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Institutional Options for the Provision of Infrastructure

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Christine Kessides

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ABSTRACT

This paper develops a comprehensive framework for identifying the criteria for choosing among various institutional forms for infrastructure activities. The framework is based on the presumption that the objectives of the decision are to promote efficiency, fairness, and accountability in the supply of infrastructure services. The discussion starts from the premise that the competitive private market is the preferred mode of supply when the economic and technological characteristics of the activity permit it. The characteristics of various infrastructure activities are discussed to identify the scope for applying competitive markets, and the appropriate functions to be played by the government and private sector. The intention here is to make the rationale for choice as transparent as possible. However, this process of analysis does not lead to one unique institutional solution for any infrastructure activity in all contexts. A variety of institutional arrangements which involve different degrees of involvement by the public and private sectors are discussed with reference to specific examples in developed and developing countries. The paper then summarizes key policy issues that affect the actual incentives and performance of these institutional arrangements—including issues of creating competition, broadening participation, achieving appropriate treatment of risks, and designing effective regulation, financing, and planning of infrastructure.

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ABBREVIATIONS

BOT	Build-Operate-Transfer
BOO	Build-Own-Operate
MSW	Municipal Solid Waste
NGO	Non-governmental organizations
O&M	Operations and maintenance
UFW	Unaccounted for water
WSS	Water Supply and Sanitation

FOREWORD

Infrastructure has been a major focus of World Bank lending since its founding, and currently accounts for about forty percent of our portfolio. A key concern of the Bank is to ensure that countries obtain the full benefits from their substantial investments in infrastructure. Our review of operational experience and research regarding infrastructure development points to the conclusion that institutional issues—especially those issues concerning the relative roles of government and the private sector, and the structure of incentives—are the key to performance in these sectors. In the past decade, international experience with reform and restructuring of infrastructure activities has been growing rapidly. This paper attempts to develop a systematic approach to evaluating the range of institutional options in the infrastructure sectors; to take stock of the lessons of experience and identify the best practices; and, hopefully, to accelerate and focus the learning process.

The present study was undertaken as part of an ongoing effort in the Transport, Water and Urban Development Department to look at the key cross-sectoral issues in infrastructure. This analysis supports the Bank's internal review of its own policy and operational activities in infrastructure, as well as the Bank's dialogue with borrowers and other agencies on infrastructure issues. The paper draws upon much recent analytical work, done within and outside the Bank, as well as on numerous economic and sector studies by Bank staff which evaluate the performance and impact of infrastructure in the context of individual developing countries. The intended audience for this paper includes students of economic development as well as officials, in both developed and developing countries, who are concerned with infrastructure policy.

L. Pauliquev

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EXECUTIVE SUMMARY

The present study provides both an analytical framework, and a review and assessment of experience, regarding institutional reform issues and options in infrastructure. “Institutions” are understood here to include factors affecting the relationships among actors (especially government and private parties) and the structure of incentives; thus, the classic competitive market is one type of institution. The key concern of this paper is to clarify the rationales for choosing particular institutional arrangements for the provision of infrastructure services, with the aim of promoting efficiency, equity, and accountability to users and other financiers. These choices should be based on an understanding of the economic and technological characteristics of the infrastructure services; the incentives provided by various institutional arrangements; and the issues involved in implementing the institutional arrangements so as to achieve the desired outcomes.

Much of infrastructure has characteristics that make it unsuitable to be provided solely through competitive markets. Such features of “market failure” include economic and technical conditions which create natural monopoly, “lumpy” investment requirements, spillover effects on non-users, and the fact that some services are consumed jointly as “public goods”. **These factors create a legitimate public interest in infrastructure, but they do not necessarily require government involvement in all aspects of providing the services.** Moreover, it has become increasingly recognized that these characteristics traditionally attributed to infrastructure are not equally true of all the activities involved. For example, in railways, only the imbedded rail infrastructure has monopoly features, (and even these maybe very limited by competition by other modes), while operation of the railway equipment does not. In many activities, technological developments have widened the scope for competition (especially in long distance telecommunications services); created low-cost supply options (e.g. in sanitation and irrigation); and increased the possibilities for pricing of individual consumption and charging for spillover effects such as pollution (e.g. electronic road pricing). Technology has also created new types of services—for example, informatics and intermodal transport systems have revolutionized trade logistics—and new options for production. Even the nature of externalities and social concerns in infrastructure vary greatly by type of infrastructure: for example, urban roads and solid waste disposal systems have stronger impacts on local communities and on land use patterns than do power or telecommunications distribution systems. **Thus infrastructure is highly heterogeneous, the traditional “monolithic” structures of supplying infrastructure are no longer relevant in many activities.**

The worldwide trend towards economic liberalization in many sectors, including infrastructure, has led to experimentation with various institutional arrangements. This experience has led to two important conclusions: **that there are fewer activities requiring public intervention than once was believed; and that public intervention, when justified, can be exerted through less distorting policy instruments than those traditionally used.**

The pervasive government involvement in finance, regulation, and actual delivery of many infrastructure services has led to poor performance in many cases—by weakening managers’ operational and financial responsibility, imposing conflicting objectives, and politicizing decisions on investment, pricing, labor, and technological choice. It is necessary to reexamine the basic rationale for government intervention and the justification for each type of policy response. **In many cases, experience shows that the risks of poor performance due to possible market failure are less serious to the economy than the risks of government failure.** Public infrastructure monopolies were created in many countries in order to exploit economies of scale, protect national interests, and mobilize resources for basic system development. In practice, many of these entities achieve neither efficiency nor distributional fairness, and

they fail to generate sustainable sources of finance (whether from internal revenues, loans or equity). Moreover, the extremely poor quality and unreliability of service handicaps economic activities elsewhere in the economy.

Clarify the rationale for private versus public involvement in infrastructure. The first issue for analysis is to determine whether market conditions exist for each infrastructure activity, based on the following criteria:

- (a) **nature of the good/service**—whether jointly consumed (“public good”) or privately consumed (“private good”);
- (b) **conditions of production**—to what extent there are economies of scale creating natural monopoly; whether there are high sunk costs which would deter new suppliers (if not, the activity is said to be “contestable”); and what degree of coordination (e.g., of technical standards) in production is needed for efficiency.
- (c) **externalities and social objectives**—to what extent are there benefits and costs affecting persons other than those directly involved in the activity;
- (d) **characteristics of user demand**—such as the degree of consumers’ access to information about supply alternatives, and the existence of substitutes for particular kinds of services.

The above conditions provide the *a priori* justification for assigning to the private sector or to the public sector responsibility for various functions—including sectoral planning and policy-making, ownership, regulation, financing, execution of investment, and/or operation and maintenance (O&M)—for each infrastructure activity. The following general guidelines for policy are suggested by this analysis:

- For activities involving public or quasi-public goods, natural monopoly, or capital with high sunk costs—e.g., the provision of network, trunk-type facilities such as power transmission grids, major highways and pipelines for water and sanitation, port installations, etc.—there is a case for a public sector role in planning/policy-making, financing and ownership; or alternatively, for private sector ownership under public regulation.
- The activities necessary to generate services from these facilities may best be carried out on the basis of competitive bidding for the right to operate the monopoly. The government’s responsibility in this case is to issue the exclusive contract and monitor performance under its terms; to ensure that other providers of services using the network facilities face fair conditions of access (including price); and to protect users from other possible abuses of the monopoly.
- For most activities involving capital with low sunk costs (e.g. road freight transport), entry by the private sector should be fully liberalized (urban bus transport being an exception where regulation of entry can still be justified); the government should mainly be responsible for ensuring fair competition.
- Additional characteristics of infrastructure activities such as externalities, social service objectives, and certain features of user demand may provide justification for public intervention

through investment planning, regulation and/or fiscal transfers (taxes/subsidies)—but rarely for public ownership or direct public execution of investment or service operation.

Choose institutional arrangements with appropriate assignment of responsibilities to the public and private sectors. The institutional options considered here represent a continuum from mainly public sector, to mainly private sector, responsibilities for the functions of planning/policy-making, ownership, regulation, financing, investment, and O&M. These options include: (i) government department, (ii) public utility, (iii) service contracts, (iv) management contracts, (v) lease contracts (affermages), (vi) concessions, including BOTs, (vii) private entrepreneurship (i.e., with at least majority private ownership), including through divestiture, and (viii) communal or “self-help” schemes, including cooperatives. Much of the prevailing attention to “privatization” in infrastructure tends to focus on only a few of these options (notably BOTs and divestiture).

The choices among these institutional options for particular infrastructure activities should depend in large part on the objectives, or benefits, sought from involving the private sector. These objectives include (i) skilled and independent management, (ii) productive efficiency, (iii) innovation (dynamic efficiency), (iv) accountability to customers (and improved service quality), and (v) financial autonomy (including mobilization of additional financial resources for the sector).

Experience with the alternative institutional arrangements in various infrastructure activities leads to the following observations regarding their potential advantages and disadvantages:

- Some improvements in management and productive efficiency can be gained from introducing commercial practices (such as by shifting activities from a government department to a corporatized parastatal) and even a modest degree of private sector participation (as in contracting-out of specific services or management of operations); these approaches are often impeded by political interference, however, so that the benefits may not be sustained. Such incremental arrangements may still be useful as part of a transition to fuller private sector involvement.

- Arrangements which give the private sector producer of services full managerial autonomy and full commercial risk (e.g., lease contracts), and in addition, responsibility for both operation and investment (e.g., concessions) have the potential to produce stronger and more lasting benefits than more limited forms of private sector participation such as service contracts and management contracts.

- BOTs and complete private entrepreneurship through divestiture may, in addition, mobilize new sources of funding and further reduce government’s financial risk—but this depends on the terms of the specific agreements.

- Service contracts and management contracts are arrangements which appear to have unexploited potential as part of a strategy of transition to greater privatization. As the public and private sector gain experience with these partnerships, they can lead to progressive expansion of private sector participation through leases and concessions and in some cases, ultimately, to divestiture.

Create the conditions for successful implementation of institutional arrangements. The actual incentives involved in these institutional arrangements depend on the framework for competition, participation, regulation and financing.

Competition. Even where legal barriers to entry in certain activities are removed, there are often practical constraints which prevent new entrants from competing on equal terms with existing suppliers—such as regulations regarding access to fixed facilities (e.g., transfer stations, bus terminals) or to credit, or tax rules that favor public firms. To increase the pool of potential entrants, it may be helpful in some cases to develop opportunities for competition between public and private operators, as is practiced in a number of countries for solid waste collection. To reduce uncertainty and the scope for rent-seeking (corruption) by both private and public sector partners in contractual arrangements, it is necessary to provide disclosure of information (about the condition of fixed assets, for example), and a public process of bidding for contracts.

Participation. Institutions must be adapted to foster participation by both users and other interest groups, including those affected by environmental or other externalities. Participation options include the provision of facilities and services through self-help schemes (e.g. by neighborhood associations), or cooperatives as practiced in many countries for electrification and telecommunications in rural areas; and through mechanisms to represent the views of users and other stake-holders in decision-making regarding investment planning, regulation, and delivery of services.

Experience with participatory approaches in infrastructure activities suggests that involving users in all phases of the project cycle (i.e., in the initial design as well as implementation), and providing opportunities not merely for consultation, but rather for responsible decision-making, is likely to produce the greatest benefits in terms of both project effectiveness and building of local capacity for sustained development. Specific efforts often need to be made at the outset to promote the involvement of the very poor and representation of women as well as men in participatory programs.

Regulation. To design appropriate regulatory policy in any infrastructure activity, it is necessary to identify clearly the rationale for government intervention in each area as discussed above, and the specific objectives to be sought. A basic prerequisite for regulation is a stable, predictable legal framework which is enforced, especially regarding property rights, liability, and contracting.

Regulatory functions and responsibilities should be clearly separated from those of system operations; this can be achieved through organizational separation (e.g. independent regulatory agencies distinct from the operating entities, as in the U.K. utilities sectors) or by delegation through contracts, as is the practice in French urban services. Regulatory procedures should also be transparent, easy to administer and enforce promptly. The scope for regulators to exercise discretion should be clearly circumscribed in most cases, in order to create sufficient confidence in the stability and objectivity of the process. Where regulation of tariffs is necessary (for monopoly services), methods should be preferred which lead to simple, automatic adjustments and enable producers to benefit from efficiency improvements. It is also necessary that regulators have direct access to information about quality of service and user satisfaction, with mechanisms for consultation with the public.

For governments unaccustomed to formal regulation, the practice of contracting for operations (through service contracts, management contracts, and leases) may provide a gradual learning process, with the regulatory function embodied in the design and monitoring of the contract. This may be a more practical approach in some developing countries than creating a separate new regulatory agency at the outset, especially for subsectors such as railways, urban water supply and sanitation.

Pricing and Financing. Infrastructure is more likely to be economically efficient, and to have favorable impacts on the environment, when it is subject to user charges. The absence of user

charges has usually not promoted access to services by the poor, but has rather reduced availability and worsened inequalities. User charges should be based on economic prices reflecting both costs of supply and demand considerations (willingness to pay) and, to the extent possible, externalities. In many infrastructure activities, the structure of tariffs needs to be revised to remove or reduce internal cross-subsidies, such as between long distance and local telephone service, or between industrial and household users. As institutional reforms permit facilities and services to be “unbundled” (managed under separate organizational structures) and increased entry by the private sector is permitted, the structure of rates becomes even more important, as it determines the incentives for investment and operation in different market segments.

Social objectives (for legitimate public service obligations, such as supply of water and transport to low-income neighborhoods) should be financed by explicit budgetary subsidies to the provider for these purposes alone; or, an even better approach where feasible, paid directly to the needy population. Such transfer payments must be clearly specified at the outset in any contracting arrangement with private providers. Moreover, they should preferably be auctioned-off to bidders who will minimize the costs of such services. Before any such subsidies are justified, the ability and willingness to pay for services should be clearly assessed.

In activities where services cannot be priced according to individual consumption, financing through benefit taxes (i.e. paid by the beneficiaries of the services) provides an instrument to manage demand and promote efficient resource allocation. Establishing an explicit link between such revenues and the activities they support can be an important element in transforming activities such as road maintenance and municipal sanitation from a bureaucratic to a commercial orientation.

Once incentives for internal cost recovery and financial discipline are clearly established in the infrastructure sectors, the prospects for access to external financing improve. Debt instruments should be used in many areas of infrastructure, especially in the creation of long-lived assets to ease the cash flow and promote fair burden-sharing between generations. Instruments such as revenue bonds, as well as equity issues, can provide a good feedstock for emerging capital markets and an attraction to institutional investors. If specialized institutions are created to provide credit to municipal government, they should operate on solely financial criteria. In many cases, local governments need to improve their creditworthiness. This may require more effective tax mobilization, as well as changes in the sharing of revenue and expenditure responsibilities among levels of government.

Planning. The government often must retain a role in planning of investment even where execution of investment and O&M is provided by the private market. Especially where market conditions remain very limited, it is necessary to create measures to ensure that activities of planning (as well as regulation) are based on incentives for efficiency and responsiveness to demand. A demand-based strategy for infrastructure development imposes significant information requirements: about the underlying determinants of demand for specific services, users’ willingness to pay, and patterns of congestion, for example. Performance indicators which reflect service quality and user satisfaction should be used to inform decisions on planning and policy-making, as well as the operation and regulation of infrastructure activities. Since demand is ever-changing, it is necessary for infrastructure decisions to be based on a dynamic process of assessing demand—and where competitive markets cannot provide this, other approaches such as regular demand surveys and channels for participation are needed.

Introduction

This paper concerns the choices policy-makers face in designing and implementing institutional arrangements for the provision of infrastructure—including transportation, electric power, telecommunications, water supply and sanitation, and irrigation.¹ “Institution arrangements” are broadly defined to encompass all the factors influencing the environment in which a project or organizational entity operates. This environment includes the structure of ownership, horizontal relationships among entities (e.g., competition), hierarchical relationships (e.g., regulatory controls), financing responsibilities, and participation by various groups in decision-making. The classic notion of a “competitive market” may be considered one type of institutional arrangement; there are also variations on this model, involving many different roles for the public and the private sector. The paper illustrates how a variety of institutional arrangements may be applied to different infrastructure activities, with the ultimate aim of improving the performance of infrastructure and its potential contribution to economic development.

Part One of the paper presents some decision-making criteria for assigning activities “to the market”, and for determining the roles of government and the private sector. This section also outlines a menu of institutional arrangements that represent different degrees of public and private sector responsibility for the tasks involved in providing infrastructure. Part Two discusses some applications of these arrangements to infrastructure sectors in a number of countries, and provides a comparative evaluation based on these experiences. Part Three discusses cross-cutting issues (regarding competition, participation, risk-sharing, regulation, financing, and planning) which determine the incentives and conditions for good performance under any of these schemes. A Glossary of the terms used in this paper is provided in Appendix I.

¹ These sectors embrace activities commonly known as “public works” or “economic infrastructure”. Transport includes the subsectors of roads and highways, railways, ports and waterways, urban transport, and road freight. The water supply and sanitation sector includes both wastewater (sewerage) and solid waste management. This paper does not specifically address social infrastructure, such as for health and education, nor certain urban structures such as public buildings, street lighting and marketplaces, although some of the issues discussed here may apply to these activities as well.

I. A Framework for Analysis of Institutional Arrangements in Infrastructure

There has been much discussion in recent years about expanding the involvement of the private sector in infrastructure, and increasing experimentation with specific arrangements for doing so. Often, however, these efforts are not based on an explicit, normative analysis of the rationale for assigning specific functions to the public or private sector. One clear lesson from industrial organization analysis is that much can be learned about the actual structure and performance of an industry, and about the potential for policies to improve these outcomes, by looking carefully at the economic characteristics of the goods and services involved, the nature of production, and the structure of demand in the sector. It is argued here that choosing among various institutional forms for infrastructure should be based on such an analytical framework as described below, which draws upon established concepts in industrial organization as well as public finance theory. The analysis focuses on infrastructure, but could be applied equally to any goods or services.

This framework is based on the premise that the choice among institutional arrangements should be based on the objectives of promoting efficiency, equity (fair access), and accountability (responsiveness to users and other financiers) in the supply of infrastructure services. There may, of course, be other objectives, such as specific political concerns, which determine the ultimate decisions by policy makers. The discussion also starts from the premise that for goods and services generally, competitive markets—mainly involving private actors—are both the most efficient mode of supply and most accountable to users' (consumers') needs. The task of the analysis is to identify where the conditions of competitive markets apply, or can be approximated, in infrastructure activities; and where these conditions do not apply, to identify the functions which government needs to undertake and can implement effectively. **This analysis places the burden of proof on the policy maker to explain the reasons for departing from competitive markets and the private sector for each activity involved in infrastructure.**

To allocate responsibilities between the public and private sectors, one must first distinguish among the functions involved in enabling infrastructure to become available (sectoral planning and policy making, ownership, regulation, and financing) or in actually supplying the service (tasks of investment, operation, and maintenance). Under this framework, the key question is to determine how extensively government needs to perform the above functions; in other words, in which of these tasks is public involvement warranted, and through what kinds of policy instruments. International experience with economic liberalization during the past decade, in infrastructure as well as in other sectors, has revealed two important conclusions: that the realm of economic activity in which public intervention is required is narrower than once believed; and that where it is warranted, the public role can often be exerted through less distorting policy instruments than those traditionally used.

The intention of this framework is to make the rationale for decisions as transparent as possible. This analysis does not lead to one unique institutional solution for a given infrastructure activity in all contexts; rather, it suggests some objective guidelines for designing public policies to fit the specific conditions of infrastructure activities in individual countries.

A. Determining the “Marketability” of Infrastructure Activities

Since the efficiency characteristics of a classic market are well understood, a good point of departure for deciding the disposition of any infrastructure activity should be the relevance of the market model—the burden of proof should be to identify where and why this cannot apply. Neoclassical economics and public finance theory offers three grounds on which markets may not be considered entirely appropriate to supply infrastructure, and where “market failure” is expected to occur:

The Nature of the Good² Involved

A necessary condition for a market is that transactions can be made privately, between individual buyers and sellers. There are two criteria here:

- (i) Subtractability. A purely private good can only be consumed by one person at a time. Such goods (e.g., food and typical consumer goods) are said to be highly subtractable or rivalrous in consumption. At the opposite extreme, purely public goods have low subtractability or rivalry, because consumption by one individual does not lessen the availability to others—such goods (e.g., clean air) are said to be jointly consumed. A more operational definition of this criterion for private transactions is that the costs of consumption by a specific individual can be identified. For an infrastructure facility with a limited physical capacity, such as a highway designed for a given traffic volume, the marginal costs of each incremental user may be imperceptibly small until the capacity limit is reached and congestion appears—but the fact that congestion is possible indicates that the facility is, in principle, subtractable. Similarly, scarce natural resources such as an aquifer should be characterized as subtractable, even though the marginal costs of consumption may appear insignificant until the possibility of depletion is actually felt.
- (ii) Excludability. Individual consumers can also be excluded from transactions involving purely private goods. Such exclusion is not feasible (or excessively costly) in the case of purely public goods.

In between the two extremes of purely private goods and purely public goods are toll goods and common pool goods. Toll goods are characterized by exclusion but low subtractability (e.g., a piped sewerage system). Common pool goods are subtractable but have a low feasibility of exclusion (such as many water and forest resources).

The two concepts of subtractability and excludability are related, in that they both are based on assessments of costs and benefits. Whether the costs of barring access to additional users are worth incurring depends on the costs they impose on existing users. For example, once a roadway becomes heavily congested, users may consider it worth the inconvenience to install access gates and fees. The public interest in policing the use of fisheries and forests grows as society becomes more aware of the costs of resource depletion. There appears to be an increasing tendency for some goods which were traditionally seen as purely public (e.g., major highways) or common pool (natural resources) to be viewed as increasingly private or “toll-able”—both because the technology now exists in some cases

² The terms “good” and “service” in this note are used interchangeably.

which makes it easier or cheaper to restrict access (e.g., electronic road pricing), and because greater environmental awareness is making society more cognizant of the costs of congestion and resource depletion.

Appendix II presents a matrix which applies the above criteria to sixteen subsectors in infrastructure. It becomes clear from this exercise that attempting to determine the “marketability” of infrastructure according to these two criteria does not result in simple yes/no answers, but in degrees (high/medium/low). Particular judgements in each case would depend in practice on the technology in use, which affects the marginal costs of consumption, the extent of congestibility, and the costs of exclusion. Each subsector also consists of various activities, each of which may have different degrees of subtractability and excludability. The ratings for each activity and subsector from Appendix II are summarized on the following matrix (Table 1-1).³ The conclusion can be drawn that, **contrary to the common assumption that most of infrastructure concerns largely “public goods”, in fact the major share of the services of these sectors can be characterized as closer to “private goods”.**

The Nature or Conditions of Production

- (i) Natural Monopoly. The efficiency of the private market depends on the existence of effective competition, which is precluded for goods which entail natural monopoly in production. Natural monopoly occurs mainly where there are extensive economies of scale (high fixed costs relative to variable costs, so that average costs decline continuously over the relevant range of output).⁴ Natural monopoly implies that the unit costs of supplying a given market will be minimized with a single (profit-maximizing) supplier, rather than with multiple suppliers. However, a single or dominant supplier would have an incentive to charge prices in excess of marginal costs, and so allocative efficiency would not be achieved. Moreover, lack of competition may blunt incentives for dynamic and productive efficiency.⁵ Hence, where there is market power due to natural monopoly, the conditions for a purely free private market to achieve efficiency do not hold. Monopoly power also violates the assumption of “fairness” of transactions and equity in relations between buyer and seller which underlies the market model.

Where natural monopoly exists, it confers market power and a natural barrier to entry. The existence of natural monopoly in a given activity depends on the cost structure, which varies with the particular technology. Technological options may be available which reduce economies of scale and/or

³ Appendix II (and the summary Tables 1-5) are intended to be illustrative, not definitive, since there may be different ratings in some cases based on the particular technology in use and other circumstances.

⁴ Natural monopoly may also entail *economies of scope* (unit costs of producing different services in combination are lower than of producing them separately), which continue to exist in some activities in power and telecommunications; and/or *economies of contiguity* (the unit costs of producing services in markets which are located close to each other are less than if the markets are served separately), which are a factor in solid waste collection, for example.

⁵ This point has been debated extensively in the literature (e.g., Scherer 1990).

TABLE 1-1. CHARACTERISTICS OF INFRASTRUCTURE SERVICES: SUBTRACTABILITY AND EXCLUDABILITY

EXCLUDABILITY	SUBTRACTABILITY		
	LOW	MEDIUM	HIGH
	PUBLIC GOODS		COMMON POOL GOODS
LOW	<u>Airports/Airways</u> : Air traffic control <u>Roads and Highways</u> : Signaling and traffic control		<u>Roads and Highways</u> : Tertiary roads - urban
MEDIUM	<u>Railways</u> : Switching and Signaling <u>Roads and Highways</u> : Primary roads (National, Trunk); Tertiary roads - rural <u>Solid Waste Management</u> : Disposal: Sanitary land fill <u>Urban Transport</u> : Traffic signaling	<u>Irrigation (Surface Water)</u> : Trunk System: Dam, main canal; Distribution System: Secondary and Tertiary canals <u>Roads and Highways</u> : Secondary Roads <u>Solid Waste Management</u> : Collection <u>Wastewater Management (Intermediate/Low Cost Sewerage)</u> : e.g. Condominial Sewerage	<u>Irrigation (Surface Water)</u> Terminal System: Gravity <u>Water Supply (piped)</u> : Common Terminal Equipment (i.e. handpump)
HIGH	<u>Wastewater Management (Conventional Sewerage)</u> : Conventional Street Sewer; Pumping Station; Treatment Plant	<u>Airports/Airways</u> : Runways, gates <u>Ports and Waterways</u> : Piers, harbor <u>Railways</u> : Railbed <u>Solid Waste Management</u> : Disposal: Incineration <u>Telecommunications (Basic Network)</u> : Networks <u>Transmission</u> : Local, Long Distance; Switching; Common Terminal Equipment <u>Urban Transport</u> : Metro/rapid transit: Tracks and Rails	<u>Airports/Airways</u> : Airplane Services; Ground Services <u>Electric Power</u> : Generation: thermal, hydro, nuclear; Transmission; Distribution <u>Irrigation (Groundwater)</u> : Tubewells <u>Irrigation (Surface Water)</u> : Terminal System: Sprinkler <u>Ports and Waterways</u> : ships; Port equipment (Loading/Unloading) <u>Railways</u> : Rail cars; Freight Loading/Unloading <u>Road Freight Transport</u> : Trucking Services <u>Solid Waste management</u> : Transfer; Resource Recovery (recycling) <u>Telecommunication (Basic Network)</u> : Individual Terminal Equipment <u>Telecommunications (network Extensions)</u> : Value-Added Services; Cellular, Paging, Microwave Relay; Private or Specialized Networks <u>Urban Transport</u> : Van, bus; Taxi; Metro: Railcars <u>Wastewater management (Intermediate/Low Cost Sewerage)</u> : Basic Sanitation (pit latrine) <u>Water Supply (Nonpiped)</u> : Vendor tanks; Boreholes <u>Water Supply (piped)</u> : Trunk and Distribution System; Individual Terminal Equipment (i.e. home faucet)
	TOLL GOODS		PRIVATE GOODS

Definitions:

Subtractability (or rivalry) refers to the impact that consumption by incremental users has on consumption opportunities of all users. *Low subtractability* (nonrivalry) = consumption by one user does not impede availability to other users (such goods are "jointly consumed"). *High subtractability* = consumption by one user imposes identifiable, calculable costs on other users (such goods are "privately consumed").

Excludability refers to the feasibility of controlling access to a good. *High excludability* means it is relatively easy (i.e. non-costly) to prevent users from consuming it.

reduce the nature of capital investment needed to enter the market. Recent advances in economic theory⁶ have contributed to the understanding that the main deterrent to competition is the element of the fixed production costs which would be lost in the event of an unsuccessful attempt to enter the market—in other words, the magnitude of sunk costs in the event of exit. Capital costs are “sunk” to the extent that they cannot be recovered for other uses, which is generally the case for specialized equipment (i.e., firm, rather than industry, specific) and fixed (location-specific) installations, such as roads and sewer pipes. Where production of a good requires no sunk costs, it is said to be perfectly contestable, and the potential threat of entry is considered to provide approximately the same market discipline to an existing incumbent as actual competition. There may be still be practical barriers to entry imposed by policies or other factors such as shortages of financing; these barriers may be addressed separately as long as an activity is contestable in principle.

The matrices in Appendix II characterize the activities comprising each infrastructure service subsector by the degree of economies of scale (for the types of technology most generally in use) and “sunkness” of costs of capital involved. These characteristics are summarized on Tables 1-2 and 1-3 below.

- (ii) Coordination. A concept which is related to, but distinct from, natural monopoly is coordination. Because of the interlocking networks involved in much of infrastructure and the fact that flows along these networks (whether of electric power, voice signals, water, or vehicle traffic) need to follow some explicit rules, formal coordination is required to some degree—at least in the planning of investment, technical operation, and setting of minimum standards of equipment and operation. The extent of coordination needed by the various infrastructure service sectors is also indicated in Appendix II, and summarized in the following Table 1-4.

Externalities and Social Objectives

Externalities occur where the benefits (or costs) of producing or consuming a good affect persons other than the individuals involved in the transaction. When the externalities are positive, the benefits to society are greater than those perceived by the individuals, and the resources allocated to such goods will be less than socially optimal. When the externalities are negative, the marginal costs faced by individuals understate the true cost to society, and such goods will be overproduced. In infrastructure, negative externalities include effects on air, water, and land pollution from motor vehicle traffic, electric power generation, and irrigation, while positive externalities include the public health benefits gained from water and sanitation infrastructure. Many infrastructure activities also pose external economies of consumption (network externalities), whereby all users (e.g., of voice telecommunications) benefit when a new subscriber gains access to a network because it increases the range of service they can all enjoy—namely, the ability to communicate with more people.

In a similar vein, certain social or political objectives valued by the community, such as universal access to a minimum level of service (particularly for water and personal mobility) may be considered to have a social benefit beyond that accruing to individual users. Such so-called “merit goods” have positive social externalities of consumption.

⁶ Baumol, William J., Panzar, John C., and Robert D. Willig, *Contestable Markets and the Theory of Industry Structure*. San Diego: Harcourt Brace Jovanovich, 1988.

The following Table 1-5 summarizes these types of considerations for the various infrastructure services, as identified in Appendix II.

The three criteria discussed above (private vs. public nature of goods, natural monopoly, and externalities) are normally considered to cover the conditions for “market failure”, i.e., the inability of the market model to achieve efficiency because of characteristics of the goods and their production. A fourth set of considerations concerns the nature of demand for the goods. These features suggest additional requirements for consumers to acquire satisfaction from any given supply arrangement—requirements which may have implications for regulatory or price policy, as discussed in Section B and more fully in Part III.

Characteristics of Demand and Service Use

- (i) Existence of substitutes. When there are acceptable and affordable substitutes available for the services provided by a main supplier, the latter will be unable to exercise the same market power as a true monopolist. Which alternatives are the relevant substitutes is a judgement made by the consumers, and these alternative services need not be identical to those of the dominant supplier. For example, when the public power source becomes too unreliable, firms turn to private generation even when it is at a higher cost to them. Households similarly resort to water vendors when the public water utility fails to serve them adequately. Specialized communications networks for high-volume business users are sought in some countries to bypass the congested public telephone network. Much shipping can be loaded and unloaded by lighters without entering port facilities, for which the lighters serve as a partial substitute. In many countries, freight traffic by road has become the preferred substitute for rail transit. Since much of infrastructure is fixed in place, consumers—especially the poor—are often physically restricted in their access to substitutes (e.g., the roads have to exist in the same regions served by rail). **Thus substitutability is specific to location and to price and income variables.** The issue becomes particularly important for determining the welfare costs of monopoly suppliers of many infrastructure services.
- (ii) The price elasticity of demand. The classic market model assumes that the consumer is able to adjust demand to price. However, for certain goods in certain minimum quantities (drinking water being the most obvious case), demand is virtually inelastic, meaning that that quantity would be consumed at any price. Beyond this extreme case, the price elasticity of demand for infrastructure services varies greatly among different groups of consumers. As a generalization, minimum levels of consumption of urban public transport, electricity, and even basic voice telecommunications demonstrate relatively inelastic demand as development increases—they become “necessities” to gain access to jobs, health care, etc. **Wherever demand is price-inelastic, market power by suppliers poses a greater risk to welfare.**

TABLE 1-2. PRODUCTION CHARACTERISTICS OF INFRASTRUCTURE ACTIVITIES: ECONOMIES OF SCALE

SECTOR	ACTIVITY	ECONOMIES OF SCALE		
		LOW	MEDIUM	HIGH
Airports/Airways	Airplane Services; Ground services		Runways, gates; Air traffic control	
Electric Power			Generation, Distribution	Transmission
Irrigation (Groundwater)	Deep Tubewell; Shallow Tubewell			
Irrigation (Surface Water)	Terminal System (On-farm): Gravity, Sprinkler		Trunk System: Dam, main canal; Distribution System: Secondary and tertiary canals	
Ports and Waterways	Ships; Port equipment (loading/unloading)		Piers, harbor	
Railways	Switching and Signaling; Rail cars; Freight Loading/Unloading		Railbed	
Road Freight Transport	Trucking Services			
Roads and Highways	Primary Roads (National, Trunk); Secondary Roads; Tertiary roads - rural, urban; Signaling and traffic control			
Solid Waste Management	Collection; Resource Recovery (recycling)			Transfer; Disposal: Sanitary land fill, Incineration
Telecommunications (Basic Network)	Network: Transmission - Long Distance; Switching; Terminal Equipment			Network: Transmission - Local
Telecommunications (Network Extensions)	Value-Added Services; Cellular, Paging, Microwave Relay, Private or Specialized Networks			
Urban Transport	Van, bus (urban, inter-urban); Taxi; Metro/rapid transit - Rail cars; Traffic signaling		Metro/rapid transit - Tracks/Rails	
Wastewater Management (Conventional Sewerage)			Conventional Street Sewer; Pumping Station; Treatment Plant	
Wastewater Management (Intermediate/Low Cost Sewerage)	Condominial Sewerage; Localized treatment; Other intermediate sewerage; basic sanitation - (pit latrine)			
Water Supply (Nonpiped)	Vendor Tanks; Borehole			
Water Supply (Piped)	Terminal Equipment: Common (i.e. handpump), Individual (i.e. home faucet)			Trunk System (intake pumping station); Distribution System

TABLE 1-3. PRODUCTION CHARACTERISTICS OF INFRASTRUCTURE ACTIVITIES: SUNKNESS OF COSTS

SECTOR	ACTIVITY	SUNKNESS OF COSTS		
		LOW	MEDIUM	HIGH
Airports/Airways	Airplane Services; Air traffic control; Ground services			Runways, gates
Electric Power			Generation, Distribution, Transmission	
Irrigation (Groundwater)	Shallow Tubewell			Deep Tubewell
Irrigation (Surface Water)	Terminal System (On-farm): Gravity, Sprinkler			Trunk System: Dam, main canal; Distribution System: Secondary and tertiary canals
Ports and Waterways	Ships		Port Equipment (loading/ unloading)	Piers, harbor
Railways	Switching and Signaling; Rail cars		Freight (loading/unloading)	Railbed
Road Freight Transport	Trucking Services			
Roads and Highways	Signaling and traffic control			Primary Roads (National, Trunk); Secondary Roads; Tertiary Roads: rural, urban
Solid Waste Management	Collection; Transfer; Resource Recovery		Disposal: Sanitary land fill, Incineration	
Telecommunications (Basic Network)	Network: Transmission - Long distance; Switching; Terminal Equipment: Individual		Terminal Equipment: Common	Network: Transmission - Local
Telecommunications (Network Extensions)	Value-Added Services; Cellular, Paging, Microwave Relay; Private or Specialized Networks			
Urban Transport	Van, bus (urban, inter-urban); Taxi; Traffic Signaling; Metro/rapid transit: Rail cars			Metro/rapid transit: Tracks/Rails
Wastewater Management (Conventional Sewerage)				Conventional Street Sewer; Pumping Station; Treatment Plant
Wastewater Management (Intermediate/Low Cost Sewerage)	Basic Sanitation - (pit latrine)		Condominial Sewerage; Localized treatment; Other intermediate sewerage	
Water Supply (Nonpiped)	Vendor Tanks			Borehole
Water Supply (Piped)	Terminal Equipment: Common (i.e. handpump), Individual (i.e. home faucet)			Trunk System (intake pumping station); Distribution System

Note: High sunk costs imply low contestability, and vice versa.

TABLE 1-4. PRODUCTION CHARACTERISTICS OF INFRASTRUCTURE ACTIVITIES: COORDINATION REQUIREMENTS

SECTOR	COORDINATION REQUIREMENTS		
	LOW	MEDIUM	HIGH
Airports/Airways		Ground Services	Airplane services; Runway, gates; Air traffic control
Electric Power			Generation; Transmission; Distribution
Irrigation (Groundwater)	Shallow Tubewell	Deep Tubewell	
Irrigation (Surface Water)	Terminal System (On-farm); Gravity, Sprinkler		Trunk System: Dam, main canal; Distribution System: Secondary and tertiary canals
Ports and Waterways	Ships, Port equipment (loading/unloading)		Piers, harbor
Railways		Freight Loading/Unloading	Railbed; Switching and Signaling; Railcars
Road Freight Transport	Trucking Services		
Roads and Highways	Primary Roads (National, Trunk); Secondary Roads; Tertiary Roads - rural		Tertiary Roads - urban; Signaling and traffic control
Solid Waste Management	Resource Recovery (recycling)	Collection	Transfer; Disposal: Sanitary land fill, Incineration
Telecommunications (Basic Network)		Terminal Equipment	Network: Transmission - Local, Long Distance; Switching
Telecommunications (Network Extensions)			Value-Added Services; Cellular, Paging, Microwave Relay; Private or Specialized Networks
Urban Transport	Van, Bus (urban, inter-urban); Taxi		Metro/rapid transit: Tracks/Rails, Railcars; Traffic signaling
Wastewater Management (Conventional Sewerage)	Pumping Station; Treatment Plant	Conventional Street Sewer	
Wastewater Management (Intermediate/Low Cost Sewerage)	Basic sanitation (pit latrine)		Condominial Sewerage; Localized treatment; Other intermediate sewerage
Water Supply (Nonpiped)	Vendor Tanks; Borehole		
Water Supply (Piped)	Terminal Equipment: Common (i.e. handpump), Individual (i.e. home faucet)		Trunk System (intake pumping station); Distribution System

Table 1-5. EXTERNALITIES AND SOCIAL OBJECTIVES PERTAINING TO INFRASTRUCTURE

Sector/Subsector	Externalities	Socio-political Objectives
Transportation Railways	Network effects ¹	Access to service for remote areas
Urban Transport Bus, taxi	Air pollution Urban congestion Public safety Noise	Affordable access to means of personal mobility
Rapid transit	Urban land use	
Road freight	Air pollution Noise	Common carrier Access for remote areas
Roads and Highways	Affects settlement/land use patterns, drainage, erosion public safety, dust pollution	National integration, access to remote areas
Airports	Noise, public safety	National defense
Ports/waterways	Water pollution	National defense
Electric Power	Air pollution (thermal) Radiation (nuclear) Resettlement (hydro)	Affordable access to minimum service
Telecommunications	Network effects	Affordable access to minimum service National integration
Water Supply	Intersectoral allocation of water resource; Public health	Affordable access to minimum service
Sewerage	Land, water pollution Public health	Affordable access to minimum service
Solid waste management	Land/air/water pollution, Public health Drainage	Affordable access to minimum service
Irrigation	Intersectoral water allocation; waterlogging, salinization, erosion of land; depletion, pollution of aquifer; introduction of diseases	

¹ **Network effects**—Refers to positive externalities of consumption (decision by one user to link to the network yields benefits to other users, e.g. by increasing the range of possible communications through the telephone systems). As another example, for a railway between towns A and B, benefits to users at any point along the line increase when a link to town C is added.

- (iii) Consumers' access to information. The premise of "consumer sovereignty" in the market is based on consumers having access to information about the characteristics of products and services. In some areas of infrastructure, the qualities of service are not easily assessed by the consumer (e.g. purity of the water supply), which makes it more difficult to "shop around" and thereby challenge the dominance of particular suppliers. Another example of asymmetries in the information available to producers and consumers is provided by the urban transport sector. Individuals cannot assess the safety of the buses or taxis in which they ride, which justifies public safety regulation. In addition, inefficiencies (in the form of suboptimal price and frequency of service) arise in urban bus markets where there is fully unregulated entry, because of imperfections in consumers' knowledge about the actual service alternatives available at any one time.⁷ Indicators of service quality which make the performance of services more transparent increase the "marketability" of infrastructure.⁸ Similarly, the prospects for providing services efficiently through a market can be enhanced when information is made publicly available regarding the impacts of consumption on nonusers (i.e., where there are externalities, such as air pollution caused by motor vehicle traffic).
- (iv) Temporal patterns of demand. For certain infrastructure services (especially electric power and voice telecommunications, and to a lesser extent, water supply and urban transport), demand is not randomly distributed over time but shows distinct peak and off-peak periods. The outputs of some of these services also cannot be readily stored, and the capacity of the system needs to be related to peak demand rather than average demand. Where facilities involve large, "lumpy" capital investments, the physical capacity cannot readily be expanded or contracted and the supplier must bear high costs of excess capacity in slack periods, as is the case for example with power transmission. However, where incremental facilities can be brought into service to meet peak demand (such as from standby generators which are connected to the transmission grid), this may be more efficient in some cases than adding to the main capacity. Likewise, at some times, construction of extra capacity to avoid congestion at the peak periods may be avoided by charging higher prices for peak than for off-peak consumption. Removal of regulations which impede such approaches to dealing with peaks in demand can reduce the need for very large investments.
- (v) Extent of diversity of user needs. A traditional conception about much of infrastructure is that it produces fairly homogeneous products (e.g., generic power, telephone, freight transport service) which lend themselves to standardized production processes by central public suppliers. Yet it is becoming realized from research that even household demand for drinking water is not uniform but varies with perceived

⁷ The peculiar features of urban transport markets in this respect are described in Dagerman (1992).

⁸ A related point is that a condition for production by profit-seeking agents is that the requirements of the product/service can be fully defined in advance, and that the product delivered can be evaluated unambiguously. These conditions are not met if information about service performance and quality is not readily available to users (John D. Donahue, *The Privatization Decision: Public Ends, Private Means*. New York: Basic Books, Inc., 1989)

quality differentials and reliability (e.g., Humplick and Madanat, 1992). Moreover, user needs for telecommunications and transport are becoming ever more diversified due to rapid changes in technology and production processes. The increasing differentiation of user demand implies for some services that the structure of supply has to become more diverse as well to respond adequately. Thus, this last characteristic of user demand provides an argument for multiplicity of suppliers.

To conclude this section on the “marketability” characteristics of infrastructure subsectors, it can be said that the provision of network (pipeline-type) facilities, especially the primary or “trunk” level (e.g., basic transmission hardware for power, telecommunications, piped water supply and sewerage, trunk highways, port berth structures, and large scale irrigation networks) exhibits, to varying degrees, the characteristics of public goods, natural monopoly, and high sunk costs. The operation of these networks, on the other hand (tasks involved in generating services from the facilities), often does not entail large sunk costs for equipment, and is thus contestable. In addition to these features, it has been argued here that the nature of externalities and social values associated with the services, as well as the nature of the market for the services from the users’ perspective, must be understood in order to identify the appropriate roles that the public and private sectors should play concerning both facilities and operational functions.

In many cases, technological change has transformed the economic conditions of production and the nature of demand for the services according to the above criteria. Technology has also thereby introduced new options for supply (see Box 1).

The key point of this section is that to properly judge the “marketability” of infrastructure, it is necessary to consider the economic and technological characteristics at the level of specific activities within subsectors. Looked at in this way, as illustrated by the tables above, it becomes clear that **infrastructure is highly heterogeneous not only across subsectors, but also within subsectors**. Taking the airlines subsector as one example, air traffic control is a pure public good; runways and gates are essentially toll goods; and airline and ground services are private goods. Among the infrastructure activities charted on these matrices, the majority appear as private goods rather than as public goods. Fewer of the activities involve large economies of scale than is customarily imagined; however, a significant share of the activities involve high sunk costs and require technical coordination to operate efficiently—features that call for some regulation when private entry is allowed.

B. Determining the Public and Private Roles in Infrastructure

Once the basic “marketability” of each activity has been identified in this way, it is possible to assign responsibilities for specific functions between the public and private sector. For any service involved in infrastructure—or for that matter, any other sector—if all the conditions for a competitive market as just discussed are met, then it is unquestionably preferable from an efficiency standpoint to provide it through the market. However, because of the characteristics noted above, most of infrastructure cannot be served by private markets. Government intervention is justified in, and should be limited to, cases where the potential costs of market failure are greater than those of government failure.

Box 1 The Changing Technology of Infrastructure

Although not all the technological changes relevant to this discussion have appeared during the past decade, their implications have begun to be widely exploited only in recent years as they provided support for the concurrent world trend towards economic liberalization. The following briefly illustrates the significance of technological alternatives for creating new supply options and for changes in demand for infrastructure:

- **reducing conditions for natural monopoly.** In telecommunications, technological change has reduced economies of scale in long-distance transmission, undermining natural monopoly in this area. In local exchange service, new transmission technologies such as cable-based telephone access, cellular radio, and direct microwave create some de facto competition within the local exchange market. Digitalization of switching has simplified maintenance functions, thus reducing economies of scale in overhead activities such as O&M. In electric power, technologies such as gas turbine generators have also reduced economies of scale in generation.

- **permitting low-cost supply options.** Intermediate sanitation technologies have lower construction costs than conventional sewerage, making them affordable for low-income communities. Changes in design parameters for conventional sewerage, based partly on technological advances, have also permitted lower-cost alternatives such as condominal sewerage to be used where communities organize and participate in planning and implementation. Among alternatives to traditional large surface schemes in irrigation, options such as drip, bubble, and sprinkler systems and low-level canals with low-lift pumps are highly responsive to demand for water. They promote conservation and foster private manufacture and ownership of the equipment involved.

- **increasing range and quality of service.** Value-added services in telecommunications (e.g. facsimile), which are the most dynamic source of demand in this sector, combine transmission technologies with computer processing. The container revolution in transportation permits rapid and cost-effective transfer of freight across multiple transport modes. Combined with electronic communications systems, intermodal transport has greatly reduced transport costs and improved the quality and speed of trade logistics.

- **facilitating the "unbundling" of assets and operations.** Technologies of "nondestructive testing" and remote monitoring (e.g., use of cameras within pipelines) permit the condition of fixed infrastructure facilities to be assessed and problems diagnosed without costly and time-consuming excavation or dismantling. This capacity also implies that where the ownership of fixed assets is vested in a different entity than operation (e.g. in a regional water supply/sanitation system or toll road), the owner or regulatory authority can independently monitor the condition of these assets.

- **expanding options for demand management.** In the roads subsector, electronic road pricing can permit road user charges to be differentiated so as to reflect the actual impact of different vehicle loads on road deterioration, to manage congestion, and to internalize the social costs of pollution. Automatic vehicle identification is already used on many toll roads in the United States, Norway, and elsewhere in Western Europe and is planned in Mexico and Singapore.

More analysis has been devoted to the sources of market failure than to those of government failure.⁹ The latter may include factors such as unresolvable conflicts among policy objectives; the inability of policy-makers to interpret the "public interest" accurately; and the interplay among the public interest, the concerns of particular constituencies, and the private interests of officials. It is argued here that to minimize the risks of government failure, it is necessary to be very clear about the argument for assigning any specific task to government; moreover, once it is determined that government should have

⁹ The literature on public choice and principal-agent theories, for example, and other institutional analysis have examined issues of government failure.

responsibility for a particular activity, it is preferable to choose the least interventionist policy response. In determining a strategy for transition to this target, it will of course be necessary to take account of the constraints of social, political, and institutional circumstances (e.g., human capital) in each situation.

In many cases, arguments which have traditionally been presented for public ownership, financing, and/or delivery of infrastructure services can be addressed by a more restrained policy response to achieve the same efficiency and equity objectives. This approach can be illustrated very briefly below, by relating the specific reasons for government intervention to a menu of "minimal" policy actions:

- (i) For activities involving **public or quasi-public goods, natural monopoly, or capital with high sunk costs**—typically, the provision of network, trunk-type facilities as discussed earlier—there is a case for public planning and policy making, as well as public financing and ownership. An alternative may also be private sector financing and ownership under public regulation.
- (ii) Since the activities involved in operating such facilities are normally **contestable** in nature, there is no reason *a priori* why the public sector should **operate** such facilities. Operation and maintenance could be allocated on the basis of competitive bidding for the right to the monopoly. The government's responsibilities in this case are to issue the exclusive contract and monitor performance under its terms; to ensure that other providers of services using the facilities face fair conditions of access (including price); and to protect users from other possible abuses of the monopoly.
- (iii) For other activities that do not involve high sunk capital costs (e.g., road freight transport), there is generally no economic justification for policies that impede entry by the private sector.^{10 11} The government should mainly be responsible for ensuring fair competition in such activities.
- (iv) **Externalities**, such as environmental impacts of infrastructure, can be addressed by regulations (e.g., on zoning, technical standards) or fiscal transfers (taxes, fees, or subsidies to influence private investment or operation).¹²
- (v) **Distributional objectives** can be met by regulation (e.g., universal service requirements), investment planning (e.g., to ensure a certain regional distribution of

¹⁰ As indicated earlier, a qualification is needed for urban bus transport, where some regulation (e.g., in the form of competitive licensing of routes) is justifiable because of structural features of the urban bus market.

¹¹ Even where a particular activity does not entail sunk costs, if there are economies of integration or scope with the other activities undertaken by a dominant provider (e.g., the railway or water utility), this fact may impede the ability of new entrants to compete on an equal cost basis. In such cases, there may be need for competitive restructuring of the monopolist—meaning horizontal and vertical separation of the contestable activities from those involving large sunk costs.

¹² The larger these externalities (positive or negative), the more justification for public involvement. As put by Donahue (op cit.), a poorly-performing contractor should face penalties commensurate with the potential losses it inflicts on the public. When these losses are very great (e.g. of a nuclear power plant disaster, or breakdown in air traffic control), there is justification for more public involvement in the activity.

essential minimum services), and/or public financing of nonremunerative services which are deemed of social importance.

- (vi) Significant requirements of **coordination** among facilities and services may justify regulation of investment or operating standards.
- (vii) Characteristics of market demand, such as **low availability of substitutes or low price elasticity** may argue for regulation of tariffs to protect consumers if the supply is a natural monopoly. **Assymetries in information** may justify regulation such as requirements regarding disclosure of information about service quality and alternative sources of supply. Where **temporal patterns of demand** exist, there may be a case for some public planning of investment, deregulation to promote efficient use of reserve capacity, and pricing policy to shift demand to off-peak periods. A **high diversity of services demanded** would suggest policies to liberalize production and promote competition. **It is worth noting that none of these considerations of externalities or characteristics of demand provides *a priori* justification for public ownership, nor even for the public sector to engage in all the tasks of planning, regulating, financing, and delivering the services.**

The analysis to this point has referred to assigning functions to the public and private sector to meet the objectives of efficiency and equity. A third objective mentioned earlier is **accountability**, defined as the ability of service providers to serve the interests of users and other financiers. Competitive markets meet this criterion of accountability in that the profit-oriented suppliers have an incentive to satisfy demands of their customers (and it is customers who provide the revenues). Where competitive markets cannot be used to provide infrastructure services, other arrangements have to be found to promote accountability.¹³ Such measures may include **decentralization** of activities undertaken by government administration, if such decentralization promotes greater responsiveness to users; **participation by users** in the planning, financing, and delivery of infrastructure services, whether through “self-help” or community forms of organization, or through other channels for interest groups to influence the decisions of service providers and regulators. It is also important that indicators of service quality and other dimensions of user satisfaction be incorporated into the processes of planning and regulation.

C. Characteristics of Alternative Institutional Arrangements

The analysis above helps to narrow the range of public policy options to be considered for particular activities, but does not lead to one unique institutional solution for a given infrastructure activity in all contexts. The range of institutional alternatives is in fact broader than is often recognized. The options fall along a continuum between the extremes of completely public sector and completely private sector responsibility, as shown in Table 1-6. From among these options, specific forms can be identified as appropriate for particular activities.

¹³ Whenever services are not financed by user charges, there can be a conflict between the suppliers' incentives to satisfy the users, and the need to satisfy those who provide the revenues (e.g., often the government budget). Thus, in addition to the measures listed here to increase accountability, it is important that infrastructure services be subject to user charges to the greatest possible extent (see “Pricing and Financing” in Section III.)

Table 1-6. Types of Institutional Forms by Degree of Public and Private Sector Responsibility¹

	<i>Range of Responsibility</i>	<i>Menu of Institutional Options</i>
	PUBLIC SECTOR	
Role of Market Incentives ↑ Low ↓ High	XXXXXXXXXX	Government Department
	XXXXXXXXXX	Parastatal
	XXXXXXX	Service Contracting
	XXXXXX	Management Contracting
	XXXXX	Leasing
	XXXX	Concessions (including BOT/BOO etc.)
	XX	Cooperative/communal arrangements
	X	Private entrepreneurship ²
	PRIVATE SECTOR	

1. See Annex III and Glossary for detailed, definitions, and descriptions. These categories are not mutually exclusive, e.g. government departments and parastatals may employ the various forms of contracting; also, cooperatives and private entrepreneurs may work under contractual schemes for public sector entities.

2. With majority to retail private shareholding.

Table 1-7 provides a more detailed taxonomy of the institutional alternatives which indicates how they compare in their assignment of functions, risks, and compensation to public and private parties. Table 1-8 illustrates how the various institutional options may apply to particular infrastructure activities, after taking into account the extent to which each activity lends itself to market conditions and the requirements for government involvement. If the aim is to choose alternatives which promote efficiency and accountability, then those which involve greater degrees of private sector responsibility and involvement by beneficiaries i.e., those towards the right-hand side of Tables 1-7 and 1-8 would be preferred wherever feasible.

The next section describes these arrangements as they are currently in practice in various infrastructure sectors, with an emphasis on developing countries. Appendix III includes a broader (though not exhaustive) listing, by infrastructure sector and country, of where the main alternative forms are planned or under implementation at the present time.

TABLE 1-7. COMPARISON OF INSTITUTIONAL FORMS BY ASSIGNMENT OF FUNCTIONAL RESPONSIBILITIES

FORMS FUNCTIONS	Government Department	"Traditional"	Corporatized Commercialized	Service Contracting	Management Contracting	Leasing (Affermage)	Concession (BOT)	Private Entrepreneur	"Self-Help" Cooperative/ Communal
	Parastatal/Public Utility								
Ownership of Assets	State	State	State (Majority)	State or Mixed			Private (Majority)	Private or in common	
Sectoral Investment Planning and Policy-Making Regulation	Internal to Government	By Parent Agency	Parent agency or Separate Public Authority			Public Authority negotiated w/Contractor	None or Public Authority	None or Public Authority	
Capital Financing (Fixed Assets)	Government	Large Recourse to Subsidies and	Parastatal (limited subsidies;	Public	Public	Public	Private Contractor	Private	Private
Current Financing (Working Capital)	Government	Government-backed borrowing	Market-based financing)	Public	Public	Private Contractor	Private Contractor	Private	Private
Execution of Investment	Government	By Parastatal		Private Contractor for Specific Services	Public Partner		Private Contractor	Private	Private
Operation and Maintenance	Government				Private Contractor				
<u>Other Characteristics:</u>									
Managerial Authority	Government	Government	Parastatal	Public Partner	Private Contractor	Private Contractor	Private Contractor	Private	Private
Commercial Risk	Government	Government	Parastatal	Public Partner	Mainly Public	Private Contractor	Private Contractor	Private	Private
Basis of Private Party Compensation	N/A	N/A	N/A	Based on services rendered	Based on services and results	Based on results, net of contractor payment for use of existing assets		Privately Determined	Privately Determined
Duration	No limit	No limit	No limit	Less than 5 years	About 3-5 years	5-10 years	10-30 years	No limit	No limit

TABLE 1-8. INSTITUTIONAL FORMS APPLICABLE TO INFRASTRUCTURE ACTIVITIES

FORM	Government Department (National or Sub-National)	Parastatal/ Public Utility	Service Contract	Management Contract	Leasing (Affermage)	Concession BOT	Regulated ^{a/} / Entrepreneur/ Cooperative	Unregulated Entrepreneurs	Cooperative Communal	
SECTOR		(Investment Plus O & M)	(O & M only)			(Investment Plus O & M)				
POWER:	Overall	Generation					Small Scale Enclave ^{a/}	Communal Systems		
		Transmission System								
		Distribution System								
TELECOMS:	sectoral	Local transmission, switching system			Long Distance Transmission		Terminal Equipment	Communal Systems		
									Service Extension	
TRANSPORT:	planning	Passenger and Freight Rail					Enclave ^{a/}			
		Urban Transport	Commuter Rapid Transit				Urban Bus	Taxi, Van Inter-Urban Bus		
Road Freight	and									
Roads and Highways	policy	Primary, Secondary, Urban Roads			Toll Road		Enclave ^{a/}	Rural and Local Roads		
Airport/ Airlines		General-Use Airports					Enclave ^{a/} and Airlines			
Ports and Waterways	making	General Use Ports					Enclave ^{a/} and Shipping			
WATER & SANITATION: Water Supply		Pipe Water Trunk & Distribution					Enclave ^{a/}	Communal Systems		
						Shallow Well; Vendor				
Sewerage		Conventional Sewerage and Treatment				Intermediate Sewerage				
Solid Waste Management		Collection/Transfer/Disposal					Collection/ Recycling			
IRRIGATION:	Surface Water	Trunk and Distribution Systems (large scale)				Terminal equipment (on-farm)	Small Scale	Communal Systems		
						Deep Well	Shallow Well			
Tubewells										

^{a/} Enclave or "captive" means infrastructure for exclusive use of provider, e.g. industrial or residential compound; that is, not a "common carrier."
^{b/} Refers primarily to regulation of tariffs and/or entry. There is also need for regulation when services connect to larger networks.

II. Lessons of Experience with Alternative Institutional Arrangements

The preceding section began from the premise that the competitive private market, where it can be applied, is best able to serve the objectives of efficiency and accountability in provision of goods and services. This advantage is attributed to the following features of the private sector, in pursuit of which governments increasingly seek to involve private companies in infrastructure:

- (i) **managerial skill**—rapid and flexible decision-making, due to a clear structure of incentives (individual reward based on performance);
- (ii) **productive efficiency**—e.g., lower production and delivery costs, stemming from the motivation to make a profit. This outcome is achieved in part because private companies are less constrained than the public sector by bureaucratic or political issues regarding procurement and labor practices;
- (iii) **dynamic efficiency**—the motivation to invest in and maintain capital equipment needed to expand and introduce technological improvements. Investment is also less subject to political influences;
- (iv) **accountability to customers**—the motivation and flexibility to adapt production to changing markets and to achieve better service quality and customer satisfaction;
- (v) **financial autonomy**—a final virtue of the private company, particularly from the government's perspective, is that it reduces government's financial burden for operating expenditures and debt servicing.

The institutional options reviewed here involve the private sector to varying degrees; correspondingly, they differ in the extent to which they can achieve these advantages. The analysis below moves from the institutional form with the least involvement by the private sector ("government department") to the form with most extensive private responsibility (private entrepreneurship).

It should be noted that most of these alternative forms of private sector participation have either not been in practice for many years, have not been tested in countries with different socioeconomic circumstances, or have not been rigorously evaluated. This section does not provide a systematic or comprehensive review of all relevant experiences. The discussion here is intended to illustrate some of the more typical examples in developing countries and represent the current thinking of knowledgeable observers, based on a rapidly evolving set of practices.

A. Review of Experience by Type of Arrangement

Government Department

In many countries, full responsibility for infrastructure traditionally resided in government departments, although hiving-off these functions to autonomous or semi-autonomous public corporations or public utilities became the norm in many countries years ago. In Japan, for example, telecommunications was operated by government ministry until 1952, when it was established as a state-owned enterprise (and more recently privatized). Government departments remain the typical

institutional form for sanitation (usually at the municipal level), major irrigation works, and roads and highways (both national and subnational). Even the national railway continues to operate as a government department in Bangladesh, India, China, Egypt and many former socialist countries, although this is now more the exception than the rule worldwide.

As argued in the previous section, there is no a priori justification for assigning all functional responsibility for any infrastructure service to a government department. A government department is generally appropriate mainly to provide overall policy guidance and sectoral planning. It would also be typically the channel for budgetary compensation for specific, nonremunerative public service obligations, if any, performed by the sector entities. However, since this form is so common in the roads and highways sector especially, and any change poses difficult issues of transition, it is worth considering improvements within this particular case. For limited areas in the road/highway sector, operation of toll concessions and even outright private ownership of the road infrastructure is feasible, and these options are discussed later below.¹⁴ What is addressed here is the bulk of the sector (primary, secondary, and urban roads) where these options are not practical or desirable, and some public production of road services is expected to continue.

For many government highways departments, reforms are needed to (i) better link revenues and expenditures, (ii) set clear management objectives, such as for maintenance to achieve a given quality of road services, and (iii) monitor performance on the basis of specific indicators. The aim of reforms would be to create surrogate market discipline, through a clear relationship between the supplier of road services and the users, in order to strengthen incentives for good management and improve the quality of service (Heggie, 1991). These objectives of reform can be met to varying degrees through different approaches, including (i) **decentralization** of the road management responsibilities to lower levels of government, (ii) **corporatization**, by converting the road agency to an autonomous enterprise, and (iii) **contracting-out** of functions to private operators. Options (ii) and (iii) are discussed in separate sections further below.

Decentralization. Decentralization of road administration is justified when it contributes to greater efficiency and accountability. The first step often involves reclassifying the road network into those serving the national market (e.g., 2–10 percent of the total network in most industrialized countries) and those of local or regional importance. The next step is to achieve an appropriate assignment of expenditure and administrative responsibilities as well as of resources between the central and local agencies. International experience suggests that central administrations should retain the functions of strategic planning and monitoring of a minimal network of roads of national interest; setting of technical, environmental and safety standards; and coordination of road research and training. Regarding the subnational agencies, there can be true devolution of authority, whereby the local agencies have full responsibility for planning, programming, and execution of their respective road networks. Alternatively, limited functions can be **deconcentrated** or **delegated** to local offices with central control of funding and supervision. Devolution may be more effective in achieving local accountability, but it requires a higher level of local institutional capacity and political support than the more limited forms of decentralization (Cellier, 1992).

The distribution of financial resources must be made consistent with the decentralization of expenditure responsibilities. If revenues for the road sector derive mainly from general taxation or road

¹⁴ Toll roads rarely account for more than five percent of the main road network in any country (Heggie, 1991).

user charges—which may be more efficiently collected centrally—revenue sharing needs to be worked out through intergovernmental transfers or tax reform at the local level. The main issue with fiscal decentralization is that it may make it more difficult to achieve objectives of redistribution of resources from richer to poorer areas. Certain revenues, such as vehicle registration taxes and taxes on petroleum products, may be efficiently collected at the local or provincial level.

In sum, the decentralization of road administration appears a very modest measure compared to more dramatic shifting of responsibilities from government towards the private sector, but even this measure needs to be carefully planned in view of the extremely limited supply of institutional and managerial capacity in many developing countries. It can be concluded here that effective devolution of responsibility, based on an appropriate classification of the road network and supported by adequate assignment of revenues, may achieve improved efficiency and accountability of performance as contrasted with the monolithic central road agency. However, corporatization of the agency, and contracting-out of functions to the private sector, provide additional scope for improving incentives and outcomes.

In other infrastructure sectors as well, decentralization can be an important option to make management more accountable to users, especially where the population affected is limited to a geographic region. Decentralization can also be a first step towards private sector involvement such as through contracting-out, and is most effective when combined with other measures to improved efficiency such as through commercialization (discussed below). In the railway sector, Brazil has shifted its commuter rail services in Rio and Sao Paulo from federal to state control; in Argentina a number of inter-city passenger lines are being transferred to the states, which are better able to assess local demand.¹⁵ Likewise, the national water company in Bulgaria is to be transferred to local government ownership, through formation of regional joint stock companies of which the municipalities will own shares.

Public Utility¹⁶

This type of organization is ubiquitous in both developed and developing countries for telecommunications, power generation and transmission, railways, ports, water supply and sewage treatment. Many countries have begun to reform these entities to achieve greater efficiency and accountability, through commercialization (whereby agencies are given separate budgets and financial autonomy based on tariff revenues, and the managerial autonomy to operate as a business); and corporatization (whereby agencies are transformed into a legal entity subject to company law, with formal separation of ownership and management responsibilities, e.g. through a board of directors or other body). As a publicly-owned entity, some constraints on the autonomy of a parastatal may be legitimate, such as rules on employment, wage determination, and procurement. However, often parastatals are subjected to the same political pressures facing the government administration and are prevented, for example, from disconnecting customers for nonpayment or from paying market wages for

¹⁵ Galenson, 1993.

¹⁶ Public utility is used synonymously with “public enterprise” or “parastatal” here. These entities are defined here as having majority public ownership or control (as exercised through voting rights). Joint ventures where the private sector owns and controls a minority share may provide positive incentives for efficiency as well as additional capital, but these are not considered here as qualitatively different from public enterprises. Cases where the private sector has majority ownership and control are treated under the section below as “entrepreneurship”. There may also be cases of private majority ownership with minority control, and private minority ownership with majority control (occasionally used as a transition to fuller privatization).

their staff. Public utilities therefore often function like arms of the government and their boards of directors exist only in form.

Commercialization. Although commercialization is a limited reform in the present scheme, its importance should not be underestimated. It is a prerequisite to making managers accountable for the use of resources; it is also a necessary condition for improved efficiency in response to competitive pressures. In many activities carried out by government departments or traditional parastatals, such as solid waste collection, it is typical to find officials almost totally uninformed about the structure of costs (Cointreau-Levine, 1992). Explicit cost-accounting also helps to identify activities which are nonremunerative and, if they remain justified as essential public services, should be financed by specific subsidies. In the United States, the introduction of commercial performance-based management of the road authority has been found to reduce road maintenance costs by 5–15 percent through more effective work planning and higher labor productivity (Heggie, 1991).

One dimension of commercialization of railways has been to break tasks into profit centers or “lines of business” corresponding to specific markets. For the typical government department, not only is an income statement a novel management tool, but so is a balance sheet. The characteristic lack of orientation of public officials to the concept of asset management may help to explain the widespread problem with inadequate maintenance of the infrastructure stock.

Corporatization. The Bank has a long experience in supporting government efforts to corporatize public enterprises, along with other reforms to enforce market-like pressures by cutting off access to subsidies, and enforcing bankruptcy and liquidation of enterprises that prove nonviable under these conditions. In very many cases, such public enterprise reforms have been of limited success, and the gains achieved have been ephemeral. The pervasive problem is that where governments have dominant ownership and control of enterprises, political interference in management will sooner or later reemerge (Kikery, Nellis, and Shirley, 1992). Therefore, where feasible and appropriate (according to the decision criteria outlined earlier), it is often preferable for public enterprises to be converted to private ownership through divestiture of shares or sale of assets.

Despite these shortcomings, corporatization represents a considerable advance over current practice in some areas of infrastructure—such as management of roads, major irrigation works, and solid waste transfer and disposal. In fact, for those segments of infrastructure where there are high sunk costs (specifically for the network of trunk facilities of major highways, power transmission grid, urban tram and general rail lines, and water and sewerage pipelines), the most appropriate arrangement may be for ownership to be vested in a public corporation which will take a particular interest in ensuring a reasonable return on these assets.

Since public enterprises will remain a dominant organizational form for many infrastructure activities at least for a transitional period, methods of improving their performance continue to be needed. Various ways of restructuring the activities of the enterprise, such as by “unbundling” the fixed infrastructure from the more contestable operations, are possible. The Swedish railways, for example, separates track ownership from operations to facilitate commercial operation (Galenson and Thompson 1992) discuss this and related options in practice for the railway sector in a number of countries.

Additional approaches covered in later sections below include **management contracting, service contracting, and leasing**.¹⁷

Although it is still relatively rare in developing countries, the conversion of road departments to public utility corporations is attracting increasing interest as a way of improving performance, particularly of road maintenance.¹⁸ In practically all countries, the sector has an available source of financing through road and fuel taxes. The reform entails identifying a portion of these taxes as user charges—the “road tariff”—which would be channeled directly to a fund managed by a corporation with responsibility for road expenditures. The road utility would have to be answerable to trustees as “owners”, representing both road users and the government. Such a system exists in the National Roads Board of New Zealand, under which road expenditures are budgeted based on assessments of traffic-related costs; user charges are then calculated to reflect the wear and tear created by different types of vehicles; and the Board manages its budget autonomously, but with accountability to users (Galenson, 1990).

In the municipal solid waste subsector (MSW), the activities of transferring wastes to disposal points and disposal itself exhibit economies of scale and are most efficiently managed by a metropolitan area-wide or regional authority. Cities in a number of countries are using quite effectively a public service corporation-type of authority to perform the transfer/disposal functions (Bartone, 1991). In such corporations, the local governments involved may serve as owners (partially or wholly); the entity could also be privately owned and regulated by the local governments, or publicly owned but operated as a private concession (as discussed further below).

Significant changes in orientation are required in the transition of a government department to an effective corporate entity, as illustrated in the case of the National Water Supply and Drainage Board of Sri Lanka (see Box 2). An evaluation conducted in 1988 of five of the most successful municipal and regional water and sewerage utility companies in Latin America, which compared their performance to that of Spanish and French utilities, concluded that the most successful companies in both groups had the following features: (i) high quality managers and stability in mid-management and professional positions; (ii) financial strength, including reasonable tariffs which cover at minimum operational and maintenance requirements; (iii) an emphasis on maintaining good customer relations; (iv) in some of the companies, successful use of private contractors to perform O&M function, participation of private capital, and the use of effective cost accounting systems. It was also noted that very clear delineation of roles of the government, the board of directors, and the management contributed to top performance (Yepes, 1990).

Other approaches which have been used to help public enterprises in developing countries improve performance include **twinning and contract plans**. **Twinning** involves a horizontal, sustained cooperation between a well-run, mature company and a less experienced or poorly performing company. Twinning has been done in water and power, for example between NEA, the national electrical utility

¹⁷ These three alternatives (in particular service contracting) may also be used by government departments, but they are discussed here in relation to parastatals.

¹⁸ The UN Economic Commission for Latin America and the Caribbean (ECLAC) has a research project supporting the development of this institutional arrangement (Schliesser, A., *The Reform of Road Network Conservation: Basic Issues to be Treated, Conference on Commercialization of Public Transport Services in Developing Countries*. Buenos Aires, 1991.)

Box 2 The National Water Supply and Drainage Board of Sri Lanka—Improving the Performance of a Corporatized Public Utility

In 1975, the Department of Water Supply and Drainage, within the Ministry of Local Government, Housing and Construction, was almost entirely devoted to perform capital construction projects, mainly to create new capacity. From 1975, it was transformed into an autonomous body, the NWSDB with responsibility for developing and operating water supply and piped sewerage. By 1984, the company was functioning reasonably well in terms of construction of new schemes but had been demonstrably unable to shift its role from a focus on capital projects to O&M and consumer billing. The USAID/WASH project for the institutional development of the company began in 1985 with the aim of assisting it to radically reform its role to be consistent with its corporate status. Over the next 6–7 years of intensive consultant input, the project focused on developing corporate planning, regional decentralization and delegation, improved O&M (reduction in unaccounted for water, improvement in water quality, preventive maintenance), improved financial management (performance budgeting, tariff reform, cost control), management improvement (staff optimization and employee performance evaluations), and customer relations. Indicators of performance, including collections ratio, billing lag, consumer complaints, unaccounted-for water, and the rehabilitation share of the capital budget were considerably higher by the end of the project.

The NWSDB institutional development project was considered a success in shifting the organization from engineering-oriented to an O&M and commercial orientation. Key to this success was the intensive consultant input, but sustainability is judged to be high because of the decentralization of responsibilities to regional centers, and the establishment of an effective corporate management capability in the institution. It is interesting that the project did not involve contracting-out functions to the private sector. The evaluation report notes that external political intervention continues to exist; the company was forced to accept a 45 percent government-mandated salary increase in 1989, for example; the government approves and finances all investments, and there are political pressures for hiring. To insulate the company from such negative external forces, the project stressed the development of cost consciousness, an in-house planning capability with clear project selection criteria, employee performance evaluations, and a corporate identity.

Sources: *Executive Summary Final Report on Institutional Development of the NWSDB*, August 1991. Engineering-Science Inc., Pasadena CA., in collaboration with Resources Development Consultants, LTD, Sri Lanka.

of Nepal and Electricity de France (EDF). The two-year relationship begun in 1989 helped NEA management to understand the reasons for poor performance in the past, and to clarify its role relative to that of the government. However, the arrangement was unable to affect the continued extensive intervention of the government in NEA affairs. A weakness of twinning is that the senior utility is limited in its ability to influence decision-making by the junior partner.¹⁹

Contract plans (also called “performance contracts”) are negotiated agreements between the government, acting as the owner of a public enterprise, and the enterprise managers. Contract plans also help to clarify goals of the utility and its role relative to those of the government. They usually involve a promise of increase managerial autonomy for the enterprise in exchange for its fulfillment of agreed performance targets (Nellis, 1988). For example, in the above case of NEA in Nepal, the twinning arrangement was followed by a performance contract to formalize the agreements reached between the utility and the government regarding their relationship. Contract plans under various names have been used for the railway in Senegal, Mexico, and Kenya, with very limited results.²⁰ Contract plans can be

¹⁹ From EDF International, “Seminar on Power Utility Management by Performance Contracting”, World Bank, May 19, 1992.

²⁰ Galenson and Thompson, 1992.

helpful in identifying and monitoring of performance targets, and work best for companies which already operate commercially with sound financial and reporting procedures. A major shortcoming of these agreements is that the enterprise cannot hold the authorities accountable to enforce the contract, and many governments have reneged on their commitments under these agreements when political or economic conditions change.²¹

Service Contracting

Service contracting involves “contracting-out” of specific operations and maintenance activities to the private sector, usually for a period of a few years. With this approach the public provider (government department or public enterprise) sets the performance criteria for the activity, evaluates bidders, supervises the contractor(s), and pays an agreed fee for the services, which may be based on a lump-sum, unit costs, or other basis. To achieve greater efficiency gains from contracting-out, contracts should be awarded through competitive tendering; private bids may even be compared against those of the public agency. Some countries retain a force account capacity to compete with the private contractors, or to provide a residual means of performing essential functions should the contractor fail, for example due to a labor dispute. However, since public agencies normally have poor cost accounting which renders it difficult to compare their service costs to those of an outside contractor, it is important that competition for contracts between the force account and private contractors be based on a full and comparable assessment of costs.

Activities such as ticketing, cleaning, food catering can be readily contracted-out for railways, as done in Pakistan, and locomotive repair and maintenance are carried out privately in Kenya, Sudan, and Senegal. In the water supply/sewerage sector, the operation/maintenance of standpipes, meter reading, billing and collections are also obvious candidates, and such service contracts have been used in Chile since the 1970s with good results in staff productivity and cost containment. Where there is need for particularly tight coordination and quality control, such as in maintenance of track infrastructure, contracting-out is still possible but requires especially careful oversight by the public authority.

Sometimes practically all of the core functions of public agencies can be contracted-out, with only a basic staff left in the agency to award and monitor the contracts. This is the nature of AGETIP, the nonprofit contracting agency for small scale infrastructure projects financed by World Bank projects in Senegal and several other West African countries (see Box 3). Another example is the public water company in Santiago, Chile (EMOS), which in 1977 introduced contracting-out as part of a strategy to reduce its own staff and use their services as private contractors. The approach has contributed to EMOS achieving one of the highest staff productivity rates in this sector in Latin America, even when the labor content of the contracts is taken into account (Triche, 1990).

Contracting-out of road maintenance has been an established practice for many years in a relatively few countries (including Brazil, Kenya, and Malaysia among developing countries), and has been introduced more recently in many others (including Algeria, Chile, and Pakistan). A 1991 study of this arrangement in these as well as several developed countries made some interesting observations. After experience had been gained with contract maintenance, there was a general perception in the

²¹ However, the governments can hold the enterprise accountable: in the Gambia, three public enterprise managers were dismissed due to failure to achieve the goals stipulated in contract plans (*The Reform of Public Sector Management: Lessons from Experience*, World Bank Country Economics Department, Policy and Research Series No. 18, 1991.)

Box 3 Contract Management of Public Works

The AGETIP model of contract management, first used in the context of a Bank project in Senegal, was developed to improve the efficiency of public works projects by permitting the application of private sector management practices to the public sector, transferring the execution of sub-projects from inefficient public agencies to dynamic small firms in the private sector, and liberating the managers of projects from the cumbersome red tape of public institutions. AGETIP (Agency for the Execution of Works in the Public Interest) is a private, not-for-profit company—an NGO. Its mission is to undertake general contracting commissions from public entities such as municipalities or ministries. It hires consultants to prepare designs and bidding documents and to supervise works; it issues calls for bids, evaluates them and signs the contracts; it evaluates progress, pays the contractors, and undertakes the final reception of the works. Activities of the agency are regulated through its Manual of Procedures.

In its first year of operation, AGETIP in Senegal executed \$8 million of works through 119 subprojects, using 78 mainly small or medium-sized contractors and creating almost 2000 person-years of employment. A number of factors explain its success. First, the private sector management team actively seeks out efficiency; for example, it takes pride in paying contractors in 10 days, rather than the 30 days allowed in the manual or the months taken by public entities. Second, since it contracts engineering consultants and contractors on an "as-needed" basis, its overhead is extremely low. Third, its private legal status absolves it from the cumbersome bureaucratic procedures of the public sector.

AGETIP also confers indirect benefits to the local economy, by creating demand for the services of local contracting and consulting industries, thus stimulating their development. AGETIP currently has 680 local contractors and 160 local consultants on its roster. The success of AGETIP has also spurred other agencies to improve their own performance: the Minister of Public Works is considering setting up an AGETIP within his ministry, and the mayor of Dakar has used AGETIP to execute projects financed from his own budget.

AGETIP's success has led to the creation of similar agencies under World Bank projects in Niger, Mali, Benin, and Burkina Faso; Mauritania is about to create such an agency as well. One component of the proposed Mauritanian project will disseminate information to local communities in order to increase their sense of responsibility toward project works. An objective is to improve communication between the grassroots and local authorities so that the former are consulted on projects that affect their neighborhood before the projects are presented for funding. This is particularly important in the case of garbage collection and sewer cleaning, where grassroots participation can make a difference in terms of public hygiene.

countries surveyed that it is more cost-effective than force account, although direct comparisons of costs between the approaches were difficult and incomplete because of different methods of execution, quality standards, and accounting practices. It was also generally accepted in the countries surveyed that the force account work groups became more efficient when they had to compete with private contractors. It is interesting that all contractors surveyed expressed the need to expand the scope and duration of the maintenance contracts to allow for capitalization and for the acquisition of specialized equipment; this finding suggests a tendency for service contracting to expand gradually towards contracts involving investment (concessions). In countries where there had been a successful transition from force account to contracting, a close working relationship and detailed information exchanges among the road agency and the contracting industry had been important features (Miquel and Condron, 1991).

Collection of municipal solid waste by contract is becoming increasingly common in developing countries, including some of the poorest countries such as Haiti. The impetus for seeking private sector involvement in this activity is obvious: expenditure on MSW services absorbs 20-50 percent of total municipal revenues in developing countries, yet on average only 50-70 percent of solid

wastes are collected. Studies of private sector involvement—mainly through service contracting—in MSW in both developed and developing countries have concluded that private collection is generally more efficient than public (Cointreau-Levine, 1992; Bartone et al, 1991). The private contractors have lower wages and benefit costs, younger (more productive) crews, and face fewer civil service—or union—induced restrictions on hours of work and overtime. Private sector crews also have newer and more standardized vehicle fleets, allowing for greater productivity, and higher vehicle availability. However, in this subsector, as well as in road maintenance, it is often difficult to compare exactly the cost-effectiveness of private versus public agents because of the general absence of cost accounting by the municipal solid waste department.

It is important that service contracts be of sufficient length to permit the contractors to fully amortize any equipment purchased, such as collection vehicles (about four years). In developed countries where large markets exist for resale and leasing of capital equipment, this argument for length of contract is less of a concern.

Management Contracts

Management contracting extends the responsibility of the private sector beyond individual service functions to encompass a broad scope of operations and maintenance, usually for a period of 3–5 years. In cases where the contractor receives a set fee for services rendered, the arrangement is essentially no different from technical assistance. In the concept of management contracting addressed here, the contractor obtains at least some of its compensation as a function of the company's performance, and therefore shares some of the commercial risk of the enterprise. For example, in France, where management contracts are common in the WSS sector, the incentives for productivity improvements are provided by linking the contractor's payment to indicators such as reduction in leakages or number of connections. Box 4 describes how technical assistance evolved into a management contract in Guinea-Bissau.

If compensation is linked to performance, it is necessary for the contractor to be given autonomy in day-to-day management decisions. In many developing countries, however, the private contractor cannot control key functions that affect productivity and service quality (such as staffing, procurement, or publicly-provided working capital), and thus cannot be held fully accountable for overall results and evaluation of performance is difficult. In these circumstances, management contractors are often compensated on the basis of a fixed fee. Greater efficiency gains can be obtained from management contracting when significant autonomy is granted and the compensation can be based at least in part on performance. The contracts should also incorporate some incentives for training of the internal agency staff, although this has proven difficult because of the short-term nature of management contracting. Given these problematic aspects, management contracts can be very useful as interim arrangements that allow private firms and public agencies to gain experience with partnerships prior to engaging in more comprehensive contracts such as leasing or concessions (described below), or while reforms of the regulatory framework for the sector are being developed. This has been the trend of management contracts in France, where they have tended to become more comprehensive over time.

Box 4 The Transition from Technical Assistance to Management Contracting: The National Electrical and Water Utility (EAGB) in Guinea-Bissau

In 1986, in the face of EAGB's near bankruptcy and disastrous operational performance, the government of Guinea-Bissau first requested technical assistance from Electricity de France (EDF), a French public enterprise. By 1989, this technical assistance had achieved dramatic improvement in the utility's operational efficiency, but its financial crisis remained. EAGB and EDF then entered into a two-year management contract, which was renewed in 1991. According to the terms of the contract, EDF took over the operation of the utility, with EDF's compensation based partly on fixed fees (paid by the French Ministry of Cooperation), and partly on a share of the revenue-based profits of the utility; the size of this profit share depends on the realization of performance targets. The performance indicators used include the ratio of power billed to the net power generated and delivered, and the bill collection ratio. The values of these indicators are verified by an independent auditor.

Between 1987 and 1991, EAGB achieved strong improvements in power generation, operational efficiency and financial efficiency. According to EDF's assessment, there are drawbacks of the management contract approach, including in particular the likelihood of conflicts between the external managers and the local utility; the limited incentive of the outside contractors to provide training to the local staff if performance is measured by short-term results; and potential confusion as to what will happen to the company when the contract expires. In the EAGB case, EDF notes that the main problems of the utility stem from shortages of physical capacity (new investment was not part of the management contract), and a continuation of payment arrears from government and parastatal customers of the utility.

Source: From seminar by EDF International on "Power Utility Management by Performance Contracting", presented to World Bank on May 19, 1992.

Lease Contracts²²

Leasing involves a private contractor paying the public owner for exclusive rights to operate facilities (without responsibility for major investments), and bearing full commercial risks. A lease contract accords an exclusive right (sometimes called a franchise or license) to the stream of revenues from providing a service. Leasing has been used for decades in urban water supply and sewerage in France and Spain (where the arrangement is known as "*affermage*"), and has also been used elsewhere in power, ports, urban transport, railways, and solid waste collection and disposal. In the case of "landlord ports", for example, the government owns the land and infrastructure, and the private sector owns and operates the superstructure.

In MSW, the lessee obtains exclusive rights to the solid waste in a given residential zone, which is the "asset owned" by the municipality; this exclusivity enables the operator to capture economies of contiguity within this zone.²³ In the transport subsectors such as urban transit, leasing is more often called "competitive tendering" for the rights to operate a particular route. This approach, which is a middle ground between full deregulation and purely public operation, may be particularly relevant where

²² This term may also be used with reference to an operator's renting or leasing particular equipment or vehicles, in order to reduce the costs and liability of owning such equipment. This sense is used, for example, in the case of municipalities which lease solid waste collection trucks from the private sector in Santa Cruz, Bolivia and Metro-Manila because of the governments' constraints on capital investment (Cointreau-Levine, 1992). Such limited-purpose contracting is akin to the "service contracting" discussed earlier.

²³ Cointreau-Levine, 1991, op. cit.

there are concerns to avoid excessive traffic congestion and air pollution as a result of many operators; or to provide socially desirable but unprofitable services. In the U.K., the right to obtain subsidies for certain non-profitable routes as a social service is awarded to the lowest bidder. Competitive tendering can be used to grant the rights to provide some or all services in the market, either to replace the public service or compete with it. The State Railway of Thailand introduced competitive tendering for the operation of certain passenger lines in 1985. As of 1990, the lease was found to have succeeded in attracting road users to the railway while generating a profit (Levy and Menendez, 1990).

In lease contracts, the public owner (lessor) remains responsible for fixed investments and debt servicing. The contractor (lessee) normally must finance working capital and replacement of short-lived assets, such as small-sized pipes in the case of water supply. Accordingly, the duration of the contract is usually between 6–10 years, corresponding to the amortization period of such works. The contractor usually collects the tariff revenue directly and returns an agreed portion to the public authority as a rental or license fee. The profit for the contractor is the difference between the gross revenues collected, and the sum of operating costs and this fee. Any savings from efficiency improvements are therefore retained by the contractor. The lease contract should specify the maintenance required to protect the condition of facilities during the lease period; the performance indicators to be used for judging quality of service; procedures for enforcement, penalties for nonperformance, and means of dispute resolution.

The experiences with lease contracts in the water supply sector in Guinea, and in power in Cote d'Ivoire, are described in Box 5. Cote d'Ivoire has also had leasing for urban water supply in the past, and a lease for water, sewerage, and electricity is planned in The Gambia with the assistance of the EEC.

Concessions

A concession contract incorporates all the features of a lease, but with the contractor having the additional responsibility for financing certain specified extensions or replacements to fixed assets. BOTs are concessions established for entirely new investments, and these are discussed further below. Concession arrangements exist in power, water supply and treatment, solid waste disposal and treatment, ports, railways, urban metro systems, toll roads, and telecommunications. They are not widespread in any of these sectors, however, in developing countries. The concession approach has been used more widely for specialist ports, such as grain and ore terminals, than for common user facilities, but examples of the latter exist in Thailand and Taiwan (Scurfield, 1992). Some of the longest experience with concessions has been in the municipal water sector in France (see Box 6) and in Spain (Barcelona).

In a concession, investment plans and implementation are subject to review by the authority issuing the contract. The assets revert to the public owner upon completion of the concession. The contractor's compensation is based on tariffs, which are also determined according to agreement set out in the concession contract. The tariff revenue should be sufficient to cover the operational expenses as well as debt service and depreciation on the concession's investments. Concessions normally last 15–30 years, depending on the life of the investments, and they are often renewed. Concessions, like leases, require appropriate disincentives for contractors to run down the assets towards the end of the contract period, although this would be less a concern if the incumbent intended to compete for contract renewal.

Box 5 Lease Contracts in two Urban Public Utilities in West Africa

Water Supply in Guinea. Prior to 1989, The Republic of Guinea had one of the least developed water supply sectors in West Africa. At that time, the sector was restructured: ownership of the urban water supply infrastructure, and responsibility for sector planning and investment were transferred to a new autonomous water authority, SONEG; a new company, SEEG, was created to operate and maintain the facilities. SEEG is a joint venture of which 49 percent is owned by the government and 51 percent by a foreign private consortium. The strength of the Guinean arrangement lies in the clarity of responsibilities and incentives. Under the ten-year lease contract signed with SONEG, SEEG operates and maintains the system at its own risk, with its remuneration based on user charges actually collected and new connections. SEEG benefits from improvements it achieves in the collection ratio, and in reduction of operating costs and unaccounted for water. SONEG has incentives to seek adequate tariffs and to invest prudently, based on realistic demand forecasts, since it has ultimate responsibility for capital financing. To date, the collection ratio has increased dramatically, from 20 to 70 percent, and technical efficiency and coverage have improved. Tariffs have increased from 60 GF/m³ before the lease contract to 420 GF/m³ (about US\$.45) in 1992, and are expected to reach the full cost recovery level by 1998. In the interim, a World Bank credit is financing the foreign exchange costs of the operation on a declining basis, and the government has assumed debt service on a declining basis. The arrangement has been hampered, however, by delays in procurement of equipment by the state enterprise SONEG, which has affected SEEG's ability to improve the quality of service and its financial performance.

Source: Thelma Triche, *Private Participation in the Delivery of Guinea's Water Supply Services*, Working Paper No. WPS 477, World Bank INUWS, 1990; and *PSP in Urban Water Supply: Issues, Implications, and Examples*, INUWS Note, August 1992.

Power sector in Cote d'Ivoire. The performance of EECI, the parastatal responsible for the electric power sector in Cote d'Ivoire, deteriorated during the 1980s. In 1990 a major restructuring was undertaken whereby operations and maintenance functions for generation, transmission, and distribution were transferred under a leasing arrangement to a new joint venture, the Compagnie Ivoirienne d'Electricite (CIE). Fifty-one percent of CIE is owned by a consortium of two French companies, and 49 percent by Ivorian investors. EECI continues to own the facilities and bear responsibility for investments, sector policy and planning. In the first 18 months of the new arrangement, efficiency and service has improved markedly (CIE has improved the collection ratio from 60 to 90 percent; maintenance has increased; duration of power outages reduced; business operations computerized; and operating subsidies have been eliminated). An important factor in this success is the creation of CIE as a new operating entity, which established a formal break with the past even though CIE took over some of the staff of EECI. In addition, CIE obtains considerable technical assistance from its foreign owners.

Source: EDF International, "Power Utility Management by Performance Contracting". Seminar presented to World Bank, May 19, 1992.

A concession for water supply services in Cote d'Ivoire was arranged in 1987, following 25 years of a lease contract. The lease had achieved good results in improving service and internal efficiency of the operating company, SODECI, a mixed French/Ivorian enterprise; however, financial troubles mounted in the 1980s because of policies enforced by the government regarding investment and tariffs, for which it retained responsibility. Under the new concession arrangement, the SODECI became both operator and investor, with responsibility for all new urban water supply investments in the country. The company receives no operating subsidies and all new investments are self-financed. Although the concession contract was not subject to competition, SODECI's operating fees were reduced substantially during the negotiations. The company's operating costs are comparable to those of many water utilities in West Africa, while its service quality is far better than most. Private Ivorian interests now own a majority of SODECI's shares, and the company has succeeded in reducing expatriate staff while expanding operations.

Among recent examples of this arrangement in developing countries, a concession for water supply and sewerage in Buenos Aires, Argentina, was awarded in late 1992; and as part of the restructuring of the railway in Argentina, six separate cargo lines were created and awarded by concession agreements. Initial results from the railway that has been operating privately for the longest time are quite positive. Operating on a line which had had little or no traffic under the national railway, the new company (FEPSA) has put a major emphasis on marketing and worker motivation and is competing effectively with trucks and improving locomotive availability (Galenson, 1993). The Buenos Aires subway was also put out to a concession awarded on the basis of the least subsidy required to operate and invest in the system. A recent unsuccessful attempt to arrange a concession for water supply in Caracas provides some important lessons on the need for: (i) making available information on the quality of assets and costs of operation prior to requesting bids; (ii) high-level political support for the reform; (iii) adequate tariffs and projected revenue levels; and (iv) adequate treatment of political and economic risks, particularly exchange rate risks to the private participants.

Build-Operate-Transfer (BOT) schemes.²⁴ The experiences with successfully negotiated BOT schemes are relatively few in developing countries, and are reviewed elsewhere (Augenblick and Custer, 1990; Besant-Jones, 1990; and Israel, 1992). It is increasingly recognized that such schemes are extremely complicated and time-consuming to arrange, and few have become operational to date. Experts advise that if countries can finance new infrastructure in a more traditional way, as a turnkey construction project financed by government borrowing, the time saved and greater certainty of completion may warrant the traditional approach. Of course, countries which cannot borrow sufficient investment capital directly are more interested in the BOT schemes, which have "limited recourse" to government finance. However, in many cases, such arrangements have involved considerable explicit or implicit guarantees from governments, of traffic volumes, revenue levels, input prices, etc., so that the governments are left with considerable contingent liabilities after all.

The BOT-type arrangements which have become operational in developing countries concern mainly power and transport projects in Asia. In the water supply sector, a couple of BOTs have been set up in Malaysia and one in Indonesia, for source supply or treatment. A BOT for waste water treatment and reuse by industry has been successfully implemented in Vallejo, Mexico. Financed entirely by the participating industries, it is operated under a renewable concession from the local water authority, which manages the distribution system linking the industries to the treatment plant.

It is important to note that even in cases where BOT-type arrangements are successfully concluded, they do not absolve government authorities in the sector from the basic responsibilities of sector planning, policy-making, and investigation of project feasibility as well as all the tasks involved in the contract-letting process. The public authority or sponsoring ministry has to develop the detailed specifications of the tender documents in order to ensure that bids are comparable and serve the public interests. The public authority should also ensure itself that a proposed BOT scheme is financially viable (and on what terms, i.e., possible government guarantees), and investigate alternative options which may be more attractive economically.

Toll roads. Many developing countries are looking to the option of toll road concessions as a way of generating private funding for road construction and operation, or simply to move the operating costs of roads out of government budgets. Toll roads can operate in a well-defined niche of a country's

²⁴ This section is meant to refer to other variants of BOT schemes as well, such as BOOT (build-own-operate-transfer).

Box 6: Two Models of Private Sector Participation in Water Supply: U.K. and France

Water supply and sanitation services in England and Wales were privatized in 1989, when shares in the ten public water authorities were sold to the public. The primary objective was to transfer to the private sector responsibility for the staggeringly large investment program needed to make up for past neglect of assets and to bring the U.K. systems up to new EC standards.

Prices are regulated through a price-cap formula that links water rates to the retail price index plus a factor ("K"), determined individually for each company, that takes into account the cost of the investment program. A central authority monitors and enforces environmental standards, a function previously carried out only laxly by the water authorities themselves. The cost to the British government of this privatization was significant: the government wrote off debts totalling L4.9 billion, transferred the existing cash balances of the water authorities to the new companies, and injected an additional L1.6 billion into selected companies. The regulatory method chosen has high information costs and provides no clear incentive for the companies or the regulators to economize on the costs of meeting required standards. On the benefits side are improved enforcement of environmental and drinking water standards and the promise of more reliable and efficient service.

Asset ownership in France remains with the municipalities, which contract out operations and maintenance to private firms under management contracts, lease contracts, or concessions. Under lease contracts and concessions, fees are established through negotiation or on the basis of competitive bidding, with adjustments for inflation according to an agreed formula; changes in circumstances can trigger a renegotiation. Tariff levels are monitored by the Ministry of Economy and Finance, and environmental standards are enforced at the *department* level.

Competition is a key to efficiency. While there is no direct competition among the U.K. water companies, they compete for capital in the stock market with other investment opportunities and through the use of benchmark indicators by the regulatory agency. In France, the water supply market of each municipality is contestable, and the existence of two major contracting firms (Lyonnaise des Eaux and Compagnie Generale des Eaux) also permits the use of benchmark indicators. Neither of the two arrangements necessarily ensures efficient investment, however. The U.K. price-cap approach is intended to avert over-investment, but the K factors were set without any apparent cost-benefit analysis of the needed investment or scope for cost minimization. Furthermore, the approach appears to be moving in the direction of *de facto* rate-of-return regulation, as high dividends and large increases in managers' salaries have prompted a review of price caps sooner than the planned 10 years. In France, separation of ownership and operations could distort investment incentives. One mechanism that helps prevent this is full cost recovery through water tariffs; since both owner and operator recover costs from the same source, they have an incentive to collaborate in making sound investment decisions. The length of the concessions may also result in better asset management in France; on the other hand, it reduces the potential for competition.

The complexity of marketing water and sewerage assets and lack of interest on the part of the private sector to assume responsibility for rehabilitation and investment, along with the heavy regulatory requirements, may make the U.K. model unattractive to many developing countries. The French system, on the other hand, is already in use in several developing countries. The approach can be adapted to fit a variety of situations. If properly designed (for example, with compensation linked directly to volume of water delivered to consumers and collected for), such arrangements can transfer all of the commercial risk of operation and maintenance to the private operator. Actual ownership of the assets may not matter very much; what is important in both cases is that the entity "owns" the right to a stream of revenues. Source: Thelma Triche and John Briscoe (INUWS), based on seminars on "Privatization of the Water Industry the U.K." (London, Sept. 23-25, 1991) and on "Water Supply and Sewerage Services in Developing Countries: from Technical Assistance to Concession Contracts," Paris, Sept. 26-27, 1991.

road infrastructure. In France, toll concessions made possible the creation of a 5500-km motorway system (as of 1990). At its outset the system was operated with active support from the French government in the form of contributions in kind, financial aid and loan guarantees. Of the four private companies originally involved as concessionaires, three were later integrated into the public sector in the early 1980s as a result of financial problems. Concessionaires currently include both public and private sector companies, and are chosen through a bidding process (Berthier, 1991). In Argentina, the government has in the last couple of years opened the highway sector to extensive concessioning, and consequently as of early 1992 some 40 percent of the length of highways is being operated as toll roads.

As in the other types of contracts discussed here, the advantages or disadvantages of such schemes depend on the incentives imbedded in the contract design. In Mexico, for example, recent contracts for toll roads give the private parties assurances of traffic volumes which now appear overoptimistic and are creating a burden for the government as guarantor.

Private entrepreneurship

New entry. Private ownership of infrastructure can come about, first, from entry by new entities, which can be promoted by the removal of statutory restrictions on competition. In trucking, for example, a number of countries (e.g., Mexico, Hungary, Poland) have eliminated the former regulations which imposed monopoly or cartel structures. As a result of this deregulation in Hungary, privately-owned trucking companies supplied about 18 percent of national ton-kms in 1991 (from virtually none in 1981) (Bennathan, Gutman, and Thompson, 1991). As discussed in Part One, for activities with low sunk capital costs, deregulation may be most appropriate to promote privatization by new entry. Proactive measures may also be needed to facilitate the growth of such new companies in many developing countries and enable them to challenge the dominant suppliers in a given market (see more on this in Part Three).

Joint ventures. Shared ownership and control of infrastructure through minority private participation can be a means of introducing external capital and know-how. As only one such example, Air France and the Czecho-Slovak airline, CSA, signed a partnership in early 1992 giving the foreign group headed by Air France a 40 percent share in CSA. Air France is providing assets in kind as well as technical expertise, and the deal will give both airlines new access to routes and markets. Such joint ventures have potential to develop private sector participation in infrastructure entities where even a minority interest by the foreign private partner is attractive because of particular commercial advantages to be expected, such as access to other central/eastern European markets. Minority stakes will only be an interesting proposition when the public enterprise is basically sound, and where the foreign partner can have sufficient confidence in the government's behavior towards the enterprise.

Another type of joint venture is seen in railways, where a private or mixed company contributes capital for new investment, with part of the returns obtained through the right to develop real estate owned by the railway. Examples of this arrangement (sometimes called **development gain**) are found mainly in developed countries and Hong Kong, and have been under consideration in Thailand. There are also cases of joint ventures by railway and telecommunications companies for combined use of the rail right of way for the laying of cables; the railway provides the land and enjoys a return through some share in the telecommunications revenues. In urban water supply/sewerage networks and road networks, there can also be benefits from mixed use of the land rights of way for the laying of pipes and maintenance works.

Divestiture. The transfer of ownership shares in public enterprises to private interests has become an increasing practice in many countries. The one major case of total private ownership of water supply systems (except for enclave systems, i.e. those that serve a limited residential or industrial complex) is that in England and Wales (see Box 6). The most rigorous attempt to evaluate the results of this trend is a detailed study of twelve cases undertaken recently by the World Bank (Galal et. al, forthcoming). The study estimated the net changes in welfare to several parties (the government [former owners], new owners, employees, consumers, and external sector) attributable to three privatizations in each of four countries—United Kingdom, Malaysia, Mexico, and Chile. The case studies included three privatizations of telecommunications companies, four of airlines, two electricity companies, a port and

a trucking company (the only non-infrastructure case was that of a national lottery). The research concluded that the net overall welfare change was positive in each case except one of a Mexican airline.

In drawing conclusions from this research for the design of policy on privatization of infrastructure generally, the following caveats should be kept in mind:

- (i) The privatization of a given company which has a particular combination of natural monopoly and non-natural monopoly activities is not examined as a different case from one where the company is, for example, composed of entirely non-natural monopoly activities. Another way of stating this is that the regulatory requirements of the privatized company were not examined. Therefore it is difficult to generalize about the results of privatization of other enterprises in the same sector or to other sectors, for whom regulatory conditions may be different;
- (ii) the countries chosen for the case studies are high or middle-income. It is not clear that the results would be equally applicable in countries with less capacity to regulate and less developed private markets.

The last major category of institutional options to be considered, **self-help or cooperative-type arrangements**, is discussed very briefly in the next section under "Participation".

B. Comparison and Evaluation of Alternative Institutional Arrangements

This Section summarizes the experiences with institutional options described by relating them to the five objectives, or benefits, sought from involving the private sector.

Skilled management. The opportunity for dynamic and motivated managers is improved by moving from a government department to a corporatized parastatal; the quality of management may be further improved with an external management contract. Sustainability of good management remains a problem in all of these options, however, either because of the government's tendency to reassert influence on managers, the lack of continuity of management under contracts, or lack of training of local managers by private contractors. Longer-term arrangements for private sector participation with full autonomy of operational decision-making (e.g. leases, concessions) and with specific incentives for training therefore have greater potential for achieving the benefit of improved management.

Productive efficiency. The commercialization of parastatals may create the minimum conditions for improved productive efficiency by introducing an awareness of cost accounting. The use of service contracts, management contracts and leasing may further encourage cost reductions which are within the reach of managers without requiring significant new investment (since investment decisions remain outside the contractor's control in these cases). Improvements in efficiency from the streamlining of procedures, introduction of management information systems, etc., may be more likely to occur in the cases of management/lease contracts with external parties who can offer new ideas and experiences. However, these gains can also be undermined by continued government intervention, especially in labor matters, and from problems imposed by inappropriate government actions regarding tariff policies and investments (both of which also remain outside the control of the private contractor). Again, arrangements such as concessions which give one party responsibility for investments as well as operations help to

address part of this problem. Ultimately, productive efficiency depends on the incentives created by owners and the regulatory regime.

Dynamic efficiency. Insofar as this depends on investment in new technology, meeting this objective requires institutional forms where decisions on capital investment are made on commercial rather than political grounds. This condition is more likely to be met where responsibility for operations and investment are linked in one entity which faces commercial risk, such as a concession or private entrepreneur. Again, the regulatory framework can affect the extent to which the entity enjoys the benefits from technological improvements.

Accountability to customers. Improvements in service quality may follow from changes in management practices and from new investment, but explicit efforts by entities to respond to demands for service depend on the incentives to do so. Sustained responsiveness and accountability to customers requires either significant pressures on suppliers from a competitive market or, in the absence of this, other opportunities for client representation in decision-making. The above discussion suggests that such accountability is at least likely to be greater with those arrangements in which suppliers face commercial risk in relying on revenues from customers—such as under lease and concession contracts, or private entrepreneurship.

Financial autonomy and resource additionality. Transferring infrastructure activities from a government department to a commercialized and corporatized parastatal formally separates them from state budgets. However, experience in many countries shows that even under this arrangement, claims on government for deficit financing, or attempts by government to siphon resources from the parastatal, often persist. In comparison, leases and concessions are attractive as they effectively free the public sector from working capital financing and commercial risk. These two institutional forms do not necessarily attract new sources of revenue to the sector, however, since contractors are compensated from user charges/tariffs which could have been recovered directly by the public sector—albeit political obstacles often prevent this from happening. To the extent that contracts for private O&M relieve government from current financial losses, they would also free public budgetary resources for new investment. BOTs and divestiture do involve an infusion of private (domestic or foreign) financing for new investment. However, the net financial contribution from the private partner depends on the particular terms of each agreement, and often governments must make substantial financial commitments, on-or off-budget, to settle these deals.

To conclude, the limited forms of private sector participation can have important, if often transitory benefits. Moreover, these forms are attractive as interim stages towards the development of more comprehensive contracting of operations, through leasing or concessions. In principle, all of the objectives of private sector participation can be met with concessions as well as with private ownership and control. However, to determine the conditions for successful implementation of these arrangements in a given sector and country, it is necessary to consider issues concerning the policy environment related especially to competition, participation, regulation, pricing, and financing. These issues—which have been the root of problems with many attempts at institutional reform (see Box 7)—are discussed in the next section.

Box 7 Cycles of Public and Private Sector Involvement: The Case of Empresa de Energía de Bogotá (EEB)

A successful concession was foiled by bad tariff regulation....In 1885 the Municipality of Bogotá signed a concession contract with a local entrepreneur for the formation of the Electric Company of Bogotá (EEB) to generate and distribute light and power to the city. It was stipulated that the electricity tariff should be determined by free competition with alternative sources of light and power (at the time, wax candles, oil, gas and other lighting companies). In 1890, EEB started to supply electricity to Bogotá from its 300 kw hydro plant. The Company was an immediate success, with rapid growth in electricity consumption for the next two decades. By 1920 EEB was exploiting to the limit the hydro potential available to it, and expansion would have to be based on coal-fired plants. Electricity tariffs, however, according to the concession contract were set below long-run marginal costs and did not generate enough resources for the transition from low cost hydro-electricity to higher cost thermal-electricity. After two years of deterioration in quality of service and decline in energy consumption, EEB was allowed to double its tariffs in order to finance the expansion of the system. As would be predicted, consumer reaction to the price increase was strong.

But predatory price competition over a natural monopoly was not the answer....The Government decided then that the best way to control electricity price increases was to end EEB's monopoly and introduce competition in the electricity industry through the creation of the National Electricity Company (NEC). Nevertheless, the end-result of competition was not the intended one. NEC invested heavily in generation equipment and developed a distribution network alongside the existing one owned by EEB. Soon after the start of NEC's operations, predatory competition began between the two power companies which, as is typical for power utilities, had high investment costs and low short-run marginal costs. The result of the price war, when many consumers moved from one company to the other without paying their bills, was the financial insolvency of both companies and a power crisis.

Mixed ownership of a single supplier was an improvement....In 1927 the Municipality of Bogotá was forced to intervene by buying half the shares of EEB and the whole of National Electricity Company, merging them into a single mixed company. The power crisis was thus solved and from 1928 to 1950 the electricity market resumed healthy growth, supplied by a well-managed and profitable utility.

Public ownership with private control also yielded acceptable results....In spite of the satisfactory services rendered by the local power company, the Municipality of Bogotá, in line with the then current practice in Latin America, decided to increase its control over the power utility through complete ownership of its assets. In 1951, the Municipal Government obtained financing from local commercial banks and bought the totality of shares of EEB. The commercial banks involved, concerned with the good management of EEB, demanded control of Company's board. Under the commercial bank's control, EEB continued to be well run and profitable.

Until the public sector took full control....In 1971, after liquidation of the twenty-year debt, the Municipality took full control of EEB. From then on the history of EEB is one of continuous decline. Between 1971 and 1990, operating costs grew 83 percent in real terms, total electricity losses increased from 10 to 22 percent, and the company's financial situation went from healthy to critical. Recently EEB has had six commercial managers in a period of two years.

The history of Empresa de Energía de Bogotá (EEB), in Colombia, is similar to that of several other utilities in Latin America. Presently the Bank is supporting the Government's radical restructuring program designed to address the sector's main issues: inadequate legal and institutional framework, lack of correct incentives, and political interference in management decisions.

Source: Jayme Porto-Carreiro (LA3TF).

III. Conditions for Ensuring the Effectiveness of Institutional Arrangements

Improved the performance of infrastructure requires not merely government withdrawal from direct delivery of services in favor of the private sector. More fundamentally, **the role of government needs to change**. In all the institutional alternatives involving the private sector, government retains at least some degree of responsibility for sectoral planning, policy making, regulation, and financing, even when ownership is transferred. For example, in contracting for services of solid waste collection, the municipality issuing the bids needs to have the competence and authority to develop, negotiate, manage, monitor, and enforce contracts. In developing toll road concessions or BOTs for waste treatment plants, for example, the government must carry out initial studies of each potential scheme and investigate alternative options that may be more attractive economically. It must examine the financial viability of proposed concessions (and on what terms, i.e., need for government guarantees); determine the detailed specifications of tender documents; and check ultimate compliance. In many countries, the basic transformation of government's role is made even more complex as it is occurring in the midst of a major realignment of responsibilities among levels of government—national, regional/provincial, and local.

A. Creating Competition

In most infrastructure subsectors, some activities have either high sunk costs (e.g., supplying water supply mains) or services that are most efficiently provided as a natural monopoly (e.g., airline service between certain city pairs).²⁵ In these cases, what can be open to competition is the right to operate the monopoly—also known as “competition for the market.” The trucking industry comes closest to lacking any structural barriers to competition, or being virtually contestable. Once the contestability of given activities in principle has been determined from sector analysis, the role for policy is to ensure that there are no practical barriers to competition.

Exploiting contestability. In addition to removing statutory restrictions against entry, measures are often needed to remove constraints that limit the ability of new, small operators to compete on fair terms with incumbent suppliers—particularly regarding the availability of credit, access to foreign exchange, tax treatment of dividends and profits, import duties, and general administrative requirements. In Central/Eastern European countries, for example, bilateral permits for access of trucks to the EC represent a source of market power and should be auctioned to allow smaller new trucking companies to compete. Governments could also facilitate entry in such activities by encouraging leasing companies to be formed or other measures to be undertaken that promote a domestic market for reselling capital equipment and vehicles. In several African countries (including Burkina Faso, Burundi, Central African Republic, Cameroon, and Tanzania, among others), the construction equipment fleets of the Ministries of Works are being transformed into commercially oriented leasing firms. It is also critical that all potential barriers to contestability at the specific “entry points” to the market be correctly identified. For example, in deregulating urban bus transit in the United Kingdom, allowing free access of all operators to bus terminals was found to be a key factor in promoting effective competition. In the United States' deregulation of the airline industry, access to sunk airport facilities was found to be the element constraining entry into otherwise contestable routes.

²⁵ In certain cases, even if a single provider would be the most efficient solution, when the monopolist offers particularly unsatisfactory service it may be preferable to forego the economies of scale in favor of multiple providers who would offer better service, albeit at higher cost.

Sometimes competitive pressure can be exerted against monopoly suppliers by developing alternative services, even if these are not obvious substitutes. For example, water vendors, radio communications, and freight lighters are often not considered part of the formal supply structure alongside the public water utility, local exchange network, or port facility, respectively. But they may be considered as viable service alternatives for at least some users.

Competition in Contracting. Contracting practices for public works construction in many countries are notorious for corruption (or in economic jargon, “rent-seeking”). In extending contracts to cover operations and maintenance, it is especially important to ensure effective competition in order to curb the potential for corruption. **It is critical that the bidding process be transparent and that there be a clear and formal separation between the authority issuing bids and potential contractors.** However, corruption in some countries may be virtually inevitable despite such controls. Ultimately, what matters is whether the services required are being delivered, without an unsupportable drain on the public purse.

To give contractors adequate incentives to make improvements with longer-term payoffs, it is important to permit contracts to be renewed, and to make the contract periods long enough to cover the amortization of invested capital. However, with these options, incumbents invariably develop an advantage in bidding for subsequent contracts. This potential cost may be worth taking when weighed against the gains from a contracting arrangement which has a track record of good service performance.

Some competitive pressure can be fostered at the outset by developing multiple potential challengers. For example, competition between the public sector and private contractors in municipal solid waste collection has resulted in substantial improvements in efficiency of public crews. In Bangkok and Bogota, for example, the market is divided into zones, with the private sector competing for contracts in certain zones and public agencies retaining the remaining zones. This has made both groups of providers more accountable for the cost and quality of their services; retaining the minimal capacity in the public sector also protects cities from becoming hostage to private cartels. It is important to note that in these cases, the various crews do not compete within the same area, but rather face competitive pressure on their right to the contract.

The same principle operates in contracting for municipal water supply services in France (described in Box 6). Although the incumbent concessionaires in France often win contract renewals over challengers, the municipalities retain the option of taking over the operation by force account if they are not satisfied with the contractor’s performance. This creates a margin of competitive pressure. The City of Paris contracts with two private-sector water companies in different parts of the city, which also provides a measure of comparative (“yardstick”) competition. This proxy form of competition still requires some mechanism to create pressure from consumers to achieve satisfactory service. In France, this pressure is exerted in large part through voters’ active involvement in local elections—an option that will eventually become known in the many developing countries where political decentralization is underway.

B. Developing Effective Participation

The need to make infrastructure services responsive to users poses a particular challenge in the case of activities for which competitive markets are highly imperfect. For these activities, special measures are needed to ensure that all interested parties can participate in the process of identifying and

satisfying infrastructure service requirements. For much of infrastructure, the relevant participants should include not only users but other groups affected indirectly.

The potential for developing participation varies with the nature of the service involved, the scale and technological complexity of production, and sociopolitical characteristics of the population affected. Encouraging participation is especially important for activities in which users have few substitutes available (low potential for “exit”) and lack the means of expressing personal preferences to suppliers (exercising “voice”).²⁶

One model of participation with a considerable record of experience, particularly in rural power and telecommunications, is that of **cooperatives**, whereby users act as the full or partial owners, financiers, and suppliers. The history of rural cooperatives in organizing the expansion of services in some developed countries (e.g., United States, Canada, and Finland for telecommunications) is being viewed with considerable interest by countries such as Poland. Successful service development following these examples, however, requires certain conditions. In particular, a strong regulatory influence is needed to ensure compatible technical standards for interconnection to the broader power and telecommunications networks, and to ensure that monopoly providers within geographical areas do not overbuild redundant systems or abuse their position.

A second approach to broadening participation is to incorporate the views of clients into decision-making, such as by involving customer spokesmen among utilities’ boards of directors, open hearings on regulatory reviews and proposed investments, and processes to provide consideration of consumers’ complaints. Broadening public access to information about infrastructure activities, such as through publication of financial accounts and service records, is an important element of this approach. The national roads authority of Sierra Leone, for example, includes road users (e.g., the Chamber of Commerce and the automobile association) on its governing board. Although the authority has only been existing in its present form since early 1992, the users’ representatives have proven influential in making important personnel decisions. The Sierra Leone example is being considered as a model for some other African countries.

There are also many cases throughout the world where services of a largely public nature, such as rural roads, communal water supply and sanitation, irrigation, and social infrastructure, are being provided successfully by community-based (“self-help”) organizations or by nongovernmental organizations (NGOs). Indeed, in urban squatter settlements, self-help through the informal subsistence sector is the typical approach to provision of shelter and basic infrastructure. Typically, beneficiaries are limited to a distinct geographic region (e.g., urban neighborhood, village) and use simple technologies. A sampling of some successful participatory approaches to provision of infrastructure is provided in Box 8.

Early efforts to generate beneficiary participation in rural development projects had mixed results. More recent experiences in the irrigation subsector with water users associations (WUAs) have been more positive, although they are not universally successful. Positive experiences in working with local NGOs in pilot rural roads projects in Ghana have helped to define a model approach to this subsector.

²⁶ These concepts are developed by Samuel Paul in *Accountability in Public Services: Exit, Voice and Capture*, World Bank, Working Paper No. 614, 1991.

Box 8 Some Examples of Community Participation in the Provision of Infrastructure

Olinda (Brazil): In 1983, the municipal government of Olinda (a city of 400,000 in the metropolitan area of Recife) began a project for environmental upgrading, beginning with a pilot project in a slum neighborhood. The local community association hired local labor to carry out drainage works, using low-cost drains and land fill; solid waste collection, including composting and recycling activities; sanitation, through construction of ventilated improved pit latrines; and road upgrading with low cost soil/cement paving. All materials were produced through newly created micro-enterprises in the local area.

Neighborhood residents were responsible for maintenance of the works. While initial community concerns were voiced through a community association for the larger area and through political leaders, the activities of the project stimulated the creation of a dwellers' council within the pilot slum neighborhood. The city supported community involvement by creating a special project unit within the municipal urbanization company that provided training and public education in addition to urban upgrading.

The sustainability of environmental management efforts in the pilot area is attributed to: the procedure of direct contracting of works by the community; the development of community awareness about the need to maintain environmental infrastructure; and the mobilization of household resources for local investment.

Dharavi (India): In 1979, this informal settlement of 400,000 people in Bombay formed a local organization called PROUD to improve its living conditions. Today, PROUD is a well-established, active organization made up of 150 neighborhood committees that meet monthly to discuss local problems and plan solutions. Problems that cannot be solved within this committee are referred to one of five area councils; these councils are further represented in an executive committee which formulates policies and implements programs in the settlement. An annual convention open to all residents reviews progress on issues such as water supply, drainage, solid waste collection and health. Because of PROUD's strong base of support among residents, it has been effective in petitioning municipal authorities for environmental improvements and blocking plans for demolitions and development that would adversely affect the community.

Sulabh Shauchalaya Project (India): This project was started in Bihar in 1974 as a voluntary non-profit organization supported by government sponsorship and aid, which responds to communities mobilized to improve their sanitary conditions. The aim of the project is to convert dry household latrines into new pour-flush waterseal latrines, and to construct public toilets and wash areas with the same technology. The Sulabh project approves grant and loans to homeowners for private latrines, and administers the financing. It also constructs materials in Sulabh workshops, educates the community about public hygiene, cleans the latrines for a service fee, and retrains the scavengers (traditional cleaners of the former dry latrines) in maintenance of the new latrines or in other work.

Orangi Pilot Project (Pakistan): The OPP was started with core external funding to develop affordable sewerage for Karachi's squatter settlements and create organizations to provide the systems. Technical innovations in design, coupled with elimination of corruption and provision of community labor, led to significant cost reductions for in-house sanitary latrines and sewers on house plots, and underground sewers on the streets. The project staff provides public education and technical assistance to residents, whose responsibilities are to finance their share of the costs, especially in construction and elect "lane managers". The latter elect neighborhood committees which manage the secondary sewers. OPP organizations have been able to pressure the municipality to provide funds for the construction of primary and secondary sewers. The OPP has led to provision of sewerage for over 600,000 poor residents of Karachi and the approach is being followed in other municipalities of the country.

(Excerpted from: "Environmental Strategies for Cities", UNDP/World Bank/UNCHS (Habitat), October 10, 1992 draft).

A review of the experience with participatory projects supported by international donors

suggest some key lessons.²⁷ First, an important distinction must be made between participatory strategies that are limited to **consultation** with interest groups, such as through demand surveys, as contrasted with strategies that offer **significant involvement in decision making**. Experience indicates that consultation can help in identifying features of a project that will contribute to its effectiveness. However, more substantive participation by users is associated with greater and more sustainable benefits, whether these are defined in terms of efficiency and cost recovery or, especially, in terms of longer-term capacity-building or empowerment of the community involved. A further distinction is necessary between **consultation or involvement of groups only at limited points in the project cycle, rather than throughout all stages of the activity and particularly during the initial identification and design**. There are numerous examples of poor performance in projects where attempts were made to involve users in operation, maintenance, and cost recovery, but without bringing them into early decisions regarding project design and location.

Participation occurs more strongly in practice when it is an explicit objective of the project and staff are rewarded for its achievement. Professionally trained and paid staff are found to be important to ensure sustainability of participatory associations, such as WUAs. In addition, development activities that are open-ended, flexible, adaptive processes of responding to the evolving concerns of participants, where programs reflect learning from experience and pilot demonstration, are more conducive to maintaining participation than are projects with defined timetables and predetermined “blueprints” for implementation. To involve women and the very poor members of the community, projects must be designed at the outset to recognize their different concerns and capacities. According to a recent research project on 122 completed rural water supply projects, the degree of participation by women, and a high level of client participation generally, were found to be highly correlated with overall project effectiveness.²⁸

C. Reducing Risk

An obstacle often mentioned to involving the private sector in infrastructure in poor countries is that private entities do not have the means to enter the market, and that neither the domestic nor foreign private sector has sufficient interest in assuming the risks (commercial and political) involved. Risks need to be balanced by potential rewards and by autonomy of decision-making. Private firms will want to be assured that revenues are adequate to cover costs and allow for a reasonable profit. The commercial risk can be reduced by clear policies on tariff-setting and revenue allocation, and by disclosure of information on the condition of assets and effective demand. Both commercial and political risks are more acceptable in a stable macroeconomic environment that minimizes uncertainty. It is also preferable for the rights and responsibilities of government and private partners to be clearly defined; sometimes this may be easier with legal transformation of sector institutions, as in the cases of CIE/EECI in Cote d’Ivoire and SONEG/SEEG in Guinea (see Box 5).

In the case of activities with large sunk capital expenditures, private investors are unlikely to take ownership of such assets in most countries without being assured of monopoly profits, a condition

²⁷ See C.O.N. Moser, “Community Participation in Urban Projects in the Third World”, in *Progress in Planning*, Vol. 32, p. 71-133, 1989; and Deepa Narayan, “The Challenge of Participatory Development: Lessons Learned in Rural Water Supply”, UNDP-World Bank Water Supply and Sanitation Program, March 1993.

²⁸ Narayan, op. cit..

that is often unacceptable to government and consumers.²⁹ Similarly, BOT-type arrangements in a number of cases have involved government guarantees of revenues or “take or pay” agreements, which insulate the private investor from commercial risk and thus create unfavorable incentives. Private ownership of long-lived assets may not be a desirable or practical alternative in many countries. The more narrowly-focused options for private operation (service contracts, management contracts, and leases) may be more practical alternatives to gain many of the benefits of private-sector involvement. Moving progressively from these types of contracts to a full-scale concession arrangement, or even eventually to divestiture, may be a good strategy during a transition period, as it builds naturally on the private operators’ experience with the market and allow for gradual expansion of their role.

To develop a viable private contracting industry, the public sector must be capable of sustaining demand for the contractors’ services. This requires adequate sources of financing, either based on tariff revenues, budgetary transfers (for nonremunerative activities with a social justification, such as public service obligations for urban bus operations), or foreign aid on a declining basis to support initial stages of private-sector involvement. A particularly difficult area of risk arises in countries where private operators are unable to enforce payment of bills by public-sector entities. In such cases, private contracting may not be feasible until broader reform of public enterprises enforces commercial behavior throughout the sector.

Consumers and the government, as the owner of assets, must also minimize the risks that contractors will provide inadequate service or fail to maintain the assets during the period of the agreement. These risks may be mitigated by strict monitoring of performance based on indicators specified in the contract, adequate tariff adjustments, and mechanisms for feedback from consumers. Many countries do not have the capacity to ensure these conditions effectively at the present time. Here again, a realistic weighing of the risks is needed: in such cases the quality of service and maintenance record of the existing provider (usually public monopolist) are often so poor that, in comparison, such risks may be acceptable to the public.

Where divestiture is a practical option, measures may need to be taken by government to prepare an entity for private ownership by removing undue risks, such as by supporting the reduction of redundant labor. Overstaffing is a nearly universal phenomenon in public infrastructure agencies and enterprises, particularly in transport, where job creation is a traditional source of political favors.³⁰ Research on strategies of reducing excess labor in transport entities in several countries has found that when dismissals are combined with severance pay, the reduction in force is more likely to be both politically accepted and sustainable. In cases of privatization, government financing of at least part of the severance pay may be necessary, but the actual reductions in force should be implemented by the new owners, who have the best knowledge of their labor requirements. A severance program with partial government funding was a facilitating factor in the massive labor reductions involved in the recent privatization of Argentina’s railways.

²⁹ There may be cases where monopoly rents are worth accepting: for example, where there is a high unmet demand for modern telecommunications, certain users such as producers of high-value exports may be willing to pay a monopolist’s premium for services rather than go without them entirely.

³⁰ Alice Galenson, “Labor Redundancy in the Transport Sector,” World Bank INU Working Paper No. WPS 158, 1989; Jan Svejnar and Katherine Terrell, “Reducing Labor Redundancy in State-Owned Enterprises”, INU WPS 792, 1991.

D. Effective Regulation—"Doing Well Only What is Necessary"

The worldwide experience and thinking in this area has been rapidly evolving in recent years. Models of regulation that have been developed for the particular institutional circumstances of certain countries may need further adaptation in other countries which are undergoing widespread and rapid sectoral change in the context of generally weak institutions. This paper argues that it is essential to first define explicitly the characteristics of any infrastructure activity that makes a case for public intervention through regulation, and then to identify the objectives to be served. In many cases, such as where there are no structural barriers to competition, the appropriate role for government is to liberalize

Box 9 Cycles of Public Sector and Private Sector Involvement in Urban Bus Service

Many cities in both developed and developing countries have experienced a cycle of private and public involvement in urban bus service. The cycle, which can be divided into ten phases, begins with the private sector being largely responsible for urban bus service, followed by an increasing degree of public involvement and, at least in some cases, by a partial or complete return to private provision.

The first phase is the entrepreneurial stage when the industry first emerges. At this stage service is typically provided by numerous small firms, often with only a few vehicles in their fleets. The second phase is characterized by mergers and consolidation of small firms into a few dominant companies, often with little overlap between their route networks. In some cities, the emergence of railway (tram) technology was partly responsible for this consolidation.

Consolidation is typically followed in phase three by regulation of fares and franchising of firms to control routes and entry. These were often a response to perceived market power of the firms created in phase two; to public outcry against fare increases; and/or to eliminate perceived "chaotic" competition. The fourth phase involves a gradual downward trend in the profitability of the private firms, followed by a fifth phase of capital withdrawal and service reductions. Sometimes this phase has reflected the reluctance of regulators to permit adequate fare increases, adjustment of routes, and services needed to maintain profitability. The available fleets become poorly maintained and service deteriorates.

In the sixth phase, public authorities take over the ailing private bus firms, followed by a seventh phase in which an infusion of public subsidies is made to restore capital and services. The eighth phase consists of increasing operating efficiencies and real unit costs, often due to overstaffing and poor operating practices. The subsidy burden gets worse, until in the ninth phase, public authorities face the choice between significant fare increases to curb the subsidy drain, or service reductions.

In some cities, this dilemma is resolved by entering a tenth phase, in which the bus service is returned to the private sector. In most cases, public regulation of fares is retained, resuming the cycle in its third phase.

Source: John R. Meyer and Jose A. Gomez-Ibanez. "Transit Bus Privatization and Deregulation around the World: Some Perspectives and Lessons." in Jose Carbajo, ed. (1992).

entry and to ensure commercial freedom in the market rather than regulate specific behavior. Alternatively, where there are structural barriers to entry or conditions of natural monopoly, some regulation is needed to ensure reasonable terms for access to network infrastructure, and to guard against abuses of monopoly power. Other problems that have prompted a regulatory response in many cases, such as high costs and poor service, often persist and worsen under regulation as practiced (see Box 9 on the

urban bus sector). This discussion refers mainly to “economic regulation”—that pertaining to the structure or behavior of enterprises, e.g. regarding entry/exit and pricing—although many of the points here also apply to administrative regulation for safety, health, or environmental reasons.

The Legal Framework.³¹ A minimum requirement for effective regulation of infrastructure is a framework of law pertaining to property rights, liability, conflict resolution, and contracting. There must also be capacity to enforce the laws, and credible assurances that they will not be changed by political whim. Many countries have had legal or constitutional barriers to the transfer of rights to own or operate water resources or basic telecommunications. Others have legal limits on the government’s ability to make financial commitments beyond a given fiscal year or budgetary allocation, which can constrain the use of multi-year contracts.

Determining regulatory functions and authority. Most experiences to date with formal regulation suggest the following guidelines in structuring such regulation.

- (i) Responsibilities for regulation and for operation should be formally separated. This distinction is also important in the effective enforcement of environmental, health, and safety regulations, which can impose financial costs on the operators. In the United States and United Kingdom, the regulatory authority is commonly a legally independent entity; in French urban public services, the necessary distinction is enforced by the municipalities (regulators) delegating the operational responsibilities through contracts.
- (ii) The regulatory processes should be capable of straightforward and prompt implementation—for example, rules for tariff review should be based on formulas triggering automatic adjustments; the periods between reviews should not be so short as to impede the enterprises’ managerial autonomy; and the reporting requirements should be as limited and simple as possible.
- (iii) The method of tariff regulation should enable producers to enjoy the benefits of efficiency improvements, and not require regulators to have full information on costs.
- (iv) Rulings should be enforceable, with recourse to appeal.
- (v) There should be opportunity for interested groups, including users of the infrastructure, to present views and be informed of the decisions. Regulation is also more effective when it coexists with other strong institutions such as private insurance markets (which can support observance of safety and health regulations) and an independent judiciary.

In countries where the overall institutional capacity is weak, the above guidelines need to be interpreted carefully. A recent comparative study of the institutional context of telecommunications regulation in several developing countries and the U.K. suggests that one of the most important considerations in designing regulation under weak institutions is predictability. Regulatory methods that

³¹ Further discussion of the following points is provided in a background note, “The Legal Framework and Regulation of Infrastructure” by Rita Hilton (INURD), draft, 1992.

allow very precise criteria for decision making are found to be more effective in Chile, for example, than the approaches which give regulators more discretion, such as those used in the United Kingdom. Similarly, procedures for public hearings through a U.S.-style public utility commission were very unsuccessful in the political/institutional context of Jamaica. There is need in such cases to find ways of reflecting the public's concerns effectively without undermining the private operators' confidence in the stability and impartiality of the regulatory system.³² In this connection, it is very important for regulators to have information on user satisfaction, such as indicators of service quality and consumer survey data.

Regulation through contractual oversight. In the case of lease and concession contracts, the basic parameters for regulation (the formula for setting tariffs, the mechanism and frequency of adjustment, and the output to be delivered, e.g. a given quality of service and condition of the facilities to be maintained) are specified in the contract as negotiated. It is often advisable for the contractor to collect fees directly from users and turn over the agreed portion to the contracting authority; this provides strong incentives for efficient operation to reduce costs, provides high service quality, and achieves good collection rates. Contractor's fees need to be adjusted periodically to reflect inflation, and it is important that the adjustment mechanism be transparent and easy to administer. For lengthy contract periods such as concessions, the fee review may need to take account of longer term changes in parameters such as demand, nature of service, or input mix.

It has been argued earlier that contracting for services may be a good first step in the transition to broader private-sector involvement through leasing, concessions, and eventually divestiture in some cases. Oversight of service contracting is not a negligible task in itself. But for a government agency or parastatal unaccustomed to formal regulation, focusing on the practice of individual contracting may provide a gradual learning process. Contracting provides the public authority with significant leverage for enforcement, focused on the performance indicators specified in the contract and conditions for its renewal. Moreover, as the practice of contracting expands, the government not only gains experience with regulatory functions, but the private sector also gains an increasing stake in the process. In brief, instituting regulation through a transitional process of expanding the practice of contracting may be a more practical approach in many developing countries than starting from scratch with a full-blown independent regulatory agency.

Costs of regulation. A final point to be considered is the financial costs of regulation, including contractual oversight. In the case of public transport, studies indicate that about one-fifth of the savings in operating costs achieved by shifting from public bus service to competitive tenders is absorbed by necessary regulation (Scurfield, 1990). In the municipal solid waste (MSW) subsector, studies in developed countries indicate that private collection can be 20-40 percent less costly than the public services, but the costs of monitoring can average between 10-25 percent of the service contract costs (Cointreau-Levine, 1992). In leases and concessions, the imputed costs of regulation should be covered by the share of revenue remitted by the contractor to the public authority. This approach would focus attention on the costs and benefits of regulation, forcing them to be judged in light of overall costs and tariffs in the sector.

³² Brian Levy and Pablo Spiller, "Regulatory Institutions and the Performance of Private Telecommunications: A Comparative Analysis of Five Country Studies", January 29, 1993 draft.

E. Pricing and Financing

The nature of pricing (i.e., tariffs or user charges) and incentives created by financing schemes have an important affect on the allocative efficiency of infrastructure investment, as well as on the internal sustainability and productive efficiency of services. This section addresses issues of pricing and financing in those cases where there is a legitimate role for public involvement.

Pricing. As an overall objective, tariff revenues should be sufficient to cover operating costs, debt service, depreciation, and the administrative costs of investment planning and regulation. Much analysis has been devoted to the methodological issues in setting prices for infrastructure services, and this work is not reviewed here. One key issue is that marginal cost is generally recognized to be the most efficient determination of price; however, it does not always generate sufficient revenue to finance services involving high fixed costs of production. In many cases, however, the tariffs charged are not sufficient to cover even variable costs.

Various pricing tools may be needed to deal with the sometimes conflicting concerns of efficiency, cost recovery, and equity for each type of infrastructure. These alternative pricing approaches take account of specific demand factors as well as costs of supply. The use of a two-part tariff structure, for example, can help to meet both efficiency and financing objectives; this structure involves a fixed component covering the marginal cost of providing access to the service network, and a variable part based on the volume of consumption of particular services. Other approaches include so-called Ramsey pricing, in which higher prices are charged to users whose demand is most price-inelastic. In theory, this reduces the welfare loss of not charging marginal costs, although it can have unfavorable distributional implications, since the poor have inelastic demand for some types of services (e.g., urban public transport).

Rising block pricing (higher rates for larger volumes used) and congestion pricing (higher rates for services with higher demand) are also potentially attractive options in some circumstances (e.g., to discourage waste of water or to manage traffic on certain transport routes). They require considerable information about demand to design and implement. For example, in Kumasi, Ghana, surveys of water users revealed that the large volume consumers, who would be subject to higher rates under a block scheme, included poor households sharing connections.³³ In many countries, the services of utilities are not metered, which limits the scope for using price to affect to user behavior.

An additional issue concerns the structure of tariffs across services for a given sector. As a principle for policy, the rate structure should reflect long-run incremental costs of each type of service. It is typical in many infrastructure subsectors for tariffs to reflect internal cross-subsidies, e.g. high tariffs for long-distance telephone service to finance underpriced local service; or high water tariffs to industrial users to subsidize households. As the institutional reforms discussed here lead to facilities and services becoming "unbundled" (managed by different entities), and increased entry from the private sector, the structure of rates will have important implications for the incentives for investment and operation in particular market segments. Social objectives, such as the concern to ensure the population access to essential services, are preferably financed by explicit budgetary subsidies rather than by the untargeted transfer payments often implied within existing tariffs structures. Before subsidies for particular user

³³ See Whittington, Dale et al. (1992).

groups are considered, however, their “willingness to pay” should be well investigated—including their separate demand for connection to services as opposed to demand by volume of consumption.

There is a further issue when liberalizing entry enables private operators to “cream off” the most profitable markets, as tends to occur with service contracting of MSW and urban transport, for example. The need to provide essential services in poor neighborhoods may therefore require some revenue sharing among operators in different markets, or taxation of the private providers in wealthier areas. Such an arrangement would have to be clearly established as a condition of the service contract. Similarly, countries which must expand telecommunications coverage from an extremely low base are constrained if profits from the markets already served are lost to further investment in the sector. In such cases, governments should ensure that new private entrants share some of the legitimate public service obligations in the sector, as well as responsibility for needed new investment.

There is a strong argument for financing infrastructure services through taxes when the administrative costs of these revenues are lower than for direct user charges. This is the case with public goods such as street cleaning and traffic signalling, as the consumption by individuals cannot be priced. Tax financing is not appropriate when it leads to unfavorable incentives for resource allocation—as occurs, for example, when all farmers are taxed on their output prices rather than charged specifically for the use of irrigation water. Wherever possible, the incidence of taxation should fall on the population benefitting from the infrastructure (except where there is a case for reverse transfers, i.e., targeted subsidies to certain users). Taxes on vehicles and fuel (a partial proxy for road user charges), and sanitation charges linked to property, generally fit these conditions as forms of “benefit taxation”.³⁴ The explicit identification of such revenues as user charges, however imperfect, is an important element in transforming infrastructure activities such as road maintenance and municipal sanitation from bureaucratic financing (dependent on general budgetary transfers) to a commercial orientation.

Debt and Equity Financing. Financing capital expenditures for infrastructure through borrowing is essential to ease the cash flow problem of large investments; it also promotes an equitable burden-sharing between generations, as the benefits of long-lived assets accrue in the future. The major obstacles to debt financing are the lack of creditworthiness of many public suppliers of infrastructure (especially at the local level), and the immature financial markets for long-term capital in many developing countries. In many developing countries, expanding private involvement in infrastructure will require greater availability of even medium-term domestic credit, particularly for the small firms that could provide much of the service contracting and new entry in subsectors such as trucking.

The specialized financial institutions that have been set up in many developing countries to provide credit to municipalities for infrastructure projects have a mixed record (Davey, 1988). The lessons of experience with these institutions suggest that they should be viewed only as interim solutions to the problem of municipal capital finance; that is, they should help to develop a track record of responsible borrowing by municipalities, while private long-term capital markets emerge. Where municipal credit institutions are established as a transitional measure, the government should let them operate on solely financial criteria. At the same time, central governments should help local governments

³⁴ A “benefit tax” is a tax whose incidence is confined to the beneficiaries of the services it finances, but which is not linked to specific consumption (and therefore is not a price). A property-related charge for street repair or solid waste collection in a given residential area is an example of benefit taxation.

to become good credit risks, including by developing appropriate policies on the sharing of fiscal revenues and allocation of expenditure responsibilities.

Financing infrastructure through instruments such as revenue bonds and equity issues can provide a good “feedstock” for emerging capital markets and attract funds from institutional investors (both foreign and domestic). There is especially strong potential for these instruments in power, telecommunications, and railways, once the sectors demonstrate financial discipline. An appropriate legal and regulatory framework as discussed above is essential to foster capital market activity in infrastructure. In addition, participation by multilateral institutions such as the World Bank and IFC can be important to assure the private sector that the environment is sufficiently sound for long-term financial involvement in the sector.

F. Investment Planning

The planning of infrastructure development should be based on analysis of the nature of demand for specific services, not on quantitative projections of physical “need.” The design of a demand-based strategy for infrastructure policy imposes additional information requirements. It must involve analysis of the underlying determinants of demand, such as the composition of user groups and their demand for specific kinds of services (which depend, for example, on price elasticities), and the patterns of congestion. Moreover, since demand is ever-changing, it is necessary for infrastructure decisions to be based on a dynamic process of assessing demand—such as through competitive markets where possible, regular demand surveys, and/or channels for participation. Making a thorough assessment of demand also requires that planners take account of all possible alternatives to generate the flow of services demanded—including measures (with or without investment) to increase the efficiency of existing facilities and relieve specific sources of congestion, and to promote conservation (reducing demand).

To practice a demand orientation in planning investments, as well as in their operation and regulation, it is also necessary to define performance so as to reflect quality of service and user satisfaction. Most of the performance indicators customarily used by planners and operators in the infrastructure sectors reflect physical parameters of the facilities and internal (including financial) efficiency. In addition to these, service quality needs to be measured and monitored as an input to assessing how well sectoral, operational, and policy objectives are being met; to evaluate the effectiveness of alternative service providers; and to help planners and regulators to evaluate success in achieving operating rules and standards, or performance benchmarks. Contracting for services, for example, requires quite different performance indicators to measure output than contracting for public works construction.

GLOSSARY

(Note: This glossary is not intended as a definitive lexicon, but only to explain how terms are used in the present paper. Some of the terms here may be used differently by others.)

BOT Build-Operate-Transfer. A form of concession usually referring to totally new projects. Typically in a BOT, a private party (or consortium) agrees to finance and construct a facility, and operate and maintain it, for a specified period and then transfer the facility to a government or other public authority. Variations include BOOT (Build-Own-Operate-Transfer) and BOO (Build-Own-Operate); in the last case, the contract accords the right to construct the facility, which is not transferred back to the public sector.

Commercialization Status of a State enterprise which is financed mainly by internally-generated revenues (tariffs) and thus has financial autonomy to operate as a business; its access to government support is very circumscribed, e.g., limited to explicit compensation for public services.

Concession Arrangement whereby a private party leases assets from a public authority for an extended period, and has responsibility for financing specified new fixed investments during the period; these new assets then revert to the public sector at expiration of the contract.

Contestability The practical threat of competition from new entrants in a market. In activities with high contestability, exit by a producer is relatively costless. The key criterion for contestability is the absence of sunk capital costs incurred in the even of exit.

Corporatization Transformation of an enterprise or agency into a legal entity subject to company law, with formal separation of ownership and management responsibilities, e.g. through a board of directors or other body.

Excludability The ability to control access to a good/service. High excludability means it is relatively easy (not costly) to prevent users from consuming it.

Government department Arrangement whereby services are provided and executed by civil servants and accounts are integrated into the government budget.

Leasing (or "*affermage*") Arrangement whereby a private party (lessee) contracts with a public authority for the right to operate a facility (or the right to a flow of revenues from providing a specific service) for a specified period of time; this right may be called a franchise or license. The facility continues to be owned by the public authority. Unlike in a concession, the lessee does not have responsibility for investments in fixed assets.¹ Financial risk for operation and maintenance is borne entirely by the lessee.

Management contract Private contractor assumes responsibility for full range of operation and maintenance functions, with authority to make day-to-day management decisions. Compensation may be based partially on services rendered (as for service contracts), and partially on performance achieved (such as profit-sharing), which implies limited financial risk.

¹ A lease may sometimes be called a "service concession", and a BOT sometimes called a "public works concession".

Network externalities Positive effects of consumption by one user on other users. E.g., the decision by one user to link to the telephone network yields benefits to other users, by increasing the range of possible communications through the telephone system.

Private entrepreneurship Ownership of assets held in majority or totality by private agents, either through divestiture (transfer/sale of shares or assets from public ownership) or creation of new private entity. It is assumed here that control of assets is proportional to ownership; however, it is possible in cases of divestiture that majority control (of voting rights) is granted to private agents even when the State continues to hold the majority of shares. In such cases a “majority privately-controlled” entity would be considered a private entrepreneurship here.

Parastatal (also public or State enterprise) An organization owned and controlled in majority by the State.

Public utility A public enterprise/parastatal in the infrastructure sectors (usually referring to power, telecommunications, water supply, or sanitation).

Public (or State) enterprise See Parastatal.

“Self-help” Includes variety of arrangements for financing and management of projects by beneficiaries, such as by cooperatives, community organizations, or user associations.

Service contract (or “contracting-out”) Arrangement with private sector to perform particular operating or maintenance functions for a fixed period and for specified compensation (no financial risk taken).

Subtractability (or “rivalry”) The impact that consumption by incremental users has on consumption opportunities of all users. Low subtractability means that consumption by one user does not impede availability by other users (such goods/services are “jointly consumed”). High subtractability means that consumption by one user imposes identifiable, calculable costs on other users (such goods are “privately consumed”).

“Traditional” parastatal A public enterprise with limited managerial autonomy; accounts are kept separate from the government budget, but with wide access to deficit financing from the budget and government loans.

**ANNEX II - CHARACTERISTICS OF INFRASTRUCTURE SECTORS/SUBSECTORS—
A BREAKDOWN BY ACTIVITY**

SECTOR/SUBSECTOR: AIRPORTS/AIRWAYS

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Airplane services	H	H	L	L	H	National defense concerns, Noise, USO
Runways, gates	M	H	H	M	H	
Air traffic control	L	L	L	M	H	Public safety, liability
Ground services	H	H	L	L	M	

Definitions: (H = high, M = moderate, L = low) USO = universal service obligations

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Excludability refers to the feasibility of controlling access to a good. High excludability = = it is relatively easy (i.e. non-costly) to prevent users from consuming it.

Sunkness refers to extent of sunk capital costs incurred in the event of exit from the activity. In activities with high contestability, entry and exit are relatively costless (key criterion for contestability is the absence of sunk costs incurred in the event of exit).

Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

SECTOR/SUBSECTOR: ELECTRIC POWER

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtracti- bility	Degree of Excluda- bility	Degree of Sunk- ness	Economies of Scale	Degree of Coordination Necessary	
Generation - thermal - hydro, nuclear	H H	H H	M H	M ^a M	M H	Pollution
Transmission	H	H	M	H	H	Network effects
Distribution	H	H	M	M	H	Some arguments for USO

Definitions: (H = high, M = moderate, L = low). USO = universal service obligations

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Excludability refers to the feasibility of controlling access to a good. High excludability = = it is relatively easy (i.e. non-costly) to prevent users from using it.

Sunkness refers to extent of sunk capital costs incurred in the event of exit from the activity. In activities with high contestability, entry and exit are relatively costless (key criterion for contestability is the absence of sunk costs incurred in the event of exit).

Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

^a Small for diesel generators, large for steam generators.

SECTOR/SUBSECTOR: IRRIGATION (GROUNDWATER)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Deep Tubewell ^a	H ^b	H	H	L	M	Groundwater depletion and pollution Waterlogging and Salinization
Shallow Tubewell	H	H	L	L	L	

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^a Any distribution or terminal systems associated with tubewells exhibit the same characteristics as those for surface water systems.

^b The degree of subtractability associated with a given well actually depends upon the nature of the watershed/aquifer drawn from. In this instance, relatively high resource scarcity is assumed.

SECTOR/SUBSECTOR: IRRIGATION (SURFACE WATER)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Trunk System Dam, main canal	M ^a	M ^b	H ^c	M ^c	H	Inter-sectoral water allocation Waterlogging; Salinization Erosion Introduction of new diseases
Distribution System Secondary & tertiary canals	M ^a	M ^b	H ^c	M ^c	H	
Terminal System (On-farm) Gravity Sprinkler	H H	M H	L L	L L	L L	

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See other sector tables.

^a The degree of subtractability depends on scarcity of water resources and on maximum transit capacity of canals. It is assumed here that subtractability increases at farther points from the initial water intake.

^b To some degree, this is a function of both size and engineering configuration of a given system. It is relatively easy to exclude farms adjacent to large, lined canals from a system, but far more problematic to exclude adjacent farmers from a relatively small, unlined canal.

^c Depending on size and engineering configuration.

SECTOR/SUBSECTOR: PORTS AND WATERWAYS

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtracta- bility	Degree of Excluda- bility	Degree of Sunk- ness	Economies of Scale	Degree of Coordina- tion Necessary	
Piers, harbor Ships Port equipment (loading/unloading)	M H H	H H H	H L M	M L L	H L L	National defense concerns Water Pollution

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

SECTOR/SUBSECTOR: RAILWAYS

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Railbed	M	H	H	M	H	USO Network externalities
Switching and Signaling ^a	L	M	L	L	H	
Railcars	H	H	L	L	H	
Freight Loading/Unloading	H	H	M	L	M	

Definitions: (H = high, M = moderate, L = low) USO = universal service obligations

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Sunkness refers to extent of sunk capital costs incurred in the event of exit from the activity. In activities with high contestability, entry and exit are relatively costless (key criterion for contestability is the absence of sunk costs incurred in the event of exit).

Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

^a The more technically specialized rail operations (e.g. high speed passenger; refrigerated freight) are less contestable and require greater coordination.

SECTOR/SUBSECTOR: ROAD FREIGHT TRANSPORT

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Trucking Services	H	H	L	L	L	Air, Noise Pollution

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

SECTOR/SUBSECTOR: ROADS AND HIGHWAYS

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Primary Roads (National, Trunk)	L	M*	H	L	L	Affects settlement patterns, drainage, erosion, public safety, dust and noise pollution
Secondary Roads	M	M*	H	L	L	
Tertiary roads - rural	L	M*	H	L	L	
urban	H	L	H	L	H	
Signaling and traffic control	L	L	L	L	H	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

* High for tollroads.

SECTOR/SUBSECTOR: SOLID WASTE MANAGEMENT

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Collection	M	M	L	L	M*	Public health, land, water, pollution
Transfer	H	H	L	H	H	
Disposal						
Sanitary land fill	L	M	M	H	H	
Incineration	M	H	M	H	H	
Resource Recovery (recycling)	H	H	L	L	L	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

* Some coordination needed because of "economies of contiguity" (within a given area, it is cheaper for adjacent properties to be served by one collection service agency than by multiple agencies).

SECTOR/SUBSECTOR: TELECOMMUNICATIONS - (BASIC NETWORK)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
NETWORK:						Network effects, USO
-Transmission						
Local	M	H	H*	H*	H	
Long Distance	M	H	L	L	H	
-Switching	M	H	L*	L*	H	
TERMINAL EQUIPMENT:						
-Individual	H	H	L	L	M	
-Common	M	H	M	L	M	

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Sunkness refers to extent of sunk capital costs incurred in the event of exit from the activity. In activities with high contestability, entry and exit are relatively costless (key criterion for contestability is the absence of sunk costs incurred in the event of exit).

Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

* Varies with technology

SECTOR/SUBSECTOR: TELECOMMUNICATIONS - (NETWORK EXTENSIONS)*

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Value-Added Services	H	H	L	L	H	
Cellular, Paging, Microwave Relay	H	H	L ^b	L	H	
Private or Specialized Networks	H	H	L	L	H	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

* These usually are linked to the basic network facilities.

^b Contestability depends on getting access to radio spectrum.

SECTOR/SUBSECTOR: URBAN TRANSPORT

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVE INVOLVED
	Degree of Subtracta- bility	Degree of Excluda- bility	Degree of Sunk- ness	Economies of Scale	Degree of Coordina- tion Necessary	
Van, bus (urban, inter-urban)	H	H	L	L	L	Air Pollution, USO Public Safety
Taxi	H	H	L	L	L	
Metro/rapid transit						
- Tracks/Rails	M	H	H	M	H	
- Rail cars	H	H	L	L	H	
Traffic signaling	L	M	L	L	H	

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SECTOR/SUBSECTOR: WASTEWATER MANAGEMENT (CONVENTIONAL SEWERAGE)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtracta- bility	Degree of Excluda- bility	Degree of Sunk- ness	Economies of Scale	Degree of Coordina- tion Necessary	
Conventional Street Sewer	L	H	H	M	M	Public health Water pollution
Pumping Station	L	H	H	M	L	
Treatment Plant	L	H	H	M	L	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

SECTOR/SUBSECTOR: WASTEWATER MANAGEMENT (INTERMEDIATE/LOW COST SEWERAGE)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtractability	Degree of Excludability	Degree of Sunkness	Economies of Scale	Degree of Coordination Necessary	
Condominial Sewerage	M	M	M	L	H ^b	Public health Water pollution
Localized treatment	M	M	M	L	H ^b	
Other intermediate sewerage ^a	M	M	M	L	H ^a	
Basic sanitation - (pit latrine)	H	H	L	L	L	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

^a Includes approaches such as solids-free sewerage, simplified, shallow, and flat grade sewerage.

^b Condominial sewerage requires coordination among neighboring property owners.

SECTOR/SUBSECTOR: WATER SUPPLY (NONPIPED)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtracta- bility	Degree of Excluda- bility	Degree of Sunk- ness	Economies of Scale	Degree of Coordina- tion Necessary	
Vendor Tanks	H	H	L	L	L	Public health Depletion of Aquifer
Borehole	H	H	H	L	L	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns,

SECTOR/SUBSECTOR: WATER SUPPLY (PIPED)

ACTIVITY	NATURE OF GOOD/SERVICE		PRODUCTION ASPECTS			EXTERNALITIES OR SOCIAL OBJECTIVES INVOLVED
	Degree of Subtracta- bility	Degree of Excluda- bility	Degree of Sunk- ness	Economies of Scale	Degree of Coordina- tion Necessary	
Trunk System (intake pumping station)	H	H	H H	H H	H H	Inter- sectoral resource allocation
Distribution System	H	H				Public health
Terminal Equipment: Common (i.e. handpump)	H	M	L	L	L	USO
Individual (i.e. home faucet)	H	H	L	L	L	

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Coordination refers to need for control over the rights to perform the function, e.g., because of technical conditions for efficiency, need for equipment standards, safety concerns, etc.

ANNEX III - PREVALENCE OF CERTAIN FORMS OF
PRIVATE SECTOR PARTICIPATION IN INFRASTRUCTURE BY SECTOR

PRIVATE SECTOR PARTICIPATION IN INFRASTRUCTURE BY SECTOR

Infrastructure Type/ Region/Country	BOT/ BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
POWER						
Africa						
Cote d'Ivoire			O			
The Gambia			P			
Guinea-Bissau					O	
Sierra Leone					P	
Asia						
Bangladesh						
China	O, P					
Hong Kong		O				
India	P	O			P	O, P
Indonesia	I				P	O
Malaysia	I					O
Pakistan	I					
Philippines	O, I	O				
Thailand					O	
Vietnam						
Europe, Mid-East, N. Africa						
Egypt	P					
Jordan						O
Oman	I					
Poland	P					
Turkey	I, P					
Latin America & Caribbean						
Argentina		O				
Barbados		O				
Bolivia		O				

Key: P = Planned

I = Initiated

O = Operational

Infrastructure Type/ Region/Country	BOT/ BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
POWER (continued)						
Brazil						O
Colombia						O
Dominican Republic	O					
Ecuador		O				
Honduras				P		
Venezuela				O		O
TRANSPORT						
Africa						
Benin				O		
Burkina Faso			I	I	I	
Burundi			O	O		
Cameroon			P	P	P	
Car			I	I	I	
Cape Verde				P		
Chad			P	I	P	
Congo B.				P		
Ethiopia					O	
Gambia				I		
Ghana	O	P	O	O	P	P

Key P = Planned

I = Initiated

O = Operational

Infrastructure Type/ Region/Country	BOT/BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
TRANSPORT (Continued)						
Guinea			P	O	P	
Guinea-Bissau				O		
Kenya				O		
Lesotho	O			O		
Madagascar				O		
Malawi				I		
Mali			P	P	P	
Mauritius			P	P	P	
Mozambique	P	P	P	O		
Niger				O		
Nigeria					P	
Senegal				O		
Tanzania			I	I	I	
Togo				I		
Uganda				I		
Zaire		I	O	O	O	
Asia						
Bangladesh				P		
China	I			I		
Hong Kong	O,I,P					
India			O	O		
Indonesia	O,P			P		

Key: P = Planned

I = Initiated

O = Operational

Infrastructure Type/ Region/Country	BOT/ BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
TRANSPORT (continued)						
Korea						O
Malaysia	O,P	O		O		P
Nepal	I			O	O	
Pakistan	P			O		
Papua New Guinea				P		
Philippines	I,P			P	O	
Thailand	I,P	O	O			
Europe, Mid-East, N. Africa						
Algeria		P		O		
Egypt	O	O				
Jordan	P					O
Morocco		P				
Tunisia		O,P				
Latin America & Caribbean						
Argentina	O	O				
Brazil						O
Chile	I			O		
Colombia		I	LO	O		O
Mexico						O

Key P = Planned

I = Initiated

O = Operational

Infrastructure Type/ Region/Country	BOT/ BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
WATER & SEWERAGE						
Africa						
Cote d'Ivoire		O				
Guinea			O			
Guinea-Bissau					O	
Lesotho						O
Rwanda					P	
Sao Tome		P				
The Gambia			P			
Asia						
Bangladesh		O				
China		O				
Hong Kong	P	O				
India						O
Indonesia	I					
Macau	P	O				
Malaysia	I	O				I
Pakistan						O
Philippines						I
Thailand	P					

Key P = Planned

I = Initiated

O = Operational

Infrastructure Type/ Region/Country	BOT/ BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
WATER & SEWERAGE (continued)						
Europe, Mid-East, N. Africa						
Egypt	P,O	O		O		
Jordan		O				
Morocco		O				
Yemen					P	
Latin America & Caribbean						
Argentina		I				
Bolivia		O				
Brazil						O
Chile	P	O		O		
Colombia	P			O	O	O
Mexico	O	I				
Venezuela		I				
TELECOMMUNICATIONS						
Asia						
India						O
Philippines		O				
Thailand	P					

Key P = Planned

I = Initiated

O = Operational

Infrastructure Type/ Region/Country	BOT/ BOO	Conces- sion	Leasing	Service Contracts	Management Contracts	Bonds
TELECOMMUNICATIONS (continued)						
Latin America						
Bolivia		O				
Brazil						O
Colombia		I				
IRRIGATION						
Africa						
Nigeria					O	
Asia						
Indonesia					O	
Europe, Mid-East, N. Africa						
Morocco				I		
Tunisia						O

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REFERENCES

- Augenblick, Mark and B. Scott Custer, Jr. 1990. *The Build, Operate, and Transfer ("BOT") Approach to Infrastructure Projects in Developing Countries*. Policy, Research and External Affairs Working Paper No. 498. World Bank, Washington, D.C.
- Bartone, Carl R. 1991. "Institutional and Management Approaches to Solid Waste Disposal in Large Metropolitan Areas", *Waste Managing & Research*, 9, 525-536.
- Bartone, Carl R. et al. 1991. "Private Sector Participation in Municipal Solid Waste Service: Experiences in Latin America." *Waste Management and Research*, 9, 495-509.
- Baumol, William J., Panzar, John C., and Robert D. Willig. 1988. *Contestable Markets and the Theory of Industry Structure*. San Diego: Harcourt Brace Jovanovich.
- Bennathan, E., J. Gutman, and L. Thompson. 1991. *Reforming and Privatizing Poland's Road Freight Industry*. Infrastructure and Urban Development Department Working Paper No. 750. World Bank, Washington, D.C.
- . 1992. *Reforming and Privatizing Hungary's Road Haulage*. Infrastructure and Urban Development Department Working Paper No. 790. World Bank, Washington, D.C.
- Berthier, Jean. 1991. *French Motorways Operated by Concessionary Companies: Historical Background and Current Situation*. Bureau Central Pour l'Equipement d'Outre-Mer. Paris, France.
- Besant-Jones, John E., ed. December 1990. *Private Sector Participation in Power thru BOOT Schemes*. Energy Series Paper No. 33. World Bank, Industry and Energy Department, Washington, D.C.
- Campbell, Tim., et al. 1991. *Decentralization to Local Government in LAC: National Strategies and Local Response in Planning, Spending and Management*. Regional Studies Program Report No. 5. World Bank, Latin America and the Caribbean Technical Department, Washington, D.C.
- Carbajo, Jose, ed. 1993. *Regulatory Reform in Transport: Some Recent Experiences*. A World Bank Symposium. World Bank, Washington, D.C.
- Cellier, Jacques. 1991 *Decentralizing of Road Administration*. Infrastructure and Urban Development Department Infrastructure Notes No. RD11. World Bank, Washington, D.C.
- Cointreau-Levine, Sandra. 1992. *Private Sector Participation in Municipal Solid Waste Services in Developing Countries*. Forthcoming in Urban Management Program Working Paper Series. United Nations Development Program (UNDP)/World Bank/United Nations Centre for Human Settlements, Washington, D.C.

- Coyaud, Daniel. 1988. *Private and Public Alternatives for Providing Water Supply and Sewerage Services*. Infrastructure and Urban Development Department Report No. INU-31. World Bank, Washington, D.C.
- Dagerman, Lo. 1992. "Deregulation of Local Buses in the U.K. and Santiago—Some Lessons." World Bank, Infrastructure and Urban Development Department, Transportation Division, Washington, D.C.
- Davey, Kenneth. 1988. *Municipal Development Funds and Intermediaries*. Policy, Planning and Research Working Paper 32. World Bank, Washington, D.C.
- Donohue, John D. 1989. *The Privatization Decision: Public Ends, Private Means*. New York: Basic Books, Inc.
- Electricite de France International. May 19, 1992. "Power Utility Management by Performance Contracting." Presentation at World Bank, Washington, D.C.
- Fox, William F. 1992. "Strategic Options for Urban Infrastructure Management." World Bank, Infrastructure and Urban Development Department, Washington, D.C.
- Galal, Ahmed, Leroy Jones, Parkaj Tandor, and Ingo Vogelsang. *Welfare Consequences of Selling Public Enterprises*. World Bank, Washington, D.C. (Forthcoming)
- Galenson, Alice and Louis Thompson. 1992. *The Bank's Evolving Policy Toward Railway Lending*. World Bank Discussion Paper (Forthcoming). Transportation, Water and Urban Development Department, Washington, D.C.
- Galenson, Alice. 1993. "Private Sector Development in Transportation: Railways." World Bank, Transportation, Water and Urban Development Department, Washington, D.C. Draft, April.
- . 1990. *New Zealand: Road Operated Like a Public Utility*. Infrastructure and Urban Development Department Infrastructure Note No. RD-1. World Bank, Washington, D.C.
- . 1989. *Labor Redundancy in the Transport Sector*. Policy, Planning and Research Working Paper No. 158. World Bank, Washington, D.C.
- Gyamfi, Peter and others. 1992. *Infrastructure Maintenance in LAC: The Costs of Neglect and Options for Improvement*. Regional Studies Program. Report No. 17. World Bank, Latin America and the Caribbean Technical Department, Washington, D.C.
- Heggie, Ian G., and Quick, Michael. 1990. *Improving Management and Changing Policies for Roads: An Agenda for Reform*. Infrastructure and Urban Development Department Report No. INU 92. World Bank, Washington, D.C.
- Hilton, Rita. 1992. "Participation and Delivery of Infrastructure Services." World Bank, Infrastructure and Urban Development Department, Washington, D.C. Draft, September.

- . 1992. "Legal and Regulatory Framework: Integral Components of Institutional Arrangements for Delivery of Infrastructure Services." World Bank, Infrastructure and Urban Development Department, Washington, D.C. Draft, September.
- . 1991. "Institutional Arrangements for the Provision and Production of Infrastructure." World Bank, Infrastructure and Urban Development Department, Washington, D.C. Draft.
- Humplick, Frannie and Samer Madanat. 1992. "Household Responses to Reliability of Water Supply: The Case of Istanbul, Turkey and Faisalabad, Pakistan." World Bank, Infrastructure and Urban Development Department, Water and Sanitation Division, Washington, D.C.
- Israel, Arturo. 1992. *Issues for Infrastructure Management in the 1990s*. World Bank Discussion Paper No. 171. Washington, D.C.
- Kikeri, Sunita, John Nellis and Mary Shirley. 1992. *Privatization: The Lessons of Experience*. Washington, D.C.: World Bank.
- Lethbridge, John and Zvi Ra'anana. 1991. *Port Administration: Public vs Private Sector*. Infrastructure and Urban Development Department Infrastructure Notes, No. PS-5. World Bank, Infrastructure and Urban Development Department, Washington, D.C.
- Levy, Brian and Pablo Spiller. 1993. *Regulation, Institutions, and Commitment in Telecommunications: A Comparative Analysis of Five Country Studies*. Paper presented to World Bank Conference on Development Economics, May 3-4, 1993. World Bank, Washington, D.C.
- Levy, Hernan and Aurelio Menendez. 1992. *Privatization in Transport: The Case of Port Kelang (Malaysia) Container Terminal*. Economic Development Institute Working Paper. World Bank, Washington, D.C.
- . 1992. *Privatization in Transport: Contestability in Railway Operations for the Fertilizer Industry in Senegal*. Economic Development Institute Working Paper Catalogue No. 705/027. World Bank, Washington, D.C.
- . 1990. *Privatization in Transport: Contracting Out the Provision of Passenger Railway Services in Thailand*. Economic Development Institute Working Paper Catalogue No. 705/023. World Bank, Washington, D.C.
- Lorrain, Dominique. 1992. "The French Model of Urban Services." *West European Politics*, Vol. 15, No.2, pp. 77-92.
- Miquel, Sergio and James Condron. 1991. *Assessment of Road Maintenance by Contract*. Infrastructure and Urban Development Department Report No. INU 91. World Bank, Washington, D.C.
- Moser, Carolyn .O.N.. "Community Participation in Urban Projects in the Third World," *Progress in Planning* 32 (1989): 73-134.

- Moyer, Neil E. and Louis S. Thompson. 1991. *Options for Reshaping the Railway*. Policy Research Working Paper No. 926. World Bank, Infrastructure and Urban Development Department, Washington, D.C.
- Narayan, Deepa. 1993. "The Challenge of Participatory Development: Lessons Learned in Rural Water Supply." World Bank, Water and Sanitation Department, Washington, D.C. Draft, March.
- Nellis, John. 1988. *Contract Plans and Public Enterprise Performance*. Policy, Planning and Research Working Paper No. 118. World Bank, Country Economics Department, Washington, D.C.
- Paul, Samuel. 1991. *Accountability in Public Services: Exit, Voice and Capture*. Policy, Research and External Affairs Working Paper No. 614. World Bank, Country Economics Department, Public Sector Management and Private Sector Development Division, Washington, D.C.
- Scurfield, Richard G. 1992. "Developing the Role of the Private Sector in Ports." World Bank, Infrastructure and Urban Development Department, Transport Division, Washington, D.C. Draft.
- . 1990. *Competitive Tendering For Public Bus Services*. Infrastructure and Urban Development Department Infrastructure Note No UT-1. World Bank, Infrastructure and Urban Development Department, Washington, D.C.
- Sherer, F.M. and David Ross. 1990. *Industrial Market Structure and Economic Performance*. Boston: Houghton Mifflin.
- Silverman, Jerry M. 1990. *Public Sector Decentralization: Economic Policy Reform and Sector Investment Programs*. Public Sector Management Division Study Paper No. 1. World Bank, Africa Technical Department, Washington, D.C.
- Tanahashi, Yasushi. 1991. "Reform of Railways in Japan." Infrastructure and Urban Development Department Discussion Paper 99, World Bank, Infrastructure and Urban Development Department, Washington, D.C.
- Triche, Thelma A. 1992. "PSP in Urban Water Supply: Issues, Implications and Examples." World Bank, Infrastructure and Urban Development Department, Washington, D.C. Draft.
- . 1991. "Seminar on Privatization of Water Supply in the U.K. and The Role of the Private Sector in France. Summary of The Two Approaches and Discussion of Issues." World Bank, Transportation, Water and Urban Development Department, Water and Sanitation Division, Washington, D.C.
- . 1990. *Private Participation in the Delivery of Guinea's Water Supply Services*. Policy, Research and External Affairs Working Paper No. 477. World Bank, Infrastructure and Urban Development Department, Washington, D.C.
- . 1990. *Private Participation in Water Supply*. Infrastructure and Urban Development Department Infrastructure Note No. WS-1. World Bank, Washington, D.C.

- United States Agency for International Development (USAID), Engineering-Science, Inc. (Pasadena, California) and Resources Development Consultants, Ltd. (Sri Lanka). 1991. *Executive Summary Final Report on Institutional Development of the National Water Supply and Drainage Board*. Washington, D.C.
- United States Environmental Protection Agency (EPA). 1990. *Public Private Partnerships for Environmental Facilities: A Self-Help Guide for Local Governments*. Washington, D.C.: Government Printing Office.
- Wellenius, Bjorn and others. 1993. *Telecommunications: World Bank Experience and Strategy*. World Bank Discussion Paper No. 192. World Bank, Washington, D.C.
- Whittington, Dale et al. 1992. "Possible Adverse Effects of Increasing Block Tariffs in Developing Countries." *Economic Development and Cultural Change* 41, no. 1: 75-87.
- World Bank. 1991. *The Reform of Public Sector Management: Lessons from Experience*. Policy and Research No. 18, World Bank, Policy, Research and External Affairs, Country Economics Department, Washington, D.C.
- Yates, Philip. 1988. *Improving Power System Efficiency in the Developing Countries Through Performance Contracting*. Energy Series Working Paper No. 4. World Bank, Industry and Energy Department, Washington, D.C.
- Yepes, Guillermo. 1990. *Management and Operational Practices of Municipal and Regional Water and Sewerage Companies in Latin America and the Caribbean*. Infrastructure and Urban Development Department Report No. INU 61. World Bank, Washington, D.C.

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World Bank. 1993. "Municipal Development Sector Review." World Bank, Transportation, Water and Urban Development Department, Urban Development Division, Washington, D.C. Draft, June.

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