for example the ministry or secretariat of finance). Hence, the PPP agreement may in some instances be signed by three parties: the grantor, representing the transport policy of the government; the agency responsible for public finances; and the developer.

<sup>2</sup> In some common law countries, administrative law or sovereign immunity law governs the relationships between the government and a private partner.



Zurich, Switzerland.  
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## Special privatization or PPP laws

In some countries, there has been a trend toward developing general laws on private sector participation. In others, special laws allow the private sector to provide rail services, including LRMT. These special statutes can provide a clear framework for a PPP agreement. A well-designed law addresses such issues as identifying which agencies have the power to initiate the introduction of private participation and set out the mechanisms that will allow competitive and transparent procurement processes. At the same time, poorly drafted PPP laws may hinder the PPP process. Even with specific laws (either general or sector specific), there are often limitations. Successful LRMT PPP agreements will include appropriate methodologies and techniques that make optimal use of the approach described in this chapter.

## 7.2 CONTRACT FORM

### 7.2.1 Using Contracts to Help Shape Policy

Contracts are important and are required whether or not the project is subject to a competitive procurement process. They can define a wide variety of objectives—transport, economic, financial, social, and environmental—not only on behalf of the grantor but also on behalf of other local, regional, or national stakeholders. They help give clarity and an objective basis for LRMT development and operations. Consequently, the use of PPP agreements is often promoted by external regional, national, or supranational agencies to enshrine policy objectives and to implement specific policy actions.

Contracts have been used to change the relationship between authorities and local publicly owned service providers, either to replace these providers by new developers or to distance authorities from the local publicly owned service providers and to make the providers clearly accountable for quality of

service. Although some officers within some authorities may resent the consequent diminution of their power, many, in the interviews undertaken in preparation for this book, have expressed satisfaction that they no longer had to be involved in the day-to-day aspects of public transport operations. In the case of a PPP arrangement, the contractual basis clearly allocates the grantor's and the developer's responsibilities and risks, as well as the benefits for all parties.

### 7.2.2 Allocating Risk through the PPP Arrangement

Each PPP contractual structure needs to be tailored to the specific PPP scheme. We will use a typical NCCI contract to illustrate some of the key issues to be considered when establishing a PPP arrangement. As a reminder, the NCCI is typically known as a concession-type contract or a form of the build-operate-transfer (BOT) or build-operate-own-transfer (BOOT) type of contract.<sup>3</sup> Here, the public authority contracts with an outside organization to provide (or in the case of existing systems, to maintain or upgrade) the majority of the fixed and movable assets while providing services to specified quality-of-service standards. Consequently, the developer must provide the required inventory of fixed and movable assets from internal resources or through external financing. Risk sharing may also extend into the areas of regulatory risk.

<sup>3</sup> BOOT contracts envisage the developer's (private sector's) financing, building, owning, and operating a specific new facility or system. After contract expiry, ownership of the assets is transferred to the public sector. Traditional BOOT schemes may have a number of variations, depending on the level of risk allocated to the parties. For example, one slight variation of the BOOT system is the build-transfer-operate contract. In this case, ownership of the assets is transferred to the public sector upon completion of the facility or system, and the private firm is contracted only to construct and operate it. Another variation is the build-operate-own contract, whereby ownership is not transferred to the public sector but remains with the private firm that constructs and operates the assets.





Source: <http://www.sxc.hu/>

A concession, in the form of some type of build-operate-transfer or design-build-operate arrangement, is often the most appropriate type of contract for situations where no services existed previously and where there is also a requirement to provide depots or other infrastructure (that is, greenfield projects). New light rail schemes are often covered by long-term contracts of this nature. NCCI contracts are generally long term and provide enough time for (long-term) debt repayment and reasonable investment returns; contract periods of 20 to 30 years are not uncommon.

This contract form can be adapted to include a variety of PPP arrangements in the development and financing of LRMT schemes, including (a) investment, (b) construction of new works, (c) refurbishment and renewal of existing works, (d) provision of rolling stock and equipment, and (e) long-term operation and maintenance of new and existing assets. The other contract forms, such as management contracts or leases, generally involve similar issues, but the developer has more limited involvement.

Contracts allocate obligations and risks to the contracting parties, setting out the financial links between the parties. These arrangements are complex. One way to demonstrate this complexity (and a useful tool in the analysis or development of a full contract arrangement) is to show the links between the different parties in two ways:

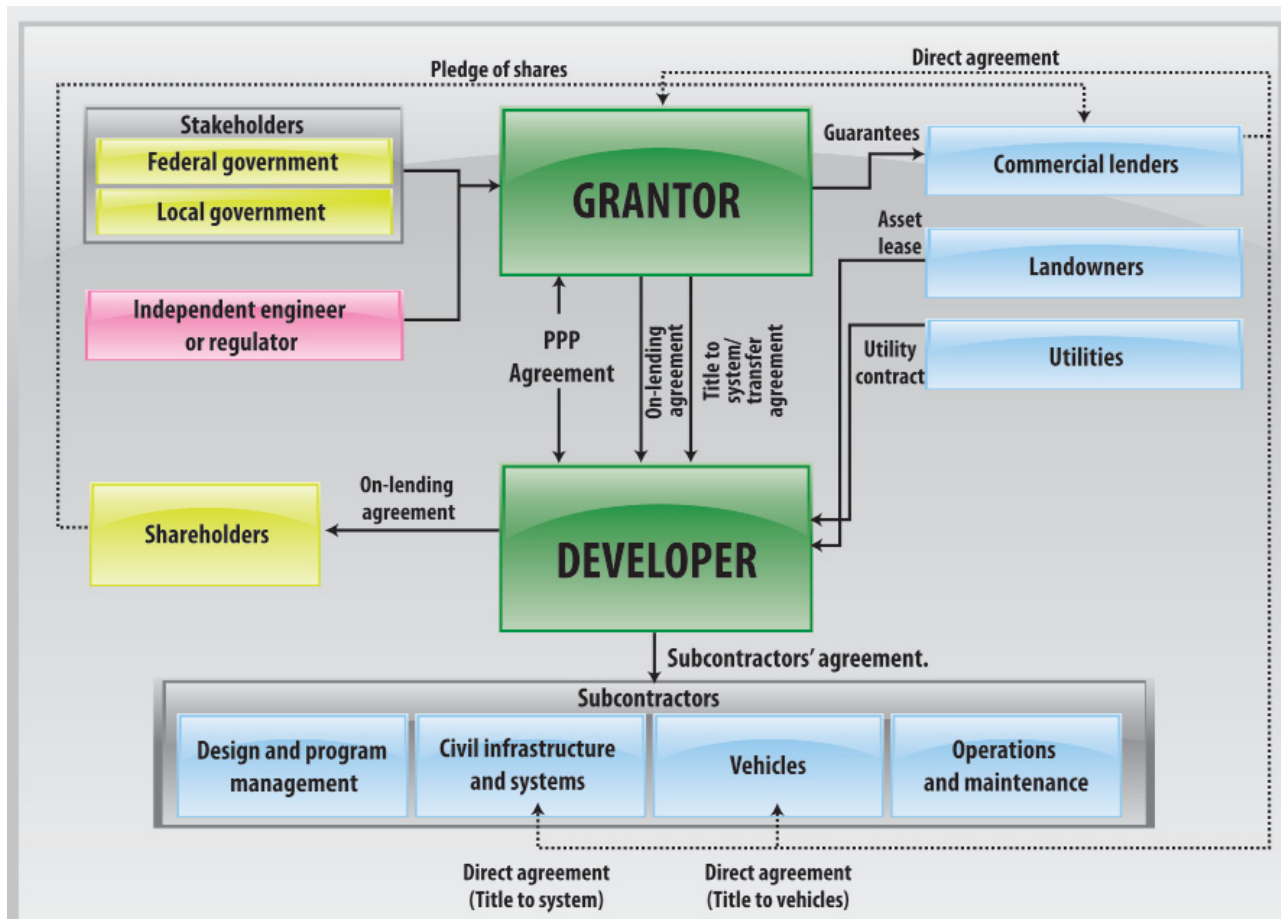
- The contractual instruments linking the parties
- The cash flows (or potential cash flows) linking the parties

Figures 7.1 and 7.2 illustrate the necessary contractual and financial links between the parties. When designing a PPP arrangement, one may find it is useful to start by defining key links in this way. This approach can be used to establish agreement on the broad principles of the contract structure, before moving on to detailed contract design. Figure 7.1 shows all the main contract links in a typical LRMT project, each of which requires its own contract document or agreement, and figure 7.2 shows some of the main cash-flow links that are also addressed contractually.



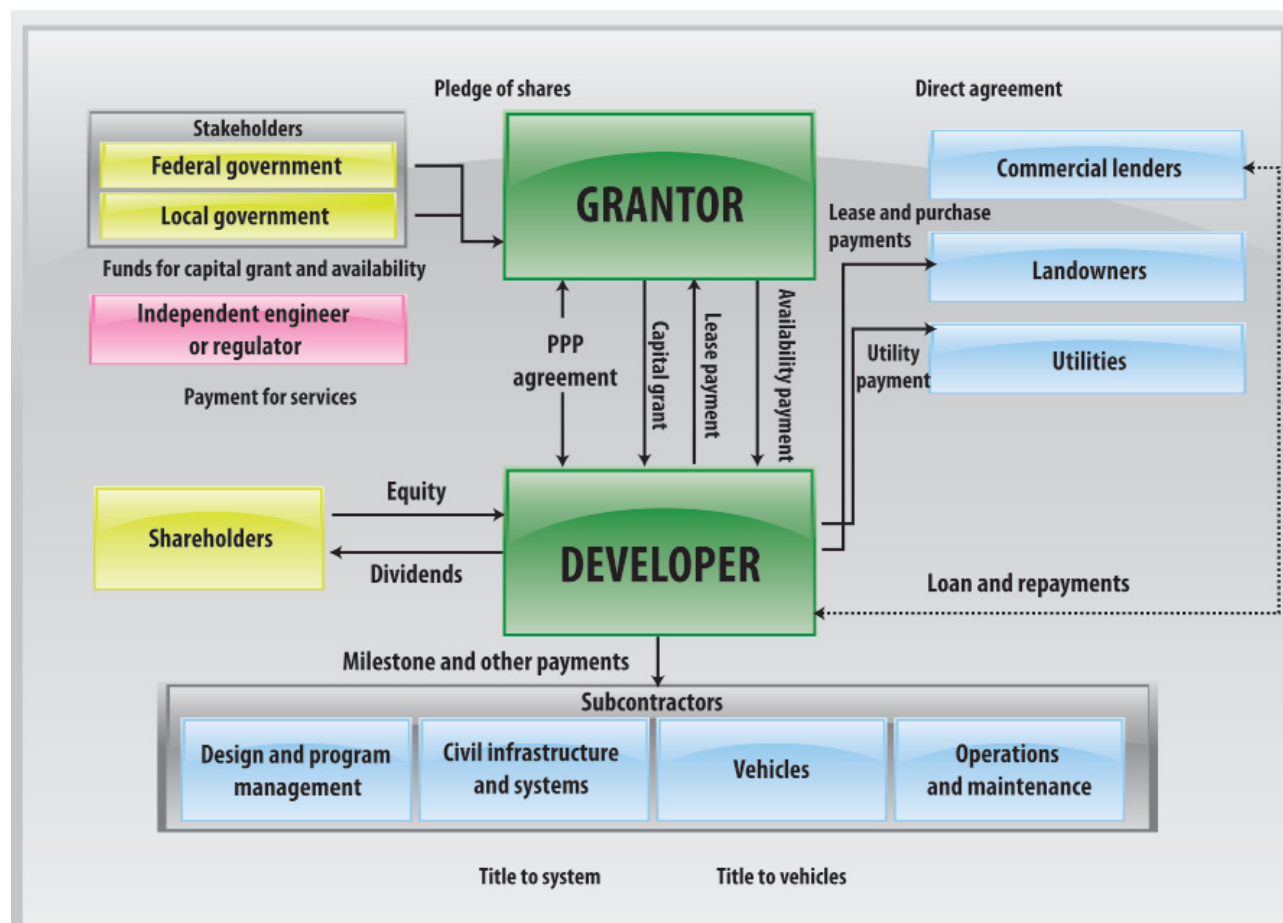
Figure 7.1

## Contractual Links



Source: Author's representation.

Figure 7.2  
**Financial Links**



Source: Author's representation.



### 7.2.3 Contractual Links

Figure 7.1 shows the typical relationships within a PPP agreement.<sup>4</sup> The grantor gives a right to a project company or developer. The terms of the PPP agreement set out the rights and obligations of the parties. The PPP agreement allows the grantor to allocate project risk to the developer and to define the risk sharing among the project participants. The PPP agreement may also set out the legal and tax regimes applicable to the project, including the developer's environmental obligations.

In drafting the PPP agreement, the grantor must be clear on a number of matters, including in particular the following:

- The overall risk allocation (that is, which party assumes or is responsible for managing specific risks). Annex 4 provides a risk allocation matrix that can aid in determining the optimum risk allocation.
- How the developer will likely raise the financing necessary to fund this significant capital expenditure and, as a related issue, what type of financial support will be available from the grantor.

Therefore, it is not uncommon for the grantor to produce subsidiary documents as part of the PPP agreement that define and describe in some detail the other contractual relationships that are considered crucial for the PPP agreement's integrity. An example is the need to include the way in which the land required for the LRMT will be allocated. This process is typically accomplished through a land-lease agreement or a license incorporated into the PPP agreement.

Furthermore, the grantor will use the PPP agreement to address some of its basic requirements for the project. For example, the government may need the LRMT system to be completed within a given time frame. This requirement may be driven by both political and practical reasons. At the same time,

the developer will be keen to meet the construction deadlines because it will want to ensure that it can start operating the system and thus generate revenues to meet debt-service obligation as quickly as possible.

The grantor will also seek to ensure that the developer performs according to a minimum set of standards and overall requirements. The grantor's requirements will cover such issues as service frequency, reliability, maintenance needs, passenger safety, and comfort. Effective performance is a key issue for any project, but the grantor's requirements will depend on the type of contract. For example, under an operating and rolling-stock contract, the grantor will have performance requirements related to serviceability and passenger comfort. If the PPP agreement is a concession-style contract, provision must be made to ensure that adequate maintenance is carried out during the contract period to allow the replacement of parts and materials. Furthermore, the grantor will want to ensure that when the assets are transferred back at the expiry of the contract term, they are in good working order.

Delmon (2009a)<sup>5</sup> offers a summary of the main issues that the PPP agreement will seek to cover:

- **Completion date.** The grantor's need for the infrastructure in question is generally immediate (often as much for political as for practical reasons).
- **Performance of the project.** The grantor's requirements will cover such issues as input consumption, efficiency of operation, maintenance needs and costs, life cycle, health, safety, the environment, quality and quantity of the output or service generated, and cost of operation.

<sup>4</sup> The type of legal system will likely govern the choice of a lease contract or a license granting use of the land.

<sup>5</sup> Delmon's list has been modified to specifically relate to the PPP agreement under an LRMT scheme.





- **Maintenance regime.** To mitigate the effects of wear and tear on the project during the PPP agreement period, the grantor will want to ensure that the maintenance regime implemented (including replacement of parts and materials) is sufficient, given the nature of the works involved. This regime is even more important later in the project term because the developer's incentive to invest funds in maintenance during the final phase of the PPP agreement period may be diminished, owing to the imminent transfer of the project to the grantor.
- **Construction and operation.** The grantor will want to ensure that the developer's construction and operation activities meet certain minimum standards—both those imposed by law and those specified by the grantor—to ensure the quality of the assets created, the quality of the services provided, and the protection of the public.
- **Government guarantees.** The government may provide guarantees for public sector bodies taking part in the project whose credit risk is otherwise insufficient.
- **Exclusivity.** The grantor may supply the project company with some form of exclusivity rights over the service to be provided to ensure a bankable revenue stream, with careful consideration of future requirements, such as demographic changes.
- **Know-how transfer.** The grantor may want to maximize the interaction between the developer and local partners or the grantor's personnel to ensure the proper transfer of know-how.
- **Government interference.** To protect the developer from a specific subset of political risk, the grantor may agree that the host government will not act against the interests of the lenders, the shareholders, the developer, the performance of the developer's obligations, or the project itself.

- **Fees.** The developer may be required to pay concession or lease fees for the privilege of obtaining a right to operate and to offset grantor costs, payable before commencement and possibly periodically during the PPP agreement period.
- **Restrictions on share transfers.** The grantor may want to restrict the transfer of shares to the developer or changes to the developer's shareholding. The grantor may want to (a) disallow any transfer (direct or indirect) until a certain point after completion of construction (a lockup period), (b) exercise approval over the identity of any transferee, or (c) maintain some guarantee from the original shareholders.
- **Grantor step-in and continuous operation.** The grantor may want the right to continue operation of the project when it terminates the PPP agreement. This right is sometimes referred to as the right to continuous operation, because it ensures continuous delivery of services.
- **Hand back.** At the end of the PPP period, the grantor will either put the project out for retender or require the developer to transfer the project assets to the grantor or to a replacement developer.



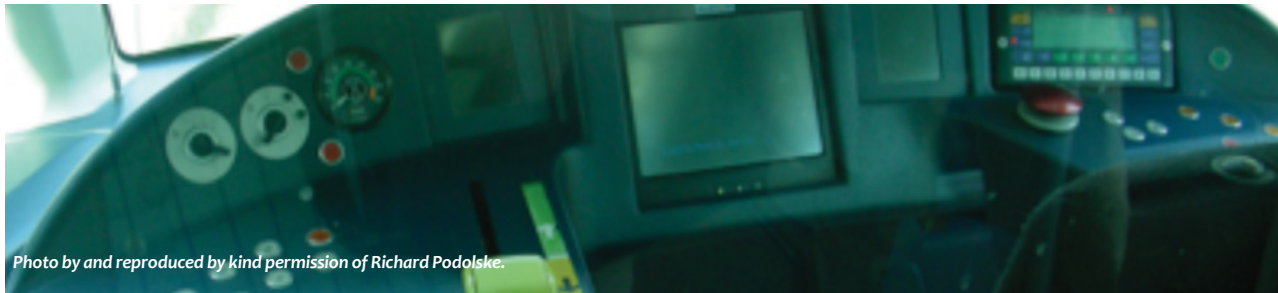


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### 7.2.4 Financial Links

In every contractual arrangement, there will be some flow of money to each allocation of key risks and responsibilities. Figure 7.2 illustrates the financial links between the parties. It is an extremely useful tool for obtaining an early understanding of and agreement on the key financial issues. This agreement is crucial; lenders and shareholders will want assurance that their rights and obligations are protected within the PPP agreement.

### 7.2.5 The Term Sheet Approach

For complex contractual structures, such as LRMT PPP contractual arrangements, the term sheet approach can help the grantor ensure that key issues are systematically and comprehensively established and agreed on before drafting the detailed contract. As a preparatory step, the grantor or its advisers prepare a term sheet for each contract or agreement, briefly summarizing the key issues to be covered in the document. The main advantages of this approach are that key issues and contractual principles are sorted out early and the detailed drafting of the PPP agreement and other related agreements is carried out with more certainty, thus reducing the need for later detailed revision. This approach should be more efficient and cost-effective and should also be beneficial for establishing supporting documents, such as the operational and technical annexes.



Source: <http://www.sxc.hu/>

## 7.3 GENERAL DESIGN OF THE PPP AGREEMENT: ONE CONTRACT OR MORE?

One of the main decisions for policy makers is whether a project should use a unified or layered approach. Under a unified system, the project is implemented on the basis of one PPP agreement with a single private sector counterparty that will assume responsibilities for all aspects of the project, including financing, construction of the civil infrastructure, mechanical and electrical work, procurement of rolling stock, and operation of the system.

Alternatively, under a layered approach, the project may be split into two or more separate PPP agreements, which should address the following:

- Construction of the infrastructure (including mechanical and electrical work)
- Procurement of rolling stock
- Operation of the system

Regardless of the approach selected, the developer will be paid in full only if the infrastructure is complete and continues to be “available” throughout the life of the contract or project.

Unlike a unified approach, which will have only one payment stream and one set of lenders, the layered approach will have a payment stream for each separate contract, and in the case of the infrastructure work and the rolling stock,<sup>6</sup> the payment streams will provide the basis for separate financing arrangements applicable to those parts of the project (that is, one set of lenders will fund the infrastructure and will rely on the infrastructure payments to repay their debt, and a separate set of lenders will fund the procurement of the rolling stock and will rely on the separate rolling-stock payments to repay their debt).

<sup>6</sup> Rolling-stock contracts usually include associated signaling and other related equipment.

This layered approach effectively means that the grantor would be exposed to a greater risk because there is no single point of contact and there are separate contractual arrangements for the construction of infrastructure and the provision of rolling stock and system operation. On the upside, this type of arrangement may be cheaper and more flexible in the longer term.

In table 7.1, we set out the principal advantages and disadvantages of pursuing a layered approach vis-à-vis a unified approach. We detail the main considerations for the way risk is transferred in each type of approach and the implications for the grantor and the developer under each. These considerations are discussed in more detail below.<sup>7</sup>

Table 7.1

### **Unified Contract System versus Layered Contract Approach**

Consideration or risk allocation	Layered approach	Unified system
Single-point responsibility and integration	No	Yes
Future expansions or network extensions	Expansions and extensions are easier to manage	Expansions and extensions are possible, but the contractual arrangement would need to allow for extensions
Contractual flexibility	Yes	A contractual variation mechanism is needed, which may be costly
Impact on procurement (including market appetite for the project)	Grantor approaches private sector counterparties who are able to deliver the grantor's requirements in their own right	Private sector counterparties have to form consortia at bidding stage and demonstrate that they are able to meet the grantor's requirements
Ability to transfer farebox risk	Grantor has limited ability to distribute risk across various private sector counterparties	Grantor has full freedom to manage and distribute risk
Payment during partial failure of the system (firewall risk)	Risk is high, because the grantor is obliged to pay even though some services are not being delivered	Risk to grantor is lower, because the developer is responsible for integrating all private sector counterparties
Risk of blame culture between private sector counterparties arising from failure of system	More likely	Although possible, this risk is a developer responsibility
Likely response of market	Project specific	Project specific

*Note: Private sector counterparties include the parties responsible for the construction of the civil infrastructure, the mechanical and electrical work (including signaling), the construction of rolling stock, and operation and maintenance. Failure of the system refers to any failure by one or all of the private sector counterparties.*

Source: Compiled by Cleddan Mandri-Perrott and Iain Menzies.

<sup>7</sup> The classification presented here was developed by Nigel Pritchard and Troy Edwards of Allen & Overy and has been adapted for use in this context.





Source: <http://www.sxc.hu/>

### 7.3.1 Single-Point Responsibility and Integration

The main difference between a layered approach and a unified approach is the way in which the interfaces between the civil infrastructure, rolling stock, and mechanical and electrical works and the obligations for running the services using those assets are managed. Conventional wisdom advocates that a single contract would be easier to manage because the grantor would have one private sector contracting counterparty, and that counterparty would have full responsibility for managing all the risks associated with the various activities that together make up the project.

Under a layered approach, the responsibility for integration—and therefore the interface risk—lies with the grantor. The grantor will be responsible for ensuring that it lets contracts and manages their implementation in such a way as to ensure that the entire system operates as intended. This responsibility and the associated risk may be perceived as a major disadvantage of the layered approach when compared with the unified approach.

However, with a unified approach, the fact that the developer has assumed responsibility for the integration of the individual components of the system does not mean that this risk has gone away. If the developer mismanages the integration, the grantor will have remedies under the relevant PPP agreement (for example, it can withhold payments, apply deductions, and ultimately—if the problem is not solved and is of significant magnitude—terminate the PPP agreement). However, although the grantor will have power under the PPP agreement to sanction the private sector for failing to manage integration, the grantor will not have the power to intervene and correct the faults. Hence, the grantor will need to wait for the LRMT system

to be fit for operation, trusting that the private sector will be able to remedy any problem. Thus, the grantor loses the ability to influence the integration at a practical level and has limited ability to actively intervene and influence the developer's behavior other than by the specific remedies provided in the PPP contract.

Conversely, under the layered approach, while the grantor will have to take the integration risk, it will be able to identify problems as they arise and find a solution that will help procure the timely opening of the system. The grantor can manage the extent of the integration risk through the following means:

- It can appoint appropriate in-house personnel or external consultants who will have the specific task of monitoring interface and integration issues throughout the development of the project so that any problems can be identified and addressed early.
- It can include provisions in each of the relevant project contracts to ensure appropriate liaison between the relevant suppliers or counterparties, perhaps with a specific coordination agreement for all relevant parties that identifies the procedures to be followed by each of the grantor's counterparties to ensure that interface issues are taken into account in the design, procurement, and construction processes. For example, each contract could contain a design review procedure that would enable the grantor's counterparties to identify problems in any designs proposed by others that would affect their own obligations.

**8** *The grantor's ability to sanction the developer for failing to manage integration needs to be measured against the conditions under which such sanctions can be imposed. It is usual for the PPP agreement to identify "extreme or extenuating circumstances" where such sanctions would be inapplicable.*



### 7.3.2 Future Expansions of the System

In some countries, such as the United Kingdom, the unified approach is the model that has been adopted to date for the majority of light rail projects. However, when the relevant system needs to be expanded, this structure can be inflexible and extremely expensive. Furthermore, there is a risk that the developer will not keep the system in good condition or be concerned about long-term failures in the system if it believes that its PPP agreement will be terminated within a limited number of years to permit the implementation of the next stage of the system. Similarly, the developer may not be concerned with running the system along sound business lines if it believes that it will receive its full investment return through the voluntary termination payment. In contrast, under the layered approach, separate contracts may facilitate the on-time and on-budget delivery of major extensions much more efficiently (see box 7.2 for an example that contrasts the two approaches).

Box 7.2

#### Implications of a Unified Contract Approach for Network Extensions and Expansions

The Manchester Metrolink system adopted the unified system. When the system was expanded, the grantor was obliged to exercise the voluntary termination rights provided for in the concession contract and consequently was obliged to buy out the existing concessionaire for a very large sum of money—equal to the predicted future profits that the concessionaire might have earned during the rest of the life of the PPP agreement. Because the Manchester Metrolink system has now been expanded twice, the grantor has already made two significant termination payments. Moreover, it is faced with the prospect of a third such payment because it plans to expand the system further. In contrast, the provision of separate layered contracts has facilitated the on-time and on-budget delivery of major extensions of the London Docklands Light Railway.

### 7.3.3 Contractual Flexibility

A major advantage of the layered approach is that it enables the public sector to adjust aspects of the project at various discrete points throughout the life of the project as conditions change, without needing to have recourse to any contractual variation mechanism or termination that would invariably trigger cost claims from the incumbent developer.<sup>9</sup>

For example, service levels may need to be varied from those originally envisaged at the outset of a project to meet changed economic and social conditions. Under a layered approach, these new service levels can simply be introduced whenever a new operations contract is entered into (anticipated to be at five yearly intervals), avoiding the need to renegotiate the whole PPP agreement with the incumbent developer. In some European countries, changes to shopping hours (for example, offering extended shopping hours during the week or opening shops on Sundays) has had a significant effect on the times when the public requires (and expects) public transport services to operate. Under the unified approach, the resulting changes to the services to be provided by the light rail operator need to be negotiated into the relevant PPP agreement.

Similarly, the grantor and the developer may well find themselves with conflicting interests when increases in customer levels cause overcrowding. In such circumstances, the grantor may wish to increase the capacity of the system to alleviate overcrowding, but the developer may prefer to price congestion off the system, thereby optimizing the revenues arising from its existing assets, rather than making further investments.

<sup>9</sup> In reality, there will always be costs, even under a layered approach, but they will be fewer because they will affect only one of the counterparties or suppliers of the grantor.

Even if the developer bears no ridership risk, the grantor's ability to require increases in capacity may be limited to the extent that it would require increased capital expenditure on the part of the developer—or to the extent that the developer or its lenders believe such capacity increases would raise the risks under the project.

The increased flexibility provided in the layered approach may prove useful in addressing fare changes and introducing common integrated ticketing arrangements. It may also provide greater flexibility if the grantor needs to schedule changes to the system's operation or needs to expand the network in the future. However, it must be noted that the layered approach does not in itself simplify the grantor's position when it wants to make changes. Different contracts imply that there are different parties and potentially different sets of lenders or financiers. Furthermore, the grantor will need to fully understand what effect (if any) the changes in one of the counterparties' contracts will have vis-à-vis the others'. For example, the grantor must ensure that in negotiating a system expansion, it carefully assesses the effect of the contract on the rolling-stock and operations and maintenance contracts.

### **7.3.4 Effect on Procurement—Including Market Appetite for the Project**

To respond to a prequalification request, bidders must be able to demonstrate that they have the ability to meet all the grantor's requirements, which, in the case of a unified approach, will inevitably require the formation of a consortium that pulls together civil contractors, rolling-stock manufacturers, and operators. Forming such a consortium requires the private sector party to expend considerable time, effort, and money. The private sector party's willingness to commit that time and effort to the project will depend, in part, on the grantor's ability to identify its requirements clearly in the tender documentation at an early stage. If the private

sector party is willing to bid on the project, it will incorporate the cost of forming the required consortium in the final bid prices offered to the grantor. Consortium members will also need to make themselves comfortable with the ability of their fellow consortium members to perform different aspects of the project and may apply a financial premium to that risk.

Conversely, with the layered approach the grantor would approach contractors that can deliver the grantor's requirements in their own right, without needing to call on other disciplines, and that can respond more quickly to the grantor's requirements. Such entities are likely to be more comfortable signing on to obligations that are fully within their core competencies.

In theory, the layered approach has the advantage of allowing the grantor to identify the preferred provider for each aspect of the project, rather than being presented with a consortium that may be strong in some areas but weak in others. Balanced against this argument is the possibility that the layered approach may not guarantee that the grantor will be able to select the “best” suppliers for the system elements. Suppliers that may show interest under a unified approach may be less interested in supplying smaller shares for layered packages because of their high risk versus smaller turnover and profit.

As a general comment related to the procurement of the project, the layering approach tends to place much greater demands on the managerial skills of the grantor.

### **7.3.5 Farebox Risk**

Under a unified approach, the grantor has freedom in handling farebox risk. It may (a) transfer all farebox risk to the private sector, (b) share the risk through a minimum revenue guarantee, or (c) retain it and make payments to the developer on an availability basis. Under the layered approach, farebox



risk can be transferred to the developer only by way of the operations contract (although the payment mechanism for the infrastructure and rolling-stock contracts may include a usage element), and given the much smaller revenue base of operations contracts, the extent to which operators may expose themselves to farebox risk may be insignificant. Although one could seek to transfer some ridership risk to infrastructure providers, doing so would conflict with a central tenet of PPPs—risk should sit with the party best placed to manage that risk—and thus would be unlikely to deliver value for money.

For the layered approach, the level of farebox revenue will be known after the first five years of operation, and so a farebox risk-sharing payment mechanism can be more easily developed and included in the new operations contract. The process whereby operations contracts are re-let every five years therefore minimizes the problems resulting from the grantor or bidders making unrealistically optimistic traffic forecasts (as has been the case on the Croydon Tramlink System) or overly pessimistic traffic forecasts resulting in superprofits for the private sector (as was the case for phase 1 of Manchester Metrolink).

### 7.3.6 Firewall Risk

Under a layered approach, each contract that the grantor enters into will result in a payment stream. Consequently, if the system is not working, it is most likely a result of a failure of only one part of the system—for example, a problem in the signaling. In this example, although the payments due to the rolling-stock or systems contractor will most likely be reduced, the payments to the operator and the infrastructure provider will not be affected. Therefore, the grantor will still pay those parties in full even though no services are being provided. The nondefaulting providers will be indifferent as to whether the defaulter sorts out the problem. In contrast, with

a unified system, all the consortium members are incentivized to resolve the problem. However, it should be noted that under the unified approach, the private sector party will have taken into account the impact of deductions arising from failures in individual parts of the system and will have made allowance for possible deductions in its risk premium. In other words, under a unified approach, although the firewall risk is not apparent, it will likely be reflected in the developer's pricing.

### 7.3.7 Blame Culture

Under the layered approach, if the provider or counterparty to the grantor of one part of the system can establish that it failed to meet its obligations because of the failure of another provider, then, as indicated above, it will be paid in full. This situation will likely trigger a blame culture among the individual providers, with the grantor caught in the middle. To mitigate the impact of such claims on the project, the relevant documentation needs to embody a robust dispute resolution mechanism to sort out these issues quickly and efficiently. In the case of a unified system, the grantor will not be concerned whether the individual providers blame each other, because the allocation of blame for the relevant failure should not affect the grantor.

## 7.4 PPP CONTRACTUAL ISSUES

What is important in any PPP agreement is clarity about the manner in which risks will be allocated to the developer under the terms of the PPP agreement and the other related project documents. It is essential to incorporate the PPP agreement obligations into the associated documents to avoid any gaps in the risk allocation of the proposed project. Regardless of whether the layered or unified approach is used, the main PPP agreement between the grantor and the developer will require several supporting documents (such as technical, operational, and financial annexes), as well as supporting subcontracts and agreements. In this section, however, we focus only on

the main PPP agreement (using the concession form as an example) to draw out some of the contractual issues in LRMT PPP arrangements and how they can be dealt with through contract terms.

In the preparation of the PPP agreement, a number of matters must be decided, but two in particular:

- The overall risk allocation—that is, which party assumes or is responsible for managing the specific risks. (Annex 4 contains a risk allocation matrix that can aid in determining the optimum risk allocation).
- The way the developer will raise the revenues necessary to fund what will be a significant capital expenditure and, as a related issue, the type of support that will be available from the grantor.

Under the general provisions of the PPP agreement, the status of the LRMT project and the legal basis supporting it must be established.<sup>10</sup> The contract starts by establishing the details of the parties to the contract. It then specifies the following:

- The rights and obligations of each party to the PPP agreement (that is, the developer and the grantor).
- The term of the PPP agreement;
- The effective date of the agreement and the term of the contract (for example, 30 years) are set out, with the mechanism for agreeing to any change in duration.
- The start date or commencement date of the PPP agreement, to distinguish the time (if any) from the signing of the PPP agreement to the moment that the services or actions detailed under the agreement will start (that is, the date when the PPP agreement becomes effective).<sup>11</sup>

<sup>10</sup> Depending on the legal tradition of a country, the subject of the LRMT PPP contract is sometimes described.

- The transfer of rights and obligations, authorized body, and mandatory requirements to the developer. Although the developer will generally be required to work within local laws, norms, and standards, this section is used to detail specific covenants made by the developer on both its status and ability to carry out the contract. The developer indicates that it has fulfilled its part in establishing all necessary legal and contractual arrangements and has obtained any necessary approvals to allow it to enter into the contract.
- Compliance by the developer, its operator, and any subcontractors with lawful demands by public authorities. This stipulation could include matters related to traffic; construction; technical, architectural, or environmental matters; public health; and fire and safety supervision.
- Some aspects regarding access to sites of works.



Tramcar in Freiburg, Germany. Although these tramcars have since been sold and Freiburg has updated its tramcar fleet.  
Source: <http://www.sxc.hu/>

<sup>11</sup> Conditions that must be met by both parties before the contract becomes effective or external conditions that must be met are usually described as effective date undertakings or as conditions precedent to the effectiveness of the contract and are typically detailed in an annex.

## 7.5 PROVISIONS DURING DEVELOPMENT STAGES

### 7.5.1 Grantor's Role after Signing of the PPP Agreement

The grantor's role after signing of the PPP agreement and before the services become effective (that is, the system begins to operate rolling stock in a part or all of the system) should be clearly specified to include at least the following measures:

- Reviewing and, as appropriate, commenting on the developer's plans for achieving the main construction and service outputs of the LRMT PPP agreement, including the developer's overall approach to infrastructure construction, method to be used, resources, timetable, and business plan outlining the developer's management and organization for the maintenance and operations part of the LRMT scheme.
- Following infrastructure construction, clearly specifying procedures by which the developer demonstrates that it has completed the infrastructure construction and other actions required before commencement of services.
- Developing the regime and associated procedures to be used in the event that the developer is unable to meet the service commencement date, including measures that would require the developer to mitigate against such an occurrence and also defining the financial consequences if the situation is not rectified.
- Developing the necessary auditing and performance measurements systems.

### 7.5.2 Land Rights, Permits, and Access

The grantor should define the right of access to and use of the land required for the project. It should describe the party that will provide the land, the terms of use (such as purchase or lease), the mechanism allowed for obtaining land and rights of access, and the party that will be responsible for the acquisition. These determinations are particularly important when LRMT systems and their alignment are in highly urbanized areas where access to land is difficult or may affect existing services, such as utilities or road traffic.

In the development of the PPP agreement, it is important to define whether the grantor is responsible for helping the developer obtain the permits and licenses necessary for the construction and operation of the LRMT project. The grantor should clarify its responsibility for the timely delivery of the land required for the project, free of legal or physical encumbrances (and any future planning requirements) and should set out who will bear the costs of dealing with these encumbrances, if any. Consideration should be given to the following issues related to approval and permitting risk:

- The developer is normally responsible for the risks involved in seeking approvals and permits connected to design and construction and related to any changes to any reference design provided by the grantor. However, it may be wary of accepting state administration risk if the penalties for delays are severe.
- It is critical that financiers and lenders see that the procedure and timetable for obtaining the necessary authorizations from relevant authorities are clear and include full details of which authorizations are needed for each part of construction, opening, operation, and maintenance and how they will be obtained. If any authorizations are not provided within the agreed timetable (assuming the developer has complied with



its obligations to receive the authorizations), the developer may be entitled to compensation under a special-event protection clause (see “Special Events” section 7.10.2). The grantor reserves the right to terminate the arrangement if the developer has not fulfilled its obligations in obtaining and approving the necessary documentation. The developer will seek assurances that the permitted use of the land allows construction and operation of the system and is free from planning constraints.

### 7.5.3 Design Documentation

Depending on the type of LRMT PPP scheme that is chosen, responsibility for design will be allocated to either the developer or the grantor (see chapter 5 for a detailed discussion). The PPP agreement should be clear about the allocation of responsibility for developing designs and related documentation, together with procedures for approval of the design documentation.

In typical LRMT PPP schemes, the developer assumes responsibility for the design, construction, integration, testing, commissioning, operation, maintenance, and ultimate performance of any asset it procures or develops. Accordingly, as a general principle, the developer assumes the risk for whether the design meets the grantor’s requirements.

Related to design documentation, the PPP agreement should provide the following:

- The procedure for the developer to submit its designs and information to the grantor
- The maximum allowable time for any reasonable comments by the grantor (if any)
- Time for the developer to take on board any comments and suggestions (if any) that the grantor may have
- Preagreement between the parties on the form and standard for presenting the design
- Some flexibility for the grantor to require some minor modifications that have no material impact on cost or service

### 7.5.4 Conditions Precedent, Effective Date, and Financing Agreements

Conditions precedent (CPs) are basically a summary of the issues that must be completed before the effective date of the PPP agreement. The effective date is when the CPs have been met; a part of meeting the CPs would be the signing of the financing agreements. The financing agreements are the arrangements that the developer (including any associated companies) makes for financing the project. CPs are often a checklist of tasks or documents that need to be completed and, depending on the legal regime in which the PPP agreement is set, may or may not be part of the agreement itself.

## 7.6 PROVISIONS RELATED TO CONSTRUCTION AND ASSETS

Provisions related to construction should cover such issues as CPs for the commencement of construction and the timetable and plan to which the developer has committed itself (including specific, appropriate milestones).

The construction program is important because it is usually linked to the developer’s loan drawdown schedule. Provisions related to addressing defects and determining how the developer and its subcontractors will handle them should be included. During the construction period, key decisions must be made regarding the extent to which the grantor will be involved during this period and the monitoring systems that will be established to track progress before and on service commencement. The grantor will wish to know whether the developer will deliver the project on time and to the agreed specifications, whereas the developer will require reassurances that it is meeting expectations. The grantor should be wary of accepting too great of an oversight role. The developer should be granted the freedom to manage the project without interference from the grantor. The developer assumes the risk of whether the design and development it has carried out and the operational procedures it has put in place are meeting the contractual requirements of the grantor. At the



Halberstadt, Germany, tram lines are an example of using a new system on old infrastructure. Photo by and reproduced by kind permission of Rainer Hesse.

same time, it is in both parties' interests that a design is developed and implemented that can deliver the service.<sup>12</sup>

Other provisions related to quality control, quality assurance, quality control systems and manuals, and accreditation of contractors and subcontractors also need to be specified. In addition, compliance with health and safety standards, including documentation and procedural requirements, should be included.

### 7.6.1 Critical Dates

In some instances, LRMT projects require specific dates by which the infrastructure construction must to be completed.<sup>13</sup> Generally, the payment mechanism envisaged in the PPP agreement details procedures for the financial penalties for late service commencement. However, if there is a critical date beyond which the effects of the unavailability of service are totally unacceptable, the grantor should have a contingency plan that can be implemented at the developer's expense.

### 7.6.2 Acceptance of the LRMT System

Acceptance of the LRMT system is one of the most critical aspects of the PPP agreement. It is essential that the PPP agreement provide clear, precise instructions for (a) notification of readiness by the developer, (b) inspection and testing to be undertaken by or on behalf of the grantor, (c) conditions for acceptance, (d) acceptance procedures and certification, and (e) remedies for defects. A procedure and timetable for recording title to the new system assets should also be included in the PPP agreement. The scheduled completion date needs to be defined, and any liquidated damages for delay need to be detailed.

Typically, the PPP agreement will have to differentiate between the construction of infrastructure and the provision of services. Accordingly, the types of tests that should be included in the acceptance procedure must be carefully set out, including the responsibility for cost and organization of the resources required for the tests.

<sup>12</sup> In this respect, the grantor should ensure that if it identifies areas in which construction delivery does not meet specifications, it quickly notifies the developer. In some instances, it may be necessary to formalize such notification procedures within the PPP agreement.

<sup>13</sup> For example, the LRMT system may be constructed as part of a city plan related to the opening of a major sporting event. In this case, the construction program needs to meet some specific timescales.

### Acceptance of the infrastructure constructed

Notably, the PPP agreement needs to specify the party responsible for assessing satisfaction of the acceptance test.

As a general rule, it is advisable that the grantor and the developer do a joint assessment. Better still, and to minimize any potential disputes, an independent third party could conduct the test.<sup>14</sup> In the case of LRMT projects, testing by a third party would be advisable for the construction of infrastructure, but in some instances, such as the approval of the rolling stock, the grantor (or a government representative) may be the best judge to deem acceptance.<sup>15</sup>



Zurich, Switzerland.  
Photo by and reproduced by kind  
permission of Rainer Hesse.

**14** It is important to note that the grantor should not allow a third party appointed by the lenders to act as its third party; an adviser appointed by the lenders will not have the same overall objectives as the grantor. The grantor should appoint a fully independent third party that is acceptable to it and to the developer.

**15** This is particularly the case when, for example, rolling-stock compliance needs to satisfy a higher authority (for example, federal requirements). Here, it is within the grantor's powers to grant such acceptance. The PPP agreement would have to specify the procedures that would be used under such circumstances, and the developer would have to satisfy itself that obtaining the grantor's approval would not constitute an unreasonable risk.

### Service acceptance and commencement of payment for services

With regard to service commencement, the PPP agreement should include some specific tests. Approval for service commencement should not be based solely on approval of the constructed infrastructure. In this respect, it would be advisable for the grantor not to allow for staged completion of infrastructure construction because that would generally tend to dilute the developer's risk. However, if provision is made for the grantor to pay the developer a capital grant in support of the construction phase of the project, capital grant payments should be linked to milestone acceptance tests. Note that milestone capital grant payments should not constitute service acceptance on behalf of the grantor. The PPP agreement should be very clear on this aspect of the risk profile between the parties.

The grantor must also recognize that it is not always practical to wait until all phases of infrastructure construction have been completed. Indeed, under certain circumstances, the grantor may wish to start operating earlier. The grantor has the option of (a) accepting only when all construction has been completed or (b) accepting each phase as it reaches completion. Clearly, each option has its implications. In option a, the grantor would receive the full service for certain phases without paying for them, which may create an unnecessary burden for the developer. Alternatively, option b, where payment is phased as sections are completed, would be "easier" for (or more palatable to) the developer, but may disadvantage the grantor if the developer delivers future works or services that are not up to standard. In that event, the grantor may wish to make partial payments, retaining certain amounts of each phase, and to make a final or balloon payment when the whole system is up and running (and tested accordingly).



### 7.6.3 Early Works Agreements

In most cases, early works agreements are considered bad practice for the following reasons:

- They may generate questions about whether the agreements have been procured in accordance with procurement laws and regulations.
- Under ordinary circumstances, contracting authorities should not be required to make any payments before financial close.
- Reaching agreements on early works contracts can distract from the negotiations on the main contract and delay contract closing.
- Early works agreements can lead to project integration issues.
- Early works agreements can alter the balance of risk on the procurement by altering the grantor's bargaining position.

When early works agreements are required, the following rules should be applied:

- The enabling works should be planned and incorporated as part of the procurement strategy.
- A decision should be made on who should perform the works—the developer or a third party commissioned by the grantor.
- The early works program should deliver time savings and provide value for money.
- Only essential works should form part of the enabling works. That means works that are not specifically related to the developer's project plans but that would be of general use to the grantor whether or not a contract is signed. They can include surveys, access roads, or other preconstruction enabling works.
- The enabling works should not affect the risk allocation of postcontract work.
- The costs of the works should be controlled, and the grantor should allocate funds for this purpose.

### 7.6.4 Handover Provisions for Assets that Transfer to the Authority

The methods for dealing with the transfer of the assets at contract termination or expiry need to be determined in the agreement. Five key areas need to be established:

- The condition of the assets to be transferred and how required repairs will be paid for.
- Any design life requirement after the expiry date
- Inspection tests before handover.
- Provision for warranties, contracts, and other rights
- Resolution of any disputes related to any of these areas.

Employees are also regarded as assets. The agreement should address how they will be dealt with (for example, transfer to another developer or to the grantor).

### 7.6.5 Valuation of Terminal Payments on Expiry Where Residual Value Risk Has Been Transferred

The grantor has two main options for calculating payments for assets with alternative uses at the end of the PPP agreement period:

- Using the market value of the assets in their current use.
- Using the amount bid by the developer during the negotiations of the original contract and indexing it during the life of the PPP agreement.

The market value of the assets is the most valid basis for determining terminal payments. But under the scenario of an extraordinary increase in the market value of critical assets (without which service availability would be compromised), a payment cap should be set to guard against excessive payments.

## 7.7 PROVISIONS RELATED TO SERVICE OBLIGATIONS

### 7.7.1 Performance of the PPP Agreement

Under these sections of the PPP agreement, the main provisions related to the operation and maintenance obligations should be set out. Identification of key performance indicators (KPIs) should include measures related to system reliability, system punctuality, satisfaction surveys, ride quality, noise levels, accessibility of travel information (including timetabling and disruption to services), ticketing and fare options, and staff services at platforms and en route, among others. KPIs must be linked to the key objective or purpose of the project to ensure that the developer is incentivized in a manner consistent with the grantor's vision for the project. KPIs may also be used as a mechanism to calculate the grantor's payments to the developer. In addition, the grantor will likely need to modify the KPIs to give itself room to deal with its strategic plans, which will inevitably change over the term of the PPP agreement.

Furthermore, performance mechanisms detailing the level of the developer's project revenue at risk from performance deductions need to be well specified. Additional rights available to the grantor if deductions are beyond specified caps should also be included. If financial deductions are not used, performance points may be considered as an alternative mechanism.

### 7.7.2 Early Commencement

To incentivize the developer to open the system early, a model could be constructed whereby any savings generated through early opening (for example, reduced financing costs through early servicing of senior debt) could be shared between the grantor and the developer. Alternatively, the early opening period could be treated as an extension to the project period, and the net additional revenue received (after allowing for the developer's usual operating costs) could be shared between the developer and the grantor.

### 7.7.3 Grantor Ability to Intervene and Persistent Minor Breaches

Within these provisions, it will also be necessary for the grantor to retain the right to intervene. In exceptional circumstances, some of the possible grounds for grantor intervention include service levels below a specified threshold, safety breaches, imminent public danger, catastrophic disaster, and environmental concerns.

Experience in LRMT design has revealed the need to establish a mechanism to deal with persistent minor breaches. The PPP agreement must include a regime that penalizes the developer for such breaches. Because deductions and financial penalties may be insufficient, the grantor may consider issuing a series of warnings that ultimately lead to termination.

Other issues to be included within this section typically include the following:

- Commencement of operations and services
- Existing services
- General requirements (that is, specification and conditions that will apply to operations and maintenance)
- Obligation to maintain LRMT services
- Integration plan
- Operation and maintenance plans and rules
- Drafts, approvals, compliance, and updates
- Engagement of an operator

### 7.7.4 Price Variations and Value Testing

Price variations will likely occur throughout the life of the PPP agreement. Such variations are normal given the lengthy duration of these arrangements. It is critical that the PPP agreement contain a consistent mechanism by which price variations would be allowed. Periodic testing of certain services provided by the developer can be included as part of the PPP arrangement. Key to this arrangement is the



developer's desire to ensure that protections are built into the PPP agreement that cover unexpected or unforeseeable material increases in costs. For example, pass-through of certain costs that are outside the developer's control may be considered, such as those associated with the introduction of new noise standards.

The grantor should be mindful that the PPP agreement should achieve a balance between the provision of certain protections and cost increases that are outside the developer's control. In this respect, it may be beneficial for the grantor to consider, within the PPP agreement, provisions that would allow the developer to value test certain services it provides. Value testing can be accomplished by two means: benchmarking and market testing. Market testing requires the developer to retender a service in order to gauge the market price for the service. After this test, any increase or decrease should be reflected in the price charged the grantor. Benchmarking refers to a procedure in which the developer compares its costs for providing certain services with the market price for the services. Any changes may lead to an adjustment in the price charged the grantor.<sup>16</sup>

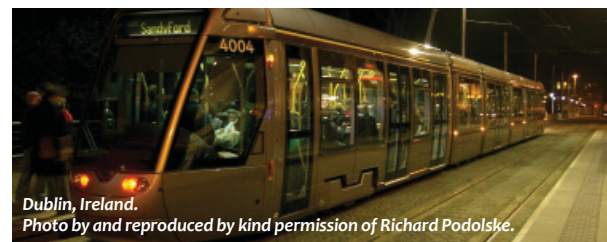
<sup>16</sup> The United Kingdom's Private Finance Initiative experience suggests that market testing will likely provide the best value for money with the following recommended schedule: (a) on certain predetermined dates, the developer retenders the service and conducts a competition for the service, and (b) if the competition shows that costs can be reduced, the payment mechanism is adjusted and the developer can reduce its costs by appointing the winning subcontractor

### 7.7.5 Payment Mechanisms and Farebox Risk

Depending on the type of LRMT PPP scheme, under the terms of the agreement, the developer may be entitled to receive a capital payment (or capital grant) toward the cost of infrastructure construction.

The quantum and timing of capital payments and any applicable conditions precedent to them need to be clearly developed. In determining the allocation of farebox risk, the provisions in the PPP agreement will need to consider how the PPP LRMT scheme may be affected by factors that are outside the developer's control and from which it must be insulated—for example, competing transport mode issues (including regulation of competing transport systems), connecting transport links, and establishment of interchange arrangements with other public transport system operators (including management of interface, through-ticketing, and scheduling issues). Furthermore, this section of the agreement should address the following issues:

- What is the interrelationship between LRMT system fares and fares on other public transport systems? Formulation of fares policy and control of fares (setting and adjusting fares, controlling fare levels, arranging fares by reference to zones and single and multiple journeys, determining periods of travel, and determining concession and discount fares) need to be clearly specified (see box 7.3).





- Is there an opportunity to introduce integrated ticketing systems across different modes of public transport?
- What is the anticipated method for ticketing for the PPP LRMT scheme (for example, prepaid, pay as you go, cash versus electronic credit)? What infrastructure, facilities, and human resources are required to support that method (labor needs, staff or automated operation of access controlled systems, wage expenditure)?
- What is the anticipated method for fare collection and what is the regime for recovering revenues from operators of other public transport systems if ticketing is integrated across modes (data collection system to calculate and apportion revenues)?
- What is the developer's ability to mitigate fare evasion risks (access control systems, penalty and infringement regimes, including policing and enforcement powers)?

The allocation of farebox risk is affected by (a) the responsible grantor's or government's control over fare increases and (b) the rights and obligations of the parties with respect to overcrowded rolling stock and the strategies to mitigate its effects; the PPP agreement should be clear on these two points. With respect to overcrowding, the PPP agreement should clearly state who is responsible for addressing this issue (who will procure additional rolling stock, how frequently services should be increased or decreased, and so forth).

Box 7.3

### Setting Fares: Phase 2 of the Manchester Metrolink

Phase 2 of the Manchester Metrolink project included a full concession that allocated revenue risks and the ability to set tariffs entirely to a private developer. Following system expansion during this concession, demand for Metrolink's services was robust, and there was a risk of overcrowding. The developer raised fares considerably, taking advantage of its substantial pricing power. Critics speculated that increased fares were an attempt to "price off" demand and avoid additional rolling-stock purchases.

In contrast, the Greater Manchester Public Transportation Authority (a public body that sets transportation policy in Manchester) sought to maximize ridership. Those conflicting objectives partially contributed to the concession's early termination, which involved a substantial payment to the concessionaire.

## 7.8 AVAILABILITY PAYMENTS AND OTHER SOURCES OF REVENUE FOR THE DEVELOPER

In the development of any availability payment regime, the following issues need to be taken into account:

- The maximum level of performance-related deductions that are to be imposed on the developer, bearing in mind the consequences on financing.
- The KPIs that are to be used to calculate performance related deductions—for example, availability, waiting times, frequency, safety, fare evasion, graffiti, condition of platforms, and standard of supporting facilities (ticketing machines, timetabling information, journey assistance).
- The best way to incentivize the developer to maximize farebox revenues (including minimizing fare evasion) if the developer is paid on an availability basis.
- Rules and method of implementation and regulation of fare-setting mechanisms.

Access to other potential sources of revenue by the developer needs to be specified. For example, entitlement to advertising or property development rights (if any) needs to be identified and clearly specified in the PPP agreement.

## 7.9 PROVISIONS APPLYING TO FINANCING

### 7.9.1 Financing of Developer Obligations

Financing arrangements for PPI projects fall into two distinct phases. First, the lenders and shareholders provide funding during the construction phase to cover design and construction costs. The lenders will advance funding progressively during the construction phase; drawdowns are usually linked to milestones and verified by an independent expert acting for the lenders and, possibly, the grantor. During this first phase, the lenders will have predetermined the ratio of equity and debt funding and may require recourse to the shareholders or to some other guarantor to cover the risk of any delays or cost overruns that have not otherwise been satisfactorily transferred to the construction contractor.

The second phase is final completion of construction followed by operation. Completion of construction includes performance tests to ensure that the project is fit for purpose and ready to enter commercial operations (revenue generation). Approval of the final completion will release the construction contractor from certain liabilities and will therefore be carefully controlled by the lenders. During operation, after the project has begun to produce output, the debt is serviced solely by the project revenue stream.

The loan agreements will therefore set out provisions such as the following to protect the lenders' interests:

- Drawdown schedule and the CPs that must be satisfied before each drawdown—in particular those related to completion of construction milestones and aggregate paid-up equity.
- Repayment schedule.
- Funding and control of reserve accounts, where the developer must set aside money for contingencies—in particular money to cover a specified number of months of debt service—and major maintenance expenses.
- Events of default, which may lead to loan acceleration or termination, such as failure to satisfy ratios (debt-service coverage ratio, loan life coverage ratio, debt-to-equity ratio, and so forth); late payment; defaults under project contracts; and changes in management or project contracts without consent.
- The right of lenders to stop disbursements to the developer, to control voting rights and other project company discretions (known as reserved discretions), and to step in if things are not going as well as the lenders would like (for example, if default arises or might arise).

### 7.9.2 Security, Step-In Rights, and Direct Agreements

Security rights (over different project rights and assets) are both offensive and defensive: offensive to the extent that the lenders can enforce the security to dispose of assets and repay debt when the project fails, and defensive to the extent that senior security can protect the lenders from actions of unsecured or junior creditors. If comprehensive security rights are unavailable, the lenders may seek to use ringfencing covenants in an effort to restrict other liabilities, security



over project company shares to allow the lenders to take over control of the company, or creation of a special golden share that provides the lenders with control in the event of default. Security rights may also allow the lenders to take over the project (to step in) rather than just sell the project assets, because the value of the project lies in its operation, not in completed assets (Delmon 2009b).

The lenders and the grantor may enter into direct agreements with the project participants that specify step-in rights, notice requirements, cure periods, and other issues intended to maintain the continuity of the project if the project company defaults. A project may not require separate agreements when provisions can be included in the relevant project document or when some other solution is available.

## **7.10 PROVISIONS APPLYING TO IMPLEMENTATION**

PPP agreements typically have long durations. Over long periods, changes are inevitable, and not all can be anticipated during contract design. Accordingly, the design of the PPP agreement must allow adequate flexibility. However, it is important that this flexibility does not open the door for full renegotiation of the basic terms of the contract. Adequate balance needs to be struck between price, long-term flexibility, and certainty of whole-life costs.

### **7.10.1 Variation and Changes**

Under any PPP structure, it is important for the grantor to reserve the right to request variations to the design and the operation of the project, as well as to the PPP agreement. To maintain an appropriate balance between the parties' rights and obligations, the PPP structure should permit variations with the consent of both parties. Such variations should not be imposed on one party by the other. If a variation is carried out, the pricing should be determined as part of an initial agreement and reflected in

subcontracts, rather than determined after construction. Predetermining such pricing will likely lead to a better and more efficient process and diminish possible areas of disagreement. The grantor should also ensure that changes in service are allowed. Given that the PPP agreement will likely be long term, the contract should allow for both current requirements of the grantor and its medium and long-term development policy for the sector. Changes may take various forms such as changes related to capacity or ridership, additional trains, additional service frequencies, or service specification. The grantor should carefully assess whether these changes could reasonably be anticipated, specified, designed, and priced as part of the initial bidding process.

### **7.10.2 Special Events**

The grantor and the developer should agree on a list of special events that would grant each party protections. Such a clause is required for such occurrences as grantor step-ins, the discovery of archaeological remains, breaches of warranties, or uninsurable forces majeures or other events outside the developer's control. If the consequences of a special event continue for a long period, the developer may seek compensation, contract term extensions, or the right of termination.

### **7.10.3 Changes in Law**

Changes in law, including any adoption, modification, or repeal, may happen at any time after a PPP agreement has been signed and has gone into effect (the effective date). Accordingly, provisions related to changes in law that are included in the PPP agreement should detail which party will be responsible for costs arising from changes in law and how such costs should be compensated. In some circumstances, the grantor may be in a position to control any changes in law. However—and in the case of LRMT projects in particular—the grantor may be a regional or subnational authority that has no





control over changes in law. In such cases, careful consideration should be given to the possible mechanisms that can be included within the PPP agreement if the developer can prove to be more adept at managing the effects of changes in law and minimizing their effect. For example, it may be possible to pass on the costs of changes in law to the customers of the LRMT through a fare increase.

However, whenever the grantor bears the risk of a change in law, the developer should be obliged to keep any associated costs to the minimum.<sup>17</sup> It is important that the PPP agreement allows costs to be recovered, but the agreement should not allow the developer to include costs that it would have normally incurred even if that change in law had not occurred. In the case of LRMT projects, for example, a developer that would be required under the terms of the PPP agreement to replace some of the rolling stock under its normal maintenance program should not be allowed to claim such replacement as an additional cost resulting from the change in law.

#### 7.10.4 Force Majeure

The PPP arrangement should include a detailed list of forces majeures that can trigger termination and the respective rights of each party should such a situation arise. If such an event arises and neither party can reach an agreement within a specified period (generally six months), each party possesses the right to terminate the contract. The developer is entitled to compensation payments, but the grantor can attempt to prevent the termination request by continuing to pay the developer as if the event had not occurred. The grantor should define the time period for these payments, after which it will review the situation.

#### 7.10.5 Step-In Rights and Remedial Action

At any time during the term of the contract, the grantor should reserve the right to suspend the developer's rights under the PPP arrangement and step in under specific circumstances—generally, events of war and long periods of unavailable service. When the grantor steps in, it must also comply with all the performance criteria and be responsible for proper maintenance and operation of the system. The grantor may still need to continue availability payments to the developer during the step-in period. In such circumstances, the developer will require compensation for any damage caused during that time.

If the step-in continues for an extended period, the developer will have the right to terminate the agreement. At the same time, the financiers of the project will undertake their own assessment of the project and will attempt to rectify any breaches that would have led to termination. Financiers will not want to take significant risk before they have had the opportunity to assess the project and to assess whether they can put together a substitute plan that could take over the project and rescue it. If the financiers confirm that a breach has been rectified, control over the project may be returned to the developer. However, if the financiers decide that a permanent replacement for the developer is required, they would then seek to find a suitable substitute to take over the rights and obligations of the project. In this event, the grantor should retain the right to approve the suitable substitute. The substitute should be granted a “clean slate” with regard to presubstitution termination defaults.

<sup>17</sup> This same principle applies to Private Finance Initiative-type projects in the United Kingdom.

### 7.10.6 Termination of the PPP Agreement

Each party to an arrangement intends to work toward fulfilling its terms and completing the contract until its expiration date. Provisions for early termination of the PPP agreement should be dealt with within the arrangement. The developer's lenders will require the agreement to detail precisely what compensation is payable if the arrangement is terminated early.<sup>18</sup>

The key consideration for contracting authorities is to ensure that the developer is motivated to perform optimally and not motivated to deliver a substandard performance because the financial penalties are insufficient to motivate it to remedy the problem. A compromise should be found that meets both expectations. The cause of termination will determine the level of compensation to be granted. Additionally, a compromise will need to be found for definitions of persistent breaches and the list of grounds for termination. When specifying termination thresholds, the grantor should be careful to not make the termination triggers too stringent (for example, hair triggers) because they will unlikely be accepted by the developer or its lenders. The chief causes for early termination include the following:<sup>19</sup>

- **Authority default.** The developer should be granted the right to terminate the arrangement if the grantor or the government conducts itself in a way that compromises the contractual relationship and makes service provision impractical or impossible.<sup>20</sup> Authority default should be a last resort, and provisions should be made to allow the contracting autho-

rities or the government reasonable time to rectify government actions before triggering termination. Compensation should be calculated on the basis of full compensation for the developer and its financiers (that is, no better or worse off than if there were no default).

- **Developer default.** The grantor may seek to terminate the agreement for unacceptable performance or service provision. A balance must be found between the effect of early termination from inadequate service provision and the developer's and financiers' interest in ensuring that termination occurs only after material defaults, after all possible attempts at rectification have been made and all other options have been exhausted. To counteract this eventuality, the grantor can incentivize the developer to deal with persistent performance breaches. The institution of a performance point system with respect to all defaults is recommended, with a right to terminate the PPP agreement if a certain threshold of points is reached. When such a point system is inapplicable, the grantor should retain a right to terminate the contract for persistent breach if defaults occur without rectification. Warning procedures should be in place before termination procedures begin. The amount of compensation payable because of contractor default is a key commercial issue. Termination compensation is paid to a developer to cover the cost of debt repayment.

<sup>18</sup> In some instances, the maximum liability payable under a termination event is limited or uncertain in law, leading to the lenders' considering the project not bankable. In that case, the lenders will likely require assurances for partial or full compensation in the event of early termination and, in some cases, even for termination because of the developer's breach.

<sup>19</sup> For a more detailed discussion on termination triggers and drafting of appropriate texts, see HM Treasury (2007), volume 4.

<sup>20</sup> For example, if the developer requires visas for its foreign personnel to be in the country and the government (or the grantor) does not grant those visas, it would be impossible for the developer to meet its contractual obligations.

- **Corrupt acts and fraud.** Termination can be triggered by fraud or corrupt acts perpetrated by the developer and its subcontractors. Careful consideration must be given to each party's interests in handling issues of corruption. It is perfectly understandable for the grantor to wish to distance itself from a corrupt agreement. The recommended approach permits the grantor to avoid terminating the agreement when the fraudulent act has been perpetrated by a subcontractor or by an employee acting on his or her own. The developer should then be given sufficient time to impose sanctions on the relevant party, to terminate the relationship, and to locate alternative service providers. Any form of corporate corruption will lead to immediate termination.
- **Voluntary termination by grantor.** Certain events can make the agreement between the grantor and the developer untenable, forcing the grantor to voluntarily terminate the agreement. Such events can include policy changes that make service provision redundant. The developer will receive a termination payment to ensure that it remains in the position it would have been in had the contract been fulfilled.
- **Authority breakpoints.** The grantor may also structure the agreement to allow it the option to terminate the agreement on specified dates for a specified compensation amount to cover equity and junior debt, as well as senior debt. The degree of increased agreement flexibility for the grantor provided by the authority breakpoints will depend on the extent to which the specified compensation amounts are less than the alternative amounts payable under voluntary termination by the authority's circumstances.
- **Termination for breach of refinancing provisions.** The agreement between the grantor and the developer

should address the possibility of termination for breaches of refinancing provisions. A balance must be struck between the grantor's need to incentivize the developer to be open and honest with regard to its refinancing and the senior lender's fear of threats to its loans attributable to actions by the developer.

### 7.10.7 Calculation and Payment of Early Termination Liabilities

The principles that apply to the calculation and payment of early termination payments should be set out:

- **Compensation payment amounts and changes to financing agreements.** Compensation payments when any of the termination triggers above are activated are calculated in whole or in part by reference to the level of the developer's senior debt at the time of termination. The grantor must ensure that the senior debt outstanding at any time is not inflated and therefore will not increase the grantor's liability.
- **Setoff on termination.** The grantor should be entitled to place any of the developer's outstanding liabilities against the amount it pays in compensation in a developer default scenario. When termination is triggered for reasons other than developer default, the grantor is entitled to place the developer's outstanding liabilities against all amounts it pays in compensation, except amounts paid to compensate senior debt.
- **Method of payment.** When an incoming developer pays market value on developer default termination or when the agreement is terminated because of grantor default, the grantor should pay the developer a lump sum. Installment payment should be avoided because unless affordability constraints hinder this option, interest will accrue on the compensation amount.



- **Transition on handover.** Handover of the LRMT system at the end of the contract or early termination should cover the following:
  - o Procedures, documentation, inspection, bonds, and survival of rights and remedies after handover
  - o Assignment of assets and stock
  - o Retention of assets by contractor on termination. When the developer retains assets after termination, the value of the assets should be deducted from any compensation payments made. When assets have no alternative use, their value will be minimal and, therefore, no contractual options are required. Assets with residual value must be carefully considered because the commercial incentives can be significant. For example, if residual values exceed original returns, they could distort the effect of any compensation agreement and reduce the developer's incentives to perform
  - o Information handover
  - o Position of personnel

### 7.10.8 Protections against Late Service Commencement: Liquidated Damages

The grantor should ensure that it is protected against late service commencement by the developer. The protections should give the grantor value for money and should consider the types of losses the grantor may suffer and the cost of contingency plans that need to be activated.

Liquidated damages for delayed service commencement are a precalculated estimate of the projected actual losses or damages the grantor will suffer should the developer fail to begin service delivery on time. If the losses incurred do not exceed the availability payment, liquidated damages will not apply. If the losses exceed the availability payment, liquidated

damages may be necessary as long as they can provide value for money and take into consideration the effect of any other protections requested by the grantor, the developer, or the financiers.

Senior lenders will require construction subcontractors to cover debt service through the period of delay with liquidated damages paid to the grantor because the project's financing plan will assume on-time service commencement and cash flows in accordance with a timetable. Subcontractors will likely include this risk in their price and inflate their costs and the timetables to allow more contingency time. In some situations, developers may refuse to allow liquidated damages clauses because they believe the clauses unreasonably increase their liabilities and thus the project costs. If the developer causes a delay in the construction of the system, the developer will already be penalized by additional financing costs and loss of revenues from a shorter operating phase.

Liquidated damages are worthwhile in situations where the costs incurred by the grantor are large enough to justify an increased availability payment for the grantor. They can also be justified if an asset has been lent to the project that could have otherwise been used elsewhere during the period before service commencement or if there are no other prior claims on liquidated damages paid by a subcontractor and liquidated damages give value for money. If decided on, the grantor should inform bidders early in the process of the liquidated damages requirement and the damages cap to allow the bidders to price such a risk. The grantor may also allow bidders to submit alternative bids without liquidated damages or with higher or lower caps. Estimates of the projected losses during delays should be genuine; otherwise the requirement may be viewed as punitive and may not be legally enforceable.

Additionally, the developer should be allowed to provide an alternative service option if it cannot deliver the agreed service

on time. The availability payment should be adjusted to reflect the alternative service and any liquidated damages liability that will be deferred for the period of alternative service.

### 7.10.9 Treatment of Assets on Expiry of Service Period

Two distinct types of contract approaches deal with how assets are handled on expiry of the service period (HM Treasury 2007):

- Contracts where the grantor's taking over the assets on expiry represents value for money. Assets that have no other feasible alternative use and are only of value to the public sector entity are included.
- Contracts where the residual value of the assets is best transferred to the developer. Such assets have alternative uses and are not required by the public sector in the long term. Residual value refers to the market value of the assets associated with the contract at the time of agreement expiration. It is classified as a risk because the residual value of the assets is unknown at the time the contract is signed. Estimations of the value of assets will be made, and they will be incorporated into the financing structure of the agreement.

Three key allocation questions need to be considered:

- Which party retains the assets on termination?
- Do these assets have alternative uses?
- How do the alternative uses affect the termination payment (if any) payable by the grantor?

The government of the United Kingdom's Private Finance Initiative Unit recommends that the long-term objectives of the contracting authority will be best served by requiring either automatic transfer or reversion of the assets to itself on the expiration of the agreement or, at the very least, an option to purchase the assets at nominal cost.

This situation occurs (a) when legal constraints prevent any practical alternative option or (b) when assets have a useful economic life if retained by the grantor and conversion of the assets for other uses is costly. The grantor may also require the asset to continue providing service.

The grantor should protect itself by not reducing the options it has available at or just before the termination of a contract. These options include the following:

- Taking possession of any assets at no cost
- Retendering the service provision with the outgoing developer's making any assets available to the grantor at no cost
- Removing any assets

When the grantor retains the assets at no cost, consideration should be given to the developer's obligations to deliver the assets in a serviceable condition. This concern does not apply if the assets have reached the end of their useful economic life. Importantly, the grantor should use operational requirements as its *modus operandi* rather than attempting to generate residual value interest.



*The French use the introduction of a new tramway as an opportunity to provide urban improvements such as this public open space in Mulhouse a city of fewer than 250,000 inhabitants.  
Photo by and reproduced by kind permission of Scott McIntosh.*



#### 7.10.10 Preserving the Conditions of the Assets on Expiry

In the past, terminal payments related to the value of the assets at the end of the agreement were used as an incentive for the developer to maintain high standards of service throughout the contract period. However, this system is flawed in that it confuses payments for services and payments for asset transfer because the assets can be well maintained but the quality of service can be low.

Instead, the availability payment should be the main vehicle for incentivizing the developer to maintain standards throughout the life of the agreement. If, at the end of the contract, the service will be retendered, the developer has further incentive to continue to meet the grantor's service requirements.

An alternative means of incentivizing the developer to maintain service standards when the asset has no alternative use would be to structure the agreement to give the grantor the option of a secondary contract with the developer. The grantor can exercise this secondary contract option at the expiry date, but this choice can be made after holding an open competition with other bidders. Under this system, the developer is incentivized to maintain standards until the expiry date without the need for terminal payment. The major difficulty with this approach is calculating the price for the secondary contract during the negotiations for the first contract.

#### 7.10.11 Intellectual Property Rights and Other Standard Contractual Issues

Intellectual property (IP) rights are an important contractual issue. Service delivery will require the developer to follow some form of IP protocol. This protocol may be created by a third party or the developer and may be specifically intended for the project or have general applications. When the developer does not own the IP, it must obtain a license to use such IP. If the grantor owns IP rights that will be required by the developer, it must decide how it will allow the developer to use those rights during the life of the agreement. The agreement must ensure against infringements of IP rights, and the penalties for such a breach should be detailed from the outset. The grantor does not need to own the IP rights, but the developer must be able to use the IP required to provide the service. In the event of expiry, early termination, or authority step-in, agreements should be made to ensure that the grantor has the right to use the IP required to continue providing the service. The grantor should receive immediate access to the IP rights and any information required to operate the system. New service providers will also need access to the IP rights before expiry dates so that they can familiarize themselves with the service and ensure a seamless transition.

Other issues that should be covered by the contract include

- Confidentiality
- Applicable laws
- Severability and entirety of the contract
- Responsible counterparts nominated by each of the parties
- Annexes or other documentation forming part of the contract



Box 7.4

## The Cost of Getting the PPP Agreement Wrong

In July 2007, Metronet BCV and Metronet SSL, two companies set up to modernize London Underground's infrastructure, went into administration when they became unable to meet their spending obligations. Their failure resulted in London Underground Limited (London Underground) having to buy 95 percent of Metronet's outstanding debt obligations from its private sector lenders in February 2008 rather than repaying this debt over the 30 years of the contract. The Department for Transport (DfT) made £1.7 billion of grant available to help London Underground do so. The government provided funding for the modernization work on the basis that it would be carried out through public-private partnership (PPP) contracts. It accepted that stable funding was needed to remedy decades of underinvestment, but was concerned about London Underground's track record in delivering major enhancement and maintenance projects to time and budget.

The government, therefore, decided that London Underground should focus on operating passenger services, and that the private sector should be used to deliver maintenance and major infrastructure improvements. Metronet BCV and Metronet SSL were responsible for two-thirds of the modernisation work under their PPP contracts—Metronet BCV for the Bakerloo, Central, Victoria and Waterloo & City lines, and Metronet SSL for the District, Circle, Hammersmith and City, Metropolitan and East London lines. Both companies, were ultimately owned by a consortium of Balfour Beatty plc, Bombardier Inc., WS Atkins plc, EDF SA (formerly Seeboard Group PLC) and Thames Water plc. The other PPP contract was awarded to a company called Tube Lines.

DfT, the Treasury and London Regional Transport (which owned London Underground until July 2003 when it was transferred to Transport for London (TfL) had the responsibility for the strategy and design of the PPP arrangements. London Underground negotiated and managed the contracts. DfT retained a crucial role after the PPP contracts were put in place. It gave assurances to Metronet's lenders that it would not stand by and do nothing should London Underground be unable to meet its financial obligations and provided an annual grant of around £1 billion for the modernization.

The cost of work under Metronet's contracts was expected to be at least £6.9 billion over the first 7½ years of the contract in 2002 prices (£8.7 billion in cash terms). As the condition of some of London Underground's assets was unknown, Metronet could be paid for unforeseen extra work that was necessary. The PPP arbiter was given the role of deciding, if asked, how far the public sector should be liable for extra costs which had been incurred economically and efficiently.

Metronet is now owned by TfL. The DfT was forced to hand TfL £1.7 billion in the wake of the Metronet collapse in order to pay off creditors following the default of the company's loans. Metronet's shareholders lost a total of £350 million in the collapse, leaving the taxpayer with the largest financial penalty. The NAO said the £1.7 billion was not entirely wasted because some of Metronet's work, covering three-quarters of the tube network, was still beneficial, but it found there was a shortfall of between £170 million and £410 million in the amount of taxpayers' money spent on Metronet and the value of the work done. In effect, the cost to the taxpayer of Metronet's inefficiency is nearly £500 million, which matches the cost in legal and consultant fees of drawing up the PPP structure.

**21** The United Kingdom's National Audit Office (NAO) report (2009), blames Metronet's structure and management for the collapse: "The main cause of Metronet's failure was its poor corporate governance and leadership." A damning assessment of the company's set-up claimed Metronet's supply chain, which was comprised of its shareholders, was able to run rings around the management. "The executive management changed frequently and was unable to manage the work of its shareholder-dominated supply chain effectively. These suppliers had power over some of the scope of work, expected to be paid for extra work undertaken and had better access to cost information than the management."

# Checklist

## Contractual Arrangements

### **Legal Framework**

- ☐ Ensure that the government or the government entity that enters into a contract has the powers (vires) to enter into obligations and can undertake the roles and responsibilities.
- ☐ Ensure that all actions by the grantor are allowable by law (intra vires).
- ☐ Where none exists, create enabling legislation to assist the government in developing and entering into PPP agreements.
- ☐ Specifically determine the legal environment under which the PPP agreement is to be procured and ensure that all parties understand the legal code that governs private participation.

### **Contract Form**

- ☐ Ensure that the PPP contractual structure is tailored to the specific PPP scheme.
- ☐ Ensure that the contract contains an appropriate overall risk allocation and clearly details the developer's sources of funding and the financial support that it will require from the grantor.
- ☐ Consider setting out subsidiary documents that provide detailed definitions and descriptions of the essential contractual relationships that underpin the PPP agreement.
- ☐ Include the following in the contract:
  - o The minimum set of standards and overall requirements the grantor expects from the developer
  - o A detailed description of how the land required for the LRMT will be used in the form of a land lease agreement or license
  - o Rights and obligations, contract duration, mechanisms for changes to duration, and so forth
- ☐ Develop a diagram detailing financial links between all parties involved in PPP agreement.
- ☐ Prepare a term sheet before drafting a detailed contract (either the grantor or adviser can prepare the term sheet).

### **General Design of PPP Agreement**

- ☐ Determine whether the contract will use a unified or layered approach and understand the implications of each approach for the operation and management of the project.

### ***Provisions during Development***

- ☐ Establish the grantor's role after the agreement is signed and before service begins (for example, procedures for commissioning the LRMT system and procedures for addressing the developer's failure to meet the commencement date and performance measurement systems).
- ☐ Define the right of access and use of the land required for the project:
  - o Identify who will provide land rights.
  - o Identify the terms of use (for example, purchase or lease).
  - o Provide information on the timetables for obtaining necessary authorizations from relevant authorities and the procedures by which they are to be obtained.
- ☐ Understand that it is the developer's risk whether the design meets the grantor's requirements.

### ***Provisions Related to Construction and Assets***

- ☐ Ensure that conditions are laid out for the commencement of construction, that a timetable exists, and that a plan is in place for performing the work (including milestones) to which the developer has committed.
- ☐ Establish a general construction requirement that details the relationship between contractors and subcontractors.
- ☐ Detail provisions relating to treatment of defects and how they will be handled.
- ☐ Specify provisions for health and safety standards.



# Contractual Arrangements

## ☐ Detail specific dates for construction completion:

- o Include in the payment mechanism provisions on financial penalties for late service commencement.
- o Ensure that capital grant payments are linked to milestones and acceptance tests.

## ☐ Detail clear, precise instructions for developer notification of readiness and inspection and testing to be undertaken by or on behalf of the grantor:

- o Include conditions of acceptance, procedures, certification, and so forth.
- o Distinguish between construction of infrastructure and commencement of service.

## ☐ Specify the party responsible for assessing satisfaction of the tests.

## ☐ Specify the details on the handover provisions.

## ☐ Determine the method of valuation and calculation of terminal payments with respect to assets with alternative uses at the end of the PPP agreement period.

### ***Provisions Related to Service Obligations***

## ☐ Set out key performance indicators related to the operation and maintenance obligations.

## ☐ Ensure that the grantor retains the right to intervene should service fall below certain thresholds.

## ☐ Develop a system to address persistent minor breaches:

- o Develop a consistent mechanism to deal with price variations (for example, with respect to operating expenses, financial obligations).
- o Consider using value-testing services.

# Contractual Arrangements

## ***Availability Payments and Other Sources of Revenue***

- ☐ Consider the level of deductions to be imposed on the developer and the performance indicators that will be used.

## ***Provisions Applying to Financing***

- ☐ Ensure protections for lenders through drawdown schedules, construction milestones, reserve accounts, and so forth.
- ☐ Develop security rights to ensure that lenders are protected from unsecured or junior creditor actions.

## ***Provisions Applying to Implementation***

- ☐ Allow for flexibility in contract design to take into account inevitable alterations in prices and costs.
- ☐ Ensure that the grantor reserves the right to request variations to the design, PPP agreement, and financial model.
- ☐ Agree on a list of special events that would grant each party protections.
- ☐ Provide protections against changes in laws (adoptions, modifications, and repeals to laws can occur after PPP agreements have been made).
- ☐ Ensure that the grantor retains step-in rights to suspend the developer's rights under the PPP arrangement for certain situations, such as war or unavailability of service.
- ☐ Provide for early termination of the PPP agreement:
  - o Outline precise details of possible triggers, compensation, and financial penalties.
  - o Set out principles of calculation and payment of early termination payments.

# CHAPTER 8

## PROCUREMENT



*In Halberstadt, Germany, a new train runs on older infrastructure.  
Photo by and reproduced by kind permission of Rainer Hesse.*



## Procurement

This chapter presents an overview of the key issues to be addressed in selecting and awarding a public-private partnership (PPP) agreement to a suitable developer for light rail–light metro transit (LRMT). Given the size and complexity of LRMT projects, the chosen procurement method not only needs to meet local procurement standards but also generally will need to be adapted to satisfy international norms and standards, to ensure effective involvement of financing institutions and developers. The overall goal is to establish an effective method for selecting a developer that is financially, technically, and operationally capable of the development and long-term operation of an effective LRMT system under the PPP agreement. We focus on competitive bidding but note some key issues of other procurement approaches. The selection criteria and assessment methods are issues to be established early in the process.

Given the nature of the development of LRMT PPP schemes, it is beneficial to have continuing stakeholder consultation throughout the procurement process, with the aim of developing the optimal scheme. We show how the procurement process can be managed from an initial survey of interest through to final bidding, negotiation, and award of the PPP agreement and financial close.

### 8.1 CHOOSING A SELECTION METHOD

The selection process is intended to achieve efficiency and to maximize value for money within a dynamic and flexible environment. Conducting a selection process requires balancing control, flexibility, and efficiency. The major parties involved in the tendering procedures—the grantor, the bidders, and the public—will require assurances that the process has been carried out with transparency, that competition among bidders has produced the best price, and that the project will deliver value for money and quality service. The winning bidder will likely present the most economically advantageous

offer and will provide adequate price, service certainty, and appropriate risk allocation. Four key considerations govern the award of public contracts: competition, economy and efficiency, integrity and fairness, and transparency.

#### 8.1.1 Competition

Competition among bidders injects efficiency into the process by allowing market forces to mold the procurement approach selected by the grantor. The goal of the bidding competition is to reduce the price of the project and to induce firms to offer the best technical and financial solutions. Bidders are aware of the other competing firms, and each firm or consortia will compete by reducing its price and improving its technical and financial proposals in order to be selected for final negotiations. Price is not the only consideration. The competitive process can spur greater innovation on the part of the bidders, and that can only benefit the grantor by providing it with technical and financial solutions that otherwise may not have been presented in noncompetitive tendering.

#### 8.1.2 Economy and Efficiency

Competitive bidding allows the selection of the developer that is best able to complete construction and deliver a high-quality service with the most cost-effective or commercially attractive proposal. Promoting competition among bidders is the most effective method for achieving this economy. The competitive approach can also be used to develop the most effective technologies and operational methods.

Excessively costly and burdensome selection procedures can dissuade bidders from participating in the proceedings and can burden the grantor. Therefore, selection procedures should be designed to select a developer within a short period, with minimal administrative burdens and at a reasonable cost to both the grantor and the bidders.



### 8.1.3 Integrity and Fairness

The selection procedure should be understandable and transparent and should ensure that all bidders are treated equally. Bidders can spend substantial amounts of time and money preparing bidding packages, and most will do so when they have confidence in the integrity of the selection procedures. When they are unsure of the fairness of proceedings, bidding firms will likely decline to participate, or they will incorporate the higher risk of participation into their bidding packages. Participant confidence will be bolstered by an approach that shows fairness and also contains confidentiality mechanisms to protect the information detailed in the bids. Assurances should be made that no information will be disclosed to competing bidders and that all negotiations or discussions will be confidential (UNCITRAL 2001). No forms of abuse, either by the firms participating in the process or by the parties administering it, should be tolerated, and a clear system of sanctions will demonstrate the integrity of the approach.

### 8.1.4 Transparency

The transparency of the bidding process; the way it is administered; and its scope, requirements, pricing, and technical specifications should be clearly detailed. Not only will transparency reduce the need for clarifications during the process, but it will also allow the bidding firms to generate a clearer view of the risks, resource commitment, and costs involved in participating. By giving every potential bidder the same information on the grantor's requirements, the costs of bidding and the probability of winning become much more calculable, thereby increasing the number of potential bidders and increasing the competitive environment.

The grantor should ensure that all procedures governing developer selection are transparent and fully disclosed. Transparency in tendering procedures can improve competition and reduce unexpected costs. It also serves to mitigate potential corruption. A clear record of the selection proceedings will assist transparency and accountability and will help reduce potential disputes. Transparent tendering procedures can also attract the interest of nontraditional investors, thus increasing potential sources of finance for bidders.

## 8.2 MANAGING THE BIDDING PROCESS

A competent, efficient procurement management team, linked to careful planning and coordination of the procurement process, will ensure successful selection proceedings. The grantor should establish a strong bid management structure capable of handling the complexities of procuring the project and managing the bidding process. The grantor should ensure that suitable administrative and personnel support is provided to undertake the selection procedure chosen. Representatives from key public agencies should form a steering committee to oversee the execution of the process.

Time and money should be invested into proper procurement preparation. When badly conceived, tendering processes can lead to delays and wasted capital. Before beginning the process, the grantor should ensure that it has thoroughly reviewed the project in detail, the potential risks, and the design requirements and is confident the project will deliver value for money. Thorough project preparation will reduce the potential developers' bidding costs, which will increase the number of parties able to participate and the level of competition, thus reducing the grantor's project costs.

### 8.2.1 Appointment of an Award Committee

The grantor can establish an award committee that will be responsible for evaluating the proposals and recommending a selection. The committee should ensure a fair, transparent, and efficient procurement process, executed in accordance with local and international laws and regulations.

The grantor decides the composition of the committee, with members of appropriate standing and skills. They will be supported by a suitable technical, operational, legal, and financial staff. Outside expertise will be critical to establishing the LRMT PPP scheme. Advice may be sought from independent experts or advisers to help determine the evaluation criteria, performance indicators, and specifications and to prepare the bid documentation. Other advisers and consultants may be hired to assist the grantor in evaluating proposals and drafting and negotiating the project agreement. Financial, technical, and legal advisers should generally be selected on a competitive basis, and they should demonstrate that they have skills relevant to the scope of the work.

The committee's responsibilities include overseeing the bid management team in (a) drafting bid documents, (b) identifying short-listed bidders, and (c) identifying the winning bid. A separate team may be required to finalize negotiations with the winning bidder.

### 8.2.2 Use of Advisers

The procurement management team will require suitable financial, technical, operational, and legal support. It is especially important to have the participation of financial experts when establishing payment mechanisms, as these mechanisms have a key influence on the long-term economic viability of the PPP agreement. Other financial inputs include (a) preparation of the financial evaluation parameters and payment mechanism, (b) financial bid evaluation, and (c) support for negotiations with bidders.

Demand analysis is a key area where external technical adviser participation is often crucial. Technical support is also required in the following tasks:

- Preparing or reviewing construction costs and assumptions for the feasibility review
- Drafting output specifications and risk analysis
- Structuring the technical aspects of the bid documentation
- Evaluating and negotiating the technical aspects of the bids
- Reviewing designs
- Supervising construction

External legal advisers can assist in specialized legal aspects of the project, particularly in drafting the PPP agreement and all bid documentation. Together with the grantor, they can ensure that the bidding procedure fits with relevant procurement legislation (Malagón and Morientes 2007).

### 8.2.3 Market Sounding

Market sounding is the process of assessing the reaction of all potential bidders to a proposed project and procurement approach before formally initiating a procurement process (Office of Government Commerce 2005). Market sounding helps establish the existence of a market for the proposed project, the level of investor interest, and the project's feasibility. It helps to obtain feedback on the basic fundamentals of a project and its key constraints. If the project's financial model is shared with the potential pool of bidders, insight on commercial viability can be sought.

In one approach, the grantor calculates the comparable cost for the public sector itself to construct the project in order to ascertain a public sector comparator. This comparator can be a useful measurement standard for assessing bids, and it provides another method for ascertaining value for money.



However, the focus of market sounding is to obtain information on the following key areas:

- Feasibility—whether the proposed project is feasible, using experience from other similar projects
- Capability and capacity—whether potential bidders can execute the project
- Maturity—whether there is an established market for the requirement and whether a competitive procurement is possible

Market sounding offers several important benefits:

- It confirms, through market reaction, that the scope and objective of the procurement are sound and achievable.
- It flags potential issues or problems with the project.
- It establishes that the requirement is packaged in such a way that the market is encouraged to respond and that real competition is stimulated.
- It lays foundations for contract and relationship management with potential winning bidders.
- It manages stakeholder expectations of what can be achieved and delivered by the procurement process with clear delineation of the business case for the project.

It is critical that the market-sounding process be open and that all participants be treated equally and fairly. Giving any potential bidder an inside advantage must be avoided to preserve a level playing field.

Market soundings can range from a request for comments, to a full market-testing questionnaire, to road shows or meetings with potential bidders to address key issues that may help optimize project design and implementation.

## 8.3 SELECTION CRITERIA AND BID EVALUATION

Contracting authorities seek bidders with proven experience and capability in the service being tendered. The award of public contracts is best achieved through methods that promote competition among a range of bidders within structured, formal procedures. Competitive selection procedures generally provide optimum conditions for competition, transparency, and efficiency. Competitive election is generally carried out in two stages:

- Prequalification of suitable bidders
- Formal bidding and selection of the winning bid

Contracting authorities should decide on the methods, principles, and scoring process and weights before starting the selection process. Contracting authorities need to indicate the broad evaluation framework to the bidders to maintain transparency and to increase bidder confidence. It may also be necessary to train staff members who will be reviewing the bids to maintain consistency in the evaluation process. In this chapter, we consider evaluation at both the prequalification and bidding stages.

### 8.3.1 Selecting Criteria for Competitive Bidding

The complexity of many infrastructure projects requires contracting authorities to design evaluation systems to compare proposals from different bidders. Bidding packages that have passed the threshold of quality and technical aspects can be judged solely on a single factor, such as a global price offered for the construction work and long-term operation or some basket of financial measures. However, price alone should not be the only determinant. Privately financed infrastructure projects are expected to be financially self-sustainable, maximizing recovery of the development and operational costs from the project's own revenue and optimizing the amounts of subsidies needed.



The grantor will therefore need to analyze the suitability of the technical elements, the commercial and financial feasibility of the project, and the soundness of the financial models of the bidding proposals. The manner by which the winning bid will be selected must be determined before the tendering process. The most common system uses the following evaluation procedures:

- **Prequalification.** Firms interested in the project are required to establish technical competence and financial viability. The purpose is to limit the field of applicants to those that meet the minimum requirements for participating in a competitive award process. The grantor reviews the information and selects a short list of firms to invite to participate in the next stage.
- **Evaluation of technical proposals.** Technical proposals are submitted on how the developers would execute the project, and further technical and financial capacity information is submitted. Grantors establish technical evaluation criteria for assessing the proposals. Bidders must achieve a minimum score according to the criteria to be chosen to participate in the next stage.
- **Evaluation of financial proposals.** Financial evaluation criteria are then used to assess the bidders' financial proposals. The bidder with the best financial proposal is then awarded the PPP agreement.

### 8.3.2 Technical Evaluation Criteria

The technical evaluation criteria determine the fitness of a bidder to undertake the project if selected. The criteria are used during the prequalification and the technical evaluation stages. As a prequalifying test, a bidder's operating capacity may be evaluated by investigating the bidder's previous experience with similar projects, its human resources, and its technical capability. Financial capacity can be established by

analyzing the bidder's financial statements and determining whether other financial institutions are supporting its bid. The financial capacity of the bidder is evaluated at the initial stage only to see whether it has the resources to carry out work of the size and complexity of the proposed LRMT PPP scheme.

Common quality criteria include the following:

- Technical skills
- Personnel skills
- Management team
- Supply chain management
- Methodology
- Environmental criteria
- Relevant experience
- Past performance

At the final bid stage, more precise technical evaluation criteria are required, specifically related to the detailed LRMT scheme and the type of PPP agreement. Depending on the type of PPP agreement being bid, the emphasis of the technical evaluation will differ: for a concession, the grantor will be more concerned with the construction, operation and maintenance, and extension plans included in the bids, whereas for a management contract, the evaluation will focus more on the quality and expertise of the management personnel, the management style, and the systems. Operational and capital works investment issues are the main focus of the technical proposal. Financial information on the bidder's working capital and investment plans may also be included to ensure that sufficient resources will be available.

Technical evaluation of proposed business plans involves a great deal of discretion and judgment, and care must be taken to ensure the continued transparency of procedures. The grantor can coordinate with bidders on the technical and service requirements before finalizing a technical package to be bid on.



### 8.3.3 Financial Evaluation Criteria

Many contracting authorities have opted for a process in which all the developers bid on the same technical specifications or service requirements, and the evaluations are based solely on the financial proposal.

The developer's financial proposal will need to assure the grantor that sufficient financial resources will be made available to ensure that the technical proposal can be carried out. The financial proposal will be evaluated on the strength and deliverability of the financing plans, the equity and debt providers' levels of commitment, and the risk allocation terms. Criteria required for financial evaluation can include the following:

- Customer and developer tariff required, availability payments, and shadow fares
- Upfront fee, periodic lease payments, or concession payments to the grantor
- Price for shares or assets to be sold
- Capital investment committed by the developer
- Service quality targets
- Service or management fees payable to the developer
- Subsidy payable to the developer
- Subsidy payable by the grantor

## 8.4 PREQUALIFICATION

With the size and complexity of privately financed infrastructure projects, the grantor may decide to limit the number of bidders from whom more detailed proposals will be requested to only those that satisfy the prequalification criteria. Prequalification is the selection of suitable bidding firms from among all interested parties. It involves evaluation of bidders' qualifications and resources, as well as technical and financial capacity for handling the project. Those bidders that

qualify can be selected to take part in the tendering phase. The prequalification process is also beneficial in helping to simplify the final bid selection process, because assessment of ability and capacity to perform will not be required again. The prequalification process helps the grantor focus on developing the project details in a clear, effective way, and the process can be used to get industry input in doing so.

### 8.4.1 Documents

Key documents issued to potential bidders at the prequalification stage can include the following:

- Background information memorandum on the proposed project
- Bidding process instructions and bidding selection criteria
- Prequalification questionnaire for all potential bidders

A key purpose of the prequalification questionnaire is not only to ensure the potential bidders' capacity but also to reduce the number of bidders invited to cut the price to a manageable amount. The grantor will evaluate the completed questionnaires and exclude the bidders that do not meet the minimum requirements of suitability (Office of Government Commerce 2005). The prequalification questionnaire explores the following information

- The bidders' previous experience and expertise in the field
- The bidders' financial health and whether there are any risks to satisfactory contract completion. Information on the bidders' capacity to raise financing and the type of debt to be raised will also be critical
- The legal status of bidding firms
- The quality of the personnel involved in the project



### 8.4.2 Road Shows

Before launching a prequalification process, governments (aided by their advisers) generally undertake a road show to promote the potential transaction and to review the level of investor interest. By meeting potential bidders, contracting authorities can set the criteria to ensure that they will have a sufficient number of bidders based on their knowledge of investor interest and the technical and financial characteristics of potential bidders.

### 8.4.3 Public Notification and Prequalification

In the interest of transparency and competition, the invitation to the preselection proceedings should be handled in a manner that attracts the broadest possible interest to ensure a competitive selection process. The invitations should be published domestically and internationally to foster interest at home and abroad. The procurement process generally begins with a public notification in electronic and traditional media outlets that details the tender opportunity. The details of the notification will adhere to the requirements of the country's procurement laws and will contain information on the project with a request for qualified companies, groups, or consortia to participate in the tender process. Companies expressing interest in the invitation are then sent prequalification documents.

The preselection documents should contain clear, concise information identifying the precise infrastructure to be built and the specific requirements expected of the developer selected, an outline of the financial structure, and a summary of the terms of agreement envisaged by the grantor.

### 8.4.4 Preselection Criteria

Bidders are required to demonstrate that they possess certain attributes:

- Technical and professional qualifications
- Financial and human resources
- Managerial capability
- Reliability and experience

The specific criteria required for large-scale infrastructure projects, such as an LRMT scheme, include the following:

- Experience in managing financial aspects and experience in operating infrastructure services under public regulatory oversight (proven through quality indicators of performance in previous projects)
- Experience of the key team members to be involved in the project
- Organizational ability (experience in construction, operation, and maintenance)
- Financial sustainability (demonstrated by the amount of equity the bidder is willing to provide and the support of financial institutions defending the bidder's financial standing)

The challenge is to identify the right parameters by which to judge quality. Performance criteria may also be used that allow bidders to demonstrate a minimum level of efficiency in their relevant operations elsewhere.

### 8.4.5 Dealing with Bidding Consortia

The prequalification process should be designed in a way that ensures the participation of the broadest range of local and international companies with relevant experience in the field. The number of firms experienced in building and operating LRMT services is relatively small. In most cases, contracting authorities will be faced with consortia of real estate developers, rolling-stock providers, and construction companies. Developer consortia seek to offer the full range of expertise and experience.

Contracting authorities should be careful to evaluate the full financial capacity of the consortium and whether the component firms have worked together in the past. The grantor needs to assess the forms of any joint ventures that have been established for submitting a bid and the likely effectiveness of their varying types of equity or subcontract structures.

For the sake of efficiency, one firm should be designated as the representative for the entire consortium. It is recommended that the grantor oblige the members of the consortium to sign an agreement committing them to remain in the consortium in the event of their selection. The grantor may also stipulate that the members of the winning consortium create a special-purpose vehicle for the entity.

### 8.4.6 Evaluation of Prequalification Responses

The grantor should create a framework to evaluate the responses to the questionnaire using a predetermined scoring matrix that determines the scale on which each component of the questionnaire will be graded and the level of importance to the grantor (the weighting) that is to be applied.

### 8.4.7 Generating a Short List for Bid Selection

Potential bidders will prefer smaller short lists because they increase the probability of their winning. Bidders may withdraw from the process if too many other firms are prequalified (more than five prequalified firms is the general threshold before firms evaluate their decision to proceed with a bid). At the same time, contracting authorities will seek to ensure greater competition among bidders by prequalifying more bidders. Experience suggests that at least three bidders are necessary to ensure competition, with four chosen as insurance should one firm drop out. Quantitative preselection criteria are more easily applied and transparent than qualitative criteria:

- **Prequalification threshold.** The grantor determines a quality threshold, and all the bidders that pass the threshold are placed on a short list. The disadvantage is that too many or too few bidders will be short listed.
- **Set number of short-listed bidders.** The grantor decides on a maximum number of bidders that will be short-listed. The top-ranking bids are then selected until the “quota” is reached. The disadvantage is the probability of including low-quality bids and excluding high-quality bids.

- **Hybrid approach.** The grantor interlaces the two approaches above by creating a maximum quota of five firms that pass the threshold for being put on a short list; at the same time, the grantor can ring-fence the right to choose the top two or three ranked firms if fewer than five bids meet the threshold.

## 8.5 CHOOSING THE BIDDING PROCESS

Contracting authorities have at their disposal a broad range of options for the bid and award procedures. There are three main approaches:

- Competitive bidding
- Competitive negotiations
- Direct negotiations

In practice, most award processes contain an interface between competition and negotiation. In this section, we look at the competitive bidding and negotiation approach, the most common and generally considered the most appropriate approach for LRMT PPP schemes.

After the prequalification stage, it is recommended that the grantor review its original feasibility study and project and performance specifications in light of the information and comments gleaned from the prequalification process.

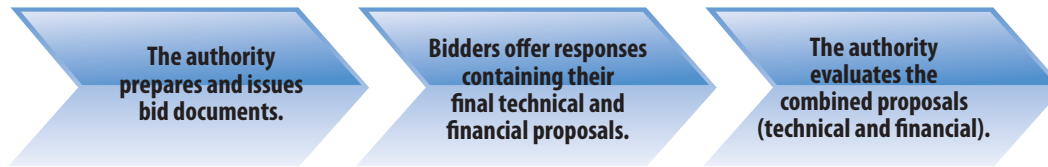
The design of the bid and award process can have a significant effect on the economic efficiency, transparency, and quality of the outcome. At this stage of the proceedings, the grantor should then decide whether a single- or two-stage procedure or two-envelope bidding system will be used to request proposals.

### 8.5.1 Single-Stage Bidding

If the grantor is confident that the final project specifications and performance indicators meet the required standards and designs, the selection process may be structured as a single-stage process (figure 8.1). After prequalifying bidders, the grantor would then proceed to issuing a final request for proposals.

Figure 8.1

### Single-Stage Bidding Process



Source: Author's representation.

### 8.5.2 Two-Stage Bidding

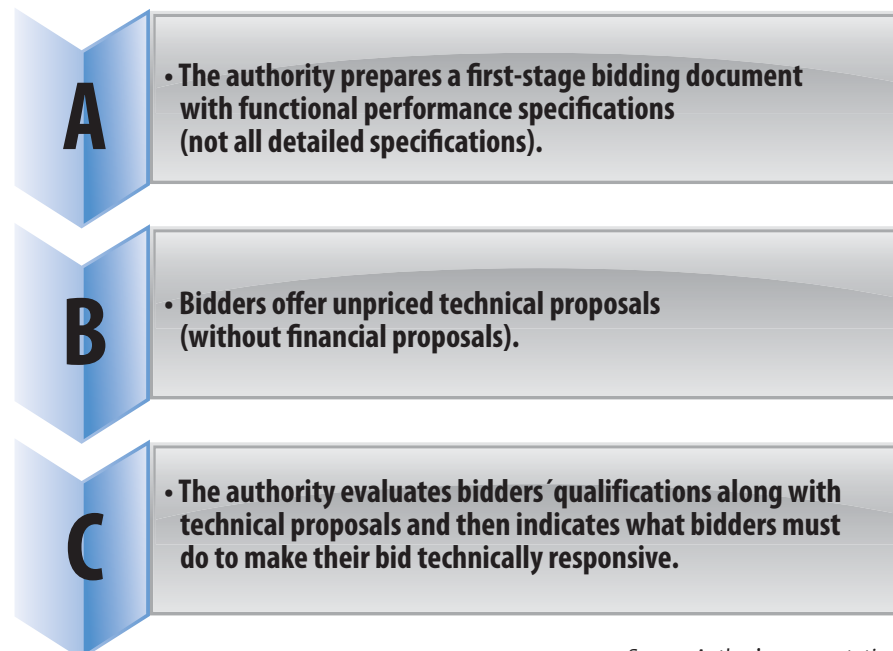
For complex projects, such as an LRMT PPP scheme, the two-stage bidding process is generally the most effective. The process includes a stage for dialogue between the grantor and the eligible bidders that ensures that bids will more likely meet acceptable standards (figure 8.2). The purpose of this initial stage is to determine what the market considers feasible and bankable, and it allows the grantor to refine the

bid requirements to take advantage of this information. No negotiations on the terms of contracts take place at this stage. The process contains the following steps:

- The grantor issues a request for proposals (RFP) that contains technical specifications and bidding documents. The RFP should also include details on the risk allocation envisaged by the grantor.
- Bidders submit a firstround bid containing only preliminary technical proposals based on the information contained in the RFP for comment and discussion.

Figure 8.2

### Stage 1 of a Two-Stage Bidding Process



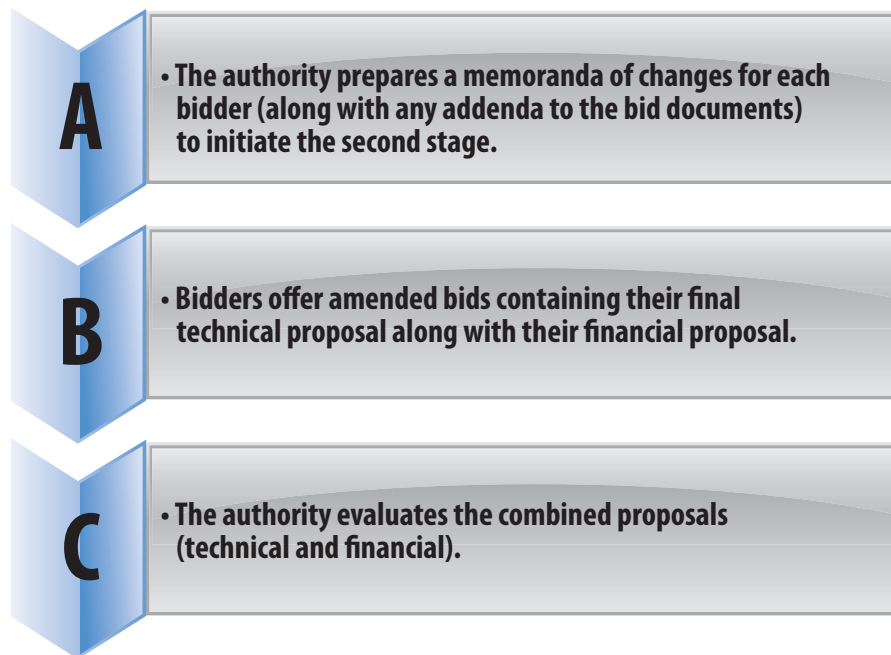
Source: Author's representation.



- The bidders' responses to the proposed risk allocation can assist the grantor in assessing the feasibility of the project. The grantor consults with each eligible bidder to discuss the bids and any changes that are required to improve the bids (see figure 8.3). The grantor must avoid disclosing details of any discussions to competing bidders and must treat all discussions as confidential.
- After these discussions, the grantor should review and, if necessary, revise the initial project specifications. Any changes to the project specifications must be communicated to the bidders in the invitation to submit final proposals. At this stage, bidders that do not wish to continue should be allowed to withdraw from the process.

Figure 8.3

### ***Stage 2 of a Two-Stage Bidding Process***



Source: Author's representation.

## 8.6 FINAL REQUEST FOR PROPOSALS

The grantor's main responsibilities at this stage will include (a) providing detailed information to the bidders along with information on the tender rules and procedures and (b) consulting with the bidders to delineate the precise format and content of the proposals. Each of these responsibilities will ensure the maximum amount of transparency competition within the bidding process.

### 8.6.1 Benefits of Providing Information

The grantor should ensure that it fully discloses all information regarding the potential project and the precise expectations for the winning bidder. Full disclosure will minimize accusations of unfairness and corruption. In addition, it will allow bidders to prepare the best possible bids according to the requirements outlined. Having received the same information, bidders will likely produce easily comparable bids. Developers who have more relevant information will be more open to accepting the associated risks. When possible, the grantor should provide the following information:

- **Description of the project and expected outputs.** This description of works and services to be performed includes technical specifications, plans, drawings, and designs; time schedules for the execution of works and provision of services; and technical requirements for the operation and maintenance of the service.
- **Minimum applicable design and performance standards.** The description of design and performance standards, including environmental standards, should include details of the desired quantity and quality of service.
- **Quality of service.** General obligations, availability of services, and relevant standards of quality to be used to assess the system should be set out.

The bidders should provide as much information as possible so that the grantor can evaluate the technical soundness of proposals, the operational feasibility, and the responsiveness to standards of quality and technical requirements, including the following:

- Preliminary engineering design, along with the proposed schedule of works
- Project costs, operation and maintenance cost requirements, and the proposed financing plan (debt-to-equity ratios)
- Proposed organization, methods, and procedures for the operation and maintenance of the project
- Description of quality of services

The contractual terms of the proposed risk allocation envisaged by the grantor should also be included in the bidding documents. If the grantor details its preferred risk allocation (provided it is bankable), it can ensure that developers will bid against a common standard. Other essential elements to be incorporated in the RFPs include the following:

- Information on the duration of the agreement
- Formulas and indexes to be used to calculate tariffs
- Government support and investment incentives
- Bid bond requirements
- Regulatory agency requirements
- Monetary rules and regulations
- Revenue-sharing agreements, if any
- Transfer of assets at termination

Information should be shared through the following channels:

- Bidding documents and information memorandums
- A data room
- Meetings with the grantor

A data room provides a one-stop location for bidders to obtain further information about the proposed project. All bidders should have equal time and access to the project data.

### 8.6.2 Interaction with Bidders

Dialogue between the grantor and bidders can be beneficial to both parties. Consultation with potential bidders before formally beginning the procurement process can increase investor interest in the contracts and can be tailored to increase the attractiveness of the project.

The main approaches for bidder interaction are bidder conferences and arm's-length consultation.



## Bidder conferences

Bidder conferences are arranged by the grantor to meet all prospective bidders, to explain the bid process, and to consult with the bidders on their ideas for the project. The grantor may provide the conference attendees with draft documentation before the conference, and bidders are given the opportunity to raise questions or request clarifications of specifications. These questions and clarifications are distributed to all potential bidders before the conference. The goal is to ensure fairness and transparency of information. There are disadvantages to this approach:

- Bidders may not wish to share innovative plans with their competitors.
- Bidders may not answer questions honestly during the conference.
- Bidders may seek to manipulate the transaction terms through their comments on the draft documentation.
- Bidders may seek to collude and persuade the grantor to take on more project risks than necessary.

## Arm's-length consultation

Alternatively, the grantor can use arm's-length discussions, where bidders submit written and independent comments on the draft bidding documents and the proposed PPP agreement. The grantor reviews the comments and can gain a greater understanding of the key issues and concerns held by potential bidders. Although this written process does not suffer from the competitive issues of bidder conferences, it does not offer the advantages of the potential dialogue from a bidder conference.

## Compensation for bid costs

Bidding for LRMT concessions is expensive. Retaining at least two bidders until final selection is absolutely imperative for maintaining public bargaining power. Public support during the final stages of the procurement process can offer good value for money by keeping competing consortia involved and committed. However, structuring competition for unsuccessful bids can be difficult because actual bid costs are often unknowable.

Bidder compensation based on a percentage of proven expenditures is one solution for compensation when parties can agree to qualifying expenses and an open information exchange. The

disadvantages of this method include increased complexity and reduced private incentives to control costs. Alternatively, fixed-sum "honoraria" may offer a simpler option for compensating unsuccessful bidders (box 8.1). Setting the honorarium amount correctly is the obvious challenge for this latter method and will require expertise from similar procurement processes.

### Box 8.1

## Bidder Compensation and Canada Line's Procurement

Procurement for Canada Line (British Columbia) took more than two and a half years and began with a prequalification round followed by a request for proposals and then a best and final offer (BAFO) process between short-listed bidders. Out of 10 respondents, 4 consortia were prequalified. Three of the prequalified consortia chose to submit proposals, and two were short-listed for the project's BAFO phase. Following the BAFO process, Canada Line's grantor, Canada Line Rapid Transit (CLCO), a wholly owned subsidiary of Vancouver's transportation authority Trans Link, selected a preferred bidder, directly negotiated a concession agreement with it, and then guided the project to financial close. To maintain interest and preserve competition during later phases of the procurement process, CLCO offered the bidders an honorarium to be paid as follows:

- During the BAFO process
  - Up to a maximum of Can\$2 million to cover an unsuccessful bidder's verifiable costs incurred during the BAFO stage (provided that bidders acted in good faith, used reasonable commercial efforts, and provided bona fide BAFO submissions).
  - If CLCO had terminated the project during the BAFO phase, both bidders would have been eligible for this honorarium subject to the aforementioned conditions.
  - Can\$2 million to the preferred bidder if CLCO terminated the project after the BAFO stage but before negotiating a concession agreement (again, subject the aforementioned conditions).
  - No compensation if a bidder withdrew from the BAFO phase, acted in bad faith, or did not deliver a bona fide BAFO submission.
- After the BAFO process but before a concession agreement was signed (commercial close)
  - Can\$4 million to the preferred bidder if contract negotiations failed (provided that each party acted in good faith and used reasonable commercial efforts, but simply could not reach an agreement).
- After signing the concession agreement (commercial close) but before financial close
  - Can\$2 million plus the preferred bidder's verifiable costs incurred during the post-BAFO negotiations phase up to a maximum of Can\$10 million if CLCO terminated the project.



### 8.6.3 The Technical Proposal

In the RFP, the grantor must clearly specify the precise information and format required in the bidders' technical proposals. The format and content should relate directly to the grantor's evaluation system because that will facilitate easier comparison and scoring of bids. Each bid package will include a technical section containing the details of how the bidder proposes to design, construct, commission, operate, maintain, and hand over (if stipulated in the contract) the project to the grantor (Mott MacDonald 2008). Bidders must respond to the performance and construction specifications that are detailed in the invitation to bid. The marking scheme and weighting allowances that the grantor will use to evaluate the bids should not be revealed to the bidders before bid closure.

Technical proposal formats differ, but their general purpose is to demonstrate the bidder's ability to execute the proposed project according to the standards specified in the RFP. Bidders should provide sufficient details to give the grantor a good understanding of the essence of the development work that the bidder would undertake should it be awarded the concession. We give a separate checklist for a typical LRMT PPP technical proposal in annex 6. Normally, the technical proposal includes details on the following:

- Design, planning, and system management
- Examples of previous projects that are similar to the LRMT system being bid, showing the procedures the bidder has used
- Procurement and subcontracting strategy
- Design management
- Approvals management
- Health, safety, quality, and environmental management
- Project program and work structure
- Other critical events and factors
- Civil works
- Testing and commissioning
- Operation and maintenance
- Handover of the LRMT system to the grantor

In evaluating the proposals, the grantor should ensure that the bidders' plans fulfill the terms of the bidding documents and can ensure the service levels stipulated in the proposed PPP agreement. In general, the evaluation process will look at the following aspects:

- The scope, clarity, quality, robustness, and deliverability of the proposals
- The technical effectiveness of the proposals in relation to the reference design and performance specification
- The superiority of the operation and maintenance proposals
- The inherent quality, reliability, availability, and maintainability of the proposed system
- The robustness of the program methodology, schedule, and delivery plans
- The technologies to be used for the supply, construction, operation, and maintenance
- The program management systems
- Compliance with environmental and sustainability requirements

### 8.6.4 The Financial Proposal

The financial proposal will demonstrate the developer's detailed financial approach to providing the technical solution detailed in its technical proposal. We provide a separate checklist for a typical LRMT PPP financial proposal in annex 8. The financial proposal typically includes specifics on (a) the financial plan (funding as well as operational) and (b) the financial model (provided by the bidder), demonstrating key financial parameters and assumptions, additional proposals made by the bidder, and the required levels of state financing (for capital and availability payments).

The structure of the financial proposal is critical because it can have important effects on the funding and the operation of the project—and ultimately on consumers. The financial plan within the bid is used to demonstrate the adequacy and feasibility of project financing proposals.



The grantor should follow two basic principles:

- The structure should be as simple and transparent as possible so that the bid award is automatic (avoiding complex formulas or anything requiring subjective judgment).
- The structure should promote economic efficiency on the part of the developer and users of the proposed system.

The bid evaluation committees will check whether the financial proposals comply with the requirements of the invitation to bid and whether they correspond to the legal and technical parts of the bid criteria. Generally, an evaluation panel awards a coefficient to each financial part and considers the quality of the financial plan and the model with respect to its maturity and feasibility.

## 8.7 SUBMISSION, OPENING, AND COMPARISON OF BIDS

Given the complexity of the tendering procedures for large infrastructure PPP projects and the multitude of criteria to be evaluated, it is recommended that contracting authorities opt for a two-step evaluation process. The technical proposal is evaluated separately from—and generally before—the financial proposal to avoid placing greater weight on price considerations to the detriment of nonfinancial criteria.

### 8.7.1 Two Envelopes

The two-envelope system has been used in past tendering competitions. The process has four steps:

- The grantor prequalifies bidders on the basis of their technical and financial capacity.
- Bidders simultaneously submit technical and financial proposals in separate envelopes.

- The grantor evaluates the technical proposal and financial proposals separately and does not open the financial proposal until the technical evaluation is complete.
- The technical and financial scores are combined using a suitable scoring methods, and a winning bid is selected.

This approach eliminates price as an influence during an evaluation of the technical proposals; therefore, the more subjective technical evaluation is less vulnerable to manipulation. However, care must be taken to ensure that technical criteria do not exclude solutions that are technically adequate and that might offer more competitive financial advantages. International institutions such as the World Bank do not generally support such procedures because of the difficulty in objectively evaluating proposals under such a system.

### 8.7.2 Two Stages

As an alternative to the two-envelope system, the grantor receives both technical and financial proposals in one package, but the evaluation is structured in two stages. The grantor establishes minimum quality and technical score thresholds and rates each proposal according to the degree to which the requirements specified in the RFPs have been met. The weighting and scoring mechanisms will be detailed in the RFP to ensure transparency. The grantor will then proceed to evaluate the financial proposals of all the technical bids that have scored at or above the threshold.

### 8.7.3 Bid Evaluation

The overall approach to selecting the winning bidder should be decided at the initiation of the tendering process. The specific evaluation criteria and their use for determining the winning bidder should be detailed in the bid procedure documents.

### Compliance

The grantor should review each bid submission to ensure that it complies with the procedures and requirements set out in the bid procedure documents. In certain jurisdictions, elimination may be mandatory at this stage. Any form of material noncompliance may lead to either the elimination of the bidding firm from the evaluation process or a request for a revised proposal.

The grantor should review any changes made to the proposed PPP agreement. Any changes to the proposed PPP agreement should be marked clearly so that suitable risk adjustments can be made to ensure that all bids are evaluated using the same risk parameters.

Bids should fulfill the requirements following any reference engineering design and should address core requirements that include commercial, technical, operational, maintenance, and financial details.

### Financial and technical evaluation

As discussed previously, technical and financial evaluations are performed sequentially but not simultaneously to ensure unbiased analysis and to ensure that cost considerations are not factored into the analysis of technical proposals. Public opening of financial proposals is commonplace, and the primary benefit is to avoid allegations of impropriety in the evaluation process. Arrangements are frequently made for opening major bids in public, with the media in attendance.

Financial criteria will depend on several factors:

- The type of arrangement proposed
- The level of cost recovery achieved by existing fares
- The predictability and value of future fare-based revenues
- The grantor's objectives
- The rules for setting future fares
- The need to prevent bidders from deliberately underpricing their bids (low balling)
- The likelihood that terms proposed by the developer in the bid can be taken to financial close



Source: <http://www.sxc.hu/>





### 8.7.4 Bid Weighting

After assessing both the technical and financial viability of bids, the grantor must then select the best overall bidder in accordance with the conclusions formed from the assessments. Some technical and financial criteria can be firmly established as crucial; but other elements of bids, such as personnel, are not completely objective criteria. Nevertheless, they can be key in ascertaining whether a company can successfully execute a project. Therefore, a common approach is to choose weights for the technical and financial scores and then combine the scores to produce an overall score (table 8.1).

Table 8.1  
**Weighting Bids: Price versus Quality Features**

Weighting feature	Advantages	Disadvantages
Price based	<ul style="list-style-type: none"> <li>• Easily administered</li> <li>• Widely used and accepted</li> <li>• Clear and objective selection process</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of innovation</li> <li>• Tendency for change</li> <li>• Tendency for orders and cost overruns</li> <li>• Tendency for mediocre quality</li> </ul>
Quality based	<ul style="list-style-type: none"> <li>• Potential for quality</li> <li>• Potential for innovation</li> <li>• Best-qualified organization</li> <li>• Better people skills</li> <li>• Best methodology potential</li> <li>• Potential for project success</li> </ul>	<ul style="list-style-type: none"> <li>• Some criteria subjective</li> <li>• More effort and skill required from the tender evaluation team</li> </ul>

Source: Pakkala 2002.

To be most effective, the weighting of these factors should be appropriately defined and measured as objectively as possible (Pakkala 2002). Each factor will be weighted differently, and weighting will depend on the contracting authorities' preferred combination of quality and price. Some considerations should be kept in mind:

- To reward quality or price aspects, the grantor should distinguish the bid weighting accordingly to reward bids that match these criteria. Therefore, to improve innovation and have the best-qualified organization provide the maintenance activities, the grantor should use appropriate percentages for the quality aspects.
- Technical proposals are usually evaluated first; scores are communicated to the bidders, and then the financial proposals are assessed. The final scores are calculated using the predetermined formula, and the winning bidder is then chosen.
- The weighted-average score can be manipulated. The technical score is subjective and is decisive for determining the winning bid. An avenue for corruption is therefore opened when an unwarranted higher technical score can be granted, with little chance of detection, thereby allowing a favored bid to win.

### 8.7.5 Assessment Marking

Within the invitation to bid document, the grantor should indicate the percentage of total assessment marks that will be awarded to the different aspects of the bidding packages—the financial, legal, and technical sections. The technical assessment and marking will allocate a percentage to each section of the performance specifications and the code of construction practice; marks are awarded to the bidder's response to each section of the documents. The marks are recorded on bid marking sheets, which are then forwarded to the grantor by

his technical assessors. The completed sheets should be kept securely for a number of years after the completion of the bidding process. The detailed marking scheme and weighting of the marks should not be revealed to the bidders or any other party before bid closure. After bid closure, bidders may privately request access to examine the bid marking sheets related to their own bid once the bid assessment process has been completed.

### 8.7.6 Other Weighting Methods

#### *Technical threshold, highest financial score*

The technical threshold method is used for concession contracts. All bidders are evaluated on their technical proposals and a technical threshold score is set. All bids that do not achieve this score are rejected. The remaining bids are then judged on their financial proposals, and the best financial offer wins the PPP agreement.

This method is simple and transparent. Because it is based on the objective criterion of price, it is harder to manipulate. However, it eliminates higher-priced bids that would provide higher-quality solutions. In many cases, the lowest bid does not necessarily provide the best value over the long term.

#### *Fixed budget, highest technical score*

Under the fixed budget method, the grantor sets a budget and informs the prospective bidders. The bidders are then asked to submit their best technical proposal based on the set budget. For management contracts, the bidders would then compete on the amount of money they would use to pay the management fee. This method encourages creativity concerning quality rather than focusing on minimizing cost.

## 8.8 FINAL SELECTION

After completing the evaluation of the technical and financial proposals, the grantor may proceed by selecting the proposal that contains the highest combined scores on price and non-price criteria. Alternatively, the amount of capital grant or availability payment required may be used as the deciding factor. The winning bidder will likely present the most economically advantageous offer, with adequate price and service certainty and appropriate risk allocation. The award committee is advised to offer written explanations for its selection that go beyond simply accepting the lowest-priced bid.

Negotiations then commence with the best-rated bidder. If more than one bid obtains a high score or there is a minimal difference between bid ratings, more than one bidding firm or consortia can be invited for further negotiations over the transaction documentation and to answer any queries from the bidders' lenders. If negotiations are unsuccessful, it may be necessary to restructure and rebid the whole selection process.

### 8.8.1 Noncompetitive Negotiations

The best-rated bidder is invited to a final round of negotiations to finalize the elements of the project. If final agreement cannot be reached, then generally negotiation is started with the bidder that was rated next best. However, using the consultative selection process suggested, combined with acceptance of contract terms at the bid stage, the risks of nonagreement at this stage can be mitigated.

### 8.8.2 Competitive Negotiations

In competitive negotiations, the grantor simultaneously negotiates with two or more bidders in order to enhance the

competitive nature of the negotiated transaction. Competitive negotiations are suited to complex, nonstandard projects. However, the process is less transparent and more subjective. The negotiated bidding process involves the following steps:

- The grantor details its requirements and requests expressions of interest through a request for proposals (RFP).
- The grantor reviews the proposals and selects those that are technically responsive to the RFP.
- The grantor negotiates the PPP agreement terms with the selected bidders.

Competitive negotiations have several advantages:

- Bidders are induced to submit innovative and creative project proposals.
- "Optimism bias" in bids is reduced, and bidders are discouraged from deliberately underbidding to win PPP agreements.
- There is greater dialogue between contracting authorities and more opportunities for the grantor to evaluate bidders on criteria beyond bid prices alone.

Competitive negotiations have the following disadvantages:

- Nonstandard bids make comparisons difficult.
- The increased level of closed dialogues between contracting authorities and bidders decreases transparency, thereby increasing the potential for corruption.
- The prolonged bidding process and the costs involved may deter some firms from engaging in the process.
- Bidders may attempt to make changes that fundamentally alter the price or risk allocation originally contained in the proposal, thereby distorting the criteria on which the bid was originally rated.



At this stage, the grantor should inform the remaining bidders that they may be contacted to negotiate should negotiations with the highest-rated bidder fail to produce an agreement. If this situation occurs, the grantor will inform the bidder of its decision to terminate negotiations and then proceed to negotiate with the next-highest bidder. It is recommended that contracting authorities do not reopen negotiations with bidders with whom failed negotiations have been conducted.

### 8.8.3 Competitive Dialogue

A process called competitive dialogue is an innovative addition to the procurement options available to contracting authorities. Pioneered by the European Union, the process allows dialogue between the grantor and prequalified bidders to permit them to fine-tune, specify, and clarify their bids (Office of Government Commerce 2006). The competitive dialogue system has four main features:

- Dialogue is permitted with selected suppliers to identify and develop solutions to the grantor's project requirements.
- Dialogue occurs in successive stages; at the end of each stage, the number of bidders and number of solutions are reduced.
- The grantor makes its decisions on the basis of the bid that provides the most value for money.
- No changes are allowed to bids in the post-final tender or postaward stage.

The procedure is executed as follows:

- Contracting authorities publish a PPP agreement notice that explains their needs and requirements.
- A prequalification questionnaire is completed by the interested parties and is evaluated by the grantor's bid evaluation team. Prospective bidders are then selected.

- Prospective bidders are invited to begin a dialogue to identify and develop the best solution to the infrastructure requirement. The grantor must clearly describe its needs to assist the process and to ensure that bidders do not use the dialogue to market test ideas.
- The grantor can reduce the number of prospective bidders that it continues discussions with as long as sufficient competition is ensured. If there are an insufficient number of prospective bidders, the authority can continue its dialogue with the remaining bidders.
- Contracting authorities can discuss all aspects of the PPP agreement with the chosen candidates, but care must be taken to ensure that all candidates are treated fairly and evenly.
- The prospective bidders submit their proposals in writing, and the award criteria contained in the PPP agreement notice are used to evaluate the proposals. At this point, the number of bidders can then be further reduced.
- The grantor decides which proposals meet its requirements, and those proposals' proponents are then asked to submit their final offers on the basis of the dialogues with the grantor; the final tenders should be as complete as possible because there are various limits on post-tender discussion and alterations to bids.
- The bids are then evaluated against the award criteria, and the most economically advantageous proposal is selected as the winner.
- Post-tender discussions with candidates that submitted final tenders are permitted to clarify, fine-tune, and provide additional information on their proposals. No changes to the fundamental nature of the bid are permitted.
- Dialogue with the preferred bidder will allow further delineation of design, PPP agreement finalization, and financial due diligence.



The dialogue process should be used to identify the best means of satisfying the grantor's needs. The intention of this dialogue phase, while there is still a competitive element to the process, is to encourage bidders to promote more value for money and more innovative solutions. Although competitive dialogue potentially extends the competitive phase, it should shorten the closure phase after a preferred bidder has been selected and should lead to a shorter procurement timetable.<sup>1</sup>

## 8.9 UNSOLICITED PROPOSALS AND DIRECT NEGOTIATIONS

Unsolicited proposals usually originate from the private sector and are generally not requested by a government. Unsolicited proposals are typically developed by companies with ties to a particular industry (such as land developers, rolling-stock suppliers, and financiers). They use their own resources to develop a project idea and then approach the relevant government or grantor for the required official approvals (Hodges and Dellacha 2007). Government openness to receiving unsolicited proposals can incentivize the private sector to come forward with innovative ideas. Additionally, in smaller municipalities, where it may be too costly or difficult to arrange a competitive bidding process, direct negotiations increase the chance of private sector interest in infrastructure development projects.

However, for grantors, a major disadvantage of unsolicited proposals is that they are associated with a lack of competition and transparency, and they do not guarantee the most effective or economical solution.

The granting of exclusive rights to private entities without the accountability of a transparent tendering process courts

<sup>1</sup> More information on competitive dialogue is available at <http://www.4ps.gov.uk>.

controversy, and history suggests that such scenarios lend themselves easily to corruption. Additionally, the competitive dialogue with the wider industry and financial sector, which can be used to develop and refine the LRMT PPP agreement, is lost.

The subject of unsolicited proposals and direct negotiation is important, and one that the grantor may consider before establishing the best competitive solution (Hodges and Dellacha 2007). We give more details of this approach in annex 8.

## 8.10 CONTRACTUAL ISSUES

Important contractual issues related to the bidding procedure include the following:

- **Bid bonds.** Bid bonds provide insurance that compensates the grantor should the winning bidder decide to withdraw from the project. The bonds serve to guarantee the grantor that the winning bidder will implement the project and has the means to fulfill the terms of the PPP agreement.
- **Acceptance of process.** The grantor may require all bidders to sign a legally binding agreement that confirms their satisfaction with all aspects of the bidding process, their willingness to accept the outcome of the process, and their assurance that they will not challenge the decision. This agreement aims to limit bidders from seeking to reopen the bid evaluation process on the basis of complaints over procedures, evaluation criteria, or lack of information. It is linked with a need for the grantor to conduct the process with full transparency and to treat all parties equally.
- **Signed PPP agreement and associated documentation.** After selection of a winning bid, a long negotiation period between the grantor and the winning bidder begins. During this period, there is a great risk



that the selected bidder will attempt to change parts of the agreement. To mitigate this risk, the grantor can require the bidders, before selection, to provide a signed PPP agreement as part of the bidding package.

## 8.11 NEGOTIATING WITH PREFERRED BIDDERS

Contracting authorities have various options available to them after completing the financial and technical evaluations:

- Choose the firm with the highest score according to the bid procedure criteria at the price stated in the firm's bid.
- Enter into negotiations with the selected firm.
- Hold another round of bidding because of (a) additional issues remaining to be agreed with the preferred bidder or (b) the opportunity for a better offer.

Several negotiation alternatives are possible:

- **No negotiation.** All previous technical and financial consultations with the bidders have removed any issues over their bids, allowing the bidding teams to include signed and unchanged PPP agreements and associated documentation in their submittals. The grantor then accepts the signed PPP agreement after selecting the preferred bidder.
- **Negotiation with the preferred bidder.** The grantor negotiates outstanding issues with the preferred bidder. The contracting authority should ensure that it maintains the resources to negotiate on level terms with the more experienced bidders to ensure that the modifications requested by the bidders are justifiable and are not attempts by the bidder to take advantage of the grantor's lack of experience.
- **Competitive negotiation.** The grantor negotiates

simultaneously with two or more bidders. The bidders compete against one another with the aim of generating a better deal for the grantor. A major criticism of this approach is that it encourages "private" negotiations between the grantor and the bidders, and the transparency of such negotiations is questionable. Competitive negotiation may be formalized to include the best and final offer (BAFO) approach. The BAFO method is becoming common in some European projects. After bids have been evaluated, the bidders are called back to give a best and final offer, with the aim of increasing benefits to the grantor (see box 8.2).

- **Additional round of bidding.** All submitted bids are shared among the bidding teams, and an additional round of bidding is then held.

## 8.12 OTHER PROCUREMENT ISSUES

Other issues that contracting authorities may come across include dealing with variant bids, dealing with unsustainable bids, and allowing flexibility and retendering.

Box 8.2

### The Downside of BAFO Processes

Best and final offer processes can both benefit and harm the public interest. Reduced bid prices or increased design value can clearly benefit the value for money that public authorities derive from public-private partnership structures. However, BAFO processes can add time and complexity to the procurement process while introducing an overabundance of subjectivity into the selection of preferred bidders. Compromises made during BAFO processes can potentially harm the economic viability of concession companies, which may lead to insolvency or renegotiation at a later date. Planners must be aware that sometimes the most accommodating bidder is not the best choice.





### 8.12.1 Dealing with Variant Bids

Contracting authorities will expect bidders to submit standard bids that are based on the bidding requirements. Additionally, bidders can be allowed to submit variant bids with alternative proposals for technical or financial provisions. The grantor must decide whether variant bids will be evaluated simultaneously with the standard bid or whether variant bids will be considered only after a preferred bidder has been selected. This system encourages innovation and can lead to the grantor's getting better value for money. Bidders must indicate the precise differences between their standard bids and variant bids, with explanations of the effects on costs and risk allocation. Variant bids also allow the grantor to test the costs of different risk profiles between the authority and the potential developer. Contracting authorities can hold meetings with the bidders to clarify or negotiate any issues emerging from the bids. All bidding teams must be dealt with fairly and equitably.

### 8.12.2 Dealing with Unsustainable Bids

With complex, competitive negotiations, a mistake or deliberate misrepresentation of information is likely. Contracting authorities should develop clear, sustainable guidelines on how to deal with such scenarios. Deliberate underbidding or even a genuine mistake by a bidder may assist the bidder's financial proposal and increase the attractiveness of its bid to the grantor. However, acceptance of the bid based on an unsustainable project means that in the long term the PPP agreement will need to be renegotiated or dissolved and rebid, both of which are expensive in time and money for the grantor. Experience shows that certain risk evaluation and mitigation techniques should be followed to ensure the sustainability of the bids and to avoid performance or financial issues. Some of those techniques are mentioned here.

### Shadow models

Shadow models are created by the grantor to project what a standard and financially viable bid might look like. Comparing the actual bids with the shadow model gives the authority greater information to query bids.

### Vigilance

The grantor creates a bidding procedure that allows discussions and clarifications, with the option to withdraw from discussions. Requesting higher-performance bonds can also protect the grantor from the risk of developer failures.

### Reputation risk

The grantor prequalifies only those firms with a track record and reputation at stake. Firms with PPP agreement experience will have observable behavioral patterns and therefore evidence of low balling in their past can be factored into the bid evaluation.

### Complaints and appeals

Every procurement process runs the risk of being challenged on the grounds of unfair competition, partisanship, or questions over procedures. Establishing guidelines on methods to deal with such eventualities is advisable. These guidelines may determine how complaints and appeals will be heard and on what grounds and how they will be evaluated.

### 8.12.3 Allowing Flexibility and Retendering

The bid details should clearly establish the process for addressing the end of the long-term PPP agreement. It should ensure that the grantor has the flexibility to extend the PPP agreement or to retender the whole agreement. This matter should be dealt with in the contractual agreements.

# Checklist

## Procurement

### ***Choice of a Selection Method***

Consider the relative importance of competition, economy and efficiency, integrity, and fairness and transparency.

- ☐ Establish a competent, efficient procurement management team; an award committee; and suitable financial, technical, operational, and legal support.

- ☐ Initiate market sounding to determine interest in proposed project.

### ***Selection Criteria and Bid Evaluation***

- ☐ Set technical evaluation criteria for prequalification.

- ☐ Set financial evaluation criteria for prequalification.

- ☐ Set technical and financial evaluation for bidding—that is, what is the bidding variable?

- ☐ Determine how the technical and financial criteria will be combined, decide on bid weights, and determine how they will be marked.

- ☐ Prepare documents detailing the proposed project.

### ***Management of Bidding Stages***

- ☐ Conduct road shows to promote the project and review the level of investor interest.

- ☐ Carry out public notification and prequalification of bidders on the short list.

- ☐ Specify the contents required of bids in the request for proposals and choose a bidding process: single stage or two stages.

- ☐ Evaluate the bids.

- ☐ Negotiate or allow bidders to further improve their bids, if necessary.

- ☐ Make a final selection on the basis of noncompetitive negotiations, competitive negotiations, or competitive dialogue.

### ***Other Issues***

- ☐ Consider how unsolicited proposals and direct negotiations will be handled.

- ☐ Ensure that contractual issues related to the project are clearly established.

- ☐ Determine the methods for dealing with variant bids.

- ☐ Determine the methods for dealing with unsustainable bids.



# CHAPTER 9

## CONCLUSIONS



*The LRMT in Rotterdam, Netherlands, showing a grade system that is made to look less intrusive by grass-covered tracks and a modern sculpture that are system features.*



## Conclusions

This chapter contains thoughts and opinions that the authors have formed from their research and interviews with light rail–light metro transit (LRMT) experts. The views expressed here are ours alone and as such are not official positions of the World Bank, its Board of Executive Directors, or its affiliated organizations. Rather, the information provided here is intended as a summary for the reader’s benefit. Local policy goals and the individual realities of unique transport problems will ultimately determine the applicability of the observations that follow.

### 9.1 VALUE FOR MONEY IN LRMT CONCESSIONS AND OTHER PUBLIC-PRIVATE PARTNERSHIPS

New LRMT systems are complex, one-of-a-kind systems. Integrating the complex and varied elements of public-private partnership (PPP) agreements requires substantial technical and contractual resources and capability and carries significant risks. Traditionally, the LRMT system was procured through public contracts for implementation. However, whereas many public entities have elected to pursue this model (most notably in the United Kingdom), others have found value for money in PPP structures that transfer the risk of integrating the contractual elements to private partners. The most common means for accomplishing such transfers are PPP agreements with private developers that fully finance, design, build, operate, and maintain the concession.

Finally publicized failures and expensive bailouts of LRMT concessions, such as Kuala Lumpur’s STAR (Sistem Transit Aliran Ringan) and PUTRA (Projek Usahasama Transit Ringan Automatik), Bangkok’s Skytrain, and France’s Orlyval, have led some experts to question the value of the full concession model. They instead propose a model of public infrastructure procurement combined with management-style operation and maintenance PPP agreements for LRMT services. Indeed,

examples exist where the latter method may be the preferred option for procuring PPPs in LRMT. However, several recent LRMT PPPs have been successfully let as full concessions. Planners for the Nottingham Express Transit, Gautrain Rapid Rail Link, and Canada Line projects have all elected to use full concession models (Dachs 2008; Hand 2008; Hewitt and Louie 2008).

For established systems with several years of successful operation, or for limited line extensions, the argument for full design-build-operate-maintain concession agreements becomes less clear because of reduced complexities and associated risks. Infrastructure-only concessions or management style PPP agreements for publicly procured and owned assets may offer the best value for money option for established systems. Docklands Light Railway’s London City Airport and Woolwich Arsenal Extensions were both structured as infrastructure-only concessions (Keep 2008). Likewise, phase 3 of the Manchester Metrolink system will employ management-style contracts for publicly procured assets (Hand 2008).

Lastly, the decision to implement LRMT as a solution for urban transportation should be decoupled from the decision to procure new services on a PPP basis. Planning processes should follow formal procedures that should insulate projects from irrational biases wherever possible. Historically, that has been difficult to achieve because of perverse funding incentives and other bias-creating factors. Although fair, unbiased planning is indeed challenging to implement, the consequences of inappropriate investments in transport can be severe. It is also important to realize that even the best PPP agreements cannot substitute for sound transportation planning.

## 9.2 THE VALUE OF PRIVATE FINANCE

Simply stated, debt disciplines the actions of both planners and system managers. Initial lender due diligence can enhance project quality and supplement public review processes. Continuous lender oversight can also help monitor concession company operations during later stages of project implementation. LRMT PPPs that do not require leveraged private sector capital contributions forgo this value along with the additional benefits associated with placing some measure of private money at risk to further incentivize partners.

However, it is important to realize that private financiers are neither transportation experts nor guardians of the public interest. As past failures illustrate, the ability to access financing does not necessarily guarantee the wisdom of doing so. Many factors that determine bankability reside beyond the control of LRMT planners. Ill-conceived projects may be able to access private financing when macroeconomic conditions are sufficiently favorable or when lenders are not fully savvy about project risks. Unfavorable macroeconomic conditions may conversely place private financing out of reach for even the best-planned projects. Bankability is therefore not an absolute measure of an LRMT initiative's quality. Nevertheless, considerations related to private finance can help improve planning and monitoring processes.

## 9.3 DEVELOPING A STRATEGY FOR SUCCESS

Decisions related to the structure of private sector participation in LRMT initiatives must be coherent. Contractual mechanisms, technical specifications, policy elements, budgetary allocations, and other factors should align with one another as part of some overarching strategy for project implementation. Likewise, the plausible business case for private sector investment should create incentives for concessionaires and developers to act in support of any strategy for supplying new services.

Any contradictions between planning decisions, private incentives, or customer needs will inevitably reduce the likelihood of project success. Public authorities are the parties best suited to reconcile policy goals and craft customer-oriented LRMT strategy. Such authorities should be keen to design systems that offer clear value to customers instead of hoping that targeted customers find LRMT services attractive. Although hope is indeed a virtue, it is not a strategy for success.

### 9.3.1 Positioning LRMT Services and PPPs to Meet Customer Needs

Integrating with other modes of transport is particularly important to attract targeted customers. System design requirements should include appropriate integration links to other forms of public and private transportation when customers may require them. For example, park-and-ride and kiss-and-ride facilities can create value for customers at stations located to attract private vehicle commuters. When customers display aversion to existing feeder and distribution modes, project promoters should consider adjusting the PPP agreement's scope to provide a more acceptable service. Gautrain's use of cobranded buses in lieu of traditional public bus transportation illustrates how such adjustments can be accomplished.

Headways, transfer requirements, service schedules, and other operational characteristics should also reflect customer needs. For example, systems that target daily business commuters may attract additional ridership by using express services during morning or evening rush hours. Key performance indicators designed to manage private developers should also focus the greatest weight on those features most important to customers.

### 9.3.2 Aligning Technical Factors with Implementation Strategy

The technical aspects of LRMT systems should balance customers' willingness and ability to pay against the public sector's willingness and ability to subsidize. In addition, planners should consider the appropriateness of privately proposed technical solutions with regard to local conditions (for example, cost and availability of skilled and unskilled labor, cost and availability of local materials, and operating environment). Kuala Lumpur's PUTRA system, which incorporated sophisticated proprietary driverless Bombardier technology, is an example of a technical solution misapplied to local realities—ultimately at additional cost to Malaysian taxpayers (Halcrow Group 2004).

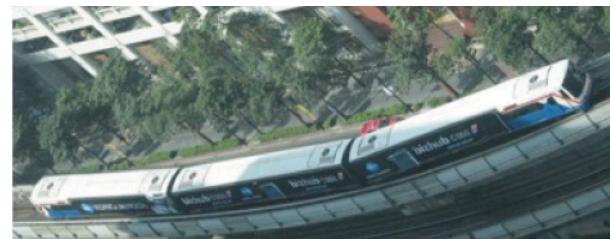
Strategies for implementation should also drive route alignment. Stations should be located where targeted customers work, live, and play. Alternatively, when the strategy for implementing LRMT services involves urban development (for example, Docklands Light Railway), route alignment should locate stations where planners want future customers to eventually frequent. Incorporating existing rail rights-of-way into system routes can help reduce upfront system costs. However, available rights-of-way should not align routes away from targeted customers. Lower-than-expected ridership on Kuala Lumpur's STAR system (which simply followed an abandoned industrial rail line) illustrates the potential consequences of misaligning routes relative to targeted customers.

Finally, contractual technical specifications should also insist on access for customers with disabilities. Beyond the obvious moral obligations, providing access to people with disabilities can make good business sense by helping to accommodate aging populations or by eliminating the need for costly future station upgrades.

### 9.3.3 Matching Contractual Structures with Strategies for Growth

Strategies for further system development have an important influence on the contractual structure that planners should choose for incorporating private sector participation. Full concession models may be incompatible with strategies that involve frequent line extensions, given that such contractual agreements are often inflexible regarding increased scope. Public bargaining power may suffer in negotiations with incumbents for expanded concession scope when failure to agree triggers large termination payments. The early termination of the Manchester Metrolink's phase 2 concession illustrates the potential incompatibility of full concession agreements and system expansion. Although shrewd PPP agreement design can facilitate extension, complex and potentially lopsided negotiations are still very likely.

Strategies for LRMT development that entail relatively frequent piecemeal system expansion may require “delayed” contractual structures. The Docklands Light Railway employs this model for private sector participation by using modular infrastructure-only concessions for civil works together with an expandable operation and maintenance franchise. Similarly, the Manchester Metrolink uses separately procured contracts for different system components, including operation and maintenance. Delayed contractual structures can offer greater flexibility for accommodating extensions by reducing the scope of required changes to existing PPP agreements. However, managing the interface between various contracts can potentially become difficult and may require additional capacity that some public institutions lack.



Bangkok, Thailand.  
Photo by and reproduced by kind permission  
of Samuel Zimmerman.





Full concession models for private sector participation may deliver better value for money when the strategy for implementing LRMT does not involve frequent extension over the concession contract's life. Canada Line is one example. Nevertheless, full concession contracts should include at least basic mechanisms for dealing with possible extensions—even when their probability is remote. Circumstances change with time, and strategies set during initial planning stages may evolve to require expanded contract scope.

### **9.3.4 Integrating Public Planning in Addition to Transportation Services**

Several sections of this book have mentioned the importance of integrating LRMT systems with other modes of transport. Private transportation links and publically available feeder and distribution networks enable LRMT to leverage advantages in greater passenger capacity, faster travel speeds, and lower marginal operating costs. In practice, integration has been difficult to achieve for several of the systems mentioned here. Besides budgetary and technical limitations, service integration often suffers when various public authorities fail to coordinate planning efforts under one centralized body. The consequences of poor integration can be dire for LRMT PPPs, as the Bangkok Skytrain demonstrated. When private partners do not take substantial demand risks, the need for service and planning integration is particularly important to guard the public interest.

In some circumstances, the size and highly publicized nature of LRMT investments can help drive public organizations to begin strategic metropolitan planning efforts. For example, Gauteng province in South Africa recently announced the creation of the Gauteng Management Transport Authority, which will oversee and align various transportation programs across the province's municipalities. Recently, large investments in the Gautrain system have helped create political impetus for this new centralized planning body (Dachs 2008; Gauteng

Province 2008). Ideally, such integration should occur before making large investments and committing substantial public resources.

## **9.4 MANAGING FARES INTELLIGENTLY**

Fares play a critical role in the outcome of LRMT investments. Some major considerations related to fares that planners should appreciate follow.

### **9.4.1 Opportunity Costs of Subsidizing the Farebox**

Fares exert critical influence over both ridership and revenues. The inverse relationship between those two factors creates an obvious challenge. Policy goals will generally emphasize ridership over revenues, depending on the availability of public support committed to an LRMT system. However, this approach may not be in the public's best long-term interest given the additional amounts of support required to sustain operations. As for private capital, public money also carries opportunity costs. Subsidies devoted to LRMT services could potentially have better uses elsewhere. Planners should consider how best to manage fares intelligently to reflect policy goals with an appreciation for rational allocation of public funds.

### **9.4.2 Price for Competition and Policy Objectives**

Fares need to reflect the customers' willingness and ability to pay. In addition, fares should align with policy goals, such as encouraging switching from private to public transport or providing services to poor transport customers. In some instances, policy goals may conflict with one another. For example, increasing fares to achieve higher farebox ratios (and minimize public operating support) may effectively exclude poor customers.

When such conflicts exist, planners must either prioritize or find creative solutions to allow for mutual success (for example, cross-subsidy schemes).

### 9.4.3 Leveraging of Private Incentives and Efficiencies

Effectively managing fare levels also requires flexible mechanisms for adjustment within PPP agreements. Providing developers some freedom to set fares in order to shape demand or to take advantage of profitable routes (such as airport connections) can be in both public and private interests—especially when public authorities take the majority of revenue-related risks. For example, Gautrain’s contractual agreement provides mechanisms that allow fare adjustments on specific links (that is, trips between certain stations). Gautrain’s concessionaire has a particularly large amount of freedom to adjust fares on Gautrain’s link to O. R. Tambo International Airport—a key revenue route that will effectively subsidize other parts of the system. Together with an agreement for sharing revenues that exceed a preagreed threshold, this agreement provides additional value capture by incorporating greater private efficiencies and incentives to maximize both ridership and revenue.

### 9.4.4 Provision of an Avenue for Political Influence

Fare levels are always politically sensitive. Implementing LRMT requires substantial public support as we have previously discussed. Large contributions of taxpayers’ money, combined with high visibility and the scale of LRMT services, can create political opportunity for conspicuous intervention into system operations. Requiring government approvals of fare levels is often the preferred outlet for exercising such influence. Problems can arise when private partners’ revenues link back to fares and the required public approvals become mechanisms for regulatory taking (that is, expropriation of the

concession’s value). Malaysia’s STAR and PUTRA systems may have suffered from this problem when discounts designed to correct lagging ridership became impossible to reverse. Phase 2 of the Manchester Metrolink also demonstrated the politically sensitive nature of fares when public outcry partially contributed to the concession’s premature termination. Demand for Metrolink’s services had been greater than expected, and the system’s developer was able to exploit significant pricing power by increasing fares considerably.

## 9.5 THE STRUCTURE OF PUBLIC SUPPORT DETERMINES OUTCOMES

LRMT’s upfront capital costs exceed the capacity of tariff revenues to support purely private scheme financing. Implementing LRMT services therefore requires some sensible structure for incorporating public support. Most recent LRMT PPPs have included substantial capital grants to reduce the amount of private finance necessary for funding upfront costs. This approach has become fairly standard for modern LRMT PPPs: Canada Line, Gautrain, and recent extension projects on both the Docklands Light Railway and the Manchester Metrolink systems have all incorporated sizable capital grants.

Although the need for public support is quite clear (through capital grants or otherwise), the obvious challenge for planners is not to offer an excess of public support. Providing for risk transfer requires that private partners have something to lose for nonperformance at every stage of project implementation (Dachs 2008). Inevitably, this approach implies value at risk in significant amounts. Project finance structures provide limited recourse vehicles that allow sponsors to take such risks together with lenders that provide debt. Although bankability concerns surrounding project finance may reduce options and pose formidable challenges for project promoters, there is considerable value in lenders’ due diligence and active oversight. Overly generous capital grants can potentially



sacrifice those benefits by excessively reducing the size and leverage ratios of private sector investments. Consequently, this practice can reduce value at risk and weaken incentives for private sector performance.

### 9.5.1 Funding Sources Matter

Although public authorities lack profit incentives that inspire private firms, their behavior is similarly affected by monetary considerations. Local transportation authorities are particularly subject to incentive structures created by regional or national government funding. When different levels of government pay the bulk of upfront project costs and cover potential overruns, local authorities may have added incentive to select riskier, more capital intensive transport solutions (such as rail-based public transportation). The ability to localize the benefits of transportation investments while externalizing the bulk of their associated costs is a major driver behind irrational decision making and biased mode selection. That capability may similarly have detrimental effects regarding the value for money of LRMT PPPs when local governments can rely on national funds to support suboptimal risk allocations. Guarding against such perverse incentive structures requires careful oversight within the government itself. National or regional PPP units with legal authority over project approval can help protect the broader public interest.

### 9.5.2 Implicit Guarantees Always Exist

LRMT systems supply valuable public services to a range of beneficiaries extending beyond fare-paying customers. Local merchants, developers, non-LRMT commuters, employees, equipment suppliers, and myriad other parties all potentially benefit. Even when the outcome of LRMT investments is less than ideal, substantial interest in maintaining services will almost always exist because of the numerous stakeholders involved. Consequently, the likelihood of a publicly sponsored

bailout for failed projects is quite strong. Abandoning a functioning LRMT system would simply be politically unacceptable in most cases (although not unprecedented).

The design of LRMT PPPs should account for this fact because any risks transferred to private partners have the potential of returning to public institutions if the private sector partners fail. Contracting authorities should therefore focus on transferring the right risks to private partners and only in appropriate amounts. If private partners cannot reasonably handle enough risk to justify value for money, projects should be procured on a traditional basis. Overloading partners with irrationally allocated risks or responsibilities can backfire when public authorities find themselves once again holding the product of a failed PPP. Even when irrational risk allocations do not cause a PPP to fail, public authorities may suffer reduced value for money when private parties endure inappropriate risks. Docklands Light Railway's Lewisham Extension, which allocated an element of demand risk to an infrastructure concessionaire, is an example of risk misalignment.

## 9.6 MANAGING DEMAND IS CRUCIAL TO SUCCESS

Effective management of demand is crucial to the success of any LRMT scheme. However, many of the factors that influence demand for LRMT services will be outside the influence of the private developer (for example, transport pricing, integration with other modes, and licensing for competing services). Typically, the grantor, as the responsible authority, will have potentially more influence over these factors and, thus, often takes more of the demand risk.

The grantor can help ensure that demand is optimized through the way that the PPP agreements are designed and implemented. A system of well-designed incentives





Source: <http://www.sxc.hu/>

through a sound performance management system, linked to performance-related payment, will help ensure that the developer meets or exceeds the planned performance target. The Gautrain and Canada Line case studies demonstrate examples of contractual structures that allow private partners to share in the benefits of increased system ridership.

## 9.7 PARTNERS' OTHER INTERESTS MATTER

LRMT projects deliver substantial benefits to parties whose interests reside outside the scope of system operations. Project planners should be keenly aware of how such external interests can influence the behavior and incentives of private partners. For example, concession shareholders with substantial real estate investments along proposed LRMT routes may expect the majority of their returns through the development of nonproject assets as opposed to revenues from system operations. Although lower expected returns on private operations would seem to benefit public institutions, the effects of external interest can also harm the sustainability of LRMT PPPs. Limited recourse project finance structures combined with significant external interests may pervert incentive structures that would otherwise promote sustainable system design and operations. Partners with interests outside the scope of LRMT concessions include the following:

- **Construction contractors.** When upfront capital grants are excessively large compared with the private investment, construction margins may be large relative to operating returns. This situation, in turn, can reduce the effective value that such partners have at risk during the system's operational life.
- **Real estate developers.** Property development along LRMT routes can yield proportionately large returns that can lead to aggressive project promotion without appropriate consideration for sustainable operations.

- **Rolling-stock manufacturers.** Showcasing new rolling-stock designs and developing captive buyers for proprietary technology can incentivize project promotion without sufficient regard for the business case for new services.

Designing public support structures so that partners still have considerable value at risk in project operations is the most obvious way to mitigate the undesirable effects of external interests. As previously discussed, the balance between too much and too little public support is difficult to achieve. In cases where private partners' external interests far exceed their interests in long-term system operations, realizing this balance may even prove impossible. Planners and policy makers must be cautious when selecting private partners and structuring contracts to ensure that such impossibilities do not arise.

## 9.8 INTERNATIONAL SPORTING EVENTS AND LRMT

Major international sporting events present unique management challenges for LRMT planners. Accommodating increased demand for services during and around the dates of competition is perhaps the most obvious challenge associated with such events. However, beyond ferrying large numbers of spectators between venues, host-city or host-country transportation networks are expected to showcase the best in local planning and project implementation. The increased media attention that accompanies such events can influence global perceptions, thus carrying considerable economic and political consequences. Such consequences, in turn, can create strong incentives to implement or upgrade public transportation solutions before receiving the world's attention. International sporting events have influenced completion, expansion, or extension efforts for several of the case studies mentioned within this book (see table 9.1).

Table 9.1

**Case Study Systems Influenced by International Sporting Events**

System name	Sporting event	Effect
Gautrain Rapid Rail Link	2010 FIFA World Cup	Targeted completion of link between O. R. Tambo International Airport and Sandton before World Cup event
Canada Line 2010	Olympic and Paralympic Winter Games	Targeted full system completion before games
Kuala Lumpur STAR and PUTRA systems	1998 Commonwealth Games	System completion (PUTRA) and extension to serve the National Sports Complex (STAR) before games
Docklands Light Railway	2012 Olympic and Paralympic Summer Games	Targeted capacity increase of 50% by 2010, requiring platform extensions to support three-car rolling-stock configurations

Sources: Canada Line Rapid Transit 2008; Gautrain Rapid Rail Link 2008; Mohamad 2003; Transport for London 2008a.

Major sporting events create hard deadlines for completion, which are known to all parties. Those hard deadlines can both help and hinder contracting authorities. Ensuring completion before major events can help galvanize government planning and approval processes. Conversely, publicized completion dates can force a government's hand by requiring preworks contracts or additional expenditures aimed at accelerating project completion. Public negotiating power may also suffer when private counterparts perceive time constraints on the procurement process or when the public "walk-away" alternative loses credibility.

Historically, large sporting events may also have contributed to irrational decision making when choosing between transport solutions. Speculations suggest that both the STAR and PUTRA systems were heavily influenced by the Malaysian government's desire to showcase technological sophistication and build-operate-transfer capacity during the 1998 Commonwealth Games in Kuala Lumpur (Halcrow Group 2004). That may be especially true for the PUTRA system, which employed complex, fully automated driverless Bombardier rolling stock despite less costly alternatives.

Planners must be keenly aware of the influence that international sporting events can exert on LRMT projects. The importance and global publicity tied to such events will inevitably create both opportunities and potential hazards that warrant special consideration. Well-established and formal processes for selecting transportation solutions can help guard against irrational decision making. Similarly, intelligent procurement strategies can also help preserve public negotiating power. Procuring private partners well in advance of known deadlines can lend credibility to rebidding options or other undesirable consequences of failed negotiations.

## 9.9 RECOMMENDATIONS FOR PROCUREMENT

The technical and contractual complexities of LRMT systems make for lengthy and involved procurement processes. This factor can expose public authorities to additional risks related to price indexations and waning bidder interest. Intelligently designed and disciplined procurement processes are therefore essential for protecting the public interest. In plans to procure LRMT PPPs, the following elements should specifically be considered.

### 9.9.1 Using a Systematic and Disciplined Procurement Management Approach

A competent and efficient procurement management approach will help ensure the success of the selection procedure. A dedicated management team—supported by an effective high-level steering group established by the grantor, with adequate power and resources—is a key element in developing, procuring, and implementing the LRMT PPP agreement. Using an experienced transaction adviser to help guide and establish the PPP agreement will contribute to the success and effectiveness of the entire design and procurement process.

The design, development, and successful implementation of LRMT PPP schemes are the result of an expensive and lengthy process. We have described the extensive measures that must be taken to produce an effective LRMT PPP scheme. In the same way, we can say that time and money invested into proper procurement preparation and management will have a positive effect on the ultimate success of the long-term project.



### 9.9.2 Retaining Sufficient Technical Capacity throughout Procurement

Concessions or turnkey contracts do not eliminate the need for public sector technical capacity. It is important for the grantor to retain sufficient engineering capacity to evaluate and continually monitor the technical aspects of LRMT proposals and subsequent operations. Experiences from the Gautrain Rapid Rail demonstrate that maintaining in-house engineering capacity may prove valuable for contracting authorities. Gautrain's construction specifications had adopted international standards for viaduct construction because South African standards (intended for heavy rail overpasses) would have required significant overdesign. Engineers working for the Gautrain Management Agency (the grantor) discovered that viaduct designs included in the winning proposal met selected international standards, but they would have been underdesigned for heavier train sets that could potentially run on the system following the end of the concession term.

The Gautrain Management Agency subsequently negotiated for more robust viaduct design. Although this redesign came at a greater cost to Gauteng province, it will likely help avoid technical problems later in the system's life.

### 9.9.3 Using Consultation to Reach a Successful PPP Agreement

A key to successful development of any LRMT PPP agreement is to draw on the experience, advice, and resources of industry stakeholders and to use them to mold and adapt the agreement to the best advantage of the project. The development and procurement processes must be structured to take advantage of this possibility. This approach has proved particularly effective in complex LRMT PPP schemes. We have shown a variety of ways that consultation can be used most effectively at various stages—including the use of initial market soundings to establish developer interest and bidder conferences—during the formal procurement process.

It is important that the results of consultation at all stages of the process be used to shape a more effective design of the PPP agreement, to offer increased benefits, and to ensure attractiveness to developers and financiers.

### 9.9.4 Using Prequalification Processes

The complexity of LRMT projects warrants prequalification processes to ensure selection of capable bidders and to preserve reasonably attractive and competitive prospects for qualifying developers. However, prequalification standards must not become a tool for eliminating competition entirely. For example, during the procurement of Manila's MRT3 system, four out of five competing consortia failed to pass prequalification. Negotiations with the sole remaining bidder resulted in a contentious contractual agreement that was partially responsible for later conflicts among government agencies, elected officials, and private partners.

### 9.9.5 Avoiding Early Works Contracts

Adhering to targeted completion deadlines for LRMT systems can require infrastructure work to begin before completion of final negotiations. These contracts for early works can allow lengthier negotiation periods without affecting promised system delivery dates. However, contracts for early works also substantially reduce the public sector's negotiating power by limiting the credibility of any walk-away alternative. Abandoning early works for a highly publicized LRMT system would result in public criticism and political pressure. Similarly, early works may be incompatible with a reserve bidder's proposed technological solution.

Ideally, contracting authorities would implement procurement processes early enough to avoid the need for early works contracts. Actual conditions are rarely ideal, however, and the need for such arrangements will likely arise on future LRMT projects. When circumstances leave no other option, quantitative and qualitative examination together must ulti-

mately decide the trade-off between the disadvantage of forgone negotiating power and the advantage of earlier construction.

### 9.9.6 Compensation for Unsuccessful Bidders

Bidding for LRMT concessions is expensive. Retaining at least two bidders until final selection is desirable to maintain public bargaining power. However, the bid costs for LRMT PPP schemes are extremely high, and suitable bidders may be deterred from completing the full selection process if they believe they are unlikely to recoup those costs if they are unsuccessful. Some grantors, such as those for the Canada Rail project, have successfully used some form of bidder compensation (for example, compensation based on a percentage of proven bid expenditures or some form of fixed-sum “honoraria”) to maintain the number of effective bidders.

### 9.9.7 Adhering to Timetables

Private bidders and public institutions alike incur greater costs as procurement processes lengthen. It is therefore important for contracting authorities to set and adhere to reasonable procurement deadlines. Private partners also show preference for disciplined procurement management and early elimination in the event that proposals are not competitive. Establishing credibility with regard to deadlines can be especially important for LRMT contracting authorities that choose to use delayed contracts for various system components. Delayed contractual structures can increase the frequency of procurement cycles and, in so doing, can magnify the benefits of credible procurement management. The Docklands Light Railway uses such a delayed structure. Through this structure, Docklands Light Railway Ltd. (Docklands’ grantor) secures the value of disciplined, credible, and timely procurement management (Keep 2008).

## 9.10 FINAL THOUGHTS

Incorporating private sector participation in LRMT initiatives can offer good value for money, but it requires carefully managed planning and implementation. The complex and massive nature of LRMT investments has a direct effect on the type and form of private sector involvement, and ensuring adequate public and private sector funding requires a major investment in commitment, time, and resources by the grantor.

Development of LRMT schemes using PPP arrangements entails the rigor of a structured approach that will satisfy both public and private sector objectives.

Funding for LRMT schemes can be difficult to structure because of large upfront costs. However, using a structured PPP approach, the scheme can be designed to incorporate current best practice, and through market consultation, it can be tailored to optimize the scheme’s bankability and attractiveness.

Sound transport policy, prudent risk allocations, coherent implementation strategies, and well-structured public support are the best tools to achieve a successful LRMT PPP scheme. Although I hope this work has presented some thoughts on how best to develop LRMT PPP schemes, it is clear that there is no one-size-fits-all solution. Accordingly, investments in LRMT PPPs should warrant extensive case-by-case consideration, drawing on the best current experience and incorporating the very best in local talent and international expertise.



Source: <http://www.sxc.hu/>





**ANNEX 1**

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# **SELECTED CASE STUDIES**

## Table of Case Studies

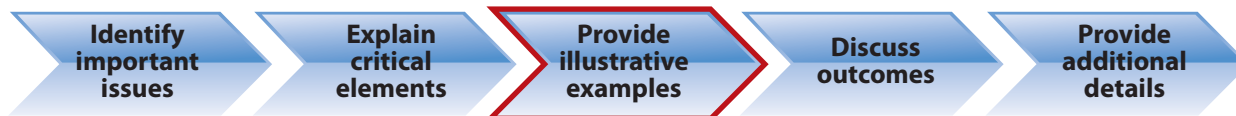
- Manchester Metrolink - United Kingdom
- Docklands Light Railway - London, United Kingdom
- Kuala Lumpur STAR and PUTRA - Malaysia
- Gautrain Rapid Rail Link - Gauteng Province, South Africa
- MRT 3 'Metrostar Express' - Manila, Philippines
- Bangkok Skytrain - Thailand
- Canada Line - Vancouver, Canada

## The Case Study Approach

This annex presents case studies, selected from recent major international LRMT PPP schemes, and chosen to represent a diverse range of scheme options, from which to draw the most relevant and practical lessons. The text drew heavily on these case studies to illustrate the issues covered, and in the diagram below we show how the case study approach is integral to the development of this work:

Figure: 1

### Case Study Approach for Presenting PPPs in LRMT



Some of these LRMT initiatives yielded outcomes that differed substantially from what was originally envisaged. For example, several of the LRMT PPPs studied terminated before their planned completion dates. One main reason was that the challenges encountered were typically more complex than originally envisaged (often including political and macroeconomic factors outside the project's scope). Nevertheless, there appear to be specific measures that can enhance chances for success in an uncertain world, and we draw on this experience.

Table A 1.1

## Technical and Known Financial Elements of Selected Case Studies

System / Phase	Bangkok Skytrain	Canada Line	Docklands Light Railway 1987	Docklands Light Railway (Lewisham)	Docklands Light Railway (City Airport)	Docklands Light Railway (Woolwich)	Gautrain Rapid Rail Link	Kuala Lumpur STAR	Kuala Lumpur PUTRA	Manchester Phase 1	Manchester Phase 2	Manila MRT 3
Notes	-	-	Without extensions	-	-	-	-	Including extensions	-	-	Eccles extension	Phase 1 only
Track (km)	235.0	19.0	13.0	4.20	4.40	2.50	77.0	27.0	29.0	31.0	6.40	16.80
Number of stations	23	16	15	5 new 2 reconstructed	4	1	10	25	24	26	10	13
Opening date	Dec. 1999	2009 (est.)	Aug. 1987	Nov. 1999	Dec. 2005	Feb. 2009 (est.)	2010 (est.)	Dec. 1996 (phase 1) Dec 1998	Sept. 1998	April, 1992	Dec. 1999 (partial) July 2000 (full)	Dec. 1999 (partial) July 2000 (full)
Approx. cost	B54b	Can\$1.904b (2003 Can\$)	£77m	£220m <sup>1</sup>	£140m	£180m	ZAR22.3b	RM3.5b	RM5b	£145m	£160m	US\$655m
Approx. cost <sup>2</sup> (2008 US\$)/km	797	881	184	1086	609	1165	286	455	607	130	474	494
Physical description	Elevated	7.5 km elevated 6.5km cut and cover tunnel 2.5 km bored tunnel 2 km at grade	Elevated	Elevated, 800 m viaduct across Deptfort Creek, bored tunnels under the Thames	Elevated	Elevated with 1.8 km bored tunnels under the Thames	14 km of underground track, 200 bridges / viaducts	Primarily elevated with approximately 4.4. km of underground track	Primarily at grade with approximately 9.4 km of elevated track 8 elevated stations	Mostly at grade	At grade and 'on street'	Approximately 3/5 elevated and 2/5 at grade with 1 underground station
Capital grant	NA	Can\$1.247b (2003 dollars)	NA	LDDC <sup>3</sup> £50m	DoT. £30m	unknown	ZAR19.2b	NA	NA	£145m	£65m	NA
Investment details <sup>4</sup>	IFC equity and debt investments KfW debt investment	Private Investment Can\$500 debt Can\$157 equity	NA	DoT 50m £165m bonds 4.5m mezz. debt 1.5m equity 11m loan stock <sup>5</sup>	DoT 30m RBS £178m £4m in equity <sup>6</sup>	EIB £100m of senior debt RBS £115 senior debt, 24m equity bridge loan <sup>7</sup>	ZAR3,094 m private investment (approximately 85% debt)	unknown	unknown	Small £5m concession fee paid by private consortium	unknown	unknown

<sup>1</sup> United Kingdom National Audit Office. Improving public transport in England through light rail. (2004)

<sup>2</sup> Estimated by converting costs into US\$ at the first year of full operations and then adjusting those figures by the US CPI index

<sup>3</sup> London Docklands Development Corporation

<sup>4</sup> Note: figures for investment details do not total official project costs in a number of cases

<sup>5</sup> Duff and Phelps Rating Co. City Greenwich Lewisham Rail Link PLC £165,000,000 Secured Bonds Due 2006-2020. (1966) Bond Rating, London

<sup>6</sup> Project Finance. PPP/Municipal Finance. (2003) Project Finance Magazine

<sup>7</sup> Project Finance. Deal Analysis DLR Woolwich: Fab prefab. (2005) Project Finance Magazine



Table A 1.2

Contractual Elements of Selected Case Studies

System / Phase	Bangkok Skytrain	Canada Line	Docklands Light Railway (Lewisham)	Docklands Light Railway (Other Infrastructure only)	Docklands Light Railway (O&M franchise)	Gautrain Rapid Rail Link	Kuala Lumpur STAR	Kuala Lumpur PUTRA	Manchester Phase 1	Manchester Phase 2	Manchester Phase 3a	Manila MRT 3
Contract date / duration	April 1992 for 30 years	July 2005 for 35 years	1993 for 24.5 years	Feb. 2003 & May 2005 both for 30 years	1997 for 7–9 years	Sept. 2006 for 20 years	Nov. 1991 for 30+30 years	Feb. 1993 for 30+30 years	Sept. 1989 for 15 years	April 1997 for 17 years	May 2008 for 10 years	1991 - 1993 for 25 years
Structure for PPP	Full concession	Full concession	Infrastructure only concession	Infrastructure only concession	O&M franchise	Full concession	Full concession	Full concession	Small concession (fee of £5m)	Full concession	O&M contract	Concession w/leaseback to public operator
Mechanism for public support	In-kind grants	Capital grant, in-kind grants	Capital grant, in-kind grants	Capital grants, in-kind grants	Capital grants for large purchases (i.e., rolling stock)	Capital grant, in-kind grant	Soft loans, in-kind grants	Soft loans, in-kind grants	Capital grant, in-kind grants, some detailed design	Capital grant, in kind grants	Full public procurement of assets	Lease payments
Treatment of demand risk	100% private	98% public 2% public	Public during early years, later private	Public	Public (with small volume based 'sweetner for operator')	Downside is entirely public. Upside is split	100% private	100% private	Public	Private	Public	Public
Source of private compensation	Farebox	Availability / quality payment and volume based shadow fare	Availability payment and shadow fare	Availability payment	Availability payment	Availability payment and farebox above min. rev.	Farebox	Farebox	Farebox	Farebox	Availability payment	Govt. lease payments
Fare setting	Private with a regulated cap	Public	Public	Public	Public	Private with a regulated cap	Private with a regulated cap	Private with a regulated cap	Private	Private	Public	Public
Known outcomes	Currently undergoing court approved restructuring	Nearing operational debut	Operational	Operational	Operational	TBD	Insolvency and public bailout	Insolvency and public bailout	Terminated at 4 year option mark	Terminated	TBD	Operational, but govt. is looking to buy back the concession

Table A 1.3

MANCHESTER METROLINK – UNITED KINGDOM

	General Summary
Discussion	<p>Planners originally sought to link Manchester’s Piccadilly and Victoria Stations via an underground tunnel as a means of integrating regional train services. After initial examination, the “Picc-Vic tunnel” solution was deemed too expensive and otherwise unjustifiable. Phase one of the Metrolink project presented a lower cost option for linking Manchester’s train stations. Additional Metrolink stops also replaced an aging legacy system of electric railcars.</p> <p>Metrolink’s development has progressed in three distinct stages:</p> <p><b>Phase 1</b> included the original link between Victoria and Piccadilly stations in addition to stops previously served by Manchester’s aging electric railway system. Phase 1 was a publically funded project with private contracts for design, construction, operation, and maintenance.</p> <p><b>Phase 2</b> further expanded the Metrolink system and was a full concession aimed at leveraging private sector resources to fund system expansion. Like phase 1, this contract allocated design construction operation and maintenance responsibilities to the private sector.</p> <p>Because of delays in commencing Phase 3, phase 1 and 2 upgrades were required to provide essential improvements and/or renewals. These were/are being undertaken as separate tasks. They include supply of eighth additional (Bombardier Flexity Swift) vehicles (to be delivered in 2009) power supply upgrades, and major infrastructure upgrades including renewal of the track. The total cost of the public sector works was approximately £102 million phased over 4 years.</p> <p><b>Phase 3</b> (also known as “the big bang”) was originally proposed as one large system expansion, but was later scaled down into two smaller phases (“a” and “b”) of price escalations and limited public funding capacity. Phase 3a involves separate contracts for</p> <ul style="list-style-type: none"><li>• Design and construction, including electrical and mechanical works</li><li>• Tram operations and maintenance</li><li>• Operating systems and infrastructure maintenance</li><li>• Rolling stock provision</li><li>• Fare collection (which forms part of the operations contract, although farebox risk is retained by Greater Manchester Passenger Transport Executive (GMPTE).</li><li>• Management of other contracts (e.g., for separate projects such as the Queens Road Depot expansion).</li></ul> <p>The M-Pact Thales consortium has been selected to design and construct phase 3 of the Metrolink system. Bombardier will supply 32 new Flexity Swift LMRT vehicles, and Stagecoach will operate and maintain the system (having won both operation and maintenance contracts).</p>

Continuation of General Summary

<b>Contract award date(s)</b>	<b>Phase 1:</b> September 1989 <b>Phase 2:</b> April 1997 <b>Phase 3a:</b> May 2008 <b>Phase 3b:</b> To be determined
<b>Type of contract</b>	<b>Phase 1:</b> Concession (with a very small amount of private investment) <b>Phase 2:</b> Concession <b>Phase 3a, 3b:</b> Operation and maintenance contract along with a separate design-build contract and other publically procured asset
<b>Contract duration</b>	<b>Phase 1:</b> 15 years <b>Phase 2:</b> 17 years <b>Phase 3:</b> (Operation and maintenance contracts) 10 years
<b>System operator</b>	<b>Phase 1:</b> the GMA Group <b>Phase 2:</b> Serco (part of the Altram consortium) <b>Phase 3a:</b> Stagecoach <b>Phase 3b:</b> To be determined
<b>Current status</b>	<b>Phase 1:</b> Terminated <b>Phase 2:</b> Terminated <b>Phase 3a:</b> Active <b>Phase 3b:</b> To be determined
<b>Relevant public institutions</b>	<b>Greater Manchester Passenger Transport Authority (GMPTA):</b> A planning and policy body representing 10 district councils in the Greater Manchester Area <b>Greater Manchester Passenger Transport Executive (GMPTE):</b> An independent entity that implements the policies of GMPTA. GMPTE owns the assets of the Manchester Metro-link
<b>Private stakeholders</b>	<b>Phase 1:</b> the Altram consortium: John Liang (26.1%), Ansaldo Trasporti (26.1%), Serco (26.1%) and 3i (21.7%) <b>Phase 2:</b> the GMA group: GEC, Mowlem, and AMEC <b>Phase 3a:</b> the M-pact Thales consortium: Thales, Laing O'Rourke, and GrantRail <b>Phase 3b:</b> To be determined

Table A 1.3 Manchester Metrolink



	Noteworthy Contractual Elements
<i>Treatment of demand / revenue risks</i>	<p><b>Phase 1:</b> Unknown</p> <p><b>Phase 2:</b> The private concessionaire assumed all downside revenue risks and was obliged to partially share upside with GMPTE above a certain threshold</p> <p><b>Phase 3a:</b> GMPTE assumes all revenue risks but, Stagecoach is accountable for revenue security</p>
<i>Allocation of other major risks</i>	Unknown
<i>Provisions for expansion /extension</i>	<p>Phase 3's funding and contractual structure aims at enhancing the system's flexibility to expand or increase capacity without requiring a large termination payment (as encountered during phase 2). During phase 3a's tendering process, bidders were required to specify indicative prices for system expansion. These "option" prices are non binding but offer a reference for future negotiations.</p>
<i>Mechanisms for dispute resolution</i>	Unknown
<i>Other</i>	<p>As an added quality assurance mechanism, the design and construction contract for Metrolink's phase 3a expansion includes a period during which the design / build contractor will maintain new works. This feature also aims at synchronizing the procurement of Metrolink's maintenance services with the expiration of Stagecoach's current contract.</p>
	Summary of Policy Elements
<i>Strategic Metropolitan Transport Planning (SMTP)</i>	GMPTA formulates transport policy for the greater Manchester area, that GMPTE then implements. Metrolink's services form a major part of GMPTA's strategic planning efforts.
<i>Value proposition of project</i>	Metrolink was originally proposed as a means of connecting Manchester's Victoria and Piccadilly stations to allow for easy integration between various regional train services. Additional phase 1 Metrolink services cannibalized a legacy electric train system in need of replacement. Subsequent expansions have aimed at reducing automobile dependence and increasing urban development in previously unserved areas.
<i>Justification for PPP approach</i>	National government policies have prescribed and encouraged PPP. Value for money analysis performed after the Phase 2 concession has led to an alternate approach in phase 3 for incorporating private sector participation.

Continuation of Summary of Policy Elements

<b>Affordability / equitability</b>	Robust demand for Metrolink services allowed the phase 2 operator to raise fares significantly. Critics speculated that increased fares were an attempt to “price off” demand and avoid additional rolling stock purchases. In contrast, GMPTA sought to maximize ridership. These conflicting objectives contributed to the concession’s eventual termination.
<b>Other</b>	Metrolink operates within an environment of regulated competition with other modes, including private vehicles. Proposed congestion based road pricing will endeavor to make Metrolink’s services even more competitive with private transportation.
	<b>Technical Summary</b>
<b>System length (km)</b>	<b>Phase 1 new works:</b> 31 <b>Phase 2 new works:</b> 6.4 <b>Phase 3a new works:</b> 22.5 km
<b>Number of stations</b>	<b>Phase 1 new stations:</b> 26 <b>Phase 2 new stations:</b> 10 <b>Phase 3 new stations:</b> unknown
<b>General characteristics</b>	Predominantly surface system with some underground and elevated segments. Approximately 75% of the Metrolink system is segregated from general traffic.
<b>Rolling stock</b>	Metrolink currently uses three different types of rolling stock. Phase 1 originally incorporated stations from a legacy British Rail stations that had elevated platforms. All Metrolink stations and trams now accommodate this feature.
<b>Ticketing, barriers, and security</b>	<ul style="list-style-type: none"><li>• Metrolink does not incorporate any barriers or conductors</li><li>• UK transit police have jurisdiction on Metrolink trains</li><li>• CCTV cameras monitor system security</li><li>• For phase 3, the operator employs ticket inspectors and is evaluated on system revenue security as one KPI</li></ul> <p>Metrolink is an open system but passengers do not have the legal right to board Metrolink’s trains without a ticket and must purchase them before boarding the train. A schedule of escalating fines serves to dissuade potential fare evaders according to the number of their offences within a 12 month period:</p> <ul style="list-style-type: none"><li>• 1st offense: £10 on the spot or £15 within 21 days</li><li>• 2nd offense: £20 on the spot or £30 within 21 days</li><li>• 3rd offense: £40 on the spot or £60 within 21 days</li><li>• 4th offense: £80 on the spot or proceed to prosecution</li></ul>

Table A 1.3 Manchester Metrolink

	Metrolink's current phase 3 operator (Stagecoach) employs inspectors who check passenger tickets and issue citations. GMPTE, in turn analyzes the revenue security of the Metrolink system as a key performance indicator when judging Stagecoach's performance. While Stagecoach ultimately bears no revenue risks, this format gives incentive to reduce fare evasion.
<b>Integration with other modes</b>	Metrolink succeeded in linking Victoria and Piccadilly stations as originally intended. Metrolink's current operator (Stagecoach) also operates a number of bus services in the Manchester area helping to achieve integration.
<b>Accuracy of initial forecasts</b>	Phase 1 and 2 exceeded demand forecasts. Phase 3 is to be determined.
<b>Other</b>	-
<b>Financial Summary</b>	
<b>Approximate cost</b>	<b>Phase 1:</b> £145 million <b>Phase 2:</b> £160 million <b>Phase 3a:</b> £575 million (estimated)
<b>Approximate cost (2008) / km</b>	<b>Phase 1:</b> US\$13 million / km <b>Phase 2:</b> US\$47.4 million / km <b>Phase 3:</b> To be determined
<b>Sources of funding and financial structure</b>	<b>Phase 1 (£145 million):</b> £15 million (10%) Borrowings from the European Investment Bank £48 million (33%) Department of Transport Section 56 Grant £13 million (9%) European Regional Development Fund £69 million (48%) Borrowings by GMPTA <b>Phase 2 (£160 million):</b> £95 million (58%) Altram £12 million (7%) Developers £10 million (8%) European Regional Development Fund £26 million (16%) GMPTA cash contribution £17 million (11%) Borrowings by GMPTA <b>Phase 3 (TBD):</b> Funding for Phase 3b will be a key part of the GMPTE 2007 Transport Innovation Fund bid. This is closely linked with proposals for the introduction of road user congestion charging. Phase 3 will not incorporate any private capital



Continuation of Financial Summary

<b>Donor funding / financing</b>	European Investment Bank (phase 2) European Regional Development Fund (phases 1 and 2)
<b>Public support</b>	Upfront capital contributions in differing proportions for all phases in addition to in-kind grants
	<b>Operational Summary</b>
<b>Fares and fare structure</b>	Zone based, with day, multiday, or season ticket options
<b>Operator assessment and incentive structure</b>	<p>Metrolink uses a Performance Management System with KPIs that focus on “what customers can see.” A ratchet type system of punitive measures seeks to incentivize timely correction of lagging KPIs without jeopardizing the operator’s solvency.</p> <p>Refurbishment and maintenance were bid evaluation criteria during phase 3 procurement. Key performance indicators from Manchester’s phase 2 performance management system (e.g., runtime, noise levels, appearance, etc.) were intended to ensure appropriate maintenance and rehab without necessarily prescribing these things in the contract. Phase 3’s performance management system goes slightly further and includes prescriptive minimum maintenance requirements.</p>
<b>Other</b>	-
	<b>Other Information</b>
<b>Other</b>	-

Table A 1.3 Manchester Metrolink

Table A 1.4

**DOCKLANDS LIGHT RAILWAY – LONDON, UNITED KINGDOM**

	General Summary
<b>Discussion</b>	<p>Dockland Light Railway (DLR) originally began as a publically procured £77 million feeder service project within an overall urban regeneration initiative for London's Docklands area. It was envisaged as a modern, innovative, and attractive system servicing low level developments, and initial ridership projections were based on this assumption. Demand for the DLR's services increased beyond original predictions in response the Canary Wharf high rise development. Planners decided to network extensions/upgrades on a PPP basis even before the DLR's first stage was fully complete.</p> <p>Docklands Light Railway Limited (DLR's public sector contracting authority) manages the system through a single O&amp;M franchise and several "de-layered" BOT infrastructure concessions for new lines/network extensions.</p>
<b>Contract award date(s)</b>	<p><b>Current Operations and Maintenance Franchise:</b> 1997</p> <p><b>Lewisham Extension Concession:</b> 1993 (opened Nov. 1999)</p> <p><b>City Airport Extension Concession:</b> February 2003 (opened Dec. 2005)</p> <p><b>Woolwich Arsenal Extension Concession:</b> May 2005 (due to open last quarter 2009)</p>
<b>Type of contract</b>	<p><b>Current Operations and Maintenance:</b> Franchise agreement</p> <p><b>Lewisham Extension:</b> Infrastructure only concession</p> <p><b>City Airport Extension:</b> 30 years</p> <p><b>Woolwich Arsenal Extension:</b> 30 years</p>
<b>Contract duration</b>	<p><b>Operations and Maintenance Franchise:</b> 7 years with a 2-year extension option</p> <p><b>Lewisham Extension Concession:</b> 24.5 years</p> <p><b>City Airport Extension Concession:</b> 30 years</p> <p><b>Woolwich Arsenal Extension Concession:</b> 30 years</p>
<b>System operator</b>	Serco Group Plc
<b>Current status</b>	<p><b>Operations and Maintenance Franchise:</b> Active</p> <p><b>Lewisham Extension Concession:</b> Active</p> <p><b>City Airport Extension Concession:</b> Active</p>

Continuation of General Summary

<b>Relevant public institutions:</b>	<p><b>Woolwich Arsenal Extension Concession:</b> Active</p> <p><b>Transport for London:</b> Presides over all transportation services for which the mayor of London is responsible including:</p> <ul style="list-style-type: none"><li>• London’s Buses</li><li>• London underground system</li><li>• Docklands Light Railway</li><li>• London overground</li><li>• Tramlink</li><li>• London river services</li><li>• Victoria coach station</li></ul> <p><b>Docklands Light Railway Limited:</b> Owns the assets of the Docklands Light Railway and functions as the system’s contracting authority within Transport for London.</p>
<b>Private stakeholders</b>	<p><b>Lewisham Extension Concession:</b> John Mowlem, Hyder Investments, London Electricity, and Mitsui and Co.</p> <p><b>City Airport Extension Concession:</b> AMEC and the Royal Bank of Scotland</p> <p><b>Woolwich Arsenal Extension Concession:</b> AMEC and RBS</p>
	<b>Noteworthy Contractual Elements</b>
<b>Treatment of demand / revenue risks</b>	<p>The office of the mayor of London sets DLR tariffs through Transport for London. With the exception of the Lewisham concession, private partners do not take farebox risks as part of their base compensation. Serco’s operating and maintenance franchise does, however, include the opportunity for additional upside depending on system use.</p> <p>DLR’s first concession (Lewisham) was the first transportation Private Finance Initiative (PFI) project in the United Kingdom. It was structured such that the concessionaire (City Greenwich Lewisham Rail plc) was paid an availability fee for the first 10 years and took farebox risk for the final 11 years of the concession period. Experience showed that this approach to risk allocation did not offer good value for money because the concessionaire, as infrastructure provider, was not involved in system operation; could not influence the quality of service and therefore not do anything to directly increase the ridership. Consequently, subsequent concessions are based entirely on an availability payment system.</p>
<b>Allocation of other major risks</b>	<p>Both franchise and concession availability payments include RPI indexation.</p>

Table A 1.4 Docklands Light Railway



<b>Provisions for expansion / extension</b>	Using de-layered infrastructure concessions allows the DLR to easily extend the network and add new lines by bidding out new concession contracts for infrastructure only. Operational responsibilities for the extensions are added to the scope of the existing franchise agreement. The franchise contract provides mechanisms for these extensions and also includes costs established with the franchise bid for operation of additional services on a marginal cost basis.
<b>Mechanisms for dispute resolution</b>	Docklands Light Rail Limited (the system contracting authority under Transport for London) serves as an initial layer of dispute resolution between private partners. To aid in cooperation and communication efforts, private partners actually maintain offices adjacent to Dockland Light Railway Ltd. Collocation helps to ensure close coordination among private partners and with the DLR's contracting authority.
<b>Other</b>	<p>Major periodic infrastructure refurbishment (such as track renewal) is included within the scope of DLR's infrastructure concession contracts and so priced into the original bids. For new rolling stock purchases and major operational upgrades, Docklands Light Railway Limited pays the bulk of new capital / refurbishment costs. However, DLR's franchisee is required to contribute funds when improvements are mutually beneficial. Serco's operating and maintenance franchise agreement also specifies some minimum level of investment. Serco and Dockland's Light Railway Ltd. together agree on a plan for annual capital projects. This plan sets out those improvements that both the authority and the franchisee see as necessary for maintaining high service quality and keeping the DLR system operational. A pre-agreed formula within the franchise agreement determines what proportion of these costs DLR's private franchisee is obliged to cover.</p> <p>DLR's new concession agreements include "breakpoints" at various dates. As part of the bidding process, concessionaires were required to indicate the costs of "breaking" the contract at certain dates. These were 2013 and 2020 (which are possible end of franchise periods) in case DLR wished to do any consolidation. Pre-agreed costs at these dates provides the DLR's contracting authority a basis for accurate decision making without having to enter into negotiations with little or no bargaining power.</p>

	Summary of Policy Elements
<b>Strategic Metropolitan Transport Planning (SMTP)</b>	It is unknown whether the DLR was part of a master transport plan, although it now resides within the larger Transport for London system. DLR was developed stage by stage, rather than as one huge project, which improved deliverability on a PFI basis. This approach also offered DLR the opportunity to gain by experience each stage and refine the PFI/PPP model with each successive extension.
<b>Value proposition of project</b>	The DLR is an example of transit oriented urban development. In addition to providing access to the Docklands area, the image of a modern and sophisticated rail system was seen as adding further value to redevelopment efforts. Light rail rolling stock incorporating articulated joints also offered the ability to construct track with very tight corners – a requirement for servicing the Canary Wharf development.
<b>Justification for PPP approach</b>	‘Value for Money’ analysis and national government policies in favor of or requiring private sector participation/ private finance initiative (PSP/PFI) led to the DLR’s current PPP arrangements. Sources suggest that much of the credit for early and on budget completion of DLR’s various extensions belongs to the United Kingdom’s PFI model.
<b>Affordability / equitability</b>	DLR’s services never explicitly targeted any single group. Approximately 60-70% of the system’s current riders are commuters who work in the revitalized docklands area. Other riders include local residents many of whom are lower income.
<b>Other</b>	-
	Technical Summary
<b>System length (km)</b>	Original 1987 DLR: 13 Lewisham Extension: 4.2 City Airport Extension: 4.4 Woolwich Arsenal Extension: 2.5
<b>Number of stations</b>	Original 1987 DLR: 15 Lewisham Extension: 5 new 2 reconstructed City Airport Extension: 4 Woolwich Arsenal Extension: 1

Table A 1.4 Docklands Light Railway

<b>General characteristics</b>	<p><b>Original 1987 DLR:</b> Elevated</p> <p><b>Lewisham Extension:</b> Elevated, 800 m viaduct across Deptford Creek, bored tunnels under the Thames</p> <p><b>City Airport Extension:</b> Elevated</p> <p><b>Woolwich Arsenal Extension:</b> Elevated with 1.8 km bored tunnels under the Thames</p>
<b>Rolling stock</b>	<p>DLR currently owns 94 trains/cars and is in the process of receiving 55 new trains – this contract was tendered to 5 bidders, but the current supplier (Bombardier) submitted the most attractive proposal. Cars are automatically guided allowing conductors to patrol passenger areas and ensuring revenue collection and assisting customers.</p> <p>DLR's rolling stock incorporates articulated joints which enable them to traverse track with very tight corners – a requirement for servicing the Canary Wharf development. At present, DLR uses a two car configuration but upgrades are currently underway for incorporating three cars in an effort to expand system capacity.</p>
<b>Ticketing, barriers, and security</b>	<ul style="list-style-type: none"> <li>• DLR has previously been an open system with no barriers. However, the new Woolwich extension will incorporate ticket gates this is the only DLR station with barriers. There are also barriers at the London Underground stations to which DLR connects – Bank, Stratford and Canning Town.</li> <li>• DLR's current operation and maintenance franchise agreement requires Serco to achieve greater than 97% farebox collection.</li> <li>• Ticketing is completely integrated with Transport for London's Underground and other systems.</li> <li>• British Transport police have jurisdiction on DLR trains and are paid jointly by the O&amp;M franchisee and Docklands Light Railway Limited.</li> </ul>
<b>Integration with other modes</b>	<p>DLR's initial route layout terminated some 300 meters from the nearest underground station presenting integration difficulties between transportation services. When planners proposed a design-build extension to Bank underground station, property developers with interests in the Docklands area were willing to partly fund project costs in order to increase the attractiveness of their property – related investments.</p>
<b>Accuracy of initial forecasts</b>	<p>DLR's planners originally designed the system to carry 1,500 pphpd (this assumed the Docklands area would develop in a low rise fashion). The current system carries 15,000 pphpd. Future capacity will increase with further line extensions and the new three car system.</p>
<b>Other</b>	-



	Financial Summary
Approximate cost	<p><b>Original 1987 DLR:</b> £77 million</p> <p><b>Lewisham Extension:</b> £220 million</p> <p><b>City Airport Extension:</b> £140 million</p> <p><b>Woolwich Arsenal Extension:</b> £180 million</p>
Approximate cost (2008) / km	<p><b>Original 1987 DLR:</b> US\$18.4 million</p> <p><b>Lewisham Extension:</b> US\$108.6 million</p> <p><b>City Airport Extension:</b> US\$60.9 million</p> <p><b>Woolwich Arsenal Extension:</b> US\$116.5 million</p>
Sources of funding and financial structure	<p><b>Original 1987 DLR:</b></p> <ul style="list-style-type: none"> <li>• 100 percent public – sources unknown</li> <li>• DoT30 million</li> <li>• RBS £178 million £4 million in equity</li> </ul> <p><b>Lewisham Extension:</b></p> <ul style="list-style-type: none"> <li>• £50 million central government contribution through the London Docklands Development Corporation</li> <li>• Private investment: <ul style="list-style-type: none"> <li>o £165 million bonds</li> <li>o £4.5 million of mezzanine debt</li> <li>o £11 million of loan stock</li> <li>o £1.5 million of equity</li> </ul> </li> </ul> <p><b>City Airport Extension:</b></p> <ul style="list-style-type: none"> <li>• Department of Transport grant of £30m</li> <li>• Private investment: <ul style="list-style-type: none"> <li>o £178 million in debt</li> <li>o £4 million in equity</li> </ul> </li> </ul> <p><b>Woolwich Arsenal Extension:</b></p> <ul style="list-style-type: none"> <li>• Private investment: <ul style="list-style-type: none"> <li>o £100 million of senior debt from the European Investment Bank (EIB)</li> <li>o £150 million of senior debt and £24m equity bridge loan from commercial banks</li> </ul> </li> </ul>
Donor funding / financing	EIB helped finance the Woolwich concession through the concession company.
Public support	The Lewisham concession benefitted from a sovereign guarantee on Docklands Light Railway Limited's availability payment. Subsequent concessions have required only a guarantee from Transport for London.

Table A 1.4 Docklands Light Railway

	Operational Summary
<i>Fares and fare structure</i>	The office of the mayor of London sets DLR fares through the system that Transport for London manages in accordance with the city's larger public transport objectives.
<i>Operator assessment and incentive structure</i>	<p>Engineers from Docklands Light Railway Limited monitor the condition of physical assets in addition to service quality. All of the PPP contracts associated with the DLR use some form of penalty regime. For DLR's infrastructure concessions 1,000 performance points are allocated on weekdays (500 on weekends). A concessionaire's points affect compensation paid points deducted for non performance can lead to deductions in the availability payment. For particularly important performance measures, failure can lead to a 100 percent deduction to the daily availability payment.</p> <p>DLR's operating and maintenance franchise uses a number of KPIs relating to service reliability, facilities availability and customer satisfaction (each with a target performance level). Where the private partner outperforms targets, bonuses apply. Conversely, penalties apply when targets are not met.</p> <p>Given high levels of satisfaction with private partners to date, DLR is considering provisions for guaranteeing certain levels of payment after a period of problem-free performance (this has already been implemented on the Woolwich Arsenal Concession contract - opened in the first quarter of 2009). This arrangement aims at reducing risk premiums assigned by private concessionaires during the concession bidding process.</p>
	Other Information
<i>Other</i>	The Lewisham concession required a special parliamentary act. DLR's activities now fall under the Transport and Works Act, whereby powers to build the system follow on from a public inquiry process, subject to a government appointed inspector's agreement with submissions made in response to any objections. This process has become less burdensome since network extensions are now generally welcomed (improved public transport services, enhanced property prices, urban regeneration).

Table A 1.5

**KUALA LUMPUR STAR AND PUTRA – MALAYSIA**

General Summary	
	<p>NOTE:</p> <p>Detailed information relating to the STAR and PUTRA concessions falls under Malaysia's Official Secrets Act (OSA) of 1972, which substantially limits public disclosure. The summary presented here represents the authors' best efforts to collect facts from a variety of non-official sources. While this particular case study does not include the level of detail shown in other cases, it does demonstrate several key lessons.</p>
Discussion	<p>Kuala Lumpur STAR began as an unsolicited proposal by a private developer (Taylor Woodrow / AEG Schienenfahrzeuge GmbH). The STAR system's original route took advantage of existing heavy rail rights of way that were unused. A build-operate-transfer (BOT) concession with a 60 year lease provided the contractual mechanism for private sector participation in the system's initial design, construction, operation and maintenance. STAR's sister system (PUTRA) was concessioned to Renong Bhd, a Malaysian conglomerate with significant experience with toll road concessions.</p> <p>Kuala Lumpur was home to roughly 1.2 million people when the STAR LRMT system (now renamed Ampang) began revenue operations in 1996. Since that time the city's population has expanded by more than one quarter, and the STAR system's ridership has approximately doubled. Even with this increase in ridership, STAR still operates at only approximately 60 percent of its original designed capacity. Despite lower than expected ridership, STAR expanded to serve the National Sports Complex in advance of the 1998 Commonwealth Games.</p> <p>STAR's sister system PUTRA has achieved greater ridership and currently operates near 140% capacity. Whereas STAR's original route layout followed an existing disused industrial rail line, PUTRA's route was intentionally designed to serve densely populated middle class neighborhoods where LRMT offered an attractive alternative over private automobile use.</p> <p>STAR and PUTRA's concessions ultimately failed because of disappointing revenues and large debt service requirements. Additional pressures from the Asian financial crisis of 1997 further destabilized the concession companies leading to an eventual government restructuring in 2002 when Syarikat Prasarana Negara Berhad (SNPB) (a public owned, national infrastructure holding company) purchased STAR and PUTRA's debts for approximately RM5.5 billion.</p>
Contract award date(s)	STAR: November 1991 PUTRA: February 1993
Type of contract	STAR: Full concession PUTRA: Full concession

Table A 1.5 Kuala Lumpur Star and Putra



<b>Contract duration</b>	<b>STAR:</b> 30 + 30 <b>PUTRA:</b> 30 + 30
<b>System operator:</b>	<b>Initially:</b> <ul style="list-style-type: none"> <li>• <b>STAR:</b> Sistem Transit Aliran Ringan</li> <li>• <b>PUTRA:</b> Projek Usahasama Transit Ringan Automatik – a wholly owned subsidiary of Renong Bhd</li> </ul> <b>Currently:</b> Rapid KL (a public company)
<b>Current status</b>	Concession companies for both the STAR and PUTRA systems became insolvent and were unable to repay debt. Assets from STAR and PUTRA were purchased by SNPB. Both concessions are now defunct.
<b>Relevant public institutions</b>	<p>Syarikat Prasarana Negara Berhad (SPNB): A public owned, national infrastructure holding company under the Ministry of Finance.</p> <p>The Ministry of Transport: has jurisdiction over private vehicles and Kuala Lumpur’s urban rail network</p> <p>Rapid KL: A wholly owned public company that currently operates the STAR and PUTRA lines under the Ministry of Finance</p> <p>The Ministry of Finance: oversees Rapid KL and owns the assets of both STAR and PUTRA in addition to Rapid KL’s fleet of buses.</p> <p>The Ministry of Entrepreneur and Cooperative Development: oversees commercial vehicle licensing (i.e., buses)</p> <p>The Ministry of Works: oversees Malaysia’s road network</p> <p>Local town councils: manages traffic control.</p>
<b>Private stakeholders</b>	<b>STAR:</b> <ul style="list-style-type: none"> <li>• Taylor Woodrow / AEG Schienenfahrzeuge GmbH (30%)</li> <li>• Malaysia’s Employee’s Provident Fund (20%)</li> <li>• Lembaga Urusandan Tabung Haji – a state administered Muslim pilgrims’ fund (15%)</li> <li>• Apfin Investment Pte Ltd – owned by the government of Singapore (5%)</li> <li>• American International Assurance Co. Ltd (10%)</li> </ul> <b>PUTRA:</b> <ul style="list-style-type: none"> <li>• Renong Bhd</li> <li>• Bombardier</li> </ul>
<b>Discussion other</b>	-
<b>Other</b>	-

	<b>Noteworthy Contractual Elements</b>
<b>Treatment of demand / revenue risks</b>	Allocated entirely to private to concession companies
<b>Allocation of other major risks</b>	Unknown
<b>Provisions for expansion / extension</b>	STAR expanded to serve the National Sports Complex in advance of the 1998 Commonwealth Games. As compensation to the private operator for servicing this low revenue route, Malaysian authorities also allowed expansion into densely populated, higher revenue neighborhoods.
<b>Mechanisms for dispute resolution</b>	Unknown
<b>Other</b>	-
	<b>Summary of Policy Elements</b>
<b>Strategic Metropolitan Transport Planning (SMTP)</b>	STAR and PUTRA were not part of a transport master plan. Neither of these systems benefited from rational transport planning or feasibility study/economic analysis. This was especially evident in the STAR system's route layout, which simply followed an abandoned industrial rail line. Kuala Lumpur still lacks a single public transportation authority as of 2008.
<b>Value proposition of project</b>	Rail services sought to alleviate traffic congestion and pollution in Kuala Lumpur. In addition, the government also saw urban rail as a means for showcasing technological prowess in advance of the 1998 Commonwealth Games. This was especially evident in the design of the PUTRA system, which was the world's longest automated, driverless urban rail system upon opening.
<b>Justification for PPP approach</b>	During the mid, 1980s and early 1990s, Malaysia had successfully concessioned a number of toll roads, and the national government was keen to further implement infrastructure projects on a BOT basis.
<b>Affordability / equitability</b>	Unknown
<b>Other</b>	<p>Low cost, locally produced "proton" cars, inexpensive parking, and subsidized fuel reduce the attractiveness of public transportation services for many Kuala Lumpur residents. The government has recently considered reductions in fuel subsidies (estimated to have cost RM14 17 billion in 2005 alone) in an effort to rationalize pricing and balance budgets. Planners have also recently been considering congestion, based charges for private motor vehicles.</p> <p>In June 2005 the Malaysian government increased the price of petrol by 78 sen to RM2.70 per liter while increasing the price of diesel by RM 1 to RM2.58 per liter. That same month, Rapid KL saw a 3.9% increase in LRMT ridership along with a 7.5% increase in bus ridership.</p>

Table A 1.5 Kuala Lumpur Star and Putra

	<b>Technical Summary</b>
<b>System length (km)</b>	<b>STAR:</b> 27 (post extension) <b>PUTRA:</b> 29
<b>Number of stations</b>	<b>STAR:</b> 25 (post extension) <b>PUTRA:</b> 24
<b>General characteristics</b>	<b>STAR:</b> Primarily at grade with approximately 9.4 km of elevated track, eight elevated stations <b>PUTRA:</b> Primarily elevated with approximately 4.4. km of underground track
<b>Rolling stock</b>	<b>STAR:</b> Trains are relatively simple by LRMT standards and rely on drivers to operate manual controls. <b>PUTRA:</b> Sophisticated Bombardier driverless vehicles using linear induction motors allowed for high levels of automation. At opening, PUTRA was the longest automated LRMT system in the world. Recent system “glitches” have resulted in highly publicized disruptions.
<b>Ticketing, barriers, and security</b>	Rapid KL has recently introduced “Touch’n Go” stored value ticketing throughout Rapid KL’s transportation network.
<b>Integration with other modes</b>	<p>Lack of coordination between ministries resulted (results) in incoherent transport planning which complicates network integration. For example, the Ministry of Transport previously granted 17 different bus licenses to private operators in KL who intended to compete with Rapid KL’s (under the Ministry of Finance) subsidized bus routes. Rationalizing KL’s bus service based on a hub and spoke model proved difficult when these private bus operators stole ridership from major trunk lines.</p> <p>Integrating with other modes has also been historically challenging because of poor quality bus services. At one point during 2005, only 50 percent of the Rapid KL’s buses were serviceable on any given day. When operating, fleet averaged 30 to 50 breakdowns per day.</p> <p>Recent attempts have aimed at improving integration with private transportation and have included designated “kiss and ride” drop-off lanes at several stations.</p>
<b>Accuracy of initial forecasts</b>	<p>STAR’s original ridership projections were overly optimistic because of poor route alignment and problems integrating with other modes of transportation. Whereas 170,000 passengers per day were considered necessary for breaking even STAR initially averaged just 49,468.</p> <p>PUTRA’s route alignment was better planned than that of the STAR system, yet initial ridership was still well below expectations. Approximately 40,188 passengers per day rode the system when phase 1 opened in 1998 – less than half the number predicted.</p>
<b>Other</b>	-



	<b>Financial Summary</b>
<b>Approximate cost</b>	<b>STAR:</b> RM3.5 billion <b>PUTRA:</b> RM5 billion
<b>Approximate cost (2008) / km</b>	<b>STAR:</b> US\$45.5 billion <b>PUTRA:</b> US\$60.7 billion
<b>Sources of funding and financial structure</b>	Unknown
<b>Donor funding / financing</b>	JEXIM (the Japan's export / import bank)
<b>Public support</b>	<p>While the Malaysian government issued no explicit guarantees on project debt, STAR did benefit from public support in a number of ways. One source suggests that STAR purchased land at very favorable rates while also enjoying an exemption from both import duties and local sales tax. As an added incentive, the project was also able to deduct 70% of its capital expenditures from income taxes in, addition to normal depreciation allowances. Various credits would have rendered the project free of all taxes for approximately 15 years.</p> <p>STAR's initial capital structure also benefited substantially from generous public support. The Malaysian government also furnished an estimated one third of the project's debt through soft loans with concessionary interest rates.</p>
	<b>Operational Summary</b>
<b>Fares and fare structure</b>	Unknown
<b>Operator assessment and incentive structure</b>	NA
<b>Other</b>	-
	<b>Other Information</b>
<b>Other</b>	-

Table A 1.5 Kuala Lumpur Star and Putra

Table A 1.6

## GAUTRAIN RAPID RAIL LINK – NAUTENG PROVINCE, SOUTH AFRICA

	General Summary
Discussion	<p>The idea of a rapid rail link between Pretoria and Johannesburg originally began with a preliminary study sponsored through a twin city (sister city) partnership. This initial study recommended rail as the preferred solution for traffic congestion along the N1/M1 highway corridor. Subsequent feasibility studies applied more rigorous analysis and considered possible road expansions in addition to bus rapid transit (BRT) and other less proven solutions. Eventually, planners chose rail over bus although this issue remains contentious to the present day.</p> <p>South Africa's Gautrain rapid rail project is currently the largest PPP initiative in South African History and involves an approximate project cost of ZAR20 billion (€1.7 billion). The system will span 80 kilometers of track and include 10 passenger stations. Planners anticipate more than 100,000 passengers per day will ride Gautrain upon completion. Phase one of the Gautrain project linking Sandton to O.R. Tambo International Airport should enter service in time to transport passengers for the 2010 World Cup.</p>
Contract award date(s)	September 2006
Type of contract	Full concession
Contract duration	<p>Contract duration is 20 years (including construction) with no provisions for renewal. This duration was chosen for several reasons including the following:</p> <ul style="list-style-type: none"> <li>• Government wanted the shortest contract duration possible because it assumed downside revenue risks while splitting potential upside with the concessionaire.</li> <li>• Financial analysis showed that longer concession periods would not result in more favorable bid prices.</li> </ul>
System operator	Régie Autonome des Transports Parisiens (RATP)
Current status	Under construction
Relevant public institutions	<p><b>Gauteng Province:</b> South Africa's geographically smallest, yet most populated province containing the Johannesburg, Tshwane and Ekurhuleni metropolitan areas.</p> <p><b>Gautrain Management Agency:</b> Gautrain's contracting authority under the Gauteng Provincial Government.</p> <p><b>National Treasury PPP Unit:</b> South Africa's national office in charge of overseeing all PPP agreements.</p>

Continuation of General Summary

<b>Private stakeholders</b>	<p><b>Murray and Roberts Ltd.:</b> A major South African contracting and construction company</p> <p><b>Strategic Partners Group:</b> The project's required Black Economic Empowerment (BEE) share-holding partner</p> <p><b>Bombardier UK:</b> A major rolling stock supplier for numerous LRMT projects around the world</p> <p><b>Bouygues Travaux Publics:</b> A major French “design and build” contractor with extensive expertise in underground tunnel works.</p> <p><b>The J&amp;J Group:</b> An investment management and holding company</p> <p><b>Absa Group Limited:</b> One of South Africa's largest financial services organizations (a subsidiary of Barclays Bank PLC).</p>
<b>Other</b>	-
<b>Noteworthy Contractual Elements</b>	
<b>Treatment of demand / revenue risks</b>	<p>Government guarantees a minimum revenue level and also requires revenue sharing above a specified threshold established as follows:</p> <p>Gauteng province provided bidders with an estimate for system revenues throughout the concession's life. Bidders in turn specified two things in their proposals:</p> <ol style="list-style-type: none"> <li>1. Their own expectations for system revenues.</li> <li>2. The minimum required revenue level they needed to meet contractual obligations and realize return on investment.</li> </ol> <p>The difference between minimum required revenues and a bidder's projected revenues set the basis for a minimum required government operating subsidy. Revenues above the specified minimum require sharing on a 50 / 50 basis between the concessionaire and the province. This methodology protects the concessionaire from downside revenue risks, while also offering incentives for maximizing system ridership.</p>
<b>Allocation of other major risks</b>	Payments to Gautrain's concessionaire include indexation
<b>Provisions for expansion / extension</b>	System extensions lead to a no-fault termination if the existing concessionaire does not win the bid to extend.
<b>Mechanisms for dispute resolution</b>	Unknown
<b>Other</b>	Two consortiums ended up competing for the Gautrain concession. Keeping both bidders committed during the long bid / negotiation period required the province to reimburse 50% of approved bid costs. While this created disincentives to control costs, retaining two competing consortiums throughout the procurement process was essential for maintaining Gauteng province's negotiating power. The benefits (on a value for money basis) of a highly competitive bid process were seen by the province to far out-weigh the additional bid cost support.

Table A 1.6 Gautrain Rapid Rail Link



	<b>Summary of Policy Elements</b>
<b>Strategic Metropolitan Transport Planning (SMTP)</b>	Gautrain was not originally part of a transport master plan. Indeed, the project's size and scope eventually galvanized transport planning efforts throughout Gauteng province. Planners foresaw problems with integrating Gautrain to other transportation services early the project's development stages – there was a history of “turf wars” between the national Metrorail agency and the three principal cities and their independent bus transportation authorities. Public transportation is relatively unpopular in South Africa because of security concerns and generally poor perceptions. Accordingly, Gautrain's concession includes its own cobranded feeder and distribution bus service designed to provide door to door services. “Park and ride / kiss and ride” facilities also aim at integrating Gautrain with private vehicle transportation as well.
<b>Value proposition of project</b>	Gautrain will endeavor to attract customers who would otherwise drive between Tshwane (Pretoria) or O.R. Tambo Airport and Johannesburg. Traffic congestion along South Africa's N1/ M1 highway corridor increased 7 percent each year between 1995 and 2005. Estimates value the ill effects of this increased congestion at ZAR300 million annually (€26 million) when accounting for direct costs, lost work time and expenses related to increased accident rates. Commutes along the 50 kilometer route between Tshwane and Johannesburg can average as long as two hours. By comparison, Gautrain's service should reduce travel times to a more manageable 42 minutes.
<b>Justification for PPP approach</b>	The decision to use a PPP was originally decoupled from the decision to pursue the Gautrain project at all. Private sector participation eventually offered value for money on a public sector comparator (PSC) basis by transferring risks associated with integrating the system's complex design, construction, operational and maintenance obligations within one organizational structure (i.e., a concession company). Planners estimated that achieving similar outputs using traditional public procurement would have required something on the order of 40 separate contracts. Coordinating between various contractors would have required significant public capacity and would have also required the Gauteng province to assume substantial risks beyond its current management capabilities.
<b>Affordability / equitability</b>	Gautrain specifically targets middle income customers who would otherwise use private transport (cars) to commute between Pretoria, O.R. Tambo Airport and Johannesburg.  Social objectives such as Black Economic Empowerment and developing small, medium and micro enterprises (SMMEs) were factored into bid evaluations along with the concessionaire's subsequent procurement of subcontracted services.
<b>Other</b>	Gautrain required provincial legislative acts to allow Gauteng province to obtain necessary land required for the project and to create the Gautrain Management Agency.

	<b>Technical Summary</b>
<b>System length (km)</b>	77 km
<b>Number of stations</b>	10
<b>General characteristics</b>	<ul style="list-style-type: none"> <li>• 100% segregated</li> <li>• 14 km of underground track</li> <li>• 200 bridges / viaducts</li> </ul>
<b>Rolling stock</b>	<p>South Africa's own Union Carriage and Wagon has partnered with Bombardier to participate in constructing Gautrain's rolling stock. Final assembly of the 96 Electrostar vehicles for the Gautrain system will take place in Union Carriage and Wagon's facility near Johannesburg. Partially constructing rolling stock in South Africa was a bid requirement.</p> <p>Gautrain will run on 1,435 mm gauge track instead of RSA gauge 1,065 mm. Larger 1,435 mm gauge track is more commonly used around the world enhancing Gautrain's ability to access internationally produced rolling stock and components. Greater distance between rails also increases Gautrain's stability and ride comfort at higher speeds.</p>
<b>Ticketing, barriers and security</b>	Closed system
<b>Integration with other modes</b>	<p>Planners foresaw problems integrating Gautrain with other transportation services early in the project's development stages, coordination between municipal governments, national agencies, and independent bus transportation authorities had historically been poor. Spatial planning in South Africa has also resulted in low population densities which would eventually limit Gautrain's walk-on ridership. Furthermore, market analysis showed that Gautrain's target customer group viewed existing public transportation as 'a transport mode of last resort' because of long travel times, poor timeliness, security concerns and generally bad perceptions. Together, these considerations suggested that simply integrating Gautrain with existing public transportation services would not compel significant conversion from private transportation.</p> <p>To avoid initial integration issues and to improve ridership demand, Gautrain's concession includes its own co-branded feeder / distribution bus service. The Bombela consortium (Gautrain's private concessionaire) will operate this network alongside rail services. A bus specific performance management system will help to ensure high quality bus links and will include key performance indicators (KPIs) emphasizing both safety and security. Selected Gautrain stations will also feature park and ride / kiss and ride facilities aimed at complementing private vehicle transportation and allowing customers to reduce personal vehicle use.</p>

Table A 1.6 Gautrain Rapid Rail Link

<b>Accuracy of initial forecasts</b>	To be determined
<b>Other</b>	-
<b>Financial Summary</b>	
<b>Approximate cost</b>	ZAR22.3 billion
<b>Approximate cost (2008) / km</b>	US\$28.6 million
<b>Sources of funding and financial structure</b>	Approximately ZAR19.2 billion capital grant in addition to ZAR3,094 million private investment (of which approximately 85% is debt)
<b>Donor funding / financing</b>	Strategic Partners Group raised its share of equity capital through funding from the Development Bank of South Africa and the Industrial Development Corporation.
<b>Public support</b>	<p>Gauteng province provides a substantial capital grant (roughly 87% - paid in Rand) in addition to a minimum revenue guarantee and in-kind grants. The minimum revenue guarantee includes an operating subsidy (described below).</p> <p>Setting the government's capital grant was relatively complex. Larger upfront government contribution increased the project's financial viability because government's cost of capital benefited from a 250 basis point advantage relative to private financing. However, ensuring that the concessionaire took adequate amounts of risk required some minimum acceptable amount of private financing. Gautrain's contract also includes liquidated damages and penalties related to construction along with demanding milestone compliance arrangements to help protect the province's financial interests.</p>
<b>Other</b>	Gauteng Province disburses its capital grant through milestone payments to the system's private concessionaire at each stage during the construction process in accordance with a pre-agreed completion schedule. Prior to a special legislative act, Gauteng's capital grants would have constituted taxable income for the concessionaire. The additional cost of these taxes would have otherwise been charged entirely back to Gauteng province in the form of higher bid prices.
<b>System length (km)</b>	<p>Many of the expenditures covered by Gautrain's capital grant were denominated in foreign currencies. Ensuring the project's financial viability therefore required some method to guard against potentially destabilizing fluctuations in foreign exchange rates.</p> <p>Gautrain's concessionaire originally assumed foreign exchange risks during the project's construction period and passed associated hedging costs along to Gauteng Province as a component of capital grant payments made at project milestones. However, this structure</p>



Continuation of Financial Summary

	<p>resulted in unfavorable forward currency pricing when the concessionaire's bankers were not forced to compete on the forward rates they offered and took full advantage of the pass-through nature of the project's hedging costs. In response, South Africa's national government intervened and decided to take capital grant related foreign exchange risks back from the concessionaire during the construction period (effectively acting as a currency swap counter party to Gauteng Province). This eliminated additional cost associated with unfavorably priced currency hedges and also insulated the province from foreign exchange exposure on its capital grant payments.</p>
	<b>Operational Summary</b>
<b>Fares and fare structure</b>	<p>Gautrain's contractual arrangement provides mechanisms that allow for fare adjustments on specific links (i.e., trips between certain stations). Gautrain's concessionaire has a particularly large amount of freedom to adjust fares on Gautrain's link to O.R. Tambo Airport—a key revenue route that will effectively subsidize other parts of the system. Together with an agreement for sharing revenue upside above a preagreed threshold, this arrangement provides for additional value capture by incorporating greater private efficiencies and incentives to maximize both ridership and revenue.</p>
<b>Operator assessment and incentive structure</b>	<p>Beyond the standard KPIs associated with headway, availability, cleanliness, and so forth. Gautrain's performance management regime includes a strong emphasis on system security. This is critically important for attracting Gautrain's target market which has traditionally shown aversion to public transportation. Also,</p> <ul style="list-style-type: none"> <li>• The concessionaire must achieve or exceed 95% revenue collection</li> <li>• Gautrain's feeder bus network also has its own set of KPI's designed to guarantee good service</li> </ul>
<b>Other</b>	-
	<b>Other Information</b>
<b>Other</b>	<p>Initial assessments of Gautrain suggest that the project is meeting its objectives regarding economic development within Gauteng province. Official estimates maintain that the Gautrain project has contributed ZAR1.89 billion in the 2007/2008 fiscal year alone to qualified broad based black economic empowerment (BBBEE) and small medium and micro enterprises (SMME). In addition, the project has been credited with creating 29,400 direct, indirect and induced jobs between 2007 and 2008. According to the Gauteng provincial government, Gautrain construction alone should boost the province's gross geographic product by R6 billion per annum. Gautrain also recently received the Gold Quill Award of Merit from the International Association of Business Communicators (IABC) for exemplary media relations and corporate communication.</p>

Table A 1.6 Gautrain Rapid Rail Link

Table A 1.7

**MRT 3 ‘METROSTAR EXPRESS’ – MANILA, PHILIPPINES**

	<b>General Summary</b>
<b>Discussion</b>	<p>The Manila metropolitan area (also known as the National Capital Region) is home to approximately 11.5 million people (about 13% of the Philippines’ total population). Traffic congestion and air pollution are major detractors from quality of life and economic development in the Manila metropolitan region. Travel speeds in Manila average only 10 km/hr – among the slowest in major Asian cities. Together with bilateral and multilateral donors, the central government has implemented several initiatives aimed at improving public transportation including several rail based transportation systems. Beginning in the 1970’s Manila began examining urban rail as an environmentally friendly solution to its traffic congestion problems.</p> <p>Manila’s light rapid transit network consists of three separate systems: LRT1 (yellow line) MRT2 (purple line) and MRT3 (blue line). LRT1 began operation in 1984 followed by MRT3 in 1999 and MRT2 in 2003. Although each system uses rolling stock with light rail characteristics, their civil works and operating performance more closely resemble light metros. MRT3’s route runs along Epifanio de los Santos Avenue (EDSA) – a major transportation artery in Manila.</p>
<b>Contract award date(s)</b>	November 7, 1991 (later re-negotiated, amended and re-signed in 1993)
<b>Type of contract</b>	Concession with a leaseback feature to a public operator
<b>Contract duration</b>	25 years
<b>System operator</b>	Department of Transportation and Communications (a public agency)
<b>Current status</b>	Active – although the national government is currently working to buy back the concession to save on future lease payments

Continuation of General Summary

Relevant public institutions	<p><b>The Light Rail Transit Authority (LRTA):</b> a wholly owned government corporation responsible for design, construction, operation, maintenance or lease of MRT3’s sister light rail lines.</p> <p>Department of Transportation and Communications (DoTC): MRT 3’s contracting authority and operator.</p> <p><b>National Economic and Development Authority (NEDA):</b> The Philippines’ social and economic development planning and policy coordinating body. NEDA is a cabinet level agency headed by the President of the Country.</p> <p><b>Land Transportation Franchising and Regulatory Board (LTFRB):</b> (under the DoTC) sets routes, regulates fares, and oversees licensing requirements for land based transportation services (including jeepney and taxis).</p>
Private stakeholders	Eli Levin Enterprises and various other Filipino property developers
Other	-
Noteworthy Contractual Elements	
Treatment of demand / revenue risks	100% assumed by DoTC
Allocation of other major risks	<p>DOTC assumed foreign exchange related risks on its payments to private investors. Throughout the project’s implementation, DoTC engaged SYSTRA (a French consultancy) to supervise design / construction, manage utility relocation, train operating personnel, liaise with other government agencies, and assist DoTC during the system’s first five years of operations.</p> <p>MRTC was responsible for the design, construction, equipping, testing, and commissioning of the system, including the supply of rolling stock, signaling equipment, facilities, and spare parts.</p> <p>In addition, DoTC can increase or decrease MRTC’s availability payment to accommodate system, capacity down to a lower threshold of 450,000 passengers per day. MRTC is guaranteed an availability payment based on this minimum threshold.</p>
Provisions for expansion / extension	Unknown
Mechanisms for dispute resolution	Unknown

Table A 1.7 Manila MRT3

<b>Other</b>	In July 1990, the government of the Philippines passed Republic Act No. 6957 governing BOT concession agreements. This act authorized the country's public institutions to enter into contracts with private parties for the financing, design, construction, operation, and maintenance of financially viable infrastructure services through BOT or BT concession schemes. Later in 1993, the government passed Republic Act No. 7718 (known as the 'Philippine BOT Law') which revised and expanded on provisions included within the original Act from 1990. The legality of MRT 3's concession contract with respect to RA 6957 was initially contentious but later reaffirmed by the passage of RA 7718 and by a Supreme Court ruling.
<b>Summary of Policy Elements</b>	
<b>Strategic Metropolitan Transport Planning (SMTP)</b>	The Manila Metropolitan Region encompasses 17 different local government units. Until 1995, when the Metropolitan Manila Development Authority was formed to transcend municipal boundaries, national government agencies sponsored only mode-specific plans and policies. Often little regard was given to integration and coordinated planning across agencies.
<b>Value proposition of project</b>	MRT 3's route alignment follows Epifanio de los Santos Avenue and was intended to help alleviate traffic congestion and associated pollution along this major thoroughfare.
<b>Justification for PPP approach</b>	<p>MRT 3 began as an unsolicited private sector proposal from Eli Leven Enterprises. The project evolved in conjunction with the Philippine's new BOT legislation and was meant as a demonstration of the government's BOT capacity.</p> <p>MRT 3's contract was eventually structured as a build-lease-transfer arrangement whereby the EDSA LRT consortium would finance, design, build and maintain the system and subsequently lease operations to the DOTC. This structure was chosen because EDSA LRT was legally forbidden from operating a public transportation service on account of foreign ownership.</p>
<b>Affordability/ equitability</b>	Fares for MRT 3's services range from ₱10 to ₱15 per trip – affordable to most income levels but still greater than jeepney fares, which were approximately ₱8.50 in 2008 (plus additional distance charges beyond 4 km).
<b>Other</b>	Various government agencies regulate competition between transportation modes.



	<b>Technical Summary</b>
<b>System length (km)</b>	16.8
<b>Number of stations</b>	13
<b>General characteristics</b>	Approximately 3/5 Elevated and 2/5 at grade with one underground station
<b>Rolling stock</b>	CKD Dopravni Systemy supplied rolling stock
<b>Ticketing, barriers, and security</b>	MRT 3 is a closed system that uses a distance dependent fare structure. In July of 2006, MRT 3 introduced an optional Radio Frequency Identification Device (RFID) based ticketing system offered by Globe Telecom. This new “G-Pass” system automatically deducts fares when participating customers pass under RFID sensors mounted on ticketing gates. G-pass does not currently work on Manila’s LRT 1 and LRT 2 lines.
<b>Integration with other modes</b>	Customer’s purchasing a “Flash Pass” ticket and voucher package are able o take advantage of integrated ticketing across Manila’s three mass transit rail lines (LRT 1, LRT 2 and MRT 3). However, given the initial lack of coordinated transport planning across modes and jurisdictions, Manila’s public transportation network has suffered substantially from poor integration between services. A recent loan and small grant from the World Bank has helped the government of the Philippines to finance infrastructure improvements aimed at improving transport integration throughout Manila.
<b>Accuracy of initial forecasts</b>	DOTC’s own Urban Transport Development Project estimated MRT 3 passenger forecast volumes of about 626,000 passengers per day. As of 2008, average volumes are approximately 400,000 passengers per day.
<b>Other</b>	-

Table A 1.7 Manila MRT3

	<b>Financial Summary</b>
<b>Approximate cost</b>	US\$655 million
<b>Approximate cost (2008) / km</b>	US\$49.9 million
<b>Sources of funding and financial structure</b>	US\$190 million equity, US\$465 million debt
<b>Donor funding / financing</b>	Czech Import Export Bank
<b>Public support</b>	DoTC paid all taxes except the concessionaire's income tax in addition to import duties. In addition, private investors were explicitly guaranteed a 15% return on equity. Planners originally estimated that the DoTC would cover payments to private partners using fare revenues. However, lower than expected ridership combined with reduced fare levels has required substantial subsidy support from the national government. At times this support has been delayed, and DoTC has fallen into arrears on its payments.
	<b>Operational Summary</b>
<b>Fares and fare structure</b>	In July 2000, President Joseph Estrada directed the DoTC to reduce MRT 3 fares to ₱9.50 – ₱15 in celebration of MRT 3's full operational debut. This discount was originally intended to last 6 months. As of 2008 MRT 3's fares have not increased other than a rounding up of the minimum ticket price to ₱10.
<b>Operator assessment and incentive structure</b>	NA
<b>Other</b>	-
	<b>Other Information</b>
<b>Other</b>	-

Table A 1.8

**BANGKOK SKYTRAIN – THAILAND**

	General Summary
Discussion	<p>The city of Bangkok initially sought a segregated rapid transit system in response to extreme levels of traffic congestion. Limited physical space available at grade required that such a system would either be elevated or underground. Preliminary analysis concluded that an elevated network represented the ‘low’ cost solution which eventually led to the Skytrain concept. Early proposals resembled a modest people mover. However, Bangkok’s extraordinary levels of traffic congestion suggested that demand was sufficiently robust enough to support a larger more complex system.</p> <p>Debt and equity investors in the Skytrain project eventually suffered considerable losses when actual ridership figures fell well below preliminary estimates. Despite relatively high service quality, the Skytrain system failed to meet expectations for the following reasons:</p> <ul style="list-style-type: none"><li>• The unreasonableness of initial ridership forecasts.</li><li>• Adverse macroeconomic conditions that negatively impacted revenues, increased costs of borrowing and created other foreign exchange related problems.</li><li>• Poor integration with other modes of transport. Many of these problems resulted from lack cooperation and coordination between government agencies that each ran different aspects of Bangkok’s transportation network.</li></ul> <p>Despite difficulties with Skytrain’s concession arrangement, the system continues to deliver high quality public transportation services.</p>
Contract award date(s)	April 1992
Type of contract	Full concession: civil works were structured on a build-transfer-operate (BTO) basis. Electrical and mechanical works followed a build-operate-transfer (BOT) model.
Contract duration	30 years from the commencement of commercial operations. Bangkok Mass Transit System Corporation Limited (BTSC) was required to make any request for extension at least 3 years before the existing concession contract expired
System operator	BTSC – initially a wholly owned subsidiary of the Tanayong Corporation.
Current status	Currently undergoing court supervised financial restructuring

Table A 1.8 Bangkok Skytrain

<b>Relevant public institutions</b>	<p><b>Bangkok Mass Transit System Corporation Limited (BTSC):</b> a private corporation established to own the Skytrain concession.</p> <p><b>Bangkok Metropolitan Authority (BMA):</b> the city of Bangkok's contracting authority. BMA also contributed land and rights of way to the Skytrain project.</p> <p><b>Ministry of Transport and Communications:</b> exercised partial control over Bangkok's bus system through budgetary control over BMTA (the public bus company).</p>
<b>Private stakeholders</b>	<p><b>Tanayong Public Company Ltd.:</b> a major Thai real estate developer</p> <p><b>Credit Suisse First Boston (CSFB):</b> an international financial firm that eventually acquired both debt and equity investments in BTSC</p>
<b>Other</b>	-
<b>Noteworthy Contractual Elements</b>	
<b>Treatment of demand / revenue risks</b>	100 percent allocated to BTSC
<b>Allocation of other major risks</b>	<p>BTSC's concession contract provided automatic tariff indexation for normal levels of inflation in 5% increments. The following events would also trigger a full fare renegotiation:</p> <ul style="list-style-type: none"> <li>• Changes in inflation greater than +/-9% in one 12 month period</li> <li>• Fluctuation in exchange rate greater than +/-10% from the base case specified in the concession contract</li> <li>• Changes in the interest rate on BTSC's foreign debt by +/- 10% from the base case specified in the concession contract</li> <li>• Changes in the interest rate on BTSC's Thai Bhatt denominated debt by +/- 10% from the base case specified in the concession contract</li> <li>• Substantial increases in electricity costs to BTSC</li> <li>• Major investments in excess of the originally agreed scope of work</li> <li>• Other exceptional events (e.g., force majeure, macroeconomic shocks, etc.)</li> </ul> <p>Prior to opening for revenue service, BTSC negotiated an increase to offset the impact of Asia's financial crisis. This negotiation also resulted in a distance based tariff regime instead of the flat rate system previously agreed.</p>
<b>Provisions for expansion / extension</b>	<p>Skytrain's original contract granted BTSC a first right of refusal on system expansion although the legality of this clause was later questioned. Thai laws governing public procurement prescribed that all such major public infrastructure projects should be competitively bid, and so removed scope for the negotiation of extensions with incumbents. These provisions were originally introduced in an effort to reduce corruption. BTSC actually sought to expand the system in an effort to aid debt repayment given that farebox ratios were sufficiently high.</p>



Continuation of Noteworthy Contractual Elements

<b>Mechanisms for dispute resolution</b>	Skytrain’s concession contract provided structure for dispute resolution through arbitration. As a first attempt, both BTSC and BMA would appoint arbitrators who would together attempt to reach resolution. In the event that was not possible, the arbitrators would subsequently appoint a single “umpire” who would continue considering the dispute. Civil courts could intervene and appoint an umpire following a motion by either party if the arbitrators were unable to reach consensus.
<b>Other</b>	BTSC was contractually obliged to absorb costs associated with relocating public utilities up to a specified threshold amount. For its part, BMA was required to provide details and plans as to the location of such utilities.
<b>Summary of Policy Elements</b>	
<b>Strategic Metropolitan Transport Planning (SMTP)</b>	Skytrain was never part of a Strategic Metropolitan Transport Planning initiative. Problems with modal integration and difficulties coordinating between various public authorities may have been avoidable through some kind of coordinated planning effort.
<b>Value proposition of project</b>	The Skytrain project aimed at providing relief from Bangkok’s extraordinary levels of traffic congestion. Skytrain also offered considerable value by stimulating property development. BTSC’s original backers included Tanayong Public Company Ltd.–a major Thai real estate developer.
<b>Justification for PPP approach</b>	The decision to pursue a PPP was largely driven by Thai law which prescribed procurement methods and private sector involvement. International financial institutions (i.e., IFC and KfW) associated with the project also advocated a PPP approach.
<b>Affordability / equitability</b>	Skytrain’s tariffs remain affordable to most segments of Thai society. However, Bangkok’s poor often prefer buses, which cost substantially less.
<b>Other</b>	-

Table A 1.8 Bangkok Skytrain

	<b>Technical Summary</b>
<b>System length (km)</b>	23.5
<b>Number of stations</b>	23
<b>General characteristics</b>	Elevated
<b>Rolling stock</b>	Siemens supplied electrical / mechanical systems in addition to Skytrain's rolling stock along with a short term (5 year) maintenance contract.
<b>Ticketing, barriers, and security</b>	Skytrain is a closed system that requires passengers to purchase tickets before accessing the station platform.
<b>Integration with other modes</b>	<p>Here lies one reason for the Skytrain concession's financial problems: Different government ministries were each planning / implementing transportation solutions in Bangkok with very little consideration given to integrating between systems. The Ministry of Transport exercised partial control over the city's bus system (through budgetary control over the bus company - BMTA) while the State Railway of Thailand controlled its own projects including the Hopewell elevated railway. Coordinated planning between public entities was deficient or lacking entirely.</p> <p>Later in 2004 Bangkok's underground "Blue Line" opened with noticeably better integration between BMTA buses and rail services. Unlike the Skytrain project, the Blue Line was implemented under the Ministry of Transport.</p>
<b>Accuracy of initial forecasts</b>	Original estimates predicted ridership in the neighborhood of 600,000 – 700,000 passengers per day. Initial ridership was approximately 150,000 passengers per day . Over time, ridership has grown to approximately 460,000 passengers per weekday in 2008 but has yet to reach levels initially predicted.
<b>Other</b>	-

	<b>Financial Summary</b>
<b>Approximate cost</b>	B54 billion
<b>Approximate cost (2008) / km</b>	US\$79.7 million
<b>Sources of funding and financial structure</b>	100% financed by commercial banks and development institutions. Exact amounts and proportions are not public information.
<b>Donor funding / financing</b>	IFC made both equity and debt investments. KfW – debt only.
<b>Public support</b>	BMA originally supplied land to the Skytrain project along with rights of way. BTSC was exempted from selected import duties, corporate taxes (for eight years) and taxes on dividends (for eight years). Any goodwill copyrights or other rights were also excluded from tax for a five year period.
	<b>Operational Summary</b>
<b>Fares and fare structure</b>	<p>Skytrain's fares were priced below the cost of a taxi (for a single person), but above the cost of other public transportation services (i.e., buses). Lack of fare integration between modes had a negative impact on BTSC's ridership. Under the terms of the concession contract, BTSC required BMA's approval before adjusting system fares.</p> <p>The system's current fare structure is zone based with options for monthly passes. Student discounts are also available.</p>
<b>Operator assessment and incentive structure</b>	KPI's were largely service related with additional emphasis on environmental factors (specific KPI examples include noise levels and service frequencies). This never became a contentious issue for the Skytrain project. Most assessments indicate that the system delivered high quality service even when actual ridership levels were well below predictions.
<b>Other</b>	-
	<b>Other Information</b>
<b>Other</b>	Special thanks to Vanee K. Dalla and Chalida Charansuk for lending their expertise regarding the Bangkok Skytrain.

Table A 1.8 Bangkok Skytrain

Table A 1.9

CANADA LINE – VANCOUVER, CANADA

	General Summary
Discussion	<p>Canada Line will be a 19 km automated light metro implemented through a 35-year design-finance-build-operate-maintain concession signed in July 2005 with the “In Transit BC” consortium (led by SNC Lavalin). While the project is not the first PPP in Canada, it is among the first within the province of British Columbia.</p> <p>At its northern terminus, Canada Line will integrate with Vancouver’s Skytrain LRT system, West Coast Express commuter rail service, bus services, Seabus (marine transit), and cruise ship terminal. An additional spur line will also provide services to YVR Airport. The Vancouver International Airport Authority has contributed towards the project’s upfront capital costs in order to make this connection possible.</p> <p>Canada Line is part of a larger public transport strategy developed by the South Coast British Columbia Transportation Authority (TransLink). This strategy aims at:</p> <ul style="list-style-type: none"><li>• Reducing greenhouse gas emissions</li><li>• Increasing the use of non-motorized transport</li><li>• Using the region’s transportation network as a tool for promoting economic development</li><li>• Promoting the densification of jobs and housing along frequently used transit routes</li></ul> <p>Planners estimate that Canada Line will begin revenue services in November 2009 – in time for the 2010 Winter Olympic games in Vancouver. Although the Canada Line was not part of Vancouver’s bid for the 2010 Games, the project’s construction schedule was partially driven by the Games.</p>
Contract award date(s)	July 2005
Type of contract	Full concession
Contract duration	35 years (including construction)
System operator	InTransit BC (SNC-Lavalin)
Current status	Preparing to open for revenue operations in late 2009



Continuation of General Summary

<b>Relevant public institutions</b>	<p><b>The Greater Vancouver Regional District (GRVD):</b> one division of a cooperative planning body representing 22 communities of the Vancouver Metropolitan Region.</p> <p><b>The South Coast British Columbia Transportation Authority (TransLink):</b> the greater Vancouver Metropolitan Region's transportation authority responsible for planning, financing, implementing and operating an integrated transport system. TransLink is required to consult with GVRD and derives its legal authority from the provincial government.</p> <p><b>The Greater Vancouver Airport Authority (GVAA):</b> the organization responsible for managing YVR airport. GVAA has no shareholders and reinvests all profits in airport development / service improvement. GVAA granted capital to the Canada Line project to partially fund the system's linkage to YVR airport.</p>
<b>Private stakeholders</b>	<p><b>InTransit BC</b> owned by</p> <ul style="list-style-type: none"><li>• SNC-Lavalin</li><li>• Investment Management Corporation of BC (IMBC)</li><li>• Caisse de Dépôt et Placements du Québec</li></ul>
<b>Other</b>	-
<b>Noteworthy Contractual Elements</b>	
<b>Treatment of demand / revenue risks</b>	<p>Canada Line's contract ties 10% of the concessionaire's payment to the system's customer volume. Calculating this volume payment involves:</p> <ul style="list-style-type: none"><li>• A base forecasted credit ridership estimate (excluding 'airport only' ridership)</li><li>• An agreed base volume payment</li><li>• An agreed shadow fare per paying customer</li></ul> <p>During the system's operating phase this information determines three possible payment scenarios as follows:</p> <ul style="list-style-type: none"><li>• If ridership equals forecasts, the concessionaire receives the base volume payment</li><li>• If ridership exceeds forecasts, the concessionaire receives the base volume payment plus the difference between actual and forecasted ridership multiplied by the agreed shadow fare</li><li>• If ridership falls below forecasts, the concessionaire receives the base volume payment minus the difference between forecasted and actual ridership multiplied by the agreed shadow fare</li></ul>

Table A 1.9 Canada Line

	<p>Independent consultants (Halcrow) prepared Canada Line’s initial ridership study that forms a basis for the system’s base credit ridership estimate. However, Canada Line’s contract specifies automatic revisions to this forecast at the commencement of services, two years after service commencement, and every five years thereafter. In addition, both TransLink and the concessionaire can trigger a forecast reassessment if any of the following events occur:</p> <ul style="list-style-type: none"> <li>• The system’s service plan changes</li> <li>• Planners expand services by adding stations along the existing route</li> <li>• Bus services change</li> <li>• Changes occur in the region’s Traffic Demand Management initiatives (e.g., changes in road pricing or tolls)</li> <li>• TransLink increases fares more than 5% (in real terms) over the average fare during the 5 years prior</li> <li>• Changes in the system’s fare structure</li> <li>• Average morning peak hour ridership during a three month period exceeds a certain level near the system’s maximum designed capacity</li> <li>• TransLink owns Canada Line’s the fixed assets (line, stations, etc.)</li> <li>• InTransit BC owns nonfixed assets (vehicles, signaling, etc.), builds, operates and maintains the system – accepting the majority of associated risks</li> </ul>
<b>Allocation of other major risks</b>	<p>During Canada Line’s procurement, bidders assumed all risks associated with price fluctuations except for items included in the project’s early works contract, which allowed for construction progress between commercial close and financial close. TransLink provided full protection and 100% reimbursement for early works in the event that financial close was not possible.</p> <p>Other noteworthy elements of Canada Line’s risk allocation structure include the following:</p> <p><b>Inflation during the construction period:</b> Capital grant payments were specified as pre-agreed milestone payments during the construction period (based on nominal dollar values as negotiated at financial close). The concessionaire endures the risk of higher inflation during the construction period in addition to any effects related to delays in reaching agreed construction milestones.</p>

Continuation of Noteworthy Contractual Elements

	<p><b>Inflation during the operating period:</b> base payments for the operating period (roughly 70% of the concessionaire’s compensation) are specified in real dollars for later inflationary adjustment based on an agreed formula as follows:</p> <ul style="list-style-type: none"><li>• Some fraction of base payments attributable to direct operating costs (40% before June 30, 2035, and 55% after) will adjust based on the Consumer Price Index (CPI), Electric Index, and Labour Index.</li><li>• The balance of the base payments not attributed to direct operating costs will adjust as follows:<ul style="list-style-type: none"><li>o 50% adjusts at a fixed 2.1% per annum</li><li>o 50% adjusts with the CPI</li></ul></li></ul>
<b>Provisions for expansion / extension</b>	Planners estimated that system extension was highly improbable and not part of TransLink’s long term strategic transportation plan. Therefore, Canada Line’s contract does not include a mechanism for accommodating this. However, stations and platforms have been designed to accommodate future system capacity expansion.
<b>Mechanisms for dispute resolution</b>	Amicable negotiations followed by arbitration and possibly litigation.
<b>Other</b>	-
<b>Summary of Policy Elements</b>	
<b>Strategic Metropolitan Transport Planning (SMTP)</b>	<p>Canada Line is part of TransLink’s larger public transportation plan that aligns with the policies of the Greater Vancouver Regional District (GVRD). In 1996 GVRD established a Livable Region Strategic Plan (LRSP) containing objectives to:</p> <ul style="list-style-type: none"><li>• Protect the “Green Zone” (agricultural lands and parks)</li><li>• Build complete communities</li><li>• Achieve a compact metropolitan region;</li><li>• Increase transportation choices</li></ul> <p>In 1993 GVRD adopted the ‘Transport 2021 Long Range Transportation Plan’ that identified three corridors for upgrading to “intermediate capacity transit systems.”</p>
<b>Value proposition of project</b>	The Canada Line project represents an effort to realize the policy goals of the greater Vancouver region as discussed above.

Table A 1.9 Canada Line

<b>Justification for PPP approach</b>	The provincial government has a policy that every publicly-funded project over Can\$20 million must be considered as a possible PPP. This policy involves, Partnerships British Columbia, a company responsible for bringing together ministries, agencies and the private sector to develop projects on a PPP basis. Partnerships BC is registered under the Business Corporations Act and is wholly owned by the province of British Columbia (reporting to the Minister of Finance).
<b>Affordability / equitability</b>	Unknown
<b>Other</b>	-
<b>Technical Summary</b>	
<b>System length (km)</b>	19
<b>Number of stations</b>	16
<b>General characteristics</b>	<ul style="list-style-type: none"> <li>• Three Water Crossings (2 bridges and 1 tunnel)</li> <li>• 7.5 km (40.5%) elevated</li> <li>• 6.5 km (35%) cut and cover tunnel</li> <li>• 2.5 km (13.5%) bored tunnel</li> <li>• 2.0 km (11%) at grade</li> </ul>
<b>Rolling stock</b>	There is no explicit obligation on the concessionaire to develop a replenishment fund or to replace rolling stock after a prescribed period. Refurbishment is not specified explicitly. Contractual terms seek to force concessionaire behavior with respect to system upgrade, maintenance, and upgrade. The system's PMS system will incentivize refurbishment after an appropriate interval through KPIs designed to measure service quality.
<b>Ticketing, barriers, and security</b>	<ul style="list-style-type: none"> <li>• Canada Line will initially be an open system.</li> <li>• TransLink is responsible for revenue collection and revenue security. In addition, TransLink will supply a special transit police unit to patrol Canada Line's trains and stations.</li> <li>• The concessionaire is not evaluated based on revenue security but is required to assist with fare checking / fare compliance.</li> <li>• Ticketing is fully integrated with Vancouver's existing integrated transit system, including the Skytrain LRT, West Coast Express commuter rail, TransLink bus network, and Sea Bus (marine transit) services.</li> <li>• Canada Line stations are designed to readily accommodate fare gates / barriers at some future date.</li> </ul>



Continuation of Technical Summary

Integration with other modes	<p>TransLink will provide feeder / distribution bus linkages with Canada Line’s stations. There are three significant bus exchanges being constructed at key Canada Line stations as part of these integration efforts. The Canada Line project also includes a 1200 stall park and ride facility at Bridgeport Station to divert personal vehicle traffic before crossing the Fraser River. All Canada Line stations outside of downtown Vancouver also include kiss and ride facilities along bicycle lockers.</p>
	<p>Canada Line also includes a spur linkage connecting the system’s main trunk route with Vancouver International Airport (YVR). Three Canada Line stations will provide services on airport lands. Travel between these three stations is free as part of an agreement with the Vancouver International Airport Authority (VIAA). VIAA contributed a substantial capital grant (Can\$ 245 million) to the Canada Line project and accordingly will use these free services to shuttle airport customers / employees between the main airport terminal, long term parking lots, future rental car facilities, and other airport support businesses located near YVR’s Canada Line stations.</p>
	<p>TransLink plans to derive benefits from increased pricing power provided by Canada Line’s airport linkage. Customers will pay a premium fare for traveling to YVR from stations not on airport land. Canada Line’s linkages with the Vancouver Skytrain and West Coast Express rail services will also help the system attract airport commuters from a relatively large geographic area.</p>
Accuracy of initial forecasts	To be determined
Other	-

Table A 1.9 Canada Line

	<b>Operational Summary</b>
<b>Fares and fare structure</b>	TransLink will set Canada Line's fares. While the system's exact fare structure is being worked out, TransLink does plan to charge a premium for passengers traveling to YVR airport.
<b>Operator assessment and incentive structure</b>	Canada Line will employ a full performance management system to provide incentives for service availability and quality. The current structure envisages availability payments to be done against performance KPIs. Accordingly, remuneration to the concessionaire is done as follows: 70% for availability and quantity of service, 20% against quality (e.g., cleanliness, graffiti, etc.) and 10% is payable as a percentage of achieved ridership (measured through automated passenger counters) against forecast ridership. The last payment constitutes a provision for a bonus / penalty for the concessionaire to encourage the promotion of higher ridership. TransLink and the concessionaire will agree to a list of KPIs at some future date.
<b>Other</b>	-
	<b>Other Information</b>
<b>Other</b>	-



# ANNEX 2

## TARGETING THE URBAN POOR AND ACCESS FOR ALL



## A 2 TARGETING THE URBAN POOR AND ACCESS FOR ALL

LRMT’s potential for serving the urban poor should not be discounted despite the number of systems aimed at middle class populations (intentionally or otherwise). Latin America’s experience with rail transportation in general has shown that lower income riders constitute the majority of rail system customers in certain instances. Table A2.1 shows the percentage of users below city/regional average income levels for selected rail transportation systems in Brazil.

Table A 2.1: **Below Average Income Rail Customers in Brazil**

Rail System (year of sample data)	Percentage of customers below city (region average)
Recife suburban rail (1997)	55.7
São Paulo Metro (1997)	57.4
São Paulo Train (1997)	80.4
Rio de Janeiro suburban rail (1996)	85.5
Belo Horizonte (1995)	55.6

Source: Gwilliam (2002)

Experience from Brazil illustrates that the income distribution of rail transportation customers is not a miraculous occurrence. Decisions made during planning and subsequent operation will determine which income groups are most likely to benefit from a project’s services. Factors that influence an LRMT system’s socioeconomic customer characteristics include

- Fare levels
- Station locations and route map
- Extent and reach of any “feeder” transportation networks
- System security and safety
- Locations of transfer points
- Operating hours and overall availability
- Integration and connection with other modes of transport
- Accommodation of non-motorized transport (i.e., bicycles)

### A 2.1 Targeting low income customers

A co-financed World Bank / UK Department for International Development (DfID) study led by consultants at Halcrow Fox, identified four broad approaches for targeting low transportation customers including the following:

- **Individual targeting:** this requires some method for identifying poor passengers such as Brazil’s “vale transporte” scheme. While individual targeting is the most efficient way to allocate subsidies, identifying poor customers is often challenging if not impossible on account of limited identification mechanisms.
- **Targeting selected groups:** discounting fares for identifiable groups that tend to be lower income can direct subsidies towards poor customers. For example, group targeting could focus on groups such as students or the elderly, where commonly carried pieces of identification offer a means for verifying eligible customers. This methodology may

suffer from subsidy misallocation when substantial numbers of middle and higher income customers belong to target groups.

- **Geographic targeting:** Aligning transportation routes and stations to serve poor neighborhoods is an effective way to target poor customers. Discounted fares along specific linkages can also ensure that services are affordable. Similarly, flat fares (i.e., fares that do not depend on distance) can also offer a means for allocating subsidy when poor populations generally reside on the outskirts of urban areas.
- **General targeting for all public transportation services:** this involves a general subsidy for all public transportation customers based on the assumption that anyone riding public transportation is poor. This is the least efficient means for allocating subsidy and may require the greatest amounts of public support.

Targeting LRMT services and subsidies towards poor populations can be an intelligent strategy for reducing poverty and increasing development. However, planners should also consider the opportunity costs of funds used for this purpose. It may be that poor customers would benefit more if transport subsidies were instead allocated towards some other form of assistance. Contractual arrangements for LRMT PPPs should also accommodate policy decisions for subsidizing transport without affecting private compensation. Later sections will discuss this in greater detail.

## **A 2.2 Ensuring Access for All**

Planners, Developers and policy makers have a moral obligation to ensure that persons with disabilities enjoy good access to LRMT services. Public-private partnership agreements in LRMT should recognize this fact and included provisions addressing basic accessibility features including:

- Lift access to underground or elevated structures
- Designated drop-off points with ample room for specialized vehicles
- Ramps where appropriate
- Accessible lavatory facilities
- Directional signage
- Tactile guidance systems
- Wider fare gates for accommodating wheelchairs (also helpful to passengers carrying baggage or parcels)
- Generally barrier free facilities
- Appropriately designed gaps between platforms and rolling stock

Ensuring good access also includes working to improve transport services that integrate with LRMT. For example, feeder networks should include low floor buses with extendable ramps or raised boarding platforms at bus stops. Providing good access to disabled customers requires important consideration when evaluating proposals and crafting PPP specifications for new LRMT services. Failing to properly incorporate such considerations can result in substandard facilities or large retrofitting expenditures later on.



**ANNEX 3**

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**ANALYTIC  
AND ADVISORY WORK**



## **A 3 ANALYTIC AND ADVISORY WORK**

Designing and implementing an arrangement requires economic, financial, technical, as well as legal expertise, as well as the coordination of that expertise. Detailed work is needed to refine the option to be implemented and the legal measures to support it, and to prepare complex documents, such as laws, bidding documents, and draft contracts.

Governments or municipalities usually lack the full range of expertise within the civil service to carry out these tasks and so will need advisers to provide some of these skills and specialized expertise.

Management of transactions of major LRMT schemes with private sector involvement need a specialist management expertise that is generally not found within the public contracting organization, and it is likely that transaction advisory support from specialist advisers will be needed to help lead the whole process.

There will be times when more or less work is needed, and the appropriate combination of advisers will always depend on the particular circumstances. The costs of advice always need to be weighed against benefits.

### **A 3.1.1 Sector Strategy**

An established and comprehensive transport sector strategy is a major help in establishing policies for development of LRMT projects. If the transport sector strategy has not already been established, advice on sector strategy involves judgments on issues such as the tradeoffs between various transport forms (including LRMT), economies of scale, and the responsibilities of, and relationships between, various institutions and levels of government. Advice on sector strategy will typically be led by economists or others with experience in the transport sector and experience with institutional analysis. The lead advisers will need input from specialists who can advise on technical, financial, and legal possibilities and constraints on the various transport forms, particularly with the role of LRMT in the sector, and from social researchers to understand the local situation.

### **A 3.1.2 Technical Issues**

We are looking principally at the work specifically associated with establishing the PPP arrangement. However, this approach takes as a starting point that there is the development of a strong and robust physical and technically effective LRMT system. Each project has its own mix of technical and operational elements, and the level of use of consultants for development of the physical infrastructure and technical systems will depend on the need for support required by the contracting authority. However, since these schemes are typically complex, the issue of coordination and management of these advisers is key. The work of these advisers (e.g., on costing and operational issues, for instance), feeds directly into the tasks of the other advisers and the decision makers establishing the PPP arrangement.

### **A 3.1.3 Setting Service Standards, Tariffs, and Subsidies**

Traffic specialists will usually be needed to determine the level of service currently being received, the services people want, and people's willingness to pay for them. Researchers may also consult with riders and organizations that represent them. Economists and traffic specialists are typically needed to develop demand forecasts from surveys and consultations. These forecasts should take into account the sensitivity of demand to price. Technical engineering consultants may estimate the cost of achieving service standards in areas such as headway and punctuality, as well as other issues such as environmental levels. This will feed into developing reasonable performance targets and methods for measuring performance. Most private developers will also wish to conduct their own technical due diligence to draw their own conclusions, as this area is one that will have direct impact on future operational and commercial success.

The demand forecasts and the results produced by the technical consultants will be inputs for the financial consultants. The technical consultants' assessment of the assets' physical condition, judgment on the assets' remaining useful life, renewal and maintenance of rolling stock and equipment, and an estimate of the capital expenditure required to construct new works, as well as to meet performance criteria, will all be inputs to the financial model. This will also have a direct involvement in developing the investment plan. The technical consultants' estimate of the human resources or levels of automation required to provide safe, efficient service will feed into the analysis of the likely staffing costs and any retrenchment compensation. These results will also go to the team that consults with workers and their unions.

The financial advisers will assist the government in determining the tradeoffs between tariffs, subsidies, and other financial variables. This analysis entails developing a financial model and discussing with the government the policy assumptions that should be included in the model. The model will be used to test the viability of the proposed service objectives and their impact on the tariff. To do this effectively, the model needs to incorporate the demand forecast and the investment plan. Economists will likely be involved again in advising on tariff structure and subsidy arrangements to balance the objectives of efficiency, cost recovery, and social acceptability.

### **A 3.1.4 Risk Analysis and Design of the Arrangements**

Ideally, all disciplines will be involved in the risk analysis. This may be led by the transaction adviser, or coordinated by the financial experts, especially if risks are estimated in a quantifiable way using a financial model.

Based on the risk analysis and the other analytic work, the outline of the arrangements will be developed. As the issues to be covered by any risk analysis and the LRMT PPP arrangement are such an extremely important part of the arrangement design and implementation, refer to chapter 4 for these issues.

Lawyers are then needed to turn the outlines or drafting instructions into a complete, legally binding regime. We give a more detailed review of the development of the contractual arrangements for LRMT PPP schemes in chapter 7. Good lawyers will focus on making the intended risk allocation legally effective and developing an arrangement that minimizes future disputes.

## **A 3.2 Coordinating Advice and Packaging Advisory Contracts**

Coordinating the advisory work described above is a difficult task. Tight integration of all the elements and interaction between various disciplines are needed to produce a coherent package.

The government needs someone with an overarching view of all the advisory and analytic work who is responsible for managing and coordinating the advisory work. This person may be a strong and experienced member of the government. But often the government will need to hire an external transaction adviser with the experience and capacity to manage all elements of the design and implementation. Transaction advisers traditionally have a financial background, but this is not essential. More important is that the chosen adviser has the following attributes:

- The ability to understand how the work of the various specialists from different disciplines fits together
- Strong communication skills, to understand what government and other stakeholders want, communicate the options to them effectively, and help them make informed choices
- Knowledge and understanding of the potential developers and financiers, their objectives, and their constraints
- Strong planning and management capabilities to keep a complex, commercially, and socially sensitive process moving forward in a controlled way

How advisers are coordinated depends largely on how the contracts under which they are hired are structured. One option is to hire a single consortium of firms with the requisite economic, technical, consultative, financial, and legal skills, to be led by the transaction manager. Another option is to procure the technical, legal, financial, economic, and other inputs under separate contracts. There are intermediate options, such as packaging some but not all components of the required advice or hiring a single lead adviser to assist the government in hiring other specialists or advisers for particular tasks.

Hiring different advisers for different areas may make it easier for the government to get the best advice in each area, but this should be done only if the government can coordinate all the specialists effectively. If the government's reform unit lacks capacity and experience, it will probably want to hire a transaction adviser to coordinate the work. Key areas of coordination include the following:

- Between technical and financial plans—the specification of service standards and the investment plans necessary to achieve them are a key determinant of costs, and thus tariffs, subsidies, and financing structures
- Between mechanisms for setting tariffs including the role of any regulatory agency, and the allocation of risk, since the two are closely connected
- Between economic and financial plans—design of tariffs and subsidies should reflect social and environmental goals, as well as provide for cost recovery

Another coordination question is whether a single adviser should be hired to help in all stages of the transaction or whether different advisers should be brought in at different points. Some firms that are good at designing policy are not good at managing transactions, and vice versa.

One common approach has been to employ one or more sets of advisers to develop policy and options for private participation with a separate transaction manager to implement the transaction. This approach allows the transaction manager to be paid a success fee, without the government needing to worry about whether the success fee would bias the advice given on policy or the best option for private participation.

A disadvantage of employing different advisers at different stages is that much of the work done in the early stages can be lost in the transition to a new adviser. In practice, the knowledge and understanding gained earlier in the transaction can seldom be fully embodied in the adviser's reports. More important, the success of the transaction depends on policy choices. Advisers who are not responsible for the final outcome may not pay sufficient attention to the requirements of bidders, reducing the usefulness of their advice.





**ANNEX 4**

**SAMPLE**

**LRMT RISK MATRIX**

Table A 4.1

Risk	Description	Proposed Allocation
1. Design and Construction		
Network expansion	Risk of inadequate design and thus options need full assessment e.g., incorporation of underused heavy rail lines into new LRMT systems needs to be assessed carefully	To grantor
Inadequacy of local standards to be applied to LRMT scheme	Risk that existing local standards are inadequate for an LRMT thus need to identify differences between local standards and current best international practice	To grantor but to be discussed as it will affect concessionaire
Third party / relevant authorities approval risk	Risk that the proposed design developed is not approved by the relevant authorities	To be discussed, this is a key risk that needs to be evaluated within a larger framework of bid submission and bid evaluation
Design risk	Risk of error in design that leads to failure of project to satisfy requirements / law	To concessionaire - Intention is to use an output specification, therefore whole of design risk can be transferred
Design risk related to extension of tramway	The wide range and dissimilarity of each tramway means that bidders, irrespective of the procurement method, have had to consider anew the implications of each tramway separately	To be discussed
Fitness for purpose	This process adds to the set-up costs of each scheme for both public and private sectors and in itself adds an element of risk	To developer
Design fault	Risk that the design proposed is not fit for purpose	To developer
Latent defect in design	Risk that a fault in design is found after design has been approved by relevant authorities, creating delays or additional costs	To developer. The design will be left to the concessionaire and the grantor will only provide approval to the design presented by the developer
Design life expectancy	Risk that a latent defect is discovered later in the life of the project	To developer
Consistency of design with urban surroundings	Risk that the design proposed is not adequate for the duration of the project	Shared
Permits and access	Risk that the major implications on architectural and urban design are not well understood	To grantor (and a blanket permit to be provided as a condition of effectiveness to contract)
Redirection of utilities and network	Risk that permits from city, municipality or borough are not granted	To be discussed depending on the complexity of the tasks
Delay / increase costs due to change in design required by Grantor	Risk that utilities network are not located where they are supposed to be, or that their relocations are more costly or time consuming than what is required	To grantor
Change in design due to legislative. Regulatory changes	Risk that grantor require changes in design that are not warranted by the initial specification proposed and / or by the existing legislations / process A change in law / regulation leads to a requirement to change the design and increase costs and or delays	To grantor, the concessionaire cannot protect itself against this type of risk
Increased design costs	Risk that the full design costs increased as the project is being developed, because of bad initial estimate of the design cost	To developer

Risk	Description	Proposed Allocation
<b>1. Design and Construction</b>		
Change in design required by concessionaire	Risk that a change in design will lead to delay / increase costs because of a change required by the concessionaire	To developer
Change in law / regulation during construction	Risk that a change in law / regulation during construction will lead to delay in construction or additional costs	To grantor
Land acquisition	Acquisition of right to use the land (over and below ground) to construct the tunnel	To grantor – benefit from expropriation rights at law and asks grantor to manage the complexity of rights to site under the river
Access to land and site	Access to land with rights to build and operate project	To grantor – benefit from expropriation rights at law and asks grantor to manage the complexity of rights to site under the river
Site / ground conditions (except sub surface conditions and man made artifact)	Site ground conditions might lead to increase in costs or delays in construction time. This is different from subsurface risk and risk of discovery of man made artifact (see below)	To developer – as long as the site ground conditions are properly documented, the developer should be able to bear the risk that the site ground conditions are likely to lead to increased costs or delay in construction
Subsurface risk	Risk that subsurface conditions are different than those anticipated	To grantor – it would be expensive for each bidder and inefficient to conduct its own survey, and therefore to assess what are the subsurface conditions. Therefore the risk should be borne by the grantor to the extent subsurface conditions are different than those indicated in the geological surveys performed by the grantor
Man-made artifacts	The risk that the discovery of man-made objects during construction requires special treatment to remove them, introducing delay in time and increased costs	To grantor – to the extent discovery was not foreseeable. This is a typical risk allocation, each bidder cannot know in advance whether (say) archeological artifact of importance could be discovered, and if so how the grantor / government would want to deal with them
Increase in construction costs due to contractor	Price of labor, materials and other elements of construction cost	To developer – able to manage in this risk through construction contract
Time overruns due to contractor	Risk of delay in construction related to contractor error or external influences	To developer – general risk of delay, to be transferred to construction contractor, subject to below
Latent defect in existing work	In the event of existing works, risk that such works might contain latent defect that might affect the quality and extent of work needed to be undertaken by the developer	To grantor
Site safety	Risk that accidents happen on site because of poor safety procedures	To developer
Industrial action	Risk of strike by construction companies or subcontractors (not general strike)	To developer



Risk	Description	Proposed Allocation
<b>1. Design and Construction</b>		
Adverse weather conditions	Weather conditions prevent or slowdown construction work, resulting in delays or increased costs	To developer specified unless these are exceptional weather conditions. It should be valuated what such “exceptional conditions” could be
Performance of sub contractor	Risk that one of the subcontractor to the developer does not perform leading to increase in costs or delay	To developer
Misinterpretation of specifications	Risks that the project specifications are misinterpreted and this leading to increase in costs and / or delays	To developer
Force majeure time delay	-	Shared
Force majeure cost implications	-	Shared
Development costs	Increase in development costs for the developer	To developer
Delays / costs because of grantor changes	-	To grantor
Cost increase because of increase in inflation, increase in interest rate or movement in foreign exchange	-	Shared, typically the risk that inflation costs, interest rate costs and Foreign exchange rate movement create higher than planned costs between bid submission and financial close are shared between the grantor and the developer. Following financial close, this tends to developer risk
Surrounds	Risk of damage to surface and subsurface structures due to construction work and settling of ground following construction	To developer – generally the developer should be responsible for its own construction methods and their impact on the surrounds. This will be an important part of the developer’s design risk. This said, the context of the project will require additional consideration by the grantor to understand the extent of surrounds risk, and whether investors will be able to assess this risk in the time permitted. If investors do not have sufficient time, they will price this risk accordingly and it may be more financially efficient for the grantor to bear some of this risk
<b>2. Commissioning</b>		
Time, and cost to satisfy commissioning	-	To developer
Fit for purpose O&M manuals, approval, and statutory certificates	-	To developer
Availability of services / utilities (traffic signals, etc.)	See risk assessment under item 2 Operation	Shared

Risk	Description	Proposed Allocation
<b>2. Operation</b>		
Revenue and ridership	-	Shared
Integration / interchange with other modes of transport	Risk of insufficient or inadequate integration or competition from other modes of transport, or risk of insufficient or inadequate interchange with other forms of public transport etc.	Shared
Obtaining and maintaining licenses to comply with regulatory requirements	-	To developer
Interface with subcontractors	-	To developer
Monitoring of performance	There are varying degrees of expense involved in operating different performance regimes from the fully automatic self-reporting to the labor intensive inspection force. Penalties to be imposed by the promoter and the method for withholding money from the developer – or recovering money – must be fair and easily understood	Shared
Operational under different weather conditions	Ability to operate in local weather conditions	To developer but mitigated through the contract's performance indicators and possibly penalty scheme
Technological	Ability to develop and implement new technological solutions to deliver requirements to time and budget; ability to take account of future growth within initial phases; interface between the differing elements rolling stock, signalling, structures and interfaces with other elements of the transport network	-
Undue benefits from future extensions	To ensure that the concessionaire does not benefit unduly from any future extension to the system, various payment mechanisms need to be examined. These could include a payment regime that acknowledges a certain amount of escalation during the construction phase and for this to be extended into any future extension. If the value of the escalation were to be proposed by the bidders in their tenders, it would ensure that a low rate was maintained	Alternative schemes that could be considered and the need to maintain financial control over future extensions is not seen as an insurmountable problem
Standard of performance non availability of service	Whether the service provided to users and to the benefit provided to the grantor corresponds to the obligations set out any concession agreement and at law	To developer – as a general consideration, but subject to a other aspects of risk allocation discussed here, for example change in law, subsurface conditions developer
Costs of compliance with general change in legislation and statutory requirements	-	To developer
Changes in scope of services due to grantor requirements	-	To grantor

Risk	Description	Proposed Allocation
Change in scope of services because of concessionaire requirements	-	To developer
Danger to users through health and safety	-	To developer
Public liability	-	The grantor
Damage to infrastructure other than for Grantor default	-	To developer, shared
Latent defect in infrastructure once constructed	Risk that a defect in the construction is found out during the operation of the tunnel and that repairing such defect creates additional costs or disrupt the operation of the tunnel	To developer
Cost of operation	Risk of increases in the cost of labor, utilities and the replacement of equipment (incl. inflation)	To developer this risk can be largely managed by the developer through on O&M contract and through its own operational efficiencies
Cost of maintenance	Risk of increases in the cost of maintenance and replacement of the works, including resurfacing and major maintenance ( incl. inflation)	To developer such maintenance is foreseeable and the developer will be in the best position to manage its costs through its own operational efficiencies
3. Traffic Volume		
Traffic or ridership levels	Risk that traffic does not achieve the levels forecast. The overall state of the economy drives ridership. Risk transfer would require the bidder to take ridership risk but he has no control over many of the drivers of demand	To be agreed between grantor and developer
Revenue risk	Two options: gross cost contract (where all fares taken on the system are paid direct to the City treasury and a guaranteed revenue – subject to penalty deductions – is paid to the developer); or a net cost contract (where farebox revenue is passed to the developer and City grants form a supplementary revenue stream)	To be agreed between grantor and developer
Demand for service	Regulatory change (local development policy, taxation policy, road provision and user charging, policy on the integration of the LRMT with other parts of the public transport network) will have a huge influence on transport demand	To be agreed between grantor and developer
Ticket levels	Risk that the ticket levels are insufficient to achieve the revenues anticipated	-
Ticket collection strategy	Risk that the toll collection technology and strategy is not the most efficient or that the grantor changes its approach	To grantor

Risk	Description	Proposed Allocation
<b>4. Environmental</b>		
i. Existing	Damage to the environment existing before commencement of work	To grantor
ii. New	Damage to the environment caused during or after commencement of work	To developer
Noise	Excessive noise causing noise pollution	To developer
Stakeholder consultation	Risk that stakeholders have not been consulted and inadequate support is mustered to deal with urban disruptions during construction. Also stakeholder interface risks such as adjacent property and land owners with differing objectives for the project	To developer and grantor
<b>5. Financial</b>		
Access to finance / financial close	Risk that the developer is unable to attract the financing required for the project, at a sufficiently low cost	To developer, before completion of the bidding process. The grantor will use best efforts to facilitate financing and accelerate the due diligence process by lenders
Interest rate	Risk that the interest charged on financing increases	To developer, though a grantor will bear part of risk that interest rate changes between project award and financial close
Inflation	Risk that higher than forecast inflation increase project costs	To developer, though a grantor will bear part of risk that inflation rate changes between project award and financial close
Change in VAT and taxes	-	To developer if applicable indiscriminately, to grantor if change is limited in application to (say) tunneling companies or PPP companies
Foreign exchange	Risk that financing is obtained in foreign currency, but revenue stream is in local currency	To developer, though this will need to be reviewed once clarity is achieved on currency of financing and availability of hedging
Tenor	Length of debt insufficient to achieve financial viability in the context of a long-term concession	To developer, subject to the above review of the source of financing, for example if the grantor decides that it would rather source debt in local currency, it may need to provide some support of debt tenor
<b>6. Social/Political/Legal</b>		
Protestor action	Disruption of construction or operation by individuals or groups against the project	To grantor, unless caused by developer act or omission
Legal challenge	Legal actions against the grantor or the developer that restrict the developer's ability to build or operate the project	To grantor, unless caused by developer act or omission
Political interference	Governmental or political act interfering with the project or the developer	To grantor to the extent contrary to the concession agreement or law
Change in Law	Change in legislation, regulation or tax	To grantor
Force majeure	-	Shared between grantor and developer
Nationalization/expropriation	Governmental acts seizing the property of the developer or the project	To grantor





# ANNEX 5

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## EXAMPLES OF INTERNATIONAL STANDARDS FOR ROLLING STOCK

Table A 5.1

**Common International Standards for Rolling Stock**

Standard No.	Version	Description
BS EN 14752	2005	Railway applications – Bodyside entrance systems
BS EN 13452-1	2003	Railway applications – Braking – Mass transit brake systems – Part 1: Performance requirements
BS EN 13452-2	2003	Railway applications – Braking – Mass transit brake systems – Part 2: Methods of test
BS EN 12299	1999	Railway applications – Ride comfort for passengers – Measurement and evaluation
BS EN 14813-2	2006	Railway applications – Air conditioning for driving cabs – Part 2: Type tests
BS EN 14813-1	2006	Railway applications – Air conditioning for driving cabs – Part 1: Comfort parameters
BS EN 14750-2	2006	Railway applications – Air conditioning for urban and suburban rolling stock – Part 2: Type tests
BS EN 14750-1	2006	Railway applications – Air conditioning for urban and suburban rolling stock – Part 1: Comfort parameters
BS EN 13104	2001	Railway applications – Wheelsets and bogies – Powered axles – Design method
BS EN 13103	2001	Railway applications – Wheelsets and bogies – Non-Powered axles – Design method
BS EN 14752	2005	Railway applications – Bodyside entrance systems
BS EN 12663	2000	Railway applications – Structural requirements of railway vehicle bodies
BS EN 50125-1	1999	Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock
BS EN 50218	2001	Railway applications – Communications, signaling and processing systems – Software for railway control and protection systems
BS EN 50206-1	1999	Railway applications – Rolling stock – Pantographs: Characteristics and tests – Part 1: Pantographs for main line vehicles
BS EN 50206-2	1999	Railway applications – Rolling stock – Pantographs: Characteristics and tests – Part 1: Pantographs for metros and light rail vehicles
BS EN 50163	2004	Railway applications – Supply voltages of traction systems
BS EN 50121-1	2006	Railway applications – Electromagnetic compatibility – Part 1: General
BS EN 50121-2	2006	Railway applications – Electromagnetic compatibility – Part 2: Emissions of the whole railway system to the outside world
BS EN 50121-3-1	2006	Part 3-1 Rolling stock – Train and complete vehicle
BS EN 50121-3-2	2006	Part 3-2 Rolling stock – Apparatus
BS EN 50155	2001	Railway applications – Electronic equipment used on rolling stock
BS EN 50215	1999	Railway applications – Testing of rolling after completion of construction and before entry into service
BS EN 50126	1999	Railway applications – Specification and demonstration of reliability, availability, maintainability and safety (RAMS)
BS EN 3381	2005	Railway applications – Acoustics – Measurement of noise inside railbound vehicles
BS EN 3095	2005	Railway applications – Acoustics – Measurement of noise emitted railbound vehicles
BS EN 6853	1999	Code of practice for fire precautions in the design and construction of passenger carrying trains
IEC 60077-1	1999-10	Railway applications – Electric equipment for rolling stock – Part 1: General service conditions and general rules

Standard No.	Version	Description
IEC 60077-2	1999-03	Railway applications – Electric equipment for rolling stock – Part 2: Electrotechnical components – general rules
IEC 60085	2004-06	Electrical insulation – Thermal classification
IEC 60310	2004-02	Railway applications – Traction transformers and inductors on board rolling stock
IEC 60322	2001-03	Railway applications – Electric equipment for rolling stock – Rules for power resistors of open construction
IEC 60494-2	2002-08	Railway applications – Rolling stock; Pantographs characteristics and tests – Part 2: Pantographs for metros and light rail vehicles
IEC 60631	1978	Characteristics and tests for electrodynamic and electromagnetic brake systems
IEC 60747-9	2005-06	Semiconductor devices – discrete devices – Part 9: Insulated gate bipolar transistors (IGBT)
IEC 60947-2	2006-05	Low voltage switchgear and control gear – Part 2: Circuit breakers
IEC 60947-3	2005-06	Low voltage switchgear and control gear – Part 3: Switches, disconnectors, switch-disconnectors and fuse combination units
IEC 60947-4-1	2005-06	Low voltage switchgear and control gear – Part 4-1: Contactors and motor starters – Electromechanical contactors and motor starters
IEC 61133	2006-10	Railway applications – Rolling stock – Testing of rolling stock on completion of construction and before entry into service
ISO 1005-1	1994-08	Railway rolling stock material – Part 1: Rough rolled tyres for tractive and trailing stock; technical delivery conditions
ISO 1005-2	1986-11	Rolling stock material – Part 2: Tyres, wheel centres and tyred wheels for tractive and trailing stock; dimensional, balancing and assembly requirements
ISO 1005-3	1982-04	Railway rolling stock material – Part 3: Axles for tractive and trailing stock; quality requirements
ISO 1005-4	1986-11	Railway rolling stock material – Part 4 Rolled or forged wheel centres for tyred wheels for tractive and trailing stock; quality requirements
ISO 1005-6	1994-08	Railway rolling stock material – Part 6: Solid wheels for tractive and trailing stock; technical delivery conditions
ISO 1005-7	1982-11	Railwayrolling stock material – Part 7: Wheelsets for tractive and trailing stock; quality requirements
ISO 1005-8	1986-11	Railway rolling stock material – Part 8: Solid wheels for tractive and trailing stock; dimensional and balancing requirements
ISO 1005-9	1986-11	Railway rolling stock material – Part 9: Axles for tractive and trailing stock; dimensional requirements
ISO 9000	2005-09	Quality management systems – Fundamentals and vocabulary
ISO 9001	2000-12	Quality management systems – Requirements
ISO 14001-0-8	2000	Environmental management systems
UIC 651	2002-07	General specification for driver’s cab of railway vehicles





# ANNEX 6

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OTHER SPECIFICATIONS  
**COMMONLY**  
INCLUDED IN LRMT  
**CONTRACTS**

Table A 6.1:  
*Examples of Specifications for LRMT PPP Contracts*

Commonly Specified LRMT Elements	Details and Explanation
General System-Wide Specifications	
Applicable technical standards	These provide guidance for engineers during design, construction, testing, commissioning and operations. For example, technical standards will aid designers as they size system components (i.e., beams, columns, foundations, etc.)
Design life for major assets	<p>Specifying minimum design lives for LRMT system assets provides for level of comparability between bids because of such information is an essential requirement for generating engineering / architectural designs. Examples assets with specified lives often include</p> <ul style="list-style-type: none"><li>• Structures</li><li>• Track</li><li>• LRMT vehicles</li><li>• Station platforms</li><li>• Station superstructure</li><li>• Signaling equipment</li><li>• Ticketing machines</li><li>• Power supply infrastructure (third rails, overhead cables, etc.)</li><li>• Substations and equipment</li><li>• Overhead lighting equipment</li></ul>
Electromagnetic compatibility	Electrical equipment (e.g., LRMT vehicles), communications devices (e.g., radios) and signaling hardware can create electromagnetic disturbances which can have adverse effects on non system assets (e.g., local cell phones). LRMT system planners should consider requiring continual monitoring of electromagnetic compatibility in addition to compliance with pertinent regulations
Other human related design elements	<p>Designing LRMT systems for good human interaction requires “softer” considerations beyond simply engineering for functionality. Some of the additional elements that contract specifications may elect to mention include the following:</p> <ul style="list-style-type: none"><li>• Good ergonomic design for reasonable levels comfort and utility</li><li>• Simple and intuitive graphical user interface (GUI – pronounced ‘goosey’) design where applicable (e.g., ticket vending machines, information kiosks, control rooms, etc.)</li><li>• Sensible physical interfaces for customers, equipment developers, maintainers, and others that provided for safe, convenient and efficient interactions</li></ul>
Provisions for future growth and expansion	<p>Planners should be keen to ensure that private design proposals align with future strategy for system expansion and extension. Accommodating greater services at later dates should encourage planners to specify some amount of over-design of elements such as</p> <ul style="list-style-type: none"><li>• Power systems</li><li>• Station capacity</li><li>• Trackwork</li><li>• Structures</li><li>• LRMT vehicle fleets</li><li>• Signaling equipment</li><li>• Communications equipment</li><li>• Depot capacity</li><li>• Other infrastructure (ducts for cables, heating ventilation and air conditioning systems, etc.)</li></ul> <p>Providing additional capacity for growth and expansion may result in greater upfront costs. Some form of financial analysis should help to determine the optimal level of additional capacity that planners should specify</p>
Requirements for standard equipment, software and non proprietary technology selection	Affordable operations, maintenance and procurement following hand-back may suffer when privately designed LRMT systems unnecessarily incorporate proprietary technology or custom equipment. Many LRMT planners elect to address this concern by specifying general requirements for using non proprietary, commonly available components wherever possible

Commonly Specified LRMT Elements	Details and Explanation
Maintainability	General contract specifications often include requirements to design system components for maintainability. Designing for maintainability implies positioning components for easy access and convenient replacement. This is an especially important consideration for system elements that require frequent maintenance.
Universal access for all customers	Contractual specifications for these considerations will often defer to local or international codes. Beyond the obvious requirements regarding disabled passengers, specifications for accessibility should accommodate the needs of customers carrying small loads, tending to children, or transporting luggage.
Requirements for non technical design elements	Providing for positive customer perceptions requires considerations beyond LRMT services alone. Contractual specifications often include general requirements for consistent and pleasingly designed <ul style="list-style-type: none"> <li>Logos</li> <li>Uniforms</li> <li>Marketing literature</li> <li>Station /LRMT vehicle interiors and exteriors and furnishings</li> </ul>
Specifications for Particular Systems or Processes	
Overall civil works	Contractual clauses pertaining to general civil works often include specifications regarding <ul style="list-style-type: none"> <li>Route alignment</li> <li>Bridges and viaducts design standards and related requirements</li> <li>Requirements for general compliance with reference designs or procedures for addressing deviations</li> <li>Requirements for certain engineering considerations (e.g., fatigue life, loading conditions, fire resistance, drainage, etc.)</li> </ul>
Stations	Specified station elements may include the following <ul style="list-style-type: none"> <li>Capacity</li> <li>Signage</li> <li>Platform shelter requirements</li> <li>Minimum platform sizes</li> <li>Requirements for passive information sources (e.g., maps, information boards)</li> <li>Basic facilities (lighting, lavatories, elevators, little bins, etc.)</li> <li>Other design requirements (e.g., fatigue life for subcomponents, specified lives for surfaces)</li> </ul>
Trackwork and alignment	General specifications for trackwork and alignment may include items relating to <ul style="list-style-type: none"> <li>Applicable standards</li> <li>Lateral acceleration requirements</li> <li>Track gauge</li> <li>Various alignment criteria (e.g., curve geometries, maximum gradients)</li> <li>Minimum safe distances</li> <li>Positional tolerances</li> <li>Noise / vibration protection</li> <li>Rail welding</li> <li>Electrical insulation</li> <li>Turnouts</li> <li>Expansion joints</li> </ul>



Commonly Specified LRMT Elements	Details and Explanation
Rolling stock	<p>Items mentioned within specifications for rolling stock include the following</p> <ul style="list-style-type: none"><li>• Applicable standards</li><li>• Minimum design criteria (maximum dimensions, availability of seating, required failsafe functions, etc.)</li><li>• Maximum energy consumption characteristics</li><li>• Accessibility requirements</li><li>• Weight limitations</li><li>• Noise / vibration requirements</li><li>• Minimum vehicle performance characteristics (e.g., braking, acceleration, jerk limit, speed, directional control, etc.)</li><li>• Aesthetics</li><li>• Durability</li><li>• Crashworthiness</li><li>• Heating, ventilation and air conditioning</li><li>• Lighting</li><li>• Auxiliary systems</li><li>• Required safety, and emergency systems</li></ul>
Power supplies (e.g., overhead lines, third rails)	<p>Power supply specifications often include requirements for</p> <ul style="list-style-type: none"><li>• Design capacity</li><li>• Appearance</li><li>• Electrical protection</li><li>• Isolation and lightning protection</li><li>• Grounding requirements</li><li>• Electromagnetic compatibility</li></ul>
Signaling	<p>Signaling specifications may include requirements for</p> <ul style="list-style-type: none"><li>• Reliability</li><li>• Design capacity</li><li>• Requirements for train identification</li><li>• Control room interfaces</li></ul>
Control and communications systems	<p>Specifications relating to control and communications systems may include requirements relating to</p> <ul style="list-style-type: none"><li>• Voice and data radios</li><li>• LANs / WLANs</li><li>• Passenger information systems</li><li>• Automatic vehicle monitoring systems</li><li>• Public address systems</li><li>• Data and storage systems</li><li>• Closed circuit television (CCTV) systems</li><li>• Fire detection and alarm networks</li><li>• Clock systems</li><li>• LRMT vehicle on-board communications systems</li></ul>

Commonly Specified LRMT Elements	Details and Explanation
Depots	<p>Depot specifications may include requirements for</p> <ul style="list-style-type: none"> <li>• Design capacities</li> <li>• Functionality</li> <li>• Safety features</li> <li>• Layout</li> <li>• Essential equipment and capabilities</li> </ul>
Ticketing, barriers and fare collection systems	<p>Specified elements for ticketing, barrier and fare collection systems often include requirements for</p> <ul style="list-style-type: none"> <li>• Wider transportation network compatibility (e.g., through ‘smart cards’ or transfer passes)</li> <li>• Design capacity</li> <li>• General performance (e.g., passenger flow, minimum gate availability, accessibility standards)</li> <li>• Acceptable ticketing forms</li> <li>• Emergency evacuations</li> </ul>
Testing and commissioning	<p>Specifications for testing and commissioning may include requirements for</p> <ul style="list-style-type: none"> <li>• Some period of “shadow running”</li> <li>• Meeting applicable testing standards</li> <li>• Tests after opening at certain milestones (e.g., one year and two year tests)</li> <li>• Demonstrating that baseline criteria have been met</li> </ul>
Support facilities for public authorities	<p>When private partners assume responsibility for designing / constructing facilities for public authorities to use in monitoring performance and compliance, specifications should include specific requirements for those facilities such as</p> <ul style="list-style-type: none"> <li>• Acceptable locations</li> <li>• Spatial capacity</li> <li>• Essential amenities</li> </ul>



# ANNEX 7

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## TECHNICAL AND FINANCIAL PROPOSALS: CHECKLISTS



# A 7 TECHNICAL AND FINANCIAL PROPOSALS: CHECKLISTS

These checklists are given to assist in development of bid documentation for LMRT PPP schemes as described in chapter 8: Procurement. They are for guidance only, and will need to be adapted and expanded to suit individual scheme requirements.

## A 7.1 The Technical Proposal

Technical proposal formats differ but their general purpose is to demonstrate the bidder's ability to execute the proposed project according to the standards specified in the request for proposals. Bidders should provide sufficient details to enable the grantor to obtain a good understanding of the essence of the development work that the bidder would undertake should they be awarded the concession. The technical section could be structured as follows:

- Executive summary
- Design, planning and system management
- Examples of previous projects similar to the LMRT system being bid on where the procedures proposed have been used by the bidder
- Procurement and subcontracting strategy
- Design management
- Approvals management
- Health, safety, quality and environmental management
- Project program and work structure
- Other critical events and factors
- Handover to the grantor
- Civil works
- Testing and commissioning
- Operations and maintenance
- Handover of the LMRT system to the contracting authority

## A 7.2 The Financial Proposal

The financial proposal demonstrates how the technical proposal will be implemented:

### 1. General

- a. The financial proposal should be developed by the bidder in accordance with the requirements of the invitation to bid
- b. Information should be provided on the level of availability payment (AP), or other compensations terms, which is the amount of compensation paid by the grantor to the selected developer during the actual operation of the LMRT system
- c. Capital grant – the amount of state financing for capital expenditure required for the project, and payment program

### 2. Financial Plan

- a. The bids should clearly state the amount of funding to be provided by the bidder and the debt and equity amounts
- b. The proposal should provide sufficient information to satisfy the evaluation commission that the bidding team/ consortia is appropriately structured, financed, and capitalized, and that the bidder's are capable of raising finance on satisfactory terms and within the time period specified

- c. Information should be provided on the finance raising strategy, the cash flows during construction and operation, the strategies for reaching financial close, mitigation measures to avoid delays in reaching financial close, the obligations of each consortium member, and the main institutions involved in the debt finance raising process and their role
- d. Details should be provided on the references interest rates, reference foreign exchange rates and risk mitigation measures taken to address foreign exchange risks, inflation risk, and movement in base interest rates between bid submission and financial close, and during construction and operation
- e. Information should be provided on the type or types of equity to be utilized
- f. For the debt financing, bidders should provide term sheets under which the debt facilities are to be made available
- g. Bidders should also provide an executive summary of the financial plan that summarizes the main features of the plan, payment structures and plans to deal with cost overruns, delays in construction completion and the hedging strategy (for interest rates, inflations rates and Forex fluctuations)

### **3. Financial Model (Provided by the Bidder)**

- a. The model must contain the information required in the tender documentation and it should function in a manner consistent with the bidder's financial plan
- b. A concise commentary summarizing all the relevant input and output data should be submitted in order to facilitate the bid evaluation committee
- c. The model should prove the viability and sustainability of the bidder's proposal from a financial, commercial, and economic standpoint
- d. The model should also be easily manipulated by the bidding evaluation committee to allow the running of sensitivity analyses with minimal adjustments (these changes are likely to include variations in construction periods, changes in capital costs, changes in operating costs, changes in tariffs and passenger traffic volumes)
- e. The model should provide financial projections from financial close until arrangement expiry
- f. Additional proposals by the bidder. For each form of finance, the model should provide details on payment schedules, assumed rates and hedging arrangements
- g. The model should include information on the tax liabilities of the developers
- h. The model should also provide detailed information on the amount of capital grant and the calculation of the availability payment, additionally, the impact of variation in rates on the grant and payment should be provided
- i. All relevant financial ratios should be declared along, with financial statements

### **4. Additional Proposals by Bidder**

- a. The bidders should provide information on the risk insurance it intends to enter into, including the names of relevant organizations and their financial reliability
- b. Details on the risks insured and the insurance premiums on each risk should be provided

### **5. Amount of Capital Grant**

- a. Each bidder should indicate the requested value of the capital grant payable for each year of construction of the proposed system
- b. Each bidder should indicate the requested amount of the availability payment (AP) payable for each year of operation of the proposed system



# ANNEX 8

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## UNSOLICITED PROPOSALS



# A 8 UNSOLICITED PROPOSALS

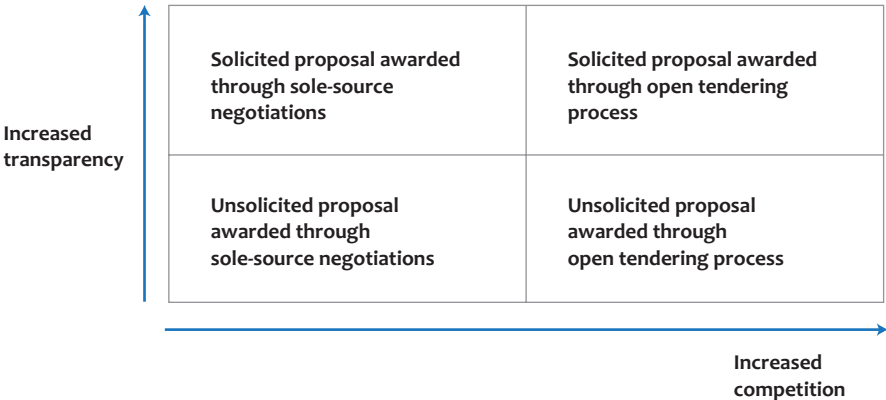
This annex draws heavily on a paper by Hodges and Dellacha, 2007 and UNCITRAL, 2001.

Unsolicited proposals usually originate within the private sector and are generally not requested by a government. Unsolicited proposals are usually developed by companies with ties to a particular industry (such as land developers, suppliers, and financiers) and that use their own resources to develop a project idea and then approach the relevant governmental or grantor for the required official approvals. Government openness to receiving unsolicited proposals can incentivize the private sector to come forward with innovative proposals. Additionally, in smaller municipalities where it may be too costly or difficult to arrange a competitive bidding process, direct negotiations increase the chance of private sector interest in infrastructure development projects.

A major disadvantage of unsolicited proposals for contracting authorities is that they are associated with a lack of competition and transparency. The granting of exclusive rights to private entities without the accountability of a transparent tendering process courts controversy, and history suggests that such scenarios lend themselves easily to corruption.

Recent research suggests that unsolicited proposals, if properly handled, can contribute to the overall infrastructure goals of a country, particularly where governments or contracting authorities do not possess adequate in-house capacity to develop projects themselves. The base principal recommended by recent research advises that unsolicited proposals should be channeled into a transparent, competitive process where challengers have a fair chance of winning the tender. Incentives are provided for the private sector to come forward with innovative infrastructure solutions, while retaining the benefits associated with awarding the project through a transparent and competitive tender.

Figure 2  
**Benefits of Proposals by Procurement Method**



## Unsolicited Proposals Circumstances

Private proponents of infrastructure projects often claim special circumstances as the primary driver of their proposal:

- **Intellectual Property Rights** – companies can claim that proprietary technology developed by the proponent that is essential for the infrastructure project, cannot be sourced elsewhere. Therefore if the government undertook a competitive process, the government would be violating the proprietary rights of the proponent by exposing their technology.

The counter argument to this is that often substitute technology of similar quality can be sourced. Governments can define a selection process which details the expected output of a project without necessarily dictating the technology required to enact the project. Each bidder can then suggest an alternative process or method, which is then compared to the unsolicited proposal without violating the original proponent's rights.

Licensing arrangements can also be organized in case the proponent's proprietary technology is required but the proponent is not the optimum choice for developing the project.

- **Lack of Private Sector Interest** – proponents of unsolicited proposals can claim that the characteristics of the proposed project are such that no other private sector entity will be interested in participating in a competitive tender process. These claims are particularly made where projects are targeted in remote areas or in smaller municipalities.

A tendering process is still advisable in situations where there is only one bidder. Awarding projects without conducting a competitive bidding process can create unwarranted accusations of corruption because the lack of transparency. An open tender will demonstrate the contracting authority's commitment to transparency and will openly reveal the lack of other bidders.

- **Cost Efficiency** – private proponents argue that contracting authorities can save on expensive tendering processes because they believe their proposal is superior to any potential rivals', and will almost certainly be selected under a tender process should one be conducted.

Rushing the selection process can lead to much greater project development issues later on which can delay the project by several years.

Competitive processes assist contracting authorities in defining their project objectives and reveal hidden costs through greater interaction and evaluation with bidders and other specialists. Long term standards and risks can be evaluated with a greater eye to mitigation. Private proponents in most cases will not share the same long-term concerns as the grantor and this disparity in interests will be clear during the negotiating process.

Hidden costs are an especially salient feature of direct negotiated projects and contracting authorities may be forced to take on more contingent liabilities.

Conducting a tendering process can deliver financial benefits even if the original proponent is selected to develop the project. If other bidders participate, the grantor gains more leverage over the original proponent because it now has other options to execute the project should the original proponent be unable to reach financial closure or complete the project. This can also alter the original proponent's behavior during the life of the contract because it will be less inclined to demand alterations to the concession agreement with the knowledge that there are other entities willing to take over the project.

- **Speed of Project Development** – it is argued that under special conditions, directly negotiated unsolicited proposals can satisfy urgent infrastructure requirements.

Equally true is that sole-source negotiations can take much longer than expected. Instead, while a competitive bidding process may be time-consuming in inception, once the grantor gains experience in holding a tendering process, future projects can be enacted more quickly and efficiently.

## ***Managing Unsolicited Proposals***

Clearly, for contracting authorities that are willing to entertain unsolicited proposals, the most important challenge is to synthesize the advantages of private sector participation in the initial project design stages along with the benefits of the increased transparency and efficiency associated with a competitive tendering process.

Recent research recommends that contracting authorities should clearly delineate their procedures for dealing with unsolicited proposals and how they intend to manage them. Formal management systems are generally divided into two stages:

- Proponent presents the project to the government, internal assessment is conducted and the project is prepared for public tender.
- The second stage sees the initiation of a competitive tender process. The exact manner in which this process is conducted will differ according to the array of incentives or benefits offered to the original proponent of the project.

## ***Approving Unsolicited Proposals***

The specific procedures generally followed for dealing with unsolicited proposals are as follows:

- The private proponent submits the conceptual description of the project to the appropriate ministry or agency – the level of detail required at this point is dependent upon the managerial procedures decided by the relevant contracting entity.
- After a review period, the proponent receives a response as to whether the project falls within the public interest or within the strategic goals of the contracting authority. At this point, additional financial, legal, and environmental studies are requested, financed by the proponent.
- If the grantor accepts the project description, the proponent is usually granted formal recognition for developing the concept.
- The grantor should have information on:
  - o The feasibility of the project
  - o Estimated total costs and financing plan
  - o Income and expenditure plan for operation
  - o Project justification arguments
  - o Environmental impact studies

The detailed proposal is then reviewed and further negotiations can then occur between the proponent and relevant grantor to further delineate project characteristics. At this point, the project will be approved to go forward for a competitive process or rejected. A bid bond may be requested in order establish the seriousness of bids.

## ***Tendering Unsolicited Proposals***

The initial selection stages are conducted and then the competitive tender process is concluded through one of three methods:

- **Best and Final Offer BAFO**

The project is published in relevant media outlets inviting interested parties to bid. Information on the bid price is not disclosed to the other bidders and the original proponent has to resubmit a formal bid. Bids are received, evaluated, and ranked. The two most attractive bids are selected to participate in another round. If the original proponent is not selected as one of the two most attractive bids, it is then automatically allowed to participate in the final round as well. The remaining bidders will then review and negotiate the project documentation with the grantor in order to generate their “Best and Final Offer” (BAFO). In the final round, if the original proponent’s bid is within a set percentage of the best offer (generally within 5 to 10 percent) then the original proponent’s offer is selected. However, if the difference between the best bid and the original proponent’s offer is more than 5 percent but below 20 percent, then the two bidders will be invited to submit their BAFO. The winning bid is selected in this second round and final round. The grantor will retain its bargaining position by negotiating with the prospective bidders. If necessary, the grantor can retain the right to introduce one or more of the remaining pre-qualified bidders into the negotiation if there are issues with the remaining final bidders.

- **Bonus System**

A bonus in the formalized bidding process is awarded to the original proponent. The bonus can take a variety of forms but is generally determined as an additional theoretical value applied to the original proponent’s technical or financial proposal. In other systems, the bonus is awarded in the form of additional points in the total evaluation score. Once the grantor approves the project concept, the original proponent is officially awarded a bonus, the value of which is determined by the grantor. The project is published in relevant media outlets inviting interested parties to bid. The value of the bonus to be awarded to the original proponent is also published, along with and the estimated reimbursable costs for project development. Interested parties are then allowed to submit bids. During the bidding phase, the original proponent is allowed to bid on the project using the bonus or it may decide not to bid. In some systems, the original proponent can sell its bonus to another bidder. If the original proponent loses the bid or chooses not to bid, then the winning bidder may be asked to compensate the original proponent for project development costs. If the original proponent’s bid is within the bonus margin granted (for example, within 10 percent of the lowest tariff or bid), then the original proponent will be awarded the project.



- **Swiss Challenge System**

A competitive tender is held and third parties are allowed to submit alternative proposals. The original proponent is granted the right to match any offer that undercuts its own. After the first stages of the approval process takes place, the following procedures take place:

- The project is published in relevant media outlets inviting interested parties to bid.
- In some systems, the original project proponent is required to submit a bid bond in order to verify that the original proponent has the means to execute the project. The grantor can publish information on the unsolicited proposal (such as pricing and specification) or it can choose to conduct a blind challenge.
- If a lower priced bid is submitted and approved, the original project proponent is granted a specified amount of days in order to match the price.
- If the original proponent does not match the price, then the project is awarded to the lower price project. In other systems, the original proponent is awarded the project if the price is matched; in other countries, if the price is matched by the original proponent, the evaluation committee will then judge the proposals based on technical merit and then select a winning bidder.

Research demonstrates that developing an effective system to manage unsolicited proposals is a challenging task. Contracting authorities must negotiate coordination between various agencies, effective long term planning, and also ensuring that the private sector remain appropriately incentivized to come forward with unsolicited projects. This latter point is perhaps the most important because the probability of success for third party challenges will influence the incentives for the private sector to propose projects.

Table A 8.1  
**Transparency in Unsolicited Proposals**

Influencing Factor	Issues
Value of bonus (under bonus system)	Large bonus will discourage potential challengers; a low bonus will discourage submission of unsolicited proposals. A bonus may be used for a technical score or economic score.
Ability to match price (under Swiss challenge)	Many challengers are reluctant to allocate resources for counter proposals because they can be matched. Sufficient time is required to develop counter-proposals.
Amount and timing of information disclosed	Information on the original proponent’s economic offer may entice challengers to offer counter-proposals, especially if the tariff is very high. If the original proponent’s bid is not disclosed, it is more likely that challengers will present their best offers. The sooner that vital information is available to challengers, the lower the advantage to the original proponent will be in project preparation.
Process transparency	If challengers feel that information is withheld or that the process is corrupt, they will be less likely to challenge. Transparency will assist challengers in their efforts to raise international financing and partners.

Source: Hodges and Dellacha (2007)



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