Systematic review

Impact of private sector involvement on access and quality of service in electricity, telecom, and water supply sectors

A systematic review of the evidence in developing countries

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September 2013

Australian AID
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
EPPI CENTRE
IOE LONDON
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This research was funded by the Australian Agency for International Development (AusAID). The research was commissioned as part of a joint call for systematic reviews with the Department for International Development (DFID) and the International Initiative for Impact Evaluation (3ie)

The authors are part of Indian Institute of Technology; Harvard Kennedy School, Harvard University, and were supported by the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre).

The EPPI-Centre reference number for this report is 2106.

Thillairajan A, Mahalingam A, Deep A (2013) *Impact of private-sector involvement on access and quality of service in electricity, telecom, and water supply sectors: a systematic review of the evidence in developing countries*. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

ISBN: 978-1-907345-59-3

Contents

List of abbreviations

BLT	Build lease transfer
BOO	Build own operate
BOOT	Build own operate transfer
BOT	Build operate transfer
BROT	Build rehabilitate operate transfer
DBFO	Design build finance operate
DFID	Department for International Development (UK)
FAT	Funnel asymmetry test
IRA	Independent regulatory agency
MRA	Meta-regression analysis
MST	Meta-significance test
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary least square
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Public-private partnership
PSP	Private-sector participation
SSA	Sub-Saharan Africa
T&D	Transmission and distribution
UFW	Unaccounted-for water
WSS	Water supply and sanitation

Abstract

The review question

What has been the impact of private-sector participation (PSP) on access and quality in provision of electricity, telecom and water services?

Background

PSPs have been increasingly used for infrastructure development all over the world. However, the impact of PSP on project outcomes is still unclear. This study is a systematic review of the evidence on the impact of PSP on access and quality in electricity, telecom and water supply. In addition to determining the nature of the impact, this review also traces the mechanisms that explain the impact of changes in access and quality.

Methods of the review

- Study sources: Eight electronic databases, hand search of for journals for a 15-year period, past reviews, five website searches, personal communication and references in identified studies.
- In-depth review: 67 studies that met the exclusion, inclusion and quality appraisal criteria were included in the analysis.
- Synthesis method: given the heterogeneity in the studies, multiple methods were used in the synthesis: meta-regression analysis, count of evidence and textual narration.
- Meta-regression analysis: regression results from 17 studies were synthesised using the *t*-statistic (Stanley and Jarrell, 1989).
- Count of evidence: The associations between PSP and outcomes were counted from all the studies included in the review. The percentage of tests that supported a relationship was used as the basis for drawing conclusions about the available evidence.
- Textual narration: a content analysis approach was used to understand the theory of change and the causal pathway.

Results

PSP on its own does not seem to have a significant impact on improvements in access and quality. Meta-regression analysis was done on evidence from quantitative studies. Fifty observations on access and 40 observations on quality were obtained from 17 quantitative studies. It was found that PSP did not have any significant impact on access and quality outcomes after controlling for various study-level characteristics. This indicated that the effectiveness of PSP was limited in achieving improvements in access and quality. It should be accompanied by other reform measures to realise the desired outcomes.

On the whole, when considered synchronously with other reform components, PSP was associated with more positive than negative outcomes. Based on 424 evidences from 67 studies (quantitative as well as qualitative), it was found that the number of positive evidences far outnumbered that of the negative evidences. The positive evidence was the strongest for those outcomes where there was a strong corresponding benefit to the private player. For example, in electricity, the evidence for positive outcomes was the strongest for product and service quality, whereas in telecom, the positive evidence was the strongest for access. Where

improvements would need higher levels of capital investment, or the benefits to the private player would occur over a longer period, the evidence for positive impact was not as strong.

Without financial support from the government, access for poor and rural consumers was affected as a result of PSP. Providing access in far-flung rural areas or highly congested poor urban dwellings involves substantial capital investment. Given the low paying capacity of these consumer segments, undertaking such large capital investments may not be remunerative to the private sector. If government does not provide any subsidy for increasing access in rural areas, PSP leads to a decline in access in rural areas. However, where government continues to provide assistance similar to that which it would have given under the public sector regime, the impact on access has been much higher than what was achieved under the public sector, as the private sector has been able to deploy the investments more efficiently.

Clearly identifying the objectives of PSP would help in appropriately handling the potential trade-offs between outcomes, such as those between access and quality outcomes. Improvements in one of the outcomes can negatively affect the other. For example, when electricity access was improved by increasing connectivity to far-flung areas, transmission and distribution losses tended to increase. To avoid such a negative impact, additional focus is needed to strengthen the distribution network. Unless there is a specific focus on quality improvement, investments needed to strengthen the distribution network are unlikely to happen, leading to a drop in quality levels. Short-term forms of PSPs, such as service contracts, management contracts and leasing, can yield faster results on some outcomes as compared to long-term forms of PSP, such as concessions and divestitures. However, short-term forms of PSP that produce quicker results may not be appropriate for attracting large amounts of private capital. In developing countries, one of the main objectives of PSP is to attract private-sector capital for capacity expansion and to overcome supply-side constraints. Long-term forms of PSP are more suitable for attracting long-term private-sector capital.

Implications

- Implementation of PSP should not be done in isolation but as a part of a broader reform strategy that includes regulatory reform and introduction of competition. PSP is not very effective in achieving the desired outcomes without corresponding changes in the market, and in institutional and governance structures.
- Higher improvements can be achieved in outcomes if incentives for improvements are built into PSP contracts.
- In the absence of financial support from the government, PSP does not lead to improvements in access for rural and poor consumers.
- There should be strong clarity on the objectives of implementing PSP, given the potential trade-offs between different outcomes.

1. Background

1.1 Background and aim of the review

The positive correlation between the development of physical infrastructure and economic growth of countries is well known. Infrastructure is the capital stock that provides public goods and services and its presence is a determinant in assessing quality of life, productivity and growth in the economy (Yoshino and Nakahigashi, 2002). Physical infrastructure generally comprises a variety of sectors, such as electricity, telecom, water supply and sanitation, roads and transport, airports and ports. Improvement in access to water, electricity and telecom infrastructure to the poor is often linked with poverty reduction, with health, and with promoting growth and reducing disparity between rich and poor (Briceño-Garmendia et al., 2004).

Realising this correlation, many developing countries have initiated measures to increase and encourage investment in the infrastructure sector. Countries essentially have two choices in this endeavour. On the one hand, governments can create and deliver these infrastructure services themselves – indeed, the responsibility for providing infrastructure services often lies with governments – or, they can choose to approach the private sector for assistance. There are advantages and benefits to both these strategies. Public sector provision of infrastructure has allowed governments to reduce the cost of services, but has led to the creation of public sector monopolies that are plagued by inefficiencies and a lack of resources. On the other hand, while the private sector can be incentivised to perform efficiently and while private monopolies can be regulated, private-sector-led provision of infrastructure often results in increased tariffs, downsizing of organisations and so on. As Klein and Roger (1994) have shown, several parts of the world have shown a tendency to move cyclically between public and private-sector implementation of infrastructure services. Public sector inefficiencies lead to calls for privatisation of infrastructure services. Deficiencies in the consequent privatisation attempts then lead to calls for (re)nationalisation of services. Despite this cyclicity, there has been a marked trend since the 1990s towards the involvement of the private-sector in the provision of infrastructure services in several regions across the globe.

Fiscal constraints and the inability to cater to the growing demand for infrastructure, coupled with an increasing push towards the privatisation of infrastructure services in developed nations has made governments in developing countries rethink and embrace a new paradigm in developing infrastructure. To increase the efficiency of the sector as well as to attract private-sector investment, many developing countries have introduced private-sector participation (PSP) in various forms in the infrastructure sector since the mid-1990s (Vives, 1996; World Bank, 2007). PSPs are contractual arrangements between a public- and a private-sector entity to provide a public asset or service for public benefit, where some investment is made by the private sector and there is substantial risk sharing between the two sectors (Bult-Spiering and Dewulf 2008). Such arrangements are often meant to look beyond being project-financing mechanisms, and leverage the sharing of competencies and knowledge to develop a sustainable, value-adding partnership (Klijn and Teisman, 2003; Hodge and Greve, 2005).

Total private investment in developing countries has increased from US$754 billion in 2001 to US$1647.8 billion in 2010. Sectoral analysis of private investment indicates that during this period, private-sector investment in energy increased

from $213 billion to $548 billion; in telecom it increased from $331 billion to $761 billion; and in water it increased from $40 billion to $62.5 billion (Harris, 2003; World Bank, 2011).

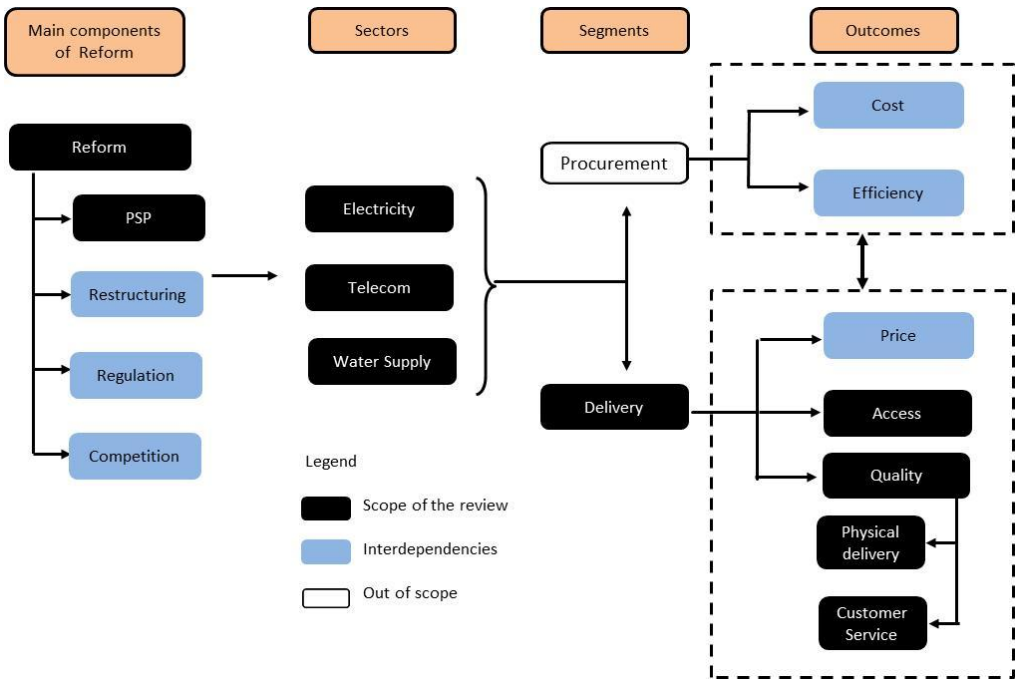
PSPs have been in use all over the world with mixed results. Some commentators have been cautiously optimistic about the success of certain public-private partnership (PPP) programmes, such as the UK's Private Finance Initiative (Hall, 1998; Pollitt, 2002), while evidence elsewhere – such as in Denmark (Greve, 2003) and Australia (Walker and Walker, 2000) - indicates that PSPs have proved to be more costly and wasteful compared to traditional public delivery approaches. In particular, there is criticism on the use of PSPs purely for financing projects, since the private sector's cost of capital is always higher than the public sector's cost of capital, leading to both a more expensive project as well as a tendency in projects that use an availability/annuity payment strategy to shift payment obligations 'off balance sheet' and towards future generations of taxpayers (see, e.g. Froud, 2003).

The aim of this study is to undertake a systematic review of the evidence on the impact of PSP on access and quality in select infrastructure sectors – electricity, telecom, and water supply. As far as the researchers know, no systematic review has been done on this topic yet. Given the need for substantial investments in infrastructure and the focus on mobilising private-sector investment to augment public sector funding, it is felt that the findings of this review can be very relevant and timely for policy makers. It is also expected that this review will contribute to evidence-based policy decision making in this area.

1.2 Definitional and conceptual issues

Figure 1.1 provides a conceptual illustration of the boundaries for this systematic review and how we plan to achieve our objectives.

Figure 1.1: Conceptual overview of the systematic review



Given the importance of infrastructure provision, it is likely that governments will contemplate a variety of reforms to achieve the desired outcomes. PSPs are one

set of reforms, and the only set that we will focus on directly in this study. We define below the particular types of PSP arrangements that we will study. However, we are aware of the mediating effects that other kinds of reforms, such as regulation, can play on the outcomes of PSP programmes. Also, in many instances, PSP is a part of a much broader infrastructure reform programme. In those instances, where PSP is closely integrated with the reform programme and thereby it is difficult to isolate the impact on outcomes that can be attributed to PSP, the effect of the entire reform programme will be used. When the impact that can be attributed to PSP component is available in the studies, the synthesis will only consider those findings that can be attributed to PSP. However, the mediating effects of other components will be noted in the discussion.

Having defined PSPs as the key intervention whose effects we plan to study, we restrict our analysis to the following sectors: water, electricity and telecommunications. While PSPs are often touted as ways by which assets can be procured through the use of private capital, we do not focus on the success or failure of PSPs vis-a-vis project procurement and asset creation. Rather, we take the view that PSPs are a means through which government organisations can supplement skill and capacity constraints to deliver more effective and efficient services. As a result, we focus on the service delivery outcomes of using PSPs in the telecommunications, water and electricity sectors. Furthermore, while a variety of project outcome indicators can be studied, the focus of this study is on two specific outcomes – access and quality. These are elaborated upon below.

As our objectives indicate, this study focuses primarily on two constructs – access to infrastructure and improvements to the quality of infrastructure – in order to ascertain the extent to which PSPs have impacted infrastructure service delivery in the water, telecommunication and electricity sectors. Access indicates the extent to which members of a community can avail of an infrastructure service. In short, the more people in a community who can utilise a service, the greater the access. One of the fundamental questions that we ask is whether private-sector participation improves access to infrastructure. In theory, contracts that incentivise private participants to provide greater access should lead to a beneficial outcome across this construct. Conversely, the private sector's profit motivation coupled with demographic and income-based divides can lead to negative outcomes across this parameter.

Our second construct – quality - can be separated into two sub-constructs – product quality and service quality. Product quality relates to physical properties of the infrastructure system. In a water-supply PSP for instance, product quality might be measured based on reduction of leakages and non-revenue water in the network, or reduced maintenance costs due to better network robustness. In essence, this variable pertains to the physical quality of the network as viewed by the sponsoring public sector agency. Service quality, on the other hand, is viewed from the perspective of the end user and attempts to measure the level of satisfaction with the infrastructure service received. In the electricity or water sectors, this can correspond to the number of hours in a day when the service is provided, or the ease with which complaints or difficulties are resolved. Given that the quality of the product and the quality of the service are viewed differently and are of differing importance to the stakeholders involved in a PSP project, we have treated them separately in our analysis. Depending on the nature of the contract/concession agreement, it may well be possible that product quality metrics are achieved, despite poor quality services being provided to users, and vice versa.

It is important to note here that access and quality may not be completely correlated. In some cases, a focus on access can imply that the private sector may achieve its contractual outcomes by connecting as many consumers as possible. In such cases, the incentive to reduce leaks and wastages in the system might be minimal, leading to good access outcomes but poor quality outcomes. The converse may also hold true. In other cases, the private sector may focus on improving access and service quality, as these indicators often lead directly to increased revenue. Product quality improvements, on the other hand, necessitate capital investments. Long-term contracts where the private sector can recoup these investment costs are therefore necessary to improve product quality, whereas in the case of short-term contracts, private investment may be low and the focus may be on operations and management, improving access and service quality.

We have also attempted to investigate the performance of various forms of PSP. They can occur at many levels. At the complex end of the spectrum, the private sector is expected to provide considerable capital investment coupled with operational expertise. Concessions and leases are arrangements that fit this description. At the less complex end, capital investment concerns are reduced and the private sector is expected to provide greater operational efficiencies, as in the case of management and service contracts. Since the structure of these contracts and the private sector's incentives vary according to PSP type, we have attempted to unpack our analysis of the effects of PSP on access and quality and investigate the effects of PSPs within each of these sub-types. For instance, concessions that involve high capital expenditure will also necessitate higher cost recovery. As a result, the propensity of a private partner to provide access and quality to poorer sections of society might be reduced. On the other hand, management or service contracts might lead to better results along the access dimension. These and other propositions are investigated through the course of our study. We consider five types of PSP in our analysis – concessions, divestitures, leases, management contracts and service contracts. Each of these types is described in the following section.

1.2.1 Forms of PSP included in the review

Various forms of PSP can be seen in the development and operation of infrastructure facilities. For the purpose of this study, the following forms of PSP will be considered:

a) **Divestitures:** In this form of PSP, the government sells an existing state-owned enterprise through a stock offering to the general public or auctions it to private investors. Full divestiture is defined as the transfer of 100 percent of all assets and operating rights to a private investor for an indefinite period; partial divestiture is defined as the transfer of at least 51 percent but less than 100 percent of these assets and rights to private hands for an indefinite period (Delmon, 2006).
b) **Service contract:** In this form of PSP, the public sector signs multiple contracts with the private sector for procuring a variety of services (such as billing and collection services) and is usually for a short period, varying between 1 and 3 years. It is a useful strategy for improving the efficiency of public companies and promoting local private-sector development (Asian Development Bank, 2008). At the end of the contract period, in most instances, a fresh bid is invited from the private sector to provide the services.
c) **Management contract:** This is a form of PSP in which the private sector is responsible only for management and not investment. As a result, management contracts are shorter than concessions (see below): usually

two to five years, with options for renewal. It is generally an interim solution during preparation for more intense forms of PSP such as divestiture (Gómez-Ibáñez, 2008).

d) **Leasing/affermage:** In this model, the public sector assumes responsibility for investment and financing the asset, whereas the private lessee is responsible for maintenance and operation of the facilities to provide services (PPIAF, 2010).
e) **Concession contract:** The government offers a contract to the private investor to invest and operate an infrastructure project or asset during the concession period. Such concessions are broadly called Public-private Partnerships (PPP), because in many instances the public sector is also a joint venture partner in the project company that is implementing the project. There are several variations of PPPs:
    - BOT (build, operate and transfer): The project company builds and operates the infrastructure asset, and transfers it to the public authority at the end of the concession period.
    - BOOT (build, operate, own and transfer): This is same as BOT except that the infrastructure ownership also rests with the project company. The public sector gets ownership of the assets at the end of the concession period.
    - BOO (build, own and operate): The ownership of the asset rests with the project company in perpetuity.
    - BROT (build, rehabilitate, operate and transfer): The concessionaire builds an add-on to an existing facility, or completes a partially built facility or rehabilitates existing assets, and then operates and maintains the facility for the concession period. The ownership of the assets rests with the public sector.
    - BLT (build, lease and transfer): A private entity builds a complete project and leases it to the government. After the expiry of the lease, the ownership of the asset and the operational responsibility are transferred to the government at a previously agreed price.
    - DBFO (design, build, finance and operate): This is similar to BOOT except that there is no actual ownership transfer, and all aspects of the project, such as financing, design, operation and maintenance, rest with the project company/concessionaire.

Table 1.1 gives a comparative analysis of the above forms of PSP.

In general, these five types of PSP may also be classified into short-term PSPs (service contracts, management contracts and leases) and long-term PSPs (concessions and divestitures). Short-term PSPs often involve very little capital investment and are for durations of 5-7 years, whereas long-term PSPs involve considerable capital investment and correspondingly larger durations (often up to 30 years or more) to recoup these investments. Many developing countries view PSPs as a means by which private capital can be raised to develop infrastructure, and as a result often attempt to undertake a large number of long-term PSPs. However, these kinds of project are often complex and require robust institutional support. When such support is lacking, project failure is imminent. On the other hand, short-term PSPs are less complex and are likely to attract a larger number of private participants, and might therefore lead to greater successes during the initial stages of a government's PPP programme.

Our study therefore attempts to address these nuances in our evaluation of the performance of PSPs in water, electricity and telecommunications. In general, as the following chapters will show, we do find some support for the view that PSPs

can have positive impacts on infrastructure service delivery. However, where such projects fail, it is often the case that the necessary preconditions for success are either not present, or have not been enacted adequately. The issue with PSPs in such cases lies therefore with the implementation of the paradigm.

Table 1.1: Forms of private-sector participation

Characteristics	**Forms of PSP**				
	Service contract	**Management contract**	**Lease**	**BOT concessions**	**Divestitures**
Definition	Service Fee from Government	Maintenance Fee from Government	Maintain and Operate	Finance, Design, Construct, Maintain and Operate	Finance, Design, Construct, Own, Maintain and Operate
Contract duration	1–3 years	2–5 years	10-20 years	25-30 years	Perpetual (some cases may be limited by licence)
Provider of service or management	Private	Private	Private	Private	Private
Price setting	Public	Public	Public	Public	Public/ private
Scale of private investment	Very low	Very low	Medium	Large/very large	Large/very Large
Extent of government preparation/supervision required	Low	High	High	High	High
Provider of working capital	Public	Public	Private	Private	Private
Provider of long-term finance	Public	Public	Public	Private	Private
Cost recovery	Fixed payment from government	Fixed payment from government	Government receives some annual revenue	Government may or may not invest, major recovery from project revenues	Recovery from project revenues
Legal ownership of assets	Public	Public	Public	Public/ private	Private
Sectoral planning/ regulation of service	Public	Public	Public	Public	Public
Cash flow rights	Public	Public	Private	Private	Private

1.3 Policy and practice background

As the previous section highlights, several efforts to implement PSPs have been undertaken recently in various regions and sectors. The share of PSP in infrastructure has been gradually increasing over the years. In 2002, around 70 percent of infrastructure investment in developing countries was estimated to be financed by governments or public utilities from their own resources or from non-concessional borrowings, 3 percent from aid, and the balance 27 percent from the private sector (DFID, 2002). Among all regions, Latin America and the Caribbean have the highest (37 percent) amount of investment from the private sector. In terms of sector, 74 percent of the PSP projects have been greenfield projects in telecom (World Bank, 2011). In the electricity sector, Latin America and the Caribbean have the largest number of privately operated utilities and the highest investment (35 percent) in electricity distribution, followed by Europe and Central Asia (Gassner et al., 2007; World Bank, 2011). PSP in the water sector is present in 62 countries, and 62 percent of these projects are on a concession model. About 47 percent of the PSP investment in this sector is in the East Asia and Pacific region (World Bank, 2011).

As countries feel the need to encourage private participation in infrastructure development, the institutional environment for infrastructure development has been simultaneously augmented. Policies and legislation supporting PSPs are often enacted, and a variety of agencies are set up to identify, structure and manage PSP transactions. The most popular among these are PPP co-ordination agencies (Farrugia et al., 2008; Sanghi et al., 2007) that provide cross-sectoral support and are often staffed by experts. Such agencies can provide a gamut of services, including developing standardised PSP documentation, documenting project experiences, providing resources for training and capacity building, identifying and structuring projects. In addition, in cases where competitive forces by themselves are not guaranteed to deliver efficient solutions, regulatory systems are set up to monitor PSP transactions.

Multilateral banks and international aid agencies have greatly helped to strengthen the institutional environment for PSPs. The Public-Private Infrastructure Advisory Facility (PPIAF), created by the World Bank in 1999, provides technical assistance to governments in order to create an enabling environment for the provision of basic infrastructure services by the private sector with an ultimate target of helping to eliminate poverty and achieve sustainable development through public-private partnerships in infrastructure. A Private Infrastructure Development Group (PIDG) has been formed with the collaboration of the DFID (UK), the State Secretariat for Economic Affairs (SECO, Switzerland), the Swedish International Development Cooperation Agency (SIDA) and the Directorate General for International Cooperation (DGIS, The Netherlands). This group aims to facilitate and support the mobilisation of private sector investment and engagement in the provision of infrastructure and basic services that support growth and the elimination of poverty. The Australian Agency for International Development (AusAID) envisaged the importance of infrastructure development in the Asia-Pacific region and has made significant contributions by helping its regional partners in addressing infrastructure needs through the Infrastructure for Growth initiative. This initiative, in partnership with the World Bank and the Asian Development Bank, has as its key objective to increase economic growth in the Asia and Pacific regions, with a major thrust for improving their infrastructure policies by providing Australian as well as international expertise, including in PSPs.

Despite all of these efforts and initiatives, the extent to which PSP initiatives have led to beneficial outcomes is still unclear. Furthermore, in cases of project failure,

it is unclear whether the cause of failure lay in the choice of implementation mode or in its execution. For instance, in 2001, 63 percent of those surveyed in 17 countries in the Latin American region felt that privatisation had not been beneficial; a proportion higher than in 1998, when only 45 percent felt this way (Lora, 2002). On the other hand, other studies have found that the managerial and technical expertise of the private sector in the provision of services like telecom, electricity and water supply has many a time been commendable (for example, Azam et al., 2002; Gassner et al., 2007; Mota, 2003). Several studies (e.g., Andres et al., 2006; Clarke and Wallsten, 2002; Clarke, et al., 2004) have analysed the effects of PSP but are unable to provide a definite conclusion about the effects.

1.4 Research background

The use of PSP models in the delivery of infrastructure has attracted the attention of researchers, leading to the emergence of various research studies looking into empirical evidence on PSP models. The growing body of knowledge on PSP models has been further analysed by researchers by reviewing research studies which have analysed the evidence from use of PPP models. A summary of review studies related to PSP in the water, electricity and telecom sectors is presented in Table 1.2. Based on the analysis of these studies, it is evident that experiences with the PSP model for improvement in access to and quality of electricity, water supply and sanitation, and telecom services has been mixed. Even though these review studies provide a rich and in-depth description of outcomes of PSP models, it lacks the methodological and analytical rigour required for drawing inferences from the large body of knowledge/literature. The systematic review has the potential to address these lacunae.

Table 1.2: Summary of review studies

Study/Year	Details	Country/ Region	Sector	Key findings
Bacon and Besant-Jones (2001)	Reviews the progress of the movement to privatise and liberalise the power sector in developing countries	Developing countries	Electricity	Quality • Improvement in the efficiency of electricity distribution companies after privatisation on a range of indicators, such as energy sales, energy losses, number of employees and customers per employee
Bayliss (2003)	Reviews the developments in water privatisation in SSA and the evidence regarding its impact	18 contracts in 14 countries of Sub-Saharan Africa (SSA)	Water	Quality • No substantial reductions in the unaccounted-for water (UFW) after privatisation • Water metering increased substantially after privatisation • Bill collection increased substantially after privatisation Access • Expansion of the network was limited after

Study/Year	Details	Country/ Region	Sector	Key findings
				privatisation • Improvement in the portion of the population with access to safe water was undermined by the existence of a high number of disconnections for non-payment
Birdsall and Nellis (2002)	Reviews the growing (but still uneven) literature on the distributional effects of privatisation	Mexico, Bolivia, Sri Lanka, India, Malaysia, Egypt, China, the Czech Republic, Georgia and Russia	Electricity Telecom	Access • A widespread result of utility privatisation is network expansion and increased access to the service, especially the urban poor
Haanyika (2006)	Analyses the influence of power-sector reforms on rural electrification (RE) and outlines the policies and institutional measures required for continued RE in a reforming and reformed power sector	Developing countries	Electricity	Access • In most instances, reforms resulted in the reduction of RE rates and lower electricity consumption levels
Harris (2003)	Aims to distil the experience with the private provision of infrastructure over the last 15 years in developing countries	Developing countries	Telecom Water supply and sanitation Electricity	Access • As far as service expansion is concerned, the evidence suggests that in many cases, the private sector does as well or better than public provision. The results have been particularly impressive in the telecommunications sector. • Well-designed private water and sanitation and electricity schemes have also seen impressive results in terms of service expansion • There is little evidence to suggest that provision of water and electricity services

Study/Year	Details	Country/ Region	Sector	Key findings
				to the poor will suffer due to PSP Quality • One of the main benefits of PSP was the reduction of leakages in meter reading and billing related to provision of electricity • Improvements in collection of bills were often rapid in electricity companies with private participation • Energy losses reduced substantially with PSP in the electricity sector • Improvements in service reliability and continuity of electricity brought major benefits to consumers
Jamasb et al. (2004)	Reviews the empirical evidence on electricity reform in developing countries	Developing countries	Electricity	Quality • In Chile, privatisation resulted in lower energy losses, quality of service and access Access • Policies aimed at improving access to services can be effective and combined with privatisation • Reforms also appear to have expanded access for urban customers
Lobina (2005)	Discusses the structural factors preventing PSP from delivering the efficiencies and social benefits expected in theory	Transition and developing countries in Latin America	Water and sanitation	Access • The profit motive of the private provision seemed extremely difficult to reconcile with service delivery to the poor without public subsidies or the alteration of the original contractual agreement
Marin (2009)	Analysed the performance of PPP projects in urban water utilities from four dimensions	Performance of 65 large water PPP projects in developing countries	Water	Access • Overall performance of concessions for expanding access has been mixed. They failed to invest the amount originally committed and did

Study/Year	Details	Country/ Region	Sector	Key findings
	– access, quality, operational efficiency and tariff Type of PSP: privatisation, excluding BOT projects Duration: Projects in place for at least 5 years (3 years in the case of management contracts)			not meet their original contractual targets • Concessions with private finance complemented by public finance performed better • Performance of leases-affermages were usually more satisfactory Quality • Improved service quality by reducing water rationing and improving service continuity
Noll et al. (2000)	Identifies potential problems and advantages of private operation by applying economic and political theory Evaluates the reform experiences in six large Latin American cities	Six large cities – Abidjan, Buenos Aires, Conakry, Lima, Mexico City, and Santiago	Water and Sanitation	Quality • Pricing policies led to drastic reduction in UFW in almost all the cities • The design of the reforms was not suitable for coping with water's characteristics: only 2 contracts addressed coverage and UFW; none had provisions for controlling pollution or wastewater use; and there was weak enforcement of the requirements in all cases • Reform improvements were greater in cities where the marginal supply price of water steeply increased, waste water externalities were less and water and safe waste disposal were inexpensive
Wamukonya (2003)	Examines the impacts of power-sector reforms in developing countries	Developing countries	Electricity	Access • It is evident that the reform models being implemented will not facilitate poverty alleviation and will instead marginalize the poor as many employees get laid off, tariffs increase, disconnections rise and the unconnected are ignored

Study/Year	Details	Country/ Region	Sector	Key findings
				• The rural and peri-urban areas remain financially unattractive to the private sector and hence direct government intervention is required Quality • Technical losses decreased among many reformers due to improvements in management and maintenance • Reforms had some success in reduction of technical and 'other' losses, mainly related to theft • In general, connected consumers experienced a more reliable supply with reform
Williams and Ghanadan (2006)	Reviews common features of electricity reforms in developing and transition countries	Non-OECD countries – Bolivia, Ghana, India, Poland and Thailand	Electricity	Quality • Unbalanced consumer contract: tariff increases and payment reinforcement were not compensated for by improvements in service • Customer service was equated to billing, with a strict focus on revenues to the exclusion of consumer concerns

Given this context, our study is both necessary and timely. It is necessary because PSPs are becoming a popular policy initiative across the world due to a prevailing positive rhetoric on the benefits of private participation in delivering infrastructure services. It is therefore important to investigate this stance using empirical data to understand the extent to which PSPs have led to project success and societal benefits, and to shed more light on the debate on the purported benefits of PSPs. In short, to what extent have PSPs worked?

This study is also timely because the recent upsurge of PSPs across the world is nearly two decades old. PSPs are often long-term contracts framed under conditions of uncertainty. The project-shaping phase often takes several years, followed by design and construction phases. Operational agreements often last up to 30 years or more. Only when significant time has passed in operating a PSP is it possible to make any judgement on the success or failure of a project. A large number of PSP projects in developing countries across sectors have only recently been awarded, and our ability to judge the success of these projects is rather limited. However, nearly two decades of experimentation with PSPs enables us to study a number of projects that have significant operational experience, and that

in turn allows us to ascertain their medium- to long-term success. Hence, from a timing perspective, we are in a good position to help partially resolve the debate on the effects and benefits of PSPs in delivering physical infrastructure in the water, electricity and telecommunications sectors.

Several other 'meta' studies have been performed, either within a sector, within a region or even across sectors, that attempt to assess the experiences with PSPs thus far (e.g. Marin, 2009). We believe that our study differs from these in our approach. First of all, our review is limited to the water, electricity and telecommunications sectors. We do not aim to or claim to review 'all' the available evidence on PSPs within these sectors. In particular, we disregard anecdotal evidence. As our methodology section indicates, we apply a rigorous technique for selecting and analysing evidences of PSP performance. We select only those pieces of evidence (articles, papers, manuscripts) that have been rigorously reviewed, and which in turn demonstrate methodological rigour (be it of a qualitative or a quantitative variety) in the conduct of the study. Furthermore, we undertake a detailed coding procedure to ensure that we are able to systematically compare results across studies. By doing so, we do not merely aggregate the evidence received. Rather, the pieces of evidence considered are weighted by rigour and relevance and compared across a discrete set of criteria – access and quality – that are elaborated upon below. We believe that this is one differentiating feature of our study.

Furthermore, the objective of our study is not to choose between the binary alternatives of whether PSPs in water, electricity and telecommunications have been shown to be successful or not. While we provide quantitative support to show the extent to which PSPs have succeeded, failed or had no impact, we also use our selected studies to generate a causal chain of constructs that helps explain success or failure. To take a simple example from the water sector, we can show (as described in more detail in Chapter 4) that the private sector's focus on generating returns on investment, coupled with difficulties in prosecuting stakeholders with illegal connections, often leads to an inability to reduce non-revenue water to a significant enough extent, thereby undermining one of the purported benefits of PSPs in the water sector. A more equitable judicial environment could therefore have led to a more beneficial outcome. Through the coding procedure adopted, we arrive at cause and effect models of PSP performance. This then helps us to understand why some PSPs succeed, whereas others fail. This analysis can then be helpful in understanding when and under what circumstances PSPs are likely to succeed, as well as the necessary and sufficient actions that governments will need to undertake in order to ensure PSP success. These analytical insights are added differentiating features of our study.

1.5 Authors, funders and other users of the review

The authors of the review are Thillai Rajan A., and Ashwin Mahalingam from the Indian Institute of Technology Madras, and Akash Deep from Harvard Kennedy School, Harvard University. The authors all have PhDs and have between them many years of doing independent research projects as well as providing research guidance to PhD students. The authors have extensive experience of doing research on the infrastructure sector.

The authors have also been involved in various research projects that involved an assessment of existing knowledge on the subject. For example, Thillai Rajan Annamalai and Akash Deep did a previous systematic review on the impact of changes in transparency on outcomes in infrastructure.

In 2011, the Australian Agency for International Development (AusAID) commissioned a series of systematic review studies that were relevant for policy. This systematic review was commissioned by AusAID as a part of this pilot exercise.

The EPPI-Centre, Social Science Research Unit, Institute of Education, University of London, provided the technology and advisory support for the review.

The results of this review will be particularly useful to multilateral and bilateral funding agencies and policy makers in governments.

1.6 Review questions

The question for the systematic review was:

> Does private involvement (including public-private partnerships) in the delivery of water, telecom and electricity services lead to improved access and quality of service in developing countries?

To make it more specific, the above question was divided into four questions:

1. Does PSP influence the access and quality of infrastructure in developing countries?
2. What are the underlying mechanisms that explain the impact of changes in access and quality as a result of PSP?
3. In instances where the impact has been negative or insignificant, what are the impediments to PSP that prevent the realisation of the expected positive outcomes?
4. What do the findings suggest about the interdependencies with other reform components and outcomes?

1.7 Outline of the report

The report is organised in five chapters. The current chapter introduces the report. Chapter 2 describes in detail the methodology adopted. Chapter 3 provides a description of the identified studies using the methodology stated in Chapter 2. Chapter 4 provides the results of the in-depth review of the studies identified in Chapter 3. Chapter 5 highlights the key findings, implications and certain limitations of the review.

2. Methods used in the review

This chapter provides the details of the search strategy and the methods used to identify the studies to be included in the review. The process comprises the following steps:

- formulating exclusion and inclusion criteria to be used to determine the studies to be included in the review
- deciding the sources and the search methods (search phrases) to be used to identify the studies
- managing the shortlisted and identified studies using a review management software

The entire search process was carefully documented and the number of studies identified was recorded at each stage so that the entire process can be replicated, if need be, by other research groups. In addition, documenting the search process will also help in updating the review in the future to include additional studies that might have been carried out. Documenting the search process and the use of well-defined exclusion and inclusion criteria also helps to reduce the study selection bias that might occur in non-systematic reviews.

2.1 User involvement

2.1.1 Approach and rationale

Evidence-based policy decision making is emerging as a major imperative. In recent times, international funding and development agencies have been increasingly using past evidence as one of the important parameters in their funding and developmental assistance decisions. The authors of this review clearly understand this imperative and would therefore target the review towards policy makers and practitioners.

2.1.2 Methods used

User involvement was achieved at three stages of the review. The first was at the protocol stage, when, in addition to a review of methods, we also requested the EPPI-Centre, the review co-ordinating agency for this study, to have the protocol reviewed by the policy team of the funding agency. The protocol was revised by including their suggestions. This ensured that the review adequately addressed those questions that were of relevance to the policy makers.

Secondly, we obtained user involvement at the synthesis stage. The draft report with the initial findings was sent to AusAID as well as to the policy makers in our network of contacts so as to obtain their perspectives. The review team also captured the responses from the organisations involved in the promotion of PSP in decision making with regard to the specific infrastructure sectors involved in the delivery of water, telecommunications technology and electricity services.

Finally, the comments and feedback received were incorporated into the revised report, which was again sent out for additional review and comments from policy makers and practitioners. The final report incorporates the comments received from the reviewers of the draft reports. Involving the policy team at AusAID, our personal contacts and the EPPI-Centre during the review helped in understanding

some of the current thrusts of policy makers and resulted in a review that is more appropriate to the end users.

2.1.3 Users of the review

The study is relevant to organisations (research, consulting, training etc.) that work in policy, governance and related areas. It is also relevant for policy making at many levels of government.

2.2 Identifying studies

2.2.1 Defining relevant studies: inclusion and exclusion criteria

Since this is a systematic review, the first step involved is the formulation of appropriate inclusion and exclusion criteria to be used to identify the studies for inclusion in the review. Studies were searched for and shortlisted first by applying the exclusion criteria; those that were excluded were not evaluated further. The studies that remained were then evaluated on the basis of the inclusion criteria. Only those studies that met all the inclusion criteria were considered for further evaluation. Tables 2.1 and 2.2 gives the exclusion and inclusion criteria used for identifying the studies.

Table 2.1: Exclusion criteria

Exclusion criteria	Description
Studies not published in English	Given the time limitations and the language constraints of the research team, only those studies that were published or translated into English were included in the review. Since English is one of the most common languages in which research findings are globally disseminated, we believe that our search is representative.
Studies published before 1995	It was felt that more recent evidence would be more compelling for the policy makers. Therefore we used a cut-off date to exclude studies that were published before that date. Our familiarity with the literature indicated that most of the studies on this topic that focused on developing countries were published after 1995.
Studies that did not analyse access and quality outcomes	Studies that do not measure the effects of PSP on access and quality were not included in the review.
Studies on developing countries	Studies that are only based on data from developed countries or those that do not distinguish developed and developing countries in the analysis were excluded from the review.
Review studies	Studies that were reviews of existing studies were not included in the review. However, these reviews formed rich sources of studies for inclusion in this review.

Table 2.2: Inclusion criteria

Inclusion criteria	Description
Context of the study	Only studies pertaining to developing countries and the 'transition or emerging' economies as classified by the World Bank were considered. Broadly, the review covers studies concerning: African countries; countries belonging to parts of South and Central America (Latin America); Asian countries, excluding Japan and the Four Asian Tigers (Hong Kong, Singapore, South Korea and Taiwan); and the transition and emerging economies in Eastern Europe and Central and East Asia.
Domain	Infrastructure segments comprising delivery of water, telecommunication and electricity services. Studies that dealt with supply or distribution of these services to the consumers would form the scope of this review.
Outcomes	Studies that analysed the effects of PSP on access and quality in the water supply, telecommunications and electricity sectors.
Year of publication	Published or completed from the year 1995. Given that most attempts at PSP were undertaken in the early 1990s, the year 1995 has been used as a cut-off as it is felt that most studies relating to this topic have been conducted after that period (such that the results of early PSPs could be observed). While there are merits in not imposing a time restriction on searches, the older studies are likely to have less applicability to current situations, especially on the policy front. A brief literature review also revealed that most studies on PSP had taken place in the past 10 years. Choosing 1995 is a conservative way of ensuring that all relevant studies are captured.

We decided not to specify in the inclusion/exclusion criteria whether the study was quantitative or qualitative. Our initial database searches yielded a large number of hits. The quantitative and econometric studies provide a stronger link between outcome and intervention, but they do not necessarily highlight the causal chain. In addition, these studies do not capture the richness of the context adequately. Therefore, to complement the robustness of quantitative studies we have included qualitative studies as well since they capture the contextual differences and causal chain for evidence in a superior way.

2.2.2 Identification of potential studies: search strategy

Hand search

Firstly, the journals that extensively publish research on infrastructure areas were identified and shortlisted from the earliest issue in 1995 to the latest issue in 2010. The studies published in these journals were manually examined. The citations of original research articles from these journals were exported into EPPI-Reviewer and were subjected to further screening. The list of journals that were hand searched is given in Appendix 2.1. Hand searching ensured that no relevant study from these journals was missed. We started the study identification process with hand search since it would give a good overview of the different types of studies that were done

in this area, the prominent authors and researchers who published on this topic, and different key words that could be used for subsequent automated searches.

Website search
After the hand search of journals, specific websites were searched which would potentially have various unpublished studies and evaluation reports. The list of websites that were searched and the details of the search process are given in Appendix 2.1. The website search further enhanced our understanding of the literature in this area, which helped in sharpening the automated search process of the electronic bibliographic databases.

Electronic databases
The third step in the search process was to search for studies in the electronic bibliographic databases. The different databases that were searched, the search phrases and the type of documents that were included in the search are given in Appendix 2.1. Wild characters were used to capture possible variations in the search terms. The hits were subsequently imported into EPPI-Reviewer, which was used to manage the search results.

Literature search
Fourthly, the search was extended to the relevant studies which had been captured in other review papers.

Reference search
As a next step in the search process, the references of all the studies that were included for the review were checked for additional studies that might not have been captured in the previous searches. In some cases, references in papers that were excluded during full-text screening were also searched.

Direct correspondence
Finally, active researchers in the field were contacted for recent studies and working papers that they might have authored but not yet published. Given their familiarity with the subject area, the list of studies identified for inclusion up to that point was shared and we requested suggestions of studies that could potentially be considered for this review.

In some instances, where access to the studies that were shortlisted from electronic databases was not available, we corresponded directly with the authors requesting a copy of their study.

The EPPI-Reviewer software was used to manage the entire search process. The citations, including the abstracts and the document in PDF format were imported into the Reviewer for screening. In some cases, where the study details could not be directly imported to the Reviewer, it was entered manually so that the entire repository of studies could be managed in the EPPI-Reviewer software.

2.2.3 Identifying eligible studies

After identifying and importing the potential studies from the different sources to the Reviewer, each study went through the inclusion and exclusion criteria at successive stages before its inclusion in the review. The steps for screening of the studies included the following.

Title screening
The first step involved a quick screening of the title of the article in order to establish its relevance for review. Studies not found suitable at this stage were excluded from further evaluation. Those studies for which a decision could not be made based on a review of the title were passed on for abstract screening.

Abstract screening
Abstracts of the studies that were shortlisted from title screening were then reviewed to determine their suitability for this study. If the abstract was found to be unsuitable, the article was not considered any further. The studies were passed on for full-text review when a decision could not be made based on the review of the abstract.

Full-text screening
Full papers or reports were screened for those studies that were shortlisted after title and abstract screening. Before full-text screening, duplicates were identified and deleted using the review management software. The inclusion and exclusion criteria were again applied to the full reports and those that did not meet these criteria were excluded. Studies that qualified for inclusion based on the review of the complete reports were again reviewed by a second researcher to determine their suitability for inclusion in the review. Only those studies where both the reviewers agreed were appraised for quality (see below) to decide on their inclusion into the review.

2.2.4 Quality assurance process

Many of the studies included in the review were published in reputable peer-reviewed journals. This ensured a basic level of quality. In the next stage, the studies (both published papers and unpublished reports) that conformed to the criteria indicated earlier were evaluated using a critical appraisal tool such as the one suggested in Campbell et al. (2003). Appendix 2.2 gives the appraisal tool used in this review.

Two members of the review team, working independently, evaluated and selected the studies for inclusion. The pairs of members, who used the same coding procedure, compared their evaluations and came to a consensus on those studies to be included in the review. In order to ensure consistency, two measures were adopted. First, the team went through an internal moderation phase where both members screened the same citations and compared the differences in judgements to arrive at a common understanding on the assurance process. When the studies were appraised for quality, although each was assessed by two reviewers, there was one common reviewer for all the studies.

In case where a consensus could not be reached between the two reviewers, the reviewers discussed the differences among themselves to arrive at a consensual decision.

2.2.5 Characterising included studies

The studies that remained after the application of the exclusion and inclusion criteria and the quality assurance process were included for the review. Such studies were characterised on the basis of broad features, such as country of study, sectors analysed, type of PSP, type of study, aims of study, data sources and data collection instruments, outcomes analysed and indicators, methods used to analyse data, including details of checks on reliability and validity, summary of results, conclusion, and the overall assessment of the study findings relevant to the review based on the critical appraisal questions. This helped to achieve a broad characterisation and overview of the included studies. Characterisation of the studies included in the review is given in Appendix 2.3.

2.3 In-depth review: synthesis process

2.3.1 Overall approach to and process of synthesis

The studies that were identified for inclusion were characterised by substantial heterogeneity in terms of the type of data, methodologies used, outcomes analysed, etc. It was therefore felt that using a single synthesis method would not adequately capture and explain the evidence in these studies. We have therefore used three approaches to synthesise the results, and the inferences have been derived from a combination of these procedures.

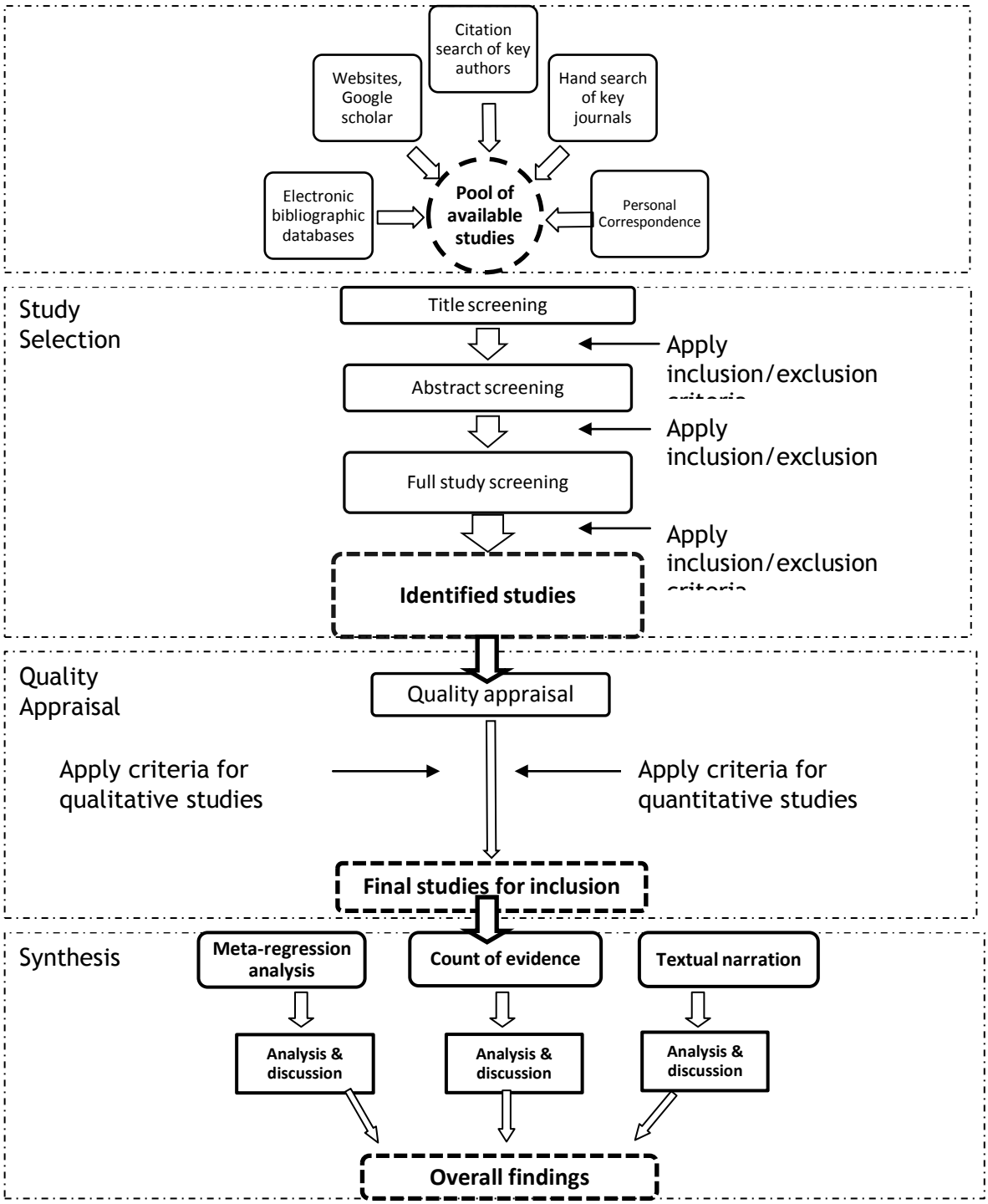
First, we used meta-regression analysis to synthesise the evidence in quantitative studies. Obviously, the studies used for meta-regression are only a sub-set of the total studies that were included in this review, since not all the studies had information suitable for synthesis using this approach. Second, we used a count of evidence approach to provide a numerical summary of the evidence obtained from all the included studies in the review.

Third, a narrative approach was used to synthesise the evidence in all the studies included in this review since it is better suited for reviews that aim to describe the existing body of literature; identifying the scope of what has been studied, and the strength of evidence available. In addition, this approach is useful in synthesising evidence of different types, such as qualitative, quantitative, economic, etc. (Lucas et al., 2007). Textual narrative also makes the context of the study clearer and is more likely to make the heterogeneity between studies transparent (Barnett-Page and Thomas, 2009). Since textual narration helps to bring out the heterogeneity between studies, this method is suitable for synthesising evidence from the qualitative studies too.

All studies selected for inclusion in the review were coded, and this was used to prepare the narrative synthesis. The coding of the studies facilitated a common understanding among all the members as well as the learning that could be gleaned from them for inclusion in the textual narrative.

A schematic overview of the study identification and synthesis process is given in Figure 2.1.

Figure 2.1: Schematic overview of study identification and synthesis



2.3.2 Meta-regression analysis

Introduction

Meta-analysis has been widely used in the medical and social sciences, where studies use data collected mostly from controlled experiments. However, in economic and public policy research, studies make empirical estimations employing regression-based econometric estimations and not from controlled experiments. Thus, meta-analysis is implemented differently in economics and is called meta-regression analysis (MRA) (Stanley and Jarrell, 1989) as it synthesises the coefficient estimates (slopes) from studies employing a regression-based technique.

A meta-analysis is developed in this review to provide a systematic test for the impact of PSP across studies on access and quality in the electricity, telecommunications and water supply and sanitation sectors. Meta-analysis quantitatively synthesises a collection of analysis results from empirical literature on a particular topic for the purpose of integrating the findings. It provides statistical explanations for the differences in results reported in the empirical literature, thus providing the same methodological rigour in a literature review as in experimental research.

Methodology

The focus on the synthesis of regression slopes is very recent, and hence the methodologies for summarising regression slopes have received less attention in statistical literature. Certain features inherent in the primary studies that involve econometric estimations make it difficult to synthesise the slopes from the estimations. The diverse complex econometric models used by researchers to model the effects of multiple predictors and for controlling potential endogenous and confounding variables in primary studies, the non-equivalent metrics of the predictors and outcomes across studies and the lack of information in the studies are some of the issues to be overcome.

In spite of this, several univariate and multivariate analytic approaches have been proposed for the synthesis of regression slopes. Most of these methods are univariate approaches (simple slope summaries, summaries of *t*-statistics, dose-response models, validity generalisation approach, univariate weighted least squares approach) which focus on the synthesis of only a single focal slope and simply ignore the dependence among the slopes, thus avoiding some of the issues and assumptions that underlie the synthesis of the sets of regression slopes. Some other approaches are more complex and some require access to raw data (iterative least squares approach, multivariate Bayesian approach); these are not suitable for a meta-analytic context. The various approaches or methods available for combining the regression slopes, along with their data requirements, estimation technique, strengths and weaknesses have been summed up by Becker and Wu (2007), who provide an overall view of the suitability of these approaches for a meta-regression analysis.

The present study is concerned with the impacts of PSP on access and quality. The predictor variable or the slope for such a study is that of private ownership in the primary studies. The quantitative studies pertaining to this review have mostly used panel methodology for estimating the impacts of PSP on access and quality. Based on the data obtained from these studies and the robustness of the methodologies available for a meta-analysis, it seems more appropriate to synthesise the regression results from the primary studies using the *t*-statistic (that is, the slope divided by its standard error) as suggested by Stanley and Jarrell (1989). The use of the *t*-statistic helps to deal with the problem of heteroskedasticity of slopes across studies that arises because of sample size

differences and differences in precision. Also, a *t*-statistic has no dimensionality, which helps to overcome the problems caused by the use of different scales/units across studies.

The meta-regression model to integrate and explain the diverse findings in the current review begins with the following equation (Stanley and Jarrell, 1989):

$$b_j = \beta + \sum_{k=1}^{K} \beta_k Z_{jk} + e_j \qquad j = 1, 2, \ldots L \tag{1}$$

where b_j is the reported estimate of β of the jth study (assumed as the effect size); β is the true value of the parameter of interest (here the *t*-statistic for the coefficient associated with the variable of private ownership); Z_{jk} are the meta-independent variables that measure relevant characteristics of an empirical study; β_k the coefficients associated with those independent variables; and e_j the meta-regression disturbance term.

The dependent variable in MRA is the estimated regression coefficient in the primary studies. Each of the primary studies used for the meta-regression analysis may have used different data sets, different sample sizes and different independent variables, which implies that the variances of these estimated coefficients may not be equal. Therefore, we can suspect that the meta-regression errors will be heteroskedastic. Stanley and Jarrell (1989) suggested a transformation of equation (1) by dividing all the terms in the equation by the standard error of the coefficient b_j, in order to tackle this potential problem of heteroskedasticity. Hence, equation (1) transforms as:

$$T_j = \frac{b_j}{S_b} = \frac{\beta}{S_b} + \sum_{k=1}^{K} \frac{\beta_k Z_{jk}}{S_b} + \frac{e_j}{S_b} \qquad j = 1, 2, \ldots L \tag{2}$$

where, T_i is the *t*-statistic of the coefficient $b_{j,}$ and S_b is the standard error of the coefficient b_j. The b_j in equation (1) as the effect size have dimensionality, that is, they have units of measurement attached to them. The reported *t*-statistic is a standardised measure of the critical parameter of interest, which has no dimensionality. It is to be noted that the intercept in equation (1) and the coefficient associated with $1/S_b$ in equation (2) is the same β. Following Stanley (2005), we substitute the inverse of the standard error with the sample size. Thus, the coefficient of the variable sample size will be the parameter that measures the true effect. From an econometric point of view, equation (2) could be rewritten as:

$$T_j = \alpha + \beta_1 Samplesize + \sum_{k=1}^{K} \frac{\beta_k Z_{jk}}{S_b} + e_j \tag{3}$$

Equation (3) now forms the basis of the empirical analysis for the review. The magnitude and statistical significance of β_1 in the model will provide empirical evidence of a true effect of the relationship examined. The magnitude of the *t*-statistics will systematically vary with the sample size or the degrees of freedom (in a regression model, 'degrees of freedom' is the sample size less the number of regressors in the model) only if there is a systematic empirical effect.

The choice of the meta-regression equation and its estimation depends on the data dimensions used for analysis. Potential data problems that could have substantial implications on the choice of the model include the sample heterogeneity, heteroskedasticity of effect-size variances and the dependency of multiple observations from the same primary study. The Stanley-Jarrell model specified above (equation (2)) takes into account the issue of heteroskedasticity. The

heterogeneity in the data set is addressed by the inclusion of appropriate moderator variables in the meta-regression equation.

The study uses a dataset from 17 primary studies that yield 90 observations for MRA, and there is enough reason for suspecting that there may be dependency issues in these observations. Four studies yield a total of four effect size estimates, seven studies yield a total of 16 estimates, four studies yield a total of 21 estimates and 2 studies yield a total of 49 estimates, i.e., one-third of the studies produced over three-quarters of the estimates (Table 2.1). Obtaining multiple estimates from a study was inevitable as there were alternate estimations with varied sample sizes and also because some studies estimated the impact of PSP on different outcome measures. When there were alternate estimations in a primary study with the same data set, only the effect sizes from the most robust estimation was chosen for analysis. However, many other factors, like the focus of the researcher, the estimation techniques used and other common geographic specificities of the data used in the primary studies could lead to the dependence of the observations in our sample.

For ensuring non-dependence of the observations in the sample, a panel data approach is used in the analysis by interpreting each study as providing a panel of observations and thus forming an unbalanced panel. Equation (3) was then rewritten as:

$$T_{ij} = \alpha + \beta_1 Samplesize_{ij} + \sum_{k=1}^{K} \frac{\beta_k Z_{ijk}}{S_b} + e_{ij} \quad (4)$$

where, the sub-script *ij* represents the *i*th estimation in the *j*th study. This equation was estimated using the usual panel data estimation technique.

An important issue in meta-analysis is to identify the possible existence of publication bias. This arises because the possibility of the studies (primary studies) getting published is greater when significant relationships between the variables of interest are found, leading to incorrect conclusions that a policy is effective. With regard to the relationship examined in this review, there could also be a possible bias of reporting negative or no effects which could be intended to show that the privatisation policies are ineffective. Stanley (2005, 2007) suggested the funnel asymmetry test (FAT) for the detection and correction of the possible publication bias in MRA.

The FAT relies on the statistical property that the standard error of estimates becomes smaller as the sample size increases. Thus, studies with larger sample sizes may have smaller publication biases. The FAT examines the relationship between a study's reported effect (*t*-statistic) and the standard errors of its coefficients. Hence, we estimate the following equation:

$$T_i = \beta_0 + \beta_1 (\frac{1}{SE_i}) + \varepsilon_i \quad (5)$$

where *T* is a study's reported *t*-statistic and *1/SE* is the inverse of the standard error. As suggested by Stanley (2005, 2007), the statistical significance of the intercept β_0 is a test for publication bias. If $\beta_0 = 0$, publication bias is absent and when $\beta_0 \neq 0$, there is evidence of publication bias. Additionally, as explained earlier, the coefficient β_1 provides an estimate of the true empirical effect of the relationship examined. The observed effects randomly vary around the true value if publication bias is absent. The variable *1/SE* is subject to measurement errors that affect the econometric estimates in the primary study. Therefore, the square root of the sample size could be used as an instrument for *1/SE* as sample size is not subject to estimation errors and the standard errors and sample size are highly correlated.

Stanley (2005, 2007) also suggests the use of a meta-significance test (MST) to identify an overall genuine empirical effect. The test examines the relationship between a study's *t*-statistic and its degrees of freedom, and is based on the statistical property that the magnitude of the *t*-statistic varies systematically with the degrees of freedom when an overall genuine empirical effect exists. For the MST, the relationship between *t*-statistics and degrees of freedom is examined in this review using the logarithmic form, and the equation to be estimated is specified as follows:

$$Ln(|T_i|) = \alpha_0 + \alpha_1 Ln(df_i) + \varepsilon_i \quad (6)$$

where $|T_i|$ is a study's reported *t*-statistic in absolute values and *df* is the corresponding degrees of freedom. On estimating equation (6), if $\alpha_1 = 0$, the *t*-statistic will not show any clear relationship with the degrees of freedom indicating no evidence of an overall genuine empirical effect. On the contrary, if $\alpha_1 \neq 0$ the observed magnitude of the *t*-statistic will vary with its degrees of freedom and this provides evidence of the existence of a systematic effect. In this review, we use the *t*-statistic of the coefficient associated with the variable for private ownership in a regression where the dependent variable is either access to a particular service or the quality of the service (product and service quality). A statistically significant α_1 will provide evidence for the existence of a genuine empirical effect of PSP on access and quality.

Table 2.1: Number of estimations used in the meta-regression analysis by study

Study	**Number of estimations**
Berg et al. (2005)	1
Fink et al. (2003)	1
Maiorano and Stern (2007)	1
Sen and Jamasb (2010)	1
Ros (1999)	2
Ros and Banerjee (2000)	2
Fink et al. (2001)	2
Gutierrez (2003)	2
Ros (2003)	2
Wallsten (2001)	3
Nagayama (2010)	3
Clarke et al. (2004)	4
Estache et al. (2009)	4
Carrillo et al. (2008)	5
Andres et al. (2008)	8
Andres et al. (2006)	20
Gassner et al. (2007)	29
Total	90

2.3.3 Count of evidence

Introduction

Light and Smith (1971) have indicated that count of evidence is a review technique that helps to gather the body of evidence related to a theoretical relationship, count the percentage of tests that support the relationship, and use that percentage as the basis for drawing conclusions about the state of the literature. While there are some limitations to synthesising evidence by count of evidence (Combs et al., 2011) we feel that the findings obtained from such a synthesis can complement the findings obtained from other approaches. While vote counting is generally used to synthesise evidence from the statistical results of independent studies, in this study we have adopted an approach to synthesise results from both quantitative and qualitative studies. The objective of this exercise is to understand the state of the literature and provide a foundation for the textual narrative synthesis done in the next chapter.

Synthesis process

The procedure for synthesis process used in this section can be described as follows. For all the studies that qualified for inclusion in the review, the relationships or associations between PSP and the outcomes were captured. In addition to capturing the presence of evidence, we have also recorded the strength of the evidence, particularly in quantitative studies, where this information was available. In such cases, the strength of the evidence was used to identify the impact on outcomes, i.e., even though the coefficient of the appropriate variable was positive, the impact was recorded as positive only when the coefficients indicated statistical significance at least at the 10% level. Many of the studies (such as Barrera-Osorio and Olivera, 2007; Clarke et al., 2004; Estache et al., 2009; Fink et al., 2003; Gassner et al., 2007) have used the 10 percent level of statistical significance in discussing the results, and moreover, using the significance level of 10% to discuss the results is common in PSP type interventions. Thus, given the policy focus of this review, we have also retained the 10% significance level as a benchmark.

In the synthesis process, the findings of each study were extracted in a template covering: study sector (electricity, telecom, water supply); sub-segments within the sector if any (for example, in the case of telecom, the sub-sectors were fixed and mobile telephony); the level at which the findings were presented in the study (i.e., whether the findings were at the global, regional, country or firm level); the type of PSP studied; the outcomes that were studied (i.e., access and quality (product and service quality); and the impact of interventions or the level of transparency on the outcomes (positive, negative, or no impact). In addition, the type of analysis and the nature of the outcome variables were also noted. The count of evidence synthesis in this chapter differs from the traditional vote counting method, which is used for combining results only from statistical studies. The synthesis used in this review is based on all the included studies, both quantitative and qualitative.

In total, 424 observations were obtained from 67 studies, which formed the basis for the synthesis of the results using the count of evidence approach. The results are presented in four sections - overall results that combine the evidence of all the sectors, followed by individual sections that analyse the evidence in each of the sectors.

Independence of study observations

In a count of evidence approach (as in other forms of meta-analysis), it is important that the observations (or effect sizes) from the different studies are independent, as non-independent findings from primary studies can lead to bias in

synthesis results. Non-independency or co-relations between findings of various studies can occur from (Ringquist, 2013):

- studies analysing multiple interventions, but using the same control sample for all the interventions;
- one or more studies using a common data set;
- one or more studies having common research teams; and
- having multiple effect sizes per study.

We used the following approach to minimise the occurrence of non-independence in the count of evidence approach.

- We chose the 'one best' effect size when there was more than one estimation for the same study characteristics. In such cases, we used only those evidences from the most robust model in the study.
- We ensured that similar findings in different studies but using common data set were not considered.

2.3.4 Textual narration

The narrative synthesis process

First, the studies were analysed through various processes such as application of inclusion/exclusion criteria, title screening, abstract screening, full-text screening and study characterisation. At the end of these processes, we had sufficient information on the variables analysed in the studies, the theories of change reported and the factors that led to the success or failure of the PSP model in improvement of access and quality in the provision of infrastructure services. On the basis of this information, we then began the content analysis of the qualitative studies.

The constructs or themes observed in a study were identified and represented in the form of short textual descriptions, called 'nodes'. The coding can be carried out in two ways: i) if a researcher has knowledge about the themes to be looked into in an article, then the node structure can be created before the start of the coding process; or ii) a researcher can create nodes during the process of coding.

We prepared a node framework for coding relevant information in a study. During the process of coding, we took care not to confine the emerging concepts from a study to our node framework. Whenever a new construct emerged in a study which was not covered in the existing node framework, we added a new node to cover this. In that way, our node framework was dynamic, and evolved during the process of coding. While preparing a node, we ensured that it was neither too specific, based on a one-off phenomenon observed in a study, nor so generic as to restrict enrichment of the description of a concept observed in a study.

The second step involved visual representation of the constructs discussed in a study. We created models to visualise, explore and present the connections between themes.

The third step involved the synthesis of concepts observed in the different studies. Each model was studied in detail for variables and the linkages discussed in the study. Most of the studies had more than two linkages. This was followed by the identification of commonalities between models from different studies. We primarily looked into causal links repeating across different models.

Finally, consolidated models were prepared by aggregating different causal links observed in a single model. These consolidated models comprised different nodes which highlighted a concept/phenomenon of interest and the studies wherein the phenomenon was observed. These different nodes were connected by the

directional arrows representing relationships between nodes. We discussed the themes in the following manner. First, we described the evidence from the studies in terms of the variables that created bottlenecks in improving access and quality in the provision of water supply and sanitation (WSS) services. Where studies existed that discussed effective management of these variables resulting in positive outcomes, we presented the evidence from these studies. Second, we discussed the interventions for improving access and quality in the provision of WSS services with PSP models. We divided the interventions into two categories – contractual and policy interventions – based on strategies for improvement reported in different studies. Also, wherever we had positive evidence about a phenomenon of interest discussed in our studies, we probed further into the variables which led to the positive outcomes.

The content analysis helped to identify appropriate policy and contractual interventions that could improve outcomes from PSP. The focus of contractual interventions is on improvements in the risk allocation framework, financial structuring, the design of payment mechanisms, the construction, operation and maintenance strategy, the management of stakeholder consultation and so on. Policy interventions aim to improve the overall institutional and policy environment surrounding a PPP project in terms of the laws, regulations and mechanisms for providing financial support to a PPP project, and bureaucratic and political commitment.

2.4 Summary

Findings from these multiple methods of synthesis complemented each other. Meta-regression analysis involved a more rigorous synthesis of evidence using quantitative tools and techniques. Synthesis using count of evidence, on the other hand, though considered a conservative approach, gave a holistic view of the evidence. Textual narration would help to bring out the causality between interventions and outcomes in greater detail.

3. Identifying and describing studies: Results

3.1 Overview

In total, 67 studies qualified for inclusion in this review after applying the exclusion and inclusion criteria followed by the quality appraisal. Since the number of studies that qualified for inclusion were within manageable limits, all the studies that qualified for review were included in the synthesis. There was no further sampling of studies from the final list of studies for inclusion in the review.

3.1.1 Selection of outcome data for synthesis

Evidence on the impact of PSP was synthesised on access and quality outcomes. Since the variables used to measure access and quality differed among the studies, our synthesis included all access and quality variables used in the studies. Quality outcomes were further classified into product quality, if the variable was related to the physical delivery of the service, or service quality, if the variable pertained to service and other related aspects of delivery. The outcome variables that were used in different studies are given in Appendix 2.3.

3.2 Results from searching and screening electronic databases

Among all the database sources, the electronic database search involved the most exhaustive effort. Table 3.1 gives details of the hits obtained from each of the databases and the number of papers that were shortlisted based on title and abstract after removing the duplicates.

Table 3.1: Hits obtained from different databases

Database	Number of hits	Studies remaining after filtering based on title and abstract
EBSCO – Business Source Complete	444	31
Emerald	555	0
JStor	38	7
ProQuest	300	31
ScienceDirect	118	70
Springer Link	34	0
SSRN	621	7
Wiley Online Library	137	15
Total	2247	161

Full documents were then reviewed for the above 161 studies. After applying the inclusion and exclusion criteria, followed by quality appraisal, 31 studies from the electronic database searches qualified for inclusion.

3.3 Description of the included studies

Table 3.2 gives the number of studies obtained from different sources. Searches from electronic databases contributed 46% of the studies included in the review and accounts for the largest proportion of included studies. This indicates that the search strategy has been reasonably effective. References from previous reviews contributed about 22% of the studies and cross references about 15%. This indicates the contribution of various sources in identifying the relevant studies for this review.

Table 3.2: Studies from different sources

Source	No. of studies	Percentage
Electronic database	31	46
Previous reviews	15	22
Website search	7	10
Personal communication	4	6
Cross references	10	15
Total	67	

The number of studies in each sector is given in Table 3.3. It can be seen that there has been good representation of all the sectors. Whenever a study covered more than one sector, it was counted individually in each. This explains why the sum of all the studies in each of the sectors is more than total number of studies in the review.

Table 3.3: Studies in different sectors

Sector	No. of studies	Percentage (of 67 studies)
Water	25	37
Telecom	26	39
Electricity	20	30

Table 3.4 gives the number of studies by the year of publication. As can be seen, recent studies constitute a higher proportion of the total studies. This implies that most of the evidence included in this review is recent, and also justifies the decision to make 1995 the cut-off point.

Table 3.4: Distribution of studies by year of publication

Year of publication	No. of studies	Percentage
1995-1999	7	10
2000-2004	28	42
2005 onwards	32	48
Total	67	

Table 3.5: Regional distribution of studies

Geographical area	No. of studies	Percentage (of 67 studies)
Africa	26	39
Asia	21	31
Latin America	37	55
Europe	10	15

Analysis of the regional distribution of the studies (Table 3.5) indicates that Latin America accounts for the highest number of studies. However, there are a good number of studies in the African and Asian regions too. Since Europe does not have a large number of developing countries, the number of studies that are based on data from the European region is also smaller. However, the widespread distribution of studies across the main geographies indicates the global nature of the review.

Table 3.6 gives the number and proportion of studies in different sectors in each of the geographical regions. It can be seen that the studies in telecom are more evenly distributed across the three main geographical regions. In the water and electricity sectors, the number of studies from Asia is not very high. However, Africa accounts for a good proportion of the studies in each of the sectors. This indicates that PSP is more common in countries in Latin America and Africa, as compared to Asia.

Table 3.6: Cross-tabulation of sector and regions covered in different studies

Sector	Africa	Asia	Latin America	Europe	Number of studies
Water	8	7	15	2	25
	32%	28%	60%	8%	
Telecom	13	12	14	7	26
	50%	46%	54%	27%	
Electricity	8	4	11	3	20
	40%	20%	55%	15%	
Number of studies	26	21	37	10	67

Table 3.7 indicates the number of studies by type of PSP. Though there are evidences available for all forms of PSP, concessions and divestiture forms of PSP account for bulk of the studies. This indicates that these are the most common forms of PSP in the electricity, telecom and water sectors.

Table 3.7: Studies by type of PSP

Type of PSP	No. of studies	Percentage (of 67 studies)
Service contract	1	1
Management contract	11	16
Lease	9	13
Concessions	24	36
Divestiture	37	55

Studies were classified into three types based on the nature of the study – qualitative or quantitative, or mixed if they had both qualitative and quantitative elements. As Table 3.8 indicates, more than half of the studies included in the review were qualitative in nature. Pure quantitative studies accounted only for 36 percent of the studies. This heterogeneity is one of the main reasons for adopting multiple synthesis approaches in this review.

Table 3.8: Nature of the study

Nature of study	Electricity	Telecom	Water	Number of studies	Percentage (of 67 studies)
Qualitative	7	14	15	35	52
Quantitative	9	12	6	24	36
Mixed	4	0	4	8	12
Total	20	26	25	67	

Table 3.9 gives the number of studies based on the type of data sources. Studies using primary data accounted for only 25% of the total, with studies using secondary data contributing the remaining 75%.

Table 3.9: Studies by type of data used

Data type	No. of studies	Percentage
Primary	4	6
Secondary	50	75
Both	13	19
Total	67	

Most of the studies included in the review used qualitative approaches in the analysis. Studies that used econometric methods such as regressions accounted for only 30 percent of the studies.

Table 3.10: Studies by type of methodology

Methodology	No. of studies	Percentage
Econometric	20	30
Qualitative approaches	39	58
Statistical	8	12
Total	67	

Studies used a variety of analysis methods, as indicated in Table 3.11. The largest number used before/after analysis, and panel data analysis accounted for the second highest number of studies.

Table 3.11: Studies by type of analysis

Type of analysis	No. of studies	Percentage (of 67 studies)
Cross-sectional	7	10
Time series	1	1
Panel data	19	28
Longitudinal	11	16
Before/after	41	61
Retrospective uncontrolled	2	3
Treatment/controlled	3	4

3.4 Summary

This chapter has presented a summary of the search process and a description of the studies that have been identified for inclusion in the review. Chapter 4 presents the results of the synthesis and the in-depth review.

4. In-depth review: Results

4.1. Overview

This chapter presents the results of the in-depth review. As indicated in Chapter 2, a multi-faceted approach was used. This chapter presents the results of synthesis from the three approaches: meta-regression analysis, count of evidence and textual narration.

4.2 Meta-regression analysis

This section presents the synthesis of the results/data from relevant quantitative studies that were included for in-depth review. Of the 20 econometric studies, 17 form the sample for meta-regression analysis in this chapter. A total of 90 observations were extracted from these studies with 50 observations forming the sub-sample for access and 40 observations for quality. For meta-regression analysis, both product and service quality were grouped together for analysis.

4.2.1 Empirical approach

The meta-analysis for the synthesis of the results of the quantitative studies on the impacts of PSP on access and quality has two major goals. First, to examine the influence that the study characteristics, such as sample size, type of PSP, type of impact (service/product quality), type of outcome variable used (absolute/ratio/growth), sectoral differences, functional forms and the estimation techniques used, geographic area/region, have on the findings from the empirical studies examining the impacts of PSP. Second, the analysis empirically checks for the overall genuine effect and whether these effects are contaminated by possible publication bias.

Meta-regression equation

The meta-regression equation that is estimated for examining the influence of different study characteristics of the primary studies on the reported results (*t*-statistic/effect size) is as follows:

$$T_{ij} = \alpha + \beta_1 samplesize_{ij} + \beta_2 PSPType_{ij} + \beta_3 Panel_{ij} + \beta_4 Conf_{ij} + \beta_5 Elec_{ij} + \beta_6 Tele_{ij} + \beta_7 Ratio_{ij} + \beta_8 Growth_{ij} + \beta_9 \text{Re}\, gion_{ij} + \varepsilon_{ij} \quad (7)$$

This equation comes from equation (4) derived under the methodology section. The dependent variable (*T*) in equation (7) is the *t*-statistic of the dummy variable for private ownership that measures the access and quality impacts of private ownership in the primary study. The explanatory variables of the meta-regression equation, also called the moderator variables, are particular characteristics of the empirical studies included in the analysis. These variables are study descriptors that represent the observed sources of heterogeneity in the primary studies. The statistical significance and positive sign of the coefficient of an explanatory variable means that the studies which possess that particular characteristic are more likely to demonstrate positive impacts of PSP on access and quality. A statistically significant negative coefficient means that a higher value of this characteristic in the study is likely to indicate negative impacts of PSP.

A common meta-regression moderator variable is the sample size of analyses in each study, as studies with a larger sample size are considered more robust. The parameter β_1 shows the true effect of the relationship between PSP and its impacts on access and quality (as explained in the methodology section). Testing the statistical significance of the coefficient of the *Samplesize* variable, β_1 helps to

conclude the existence of a systematic empirical effect. A positive and significant coefficient suggests evidence of positive PSP impacts.

The review includes studies that have examined the impacts of different types of PSP – service contract, management contracts, leases, concessions and divestitures. The service contract, management contract, and lease forms of PSP are usually for shorter periods and the private sector is responsible only for the operation, management or maintenance of the facility. Concessions and divestiture are forms of PSP where the involvement of the private sector is for longer periods or of a more permanent nature. The concession form of PSP, where private providers make capital investments to build and operate the new facility, is for a specific duration. On the other hand, divestiture involves transfer of all or part of the assets and operating rights to a private investor permanently. The impacts of these different types of PSP on outcomes also differ. Thus, based on the duration of the contract, the types of PSP covered in the studies are broadly classified as long-term and short-term forms of PSP (*PSPType*), for the purpose of analysis.

Most of the analyses of the quantitative studies included in this review have used panel estimation procedures. There are few observations from studies which use a dynamic panel model, stochastic frontier model, binary probit model etc., which require specific estimation procedures and interpretations and could have an impact on the PSP effects. A moderator variable that captures the differences in estimation procedures (*Panel*) is included in the model. This dummy variable takes the value of 1 for the usual simple panel estimations and 0 otherwise.

Apart from the differences in the estimation techniques used in the studies, there are differences in the independent variables included in the regressions. A particular slope's precision and degree of bias depends on the other independent variables in the model. Omission of certain potentially relevant independent variables (confounding variables) could generate biased estimates. In order to account for this, a dummy variable (*Conf*) is introduced which takes the value of 1 if the estimated model in the studies has more than five independent variables and 0 otherwise.

Aggregating studies across the sectors – water and sanitation, telecommunications and electricity – could result in some estimation bias, as the implementation and impact scenarios of the intervention in these sectors may differ. Dummy variables that take the value 1 for a particular sector and 0 otherwise (*Elec* and *Tele* for the electricity and telecommunication sectors respectively, with *Water* as the base category) are included as moderator variables to capture the sector-specific PSP impacts.

The outcomes used in the studies for analysing the PSP impacts are measured either in absolute numbers, as ratios or as the growth rates for the treatment and control groups in the analysis. An increase in absolute numbers is a weak measure of outcome improvements, as these increases could be attributed to other factors, like population increases caused by sudden migration. Counting the increase in numbers per unit of population (ratio) would thus serve as a better indicator of improvements in outcome. The annual growth rate of the outcome in countries/regions with and without the intervention serves as a still stronger measure of the effects of the intervention. To capture the impact that the type of outcome variable used has on the effect of the intervention, two dummy variables (*Ratio* and *Growth*, with *Absolute* as the base category) are used.

A moderator variable is included for the geographical regions examined in the primary studies. The reforms in local public services were mostly tested (quantitative studies) in the African, Asian and Latin American regions. A dummy

variable (*Region*), assuming the value 1 when a primary study examined PSP impacts for a region, differentiates its impact from the global studies.

With the need for analysing the impact of study level covariates on the effect sizes and in the presence of heterogeneous groups across studies in the review, estimating a random-effects meta-regression seems more appropriate. A random-effect model assumes that each of the primary studies reflect a separate 'true' effect size, θ_i. Random-effects meta-regression allows for residual heterogeneity (the between-study variance that is not explained by the covariates) by assuming that the true effect θ_i follow a normal distribution around the linear predictor, i.e., $T_i|\theta_i \sim N(\theta_i, \sigma^2_i)$, where $\theta_i \sim N(\boldsymbol{x}_i \beta, \tau^2)$ and thus, $T_i \sim N(\boldsymbol{x}_i \beta, \sigma^2_i+\tau^2)$.

4.2.2 Sample of included studies and data

The sample of studies used for the analysis are the studies obtained from extensive searches and filtered after applying the inclusion and exclusion criteria (discussed in Chapter 2). The total number of econometric studies that satisfied these criteria for the review was 20 (Table 3.10). Of these, 17 studies were found suitable for inclusion in the sample for meta-regression analysis. The reported results from three studies were not included as there was a lack of information in these studies on the estimation techniques used (Barrera-Osorio and Olivera, 2007) or because the significance parameters of the slopes (standard error or *t*-statistic) were not reported (Estache et al., 2006; Gasmi and Virto, 2010). For example, the study by Estache et al. (2006) used a sample of developed and developing countries on the telecommunications sector and separated out the marginal effects for the developed and developing countries on the outcomes, but did not provide the significance parameters for the marginal effects reported. Similarly, the econometric estimations made in Barrera-Osorio and Olivera (2007) for the water sector used a panel methodology with dummy dependent variables. The results in the study provided the direction of the effect of privatisation on access and quality, but to get the dimension of the effect the information on marginal effects was needed, which was not available.

The explanatory variable of interest regarding access and quality outcomes in the primary studies is PSP in service delivery. Several individual studies that were included had more than one estimation using different data sets or different explanatory variables, and these studies provided more than one observation to the data set for the meta-regression analysis. Thus, the total number of observations derived from the 17 studies for the analysis was 90, with 50 observations pertaining to access and 40 observations on quality. The descriptive statistics of the variables included in the meta-regression equation are presented in Table 4.1.

4.2.3 Estimation results of the meta-regression equation and publication bias tests

Overall results

The estimation results of the meta-regression equation (equation (7)) using data from the whole sample are provided in Table 4.2. The results contain the estimations from both simple meta-regression estimation (MR) and the panel data methodology (Panel). The statistical significance of the parameter β_1, in each of these estimations gives the underlying systematic empirical effect of the relationship between privatisation and outcomes (access and quality). The rationale is that the results of the studies with larger sample sizes would tend to be closer to the true effect.

Table 4.1: Descriptive statistics of study variables

Continuous variables	**Mean**	**Standard deviation**	**Minimum value**	**Maximum value**
t-statistic	0.174	0.265	−7.581	6.944
Sample size	434	45.02	10	2073
Number of observations – Total	90			
Number of observations – Access	50			
Number of observations – Quality	40			
Discrete Variables		Variable=1		Variable=0
PSPType (1=long term; 0=short		83		7
Panel (1=simple panel; 0=other)		82		8
Conf (1=if more than 5 variables in the model; 0=other)		34		56
Elec (1=electricity; 0=other)		44		46
Tele (1=telecom; 0=other)		17		73
Ratio (1=outcome variable is ratio; 0=other)		62		28
Growth (1=outcome variable is growth rate; 0=other)		12		78
Region (1=regional; 0=global)		50		40
ServiceQlty (1=service quality; 0=product quality)		28		12

Column 1 of Table 4.2 provides the meta-regression (MR) estimates of the model and column 2 reports the panel model (GLS) estimates. In both the approaches, the coefficient of the variable of interest, *Samplesize*, is statistically insignificant. The negative coefficient in meta-regression may perhaps indicate that studies with larger sample sizes are more likely to report worsening of quality and access as a result of PSP, but after grouping or clustering the observations based on the primary study in the panel model, there seems to be a reverse effect. However, the insignificant coefficients imply no evidence of the true effect of a systematic relationship between PSP and access and quality outcomes. The parameter, τ^2 (tau-squared) in the meta-regression estimation, which is the between-study variance, was higher in the overall sample. The square root of τ^2 is the standard deviation of the effects across studies and the interval from $2*\tau$ below the mean of the intervention effects to $2*\tau$ above it gives the approximate 95 percent range of the intervention effects. For the overall sample, this range is calculated as −4.55 and 4.9, indicating that the between-study variance in the sample is significant. However, the random-effects meta-regression model addresses the question of a possible bias that this could create.

Table 4.2: Estimation results of the meta-regression equation: full sample

Moderator variables	Dependent variable: Effect of PSP on access and quality (t-	
	MR	Panel (GLS)
	(1)	(2)
Samplesize	−0.00003 (0.0008)	0.0014 (0.0018)
PSPType	−0.69 (1.11)	−0.62 (0.63)
Panel	0.01 (1.03)	0.35 (1.38)
Conf	−0.03 (0.79)	0.49 (1.52)
Tele	1.96 (1.06)	1.49 (1.16)
Elec	0.08 (0.81)	0.02 0.68
Ratio	−1.19 (0.72)	−0.77 (0.56)
Growth	−2.06 (1.01)	−1.98 (0.81)**
Region	−0.05 (0.71)	0.75 (1.10)
Intercept	1.52 (1.46)	−0.24 (2.11)
τ^2	5.586	
Wald chi^2 (probability)		10.79 (0.29)
N	90	90

Note: Standard errors in parentheses; ** implies significance at 5 percent level

The panel estimates shows that when the growth rates of the outcome variables are used, the impact of PSP seems lesser as compared to the impact when the absolute values of outcome variables are used. The type of PSP, the estimation technique adopted, the use of enough confounding variables, the sector of the study and the regions considered in the primary studies do not explain why some of the studies find PSP impacts and others do not. The Wald chi^2 statistic indicates the joint significance of the variables used in the model and a higher probability value indicates a poor fit. The poor fit could be due to the result of including both access and quality outcomes in a single estimation. Estimations done separately for access and quality (Table 4.3) address this.

Table 4.3: Estimation results of the meta-regression equation: access and quality

Moderator variables	Dependent variable: Effect of PSP (t-statistic)			
	Access		Quality	
	MR	Panel	MR	Panel
	(1)	(2)	(3)	(4)
Samplesize	0.0009 (0.0009)	0.0014 (0.0016)	0.0003 (0.0013)	−0.0003
PSPType	−0.07 (1.03)	−0.04 (0.68)	−1.078 (2.07)	−0.94 (1.10)
Panel	2.18 (0.95)***	2.16 (1.00)**	−4.94 (3.42)	−3.73 (2.35)
Conf	−1.68 (0.95)*	−1.95 (1.80)	−0.4 (1.48)	0.30 (1.55)
Tele	3.22 (1.03)***	3.71 (1.38)***	0.19 (2.42)	−0.08 (1.60)
Elec	−1.28 (0.83)	−0.88 (0.64)	−0.17 (1.96)	0.35 (1.34)
Ratio	−0.48 (0.74)	−0.34 (0.62)	−0.76 (1.65)	−1.33 (1.06)
Growth	−1.38 (1.02)	−1.25 (1.08)	−2.05 (1.92)	−2.65 (1.27)**
Region	0.72 (0.71)	1.01 (1.25)	−0.65 (1.3)	−0.59 (1.10)
Intercept	−1.63 (1.41)	−2.36 (1.94)	6.6 (3.44)**	6.04 (1.84)
τ^2	3.016		6.672	
Wald chi^2		36.91 (0.00)		286.63 (0.00)
N	50	50	40	40

Note: Standard errors in parentheses; *** implies significance at 1 percent, ** at 5 percent and * at 10 percent levels

The issue of publication bias is a major concern in meta-analysis, as studies have a greater possibility of getting published when significant relationships between the variables of interest are found. In the context of this review, the possibility of bias could be in both directions. The advocates of PSP may uncover only statistically significant positive impacts on access and quality outcomes, while critics may be satisfied with proving neutral or negative effects and would be more inclined towards highlighting the ineffectiveness of the intervention. Hence, the empirical literature that is examined for evidence of the effects of PSP may offer biased evidence of the true effects of privatisation. As discussed under the methodology section, the funnel asymmetry test helps detect the publication bias in the data used for the analysis.

Columns 1 and 2 of Table 4.4 summarize the results of the FAT for the full sample. Column 1 shows the test results using the inverse of the standard errors as the independent variable, and in column 2, the test uses square roots of the sample size as independent variables. A statistically significant intercept term provides evidence for the existence of publication bias and the significance of the coefficient associated with 1/SE or sqrt(sample size) proves the existence of a true empirical effect. The intercept term in the tests remains statistically insignificant in both circumstances. This implies no evidence of publication bias for the sample of studies included in this analysis. The test results also do not provide sufficient evidence of a genuine empirical effect of private ownership on access and quality. The coefficients associated with neither 1/SE nor sqrt(sample size) were statistically significant, implying that PSP does not have any systematic impact on the outcomes. This reconfirms the results of the meta-regression estimations.

Table 4.4: OLS results for funnel asymmetry test (FAT) to detect publication bias

	Dependent variable: *t*-statistic					
	Full Sample		**Access**		**Quality**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept	0.28 (0.29)	0.71	0.43	0.52	0.02	0.87
1/SE	−0.0013 (0.002)		−0.002 (0.001)		0.002 (0.018)	
sqrt(sample size)		−0.029 (0.028)		−0.015 (0.034)		−0.042 (0.046)
N	90	90	50	50	40	40
R^2	0.010	0.012	0.033	0.004	0.0005	0.023

Note: Standard errors in parentheses

MST result for the overall sample is given in column (1) of Table 4.5. As can be seen, the statistical non-significance of the coefficient of the degrees of freedom in the MST indicates the absence of a systematic relationship between PSP and outcomes. This is consistent with the results obtained from the MR and panel estimates and funnel asymmetry tests. However, the values for degree of freedom are not directly provided in many of the studies, and they have been imputed based on the information provided in the study. When the studies do not specify the model used for the estimation completely, there could be some inadvertent errors in the values assumed for degrees of freedom. Therefore, the results from MR/panel estimates and FAT are considered more robust in estimating the impact of PSP on outcomes.

Table 4.5: OLS results for meta-significance test (MST)

	Dependent variable: Ln(absolute *t*-statistic)		
	Full sample	**Access**	**Quality**
	(1)	**(2)**	**(3)**
Intercept	−0.91 (0.76)	−1.42 (1.30)	−0.46 (0.73)
Ln(df)	0.17 (0.14)	0.21 (0.23)	0.16 (0.13)
N	90	50	40
R^2	0.018	0.017	0.038

Note: Standard errors in parentheses

Impact on access

Of the 90 observations used in the study, 50 were related to access. The meta-regression estimates and the panel model estimate of equation (7) done for access outcome are presented in Columns 1 and 2 of Table 4.3.

In the case of access, the coefficient estimates of the variable *Samplesize* are positive but are not statistically different from zero in both MR and panel estimations. This provides no evidence for a genuine empirical effect of PSP on access. Still, the positive coefficient indicates that larger sample sizes do show improvements in access to services as a result of PSP.

The studies analysing access in the telecommunications sector show improvements in access due to PSP as compared to the water and sanitation sector. PSP in the electricity sector does not have significant impacts, but the negative sign of the coefficient indicates that PSP effects on access in the electricity sector are fewer than those of the water and sanitation sector. The estimation methodology adopted in the studies seems to influence the PSP effects on access in both MR and panel estimations. Use of panel data analysis seems to have a positive impact on access as compared to other methods. In MR estimation, the use of more confounding variables in the studies also appears to have an effect on the study results. The use of more variables helps in estimating the attribution of PSP more clearly on the outcomes. As the results indicate, when the estimation models of the original studies have more confounding variables, the estimated impact of PSP on access is lower, i.e., more robust estimation models do not indicate as much of an impact of PSP on access as compared to less robust estimations.

Between-study variance, τ^2, was 3.016 for access in the MR estimation. This was lower than the value of 5.586 obtained for the whole sample. The 95 percent confidence interval for the access sample is calculated as −3.227 and 3.719 which means that the between-study variance in the sample is negligible. The Wald chi-square statistic in the panel estimation for access shows a good fit.

The FAT results for access outcomes are presented in columns (3) and (4) of Table 4.4. The intercept term is not statistically different from zero when either 1/SE is used as independent variable (Column 3) or when sqrt(sample size) is the independent variable (Column 4). Thus, there is no evidence of publication bias in the sample of studies for access. Also, the non-significance of the coefficients of the independent variables, 1/SE and sqrt(sample size) reiterates the non-existence of a genuine empirical effect of PSP on access.

MST results are given in column (2) of Table 4.5. It is seen that the coefficient of ln(df) is not significantly different from zero, indicating the absence of an overall genuine empirical effect of PSP on access. This supports the results from the MR and panel estimates as well as the FAT.

Impact on quality

The number of observations pertaining to quality outcomes in the sample was 40. Columns 3 and 4 of Table 4.3 provide meta-regression estimates and panel model estimates of equation (7) for quality.

The coefficient estimates of the variable *Samplesize* are statistically insignificant in both the MR and panel estimations. There is no genuine empirical effect of PSP on the quality of the services delivered. Other variables analysed, including the type of PSP, estimation technique, confounding variables, sector of the study or regions, do not seem to explain the estimation results of the PSP effects in the studies. The type of variable used for assessing the quality has impacts on the effect sizes in the panel estimation. The between-study variance, τ^2 seems to be higher for quality as compared to the studies on access. The critical values for the 95 percent confidence interval of τ^2 for the quality sample are −5.081 and 5.251, which shows that there is significant between-study variance.

The FAT results for quality are given in columns (5) and (6) in Table 4.4. The intercept terms are not statistically significant from zero, indicating the absence of publication bias in the sample. The insignificant independent variables, 1/SE and sqrt(sample size) shows no genuine empirical effect of private service provision on the quality of the services delivered.

The MST results for quality are given in column (3) in Table 4.5. Since the coefficient of Ln(df) is not significantly different from zero, this indicates that there is no significant impact of PSP on quality outcome. As seen in the overall estimation, as well as the estimation on access, there is no conflict in the results from any of the approaches even in the case of quality outcome, with all of them indicating the absence of any systematic relationship between PSP and quality.

4.2.4 Summary

The lack of systematic evidence on the relationship between PSP and outcomes also indicates that the overall impact of PSP has not been negative. The results also indicate that study characteristics in themselves do not seem to have influenced the results of the studies in a significant way, except in the case of access.

One explanation for the result is that PSP has been less effective in improving access and outcomes in certain instances as compared to others. The effectiveness of PSP is therefore not only dependent on the content of the intervention, but also on other factors, such as context, policy and contractual features. Analysing the causal pathway between intervention and results would help in understanding how these factors play a role in influencing outcomes. The textual narration synthesis that follows helps to clarify the causality between intervention and results in a holistic manner.

The FAT results indicate the absence of publication bias and strengthen the robustness of the results. The results of MST, however, are at variance with the MR/panel estimates and the FAT results for the overall sample and access sub-sample. Nevertheless, we feel that because of a lack of complete information in all the studies for calculating the degrees of freedom correctly, the MR/panel estimates and FAT results are more robust than the MST results. This synthesis using meta-regression analysis cannot be said to offer conclusive proof of the lack of true effect, since it uses evidence only from 17 of the 67 studies (i.e., about 25 percent) included in the review. However, since the evidence used in meta-regression analysis is from quantitative studies, which in general use robust quantitative techniques and tests to attribute the impact of PSP on outcomes as well as to determine statistically the significance of the impact on outcomes, we

feel that the meta-regression results are a reasonable representation of the underlying evidence.

Unlike experimental studies, where it is easier to have appropriate controls, it is not always possible, for a variety of reasons, to have precise controls in studies that aim to analyse the impact of interventions such as PSP. Additional analysis such as textual narration provide a greater understanding of when and how PSP impacts on performance. However, it needs to be stated that while such an analysis would help in understanding the causality and also the association of outcomes with PSP, it has limitations in terms of identifying the magnitude of change in outcomes that can be attributed to PSP. Partly, this has to do with the methodology and study design of the original studies included in this review. Most of the studies are in the nature of before/after studies, which are characterised by the absence of counterfactuals or appropriate control samples to identify precisely the impact of the intervention.

4.3 Results from count of evidence

4.3.1 Overall results

Table 4.6 gives the overall results from the count of evidence. Out of a total of 424 evidences, there were 133 evidences from electricity sector, 110 from the telecom sector, and 181 from the water sector. This indicates two things. First, the proportion of evidences is reasonably well distributed among the three sectors. Second, the incidences of PSP are more-or-less the same in each of the three sectors.

Analysis of evidence indicates that more than two-thirds had a positive impact on the outcomes, about one-fifth of the evidences do not indicate any significant impact, and only one-tenth of the observations indicate a negative impact on the outcomes. This indicates that the overall impact of different forms of PSP on access and quality outcomes was positive in the three sectors. Though the proportion of positive evidences is substantially higher than the proportion of no significant impact or negative evidences among the three sectors, telecom has the highest proportion of positive outcomes, and electricity sector has the least. If the proportion of positive evidences is taken as an indicator of effectiveness, our results indicate that among the three sectors, PSP has been most effective in the telecom sector.

Table 4.6: Overall results by sector

Sector	0	−	+	Inconclusive	Grand Total	
Electricity	35	17	78	3	133	31%
	26%	13%	59%	2%		
Telecom	15	12	83		110	26%
	14%	11%	75%			
Water	40	14	127		181	43%
	22%	8%	70%			
Grand total	90	43	288	3	424	
	21%	10%	68%	1%		

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on

significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

The evidences that were obtained from the different studies can be broadly classified into two categories, viz., those obtained from the results of quantitative analysis and those obtained from the results of qualitative analysis. Table 4.7 indicates the evidences based on the type of analysis. About two-thirds of the evidences were from qualitative analysis and the remaining one-third from quantitative analysis. Though meta-regression analysis was done to synthesise the quantitative evidence, such studies were again included in the count of evidence approach to compare the evidence seen in the quantitative and qualitative studies. The count of evidence of quantitative studies supports the results of the meta-regression analysis, i.e., the highest number of findings indicate that PSP does not have any significant impact on outcomes. However, the count of evidence results indicate that that the pattern of evidences varies considerably between the quantitative and qualitative studies.

Table 4.7: Results by type of analysis

Type of evidence	0	−	+	Inconclusive	Grand Total	
Qualitative	25	26	228	3	282	67%
	9%	9%	81%	1%		
Quantitative	65	17	60		142	33%
	46%	12%	42%			
Grand Total	90	43	288	3	424	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

While the proportion of positive evidence is more than 80 percent in qualitative evidences, it is just 42 percent in the case of quantitative evidences. In the case of quantitative evidences, the highest proportion (46 percent) demonstrates no significant impact, whereas the proportion of evidences on no significant impact is in single digits in the case of the qualitative studies. However, it can be seen that the proportion of negative evidences is the lowest and is in close range in both the types. This could be attributed to the study design and objectives of the two types of studies. In a quantitative study, use of appropriate control samples and explanatory variables helps in estimating the impact on outcomes that can be attributed to PSP. However, a qualitative study usually does not have a control sample, and is usually done with the objective of having a better understanding of the process rather than the outcomes. It could therefore be inferred from the trends that while there are a large number of successes from a process perspective, it is not reflected on the impact on outcomes.

Table 4.8 gives the evidence on the outcomes for all the three sectors put together. The table also gives the number of findings contributing to the evidence for each of the outcomes. In each case, it can be seen that there are reasonable number of studies contributing to a particular type of evidence. The distribution of evidence between access and quality is more-or-less equal, with each accounting for about 50 percent of the total evidences. As indicated previously, quality has

been further classified into product quality and service quality, and the number of evidences on service quality is twice that of the evidences on product quality.

Table 4.8: Results by type of outcome

Outcome	0	−	+	Inconclusive	Grand total	
Access	43	15	146	0	204	48%
	[20, 9, 11]	[9, 6, 3]	[47, 37, 10]			
	21%	7%	72%			
Product quality	22	10	41	1	74	17%
	[15, 8, 7]	[8, 7, 1]	[26, 24, 2]	[1, 1, 0]		
	30%	14%	55%	1%		
Service quality	25	18	101	2	146	34%
	[15, 7, 8]	[16, 13, 3]	[38, 32, 6]	[2, 2, 0]		
	17%	12%	69%	1%		
Grand total	90	43	288	3	424	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative. The numbers in brackets indicate information about the observations as [number of studies, number of country-specific studies, number of cross-country studies].

The proportion of positive evidence was the highest for access outcomes, followed by service quality outcomes. The proportion of positive evidence on product quality, which is only slightly higher than 50 percent, is the lowest among the three. This trend can be attributed to the following. Firstly, improvements in access and service quality outcomes lead to quick direct benefit to the private-sector participants, in terms of higher revenues and/or profits. Thus, there is an inbuilt incentive on most PSP arrangements to focus on access and service quality outcomes. Secondly, these are areas where there is a large scope for the private sector to improve efficiency through superior management practices. Therefore there is a strong evidence of positive impact from PSP. Thirdly, improvements in product quality most often need substantial capital investments, which may not lead to commensurate returns in the short and medium term. The private sector could be reluctant to make such investments, which is reflected in the evidence. The lower amount of evidence also indicates that product quality outcomes are not great drivers of PSP initiatives in these sectors.

Table 4.9 presents the count of evidences by the nature of the outcome variable. It can be seen that the highest proportion of evidences are ratio variables. This indicates that the overall quality of the evidences is high, since ratio evidence is more robust than absolute variables. The number of evidences obtained on the impact of PSP in growth rates is, however, low.

For both the absolute and ratio variables, the proportion of positive evidences is quite high, and there is not much difference in the proportion of negative

evidences. The proportion of negative evidences is the highest for growth variables, indicating that there are instances where the growth in outcomes after PSP was lower than it was before the introduction of PSP.

Table 4.9: Results by type of variable

Nature of outcome variable	**0**	**−**	**+**	**Inconclusive**	**Grand total**	
Absolute	25	12	113	1	151	36%
	17%	8%	75%	1%		
Growth	7	6	15		28	7%
	25%	21%	54%			
Ratio	58	25	160	2	245	58%
	24%	10%	65%	1%		
Grand total	90	43	288	3	424	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.10: Results by type of PSP

Type of PSP	0	−	+	Inconclusive	Grand total	
Concessions	20	8	99	1	128	30%
	[9, 6, 3]	[6, 6, 0]	[18, 16, 2]	[1, 1, 0]		
	16%	6%	77%	1%		
Divestitures	50	27	136	2	215	51%
	[20, 10, 10]	[15, 11, 4]	[35, 24, 11]	[1, 1, 0]		
	23%	13%	63%	1%		
Leases	1		25		26	6%
	[1, 1, 0]		[5, 5, 0]			
	4%		96%			
Management contracts	10	7	24		41	10%
	[5, 4, 1]	[4, 4, 0]	[7, 6, 1]			
	24%	17%	59%			
Service contracts	2	1	2		5	1%
	[1, 1, 0]	[1, 1, 0]	[1, 1, 0]			
	40%	20%	40%			
Unspecified	7		2		9	2%
	[4, 0,4]		[2, 0, 2]			
	78%		22%			
Grand total	90	43	288	3	424	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative. The numbers in brackets indicate information about the observations as [number of studies, number of country-specific studies, number of cross-country studies].

The evidence based on the type of PSP is given in Table 4.10. The type of PSP was available for 415 of the 424 evidences. The highest number of evidences was for the divestiture form of PSP, followed by the concessions form. Together, these accounted for more than 80 percent of the evidences. Management contract, lease and service contracts forms of PSP together accounted for about 17 percent of the evidences. Out of the three, the number of evidences on management contracts is the highest, accounting for about 10 percent of the total evidences. The table also gives the number of studies contributing to the evidences for each of the outcomes. It can be seen that for the major forms of PSP – concessions, divestitures, leases and management contracts, the evidence is based on reasonable number of studies.

The forms of PSP can be divided broadly into two categories, long- and short-term. In concessions, the duration of the contract is for a long period, and in divestitures, the arrangement is of a more permanent nature. Therefore, these arrangements can be classified as long-term forms of PSP. In other forms such as leases, management contracts and service contracts, the duration of the contract is usually not so long. These arrangements can therefore be classified as short-term forms of PSP. The large number of evidences in long-term forms of PSP indicates that the practice of using short-term forms is not very prevalent.

Analysing the long-term forms of PSP indicates that the proportion of positive evidences is higher for concessions as compared to divestitures. The proportion of negative evidences in divestiture, though not very high, is more than twice as that of concessions. The higher effectiveness of concessions as compared to divestiture is to be expected. In a concession contract, there is most often a clause for terminating the concession if the performance specified is not achieved. The private-sector entity therefore has an incentive to show better performance in outcomes. On the other hand, the transfer of ownership in a divestiture is of a more permanent nature, and cannot be easily reversed. The levers of control for the government after a divestiture are limited as compared to a concession.

Among the short-term forms of PSP, leases have the highest proportion of positive outcomes, indicating that they are the most effective of the three. While the proportion of positive evidences is the highest for management contracts, there are considerable evidences for negative as well as for no significant impact. The number of evidences for service contracts is not sufficiently high, to make meaningful interpretations of the results.

4.3.2 Electricity

Table 4.11 presents the evidence in the electricity sector based on the type of analysis. While the overall proportion of positive evidences is the highest, the pattern of evidences between the two types of analysis is quite different. While close to three-fourths of the qualitative evidences indicate a positive impact, in quantitative evidences, it is only slightly above 40 percent. More importantly, the highest proportion of evidences in quantitative analyses indicates no significant impact on outcomes from PSP. This is in line with the trend seen in the overall analysis, and indicates that there is a need for a greater understanding of the impact of PSP on long-term sector outcomes.

Table 4.11: Evidence by type of analysis

Type of analysis	0	−	+	Inconclusive	Grand total	
Qualitative	10	7	54	3	74	56%
	14%	9%	73%	4%		
Quantitative	25	10	24		59	44%
	42%	17%	41%			
Grand total	35	17	78	3	133	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.12: Results by outcome

Outcome	0	−	+	Inconclusive	Grand total	
Access	14	5	33		52	39%
	[5, 2, 3]	[4, 2, 2]	[11, 10, 1]			
	27%	10%	63%			
Product quality	6	4	17	1	28	21%
	[5, 3,2]	[4, 3, 1]	[10, 8, 2]	[1, 1, 0]		
	21%	14%	61%	4%		
Service quality	15	8	28	2	53	40%
	[6, 1, 5]	[7, 4, 3]	[12, 8, 4]	[2, 2, 0]		
	28%	15%	53%	4%		
Grand total	35	17	78	3	133	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative. The numbers in brackets indicate information about the observations as [number of studies, number of country-specific studies, number of cross-country studies].

Table 4.12 presents the overall evidence for the three outcomes. The results did not indicate any substantial difference in the evidence between access and product quality outcomes. On the other hand, the proportion of positive evidence for service quality was slightly lower as compared to the percentages of access and product quality. Table 4.13 presents the evidence from the two types of analysis for the three outcomes. The objective of this is to check whether both types of analysis show similar evidence on any of the outcomes. The numbers of evidences for access and service quality are greater than those for product quality.

The results indicate that evidences from both types of analysis show different trends on access outcomes. The highest proportion of evidences from qualitative analysis indicate a positive impact from PSP whereas, in the case of quantitative analysis, the highest proportion of evidences indicate that PSP has not resulted in any significant impact on outcomes. However, the proportion of negative evidences is the lowest for both types of analysis, indicating that PSP has not had any negative impact on access.

Analysis of quality outcomes indicates that the proportion of positive evidences is higher for product quality as compared to service quality. However, on both the quality dimensions, the proportion of positive evidence is higher for both study types - quantitative and qualitative. This indicates that the evidence of positive impact of PSP is stronger for quality as compared to the evidence on access. This could be because increasing access in many cases would involve connecting households that are in far-flung areas, which would involve substantial capital investment. On the other hand, improvement in quality indicators such as reduction of losses and improvements in customer service, can be effectively achieved through superior management.

Table 4.14 provides the evidence for different types of outcome variable. In line with the overall trends, the number of evidences is the highest for the ratio variable, followed by the evidences using the absolute variable. The proportion of positive evidences is also the highest for the ratio variable. A high proportion of positive evidences in the form of ratio evidence indicates that the quality of the evidence is high. In the growth variable, the number (and therefore the proportion) of evidences on positive impact is equal to that of the evidences indicating no significant impact. This indicates that PSP has not been able to substantially influence the rate of growth in outcomes as compared to overall outcomes. However, it needs to be noted that the number of evidences using the growth variable is not sufficiently high to make strong inferences.

Table 4.13: Evidence by type of analysis for various outcomes

Outcomes	**0**	**−**	**+**	**Inconclusive**	**Grand total**
Access	14	5	33		52
	27%	10%	63%		
Qualitative	*4*	*2*	*28*		*34*
	12%	*6%*	*82%*		
Quantitative	*10*	*3*	*5*		*18*
	56%	*17%*	*28%*		
Product quality	6	4	17	1	28
	21%	14%	61%	4%	
Qualitative	*2*	*2*	*10*	*1*	*15*
	13%	*13%*	*67%*	*7%*	
Quantitative	*4*	*2*	*7*		*13*
	31%	*15%*	*54%*		
Service quality	15	8	28	2	53
	28%	15%	53%	4%	
Qualitative	*4*	*3*	*16*	*2*	*25*
	16%	*12%*	*64%*	*8%*	
Quantitative	*11*	*5*	*12*		*28*
	39%	*18%*	*43%*		
Grand total	35	17	78	3	133

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.14: Evidence by type of outcome variable

Nature of outcome variable	0	−	+	Inconclusive	Grand total	
Absolute	13	4	24	1	42	32%
	31%	10%	57%	2%		
Growth	5	2	5		12	9%
	42%	17%	42%			
Ratio	17	11	49	2	79	59%
	22%	14%	62%	3%		
Grand Total	35	17	78	3	133	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.15 gives the evidence for different forms of PSP in the electricity sector. Since about three-fourths of the evidence is on divestitures, this indicates that divestiture is the most common form of PSP in the electricity sector. The number of evidences for other forms of PSP is substantially lower, and no evidence was obtained for service contracts. Though leases have the highest proportion of positive evidence, the number of observations is not very high. For concessions and management contracts, only half the observations indicate a positive impact on outcomes. Divestiture, on the other hand, seems to be more effective than concessions and management contracts, with 59 percent of the observations indicating a positive impact.

Table 4.15: Evidence by type of PSP

Type of PSP	0	−	+	Inconclusive	Grand total	
Concessions	5		6	1	12	9%
	42%	0%	50%	8%		
Divestitures	26	13	58	2	99	74%
	26%	13%	59%	2%		
Leases			7		7	5%
			100%			
Management contracts	3	4	7		14	11%
	21%	29%	50%			
Unspecified	1				1	1%
	100%					
Grand total	35	17	78	3	133	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

One of the main objectives of the study is to determine the effectiveness of different forms of PSP on various outcomes. Table 4.16 provides the proportion of positive evidence on various outcomes for different forms of PSP. It can be seen that on the whole, short-term forms of PSP are more effective than long-term forms. Among the short-term contracts, leasing seems to be more effective than management contracts. This could be attributed to the incentive structure that exists in the lease form, where any gains realised by the private sector need not be shared with the public sector. Management contract on the other hand usually involve a greater proportion of fixed payments, irrespective of outcomes, which does not create suitable incentives for the private sector.

Table 4.16: Proportion of positive evidences for each of the outcomes for different forms of PSP

Type of PSP	Access	Product quality	Service quality	Overall
Concessions	50%	0%	57%	50%
Divestitures	64%	64%	50%	59%
Leases	100%	100%	100%	100%
Management contracts	57%	33%	50%	50%

Between the two types of long-term PSP forms, divestiture has a higher proportion of positive outcomes compared to concessions. This is in variance with the overall trend, where concessions had a higher proportion of positive outcomes. Among specific outcomes, concessions have a higher proportion of positive outcomes on service quality as compared to access and product quality. This indicates that concessions seem to be an appropriate form of PSP for realising quick improvements that do not involve substantial capital investments, such as reduction of losses and improvement of customer service. On the other hand, divestiture seems to be a more appropriate form of PSP for attracting long-term investments that would improve access and product quality.

Table 4.17 provides the proportion of positive evidences in different geographical regions for different outcomes. If we look at access, the proportion of positive outcomes is higher for the African region compared to the Latin American region. The higher proportion of positive evidences in Africa is influenced by the low level of access in Africa in general. While there were evidences on access in global studies, none of them showed a positive impact.

When we consider product quality outcomes, a higher proportion of positive evidences can be seen in Latin American region compared to the African region. One possible explanation for this trend could be that in Africa, the primary emphasis on PSP is to improve access, given the low levels of electrification. In the Latin American region, where the electrification levels are higher, the emphasis on PSP is to improve other aspects of power supply, such as duration and supply at appropriate voltage and frequency.

Table 4.17: Proportion of positive evidences for each of the outcomes in different regions

Geographical region	Access	Product quality	Service quality	Overall
Africa	79%	43%	73%	70%
Asia			0%	0%
Europe			50%	50%
Latin America	62%	67%	55%	60%
Global	0%		29%	18%

On service quality outcomes, the trend is line with the evidence on access. The proportion of positive evidences in global studies is less than one-third, so the highest proportion of the evidences do not indicate a positive impact. Though not given here, the highest proportion of evidences in global studies indicates that there has been no significant impact as a result of PSP. The proportion of positive evidence is higher in Africa compared to other regions. PSP has been able to show more improvements because the existing levels of service quality are low in many countries in Africa.

Table 4.18 indicates the proportion of overall positive evidences for different forms of PSP in various regions. The findings indicate interesting trends. First, while Africa is the only region to have implemented different forms of PSP, divestiture seems to be the most common form of PSP in the electricity sector. Second, the proportion of positive outcomes is the highest in the African region, indicating that as compared to other regions, PSP has been most effective in Africa in achieving the intended access and quality outcomes.

Table 4.18: Proportion of positive evidences for different forms of PSP in various regions

Region	Concessions	Divestitures	Leases	Management contracts	Unspecified	Overall
Africa	71%	78%	100%	50%		70%
Asia		0%				0%
Europe		50%				50%
Latin America		60%				60%
Global	20%	20%			0%	18%

There are no positive evidences in Asia, although the number of evidences is smaller in Asia as compared to that of Africa or Latin America. This seems to indicate that PSP has not worked well in the electricity sector in Asia as compared to the other regions.

4.3.3 Telecom

Table 4.19 presents the evidence in telecom based on the type of analysis. In terms of the number of evidences, close to one-fourth of the evidences are based on quantitative analyses and the remaining are from qualitative analyses. Unlike the

electricity sector, qualitative analyses account for a substantial proportion of the findings in the telecom sector.

Table 4.19: Results by type of analysis

Type of analysis	0	−	+	Grand total	
Qualitative	5	9	70	84	76%
	6%	11%	83%		
Quantitative	10	3	13	26	24%
	38%	12%	50%		
Grand total	15	12	83	110	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

The proportion of positive evidences is the highest in both forms of analysis in the telecom sector, which is in contrast to the findings for electricity, though the proportion of positive evidences is not as high in the quantitative as in the qualitative studies. The proportion of negative evidences is more-or-less the same in both forms of analysis. The similar trend in evidences in both forms of analysis indicates that PSP has been more effective in achieving the desired outcomes in the telecom sector as compared to the electricity or water sectors.

The telecom sector can be broadly classified into two segments: fixed or mainlines and mobile. Table 4.20 provides the evidence separately for the two segments. It can be seen that more than 90 percent of the evidence is for fixed-line segment. The low number of evidences on the mobile segment could be attributed to the fact that development of mobile telephony is a fairly recent phenomenon, and therefore the number of studies has been lower for that segment. Another reason for the low number of observations for the mobile segment is that in many instances mobile firms started as private-sector entities right from the beginning, and because of that there are not many instances where one can study the impact of PSP. The pattern of evidences is more or less the same in both the segments, i.e., a higher proportion of evidences indicate a positive outcome in both the fixed and mobile segments.

Table 4.20: Results by type of segment

Segment	0	−	+	Grand total	
Fixed	14	11	75	100	91%
	14%	11%	75%		
Mobile	1	1	8	10	9%
	10%	10%	80%		
Grand Total	15	12	83	110	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on

significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.21 indicates the evidence for different outcomes. Access has the highest number of evidences as well as the highest proportion of positive evidences among the three outcomes. This implies that it is the most common form of outcome expected from PSP in the telecom sector. That the number of evidences on quality outcomes is not very high, indicates that PSP may not be an appropriate intervention to achieve improvements in these outcomes. The proportion of positive evidences for the quality outcomes is also not as high as seen for access, whereas the proportion of negative evidences is higher. Between service quality and product quality, the evidence is more positive on service quality than on product quality. The proportion of negative evidences and those with no significant impact is higher for product quality in comparison to service quality. To strengthen the validity of the results, Table 4.21 also provides the number of studies behind the total evidence count for each of the outcomes. It can be seen that in each of the cases, a reasonable number of the studies contribute to the total count.

Table 4.21: Results by outcome

Outcome	**0**	**−**	**+**	**Grand total**	
Access	7	6	65	78	71%
	[6, 2, 4]	[2, 1, 1]	[23, 15, 8]		
	9%	8%	83%		
Product quality	6	4	7	17	15%
	[6, 2, 4]	[2, 2, 0]	[6, 6, 0]		
	35%	24%	41%		
Service quality	2	2	11	15	14%
	[2, 1, 1]	[2, 2, 0]	[8, 7, 1]		
	13%	13%	73%		
Grand total	15	12	83	110	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative. The numbers in brackets indicate information about the observations as [number of studies, number of country-specific studies, number of cross-country studies].

Table 4.22 gives the results for the three outcomes by the type of evidence. It can be seen that in the case of access, the proportion of positive outcomes is the highest in both forms of analysis. This indicates that the evidence of positive outcomes is strong in the case of access. The evidence on quality is mixed, with observations from qualitative analysis indicating a higher proportion of positive evidences, whereas those from quantitative analysis indicate a higher proportion of evidences with no significant impact. However, the number of quantitative observations for both types of quality outcomes is low.

Table 4.22: Results by outcome and type and analysis

Outcomes	0	−	+	Grand total
Access	7	6	65	78
	9%	8%	83%	
Qualitative	*3*	*3*	*53*	*59*
	5%	*5%*	*90%*	
Quantitative	*4*	*3*	*12*	*19*
	21%	*16%*	*63%*	
Product quality	6	4	7	17
	35%	24%	41%	
Qualitative	*2*	*4*	*7*	*13*
	15%	*31%*	*54%*	
Quantitative	*4*			*4*
	100%	0%	0%	
Service quality	2	2	11	15
	13%	13%	73%	
Qualitative		*2*	*10*	*12*
	0%	*17%*	*83%*	
Quantitative	*2*		*1*	*3*
	67%	0%	33%	
Grand total	15	12	83	110

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.23 presents the evidence on the nature of the outcome variables. The ratio variable has the largest number of observations. Since the ratio variable is a better measure indicator compared to the absolute variable, this is an indication of the high quality of the evidence. Unlike in the electricity sector, the positive evidence is also very strong for the growth variable.

Table 4.23: Results by type of outcome variable

Nature of outcome variable	0	−	+	Grand total	
Absolute	2	3	24	29	26%
	7%	10%	83%		
Growth	2	3	10	15	14%
	13%	20%	67%		
Ratio	11	6	49	66	60%
	17%	9%	74%		
Grand total	15	12	83	110	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

The proportion of positive evidences for different outcomes and forms of PSP is given in Table 4.24. It can be seen that there are no short-term forms of PSP in this sector. While the concession form of PSP has a high proportion of positive evidences in access and service quality outcomes, there is no evidence on its impact on product quality. This indicates that concessions might not be an appropriate form of PSP to influence outcomes on product quality. On the other hand, though divestiture has a lower proportion of positive evidences on access and service quality, there are evidences to show that it has a positive impact on product quality.

Table 4.24: Proportion of positive evidences for various outcomes under different forms of PSP

Type of PSP	Access	Product quality	Service quality	Overall
Concessions	100%		100%	100%
Divestitures	81%	47%	71%	74%
Unspecified	100%	0%		50%

Since it is not feasible to choose multiple forms of PSP to achieve the desired results, it becomes very important to have clarity on the main objectives of PSP. One can then choose an appropriate form of PSP to achieve the desired outcomes.

Table 4.25 indicates the proportion of positive evidences for different regions on the three outcomes. Latin America has the highest proportion of positive evidences as compared to Africa, though the difference is not very large. This is in contrast to the trend seen in electricity sector, where the proportion of positive evidence was the highest for Africa. This indicates that PSP initiatives have been more effective in the Latin American region as compared to other regions.

Table 4.25: Proportion of positive evidences for various outcomes in different regions

Region	Access	Product quality	Service quality	Grand total
Africa	91%	50%	100%	83%
Asia	89%	0%	25%	72%
Latin America	85%	100%	100%	87%
Global	50%	0%	0%	36%

A close look at the evidence in both the regions indicates that the higher proportion of positive evidences for Latin America has been driven by the higher proportion of positive evidences in product quality outcome. This indicates that PSP is expected to have a stronger impact on access as compared to product quality in Africa. Though the proportion of positive evidence is high for access in Asia, it is quite low as far as quality outcomes are considered. This indicates that though PSP is associated with improvements in access, the same cannot be said of quality. Other measures such as regulation and competition can be more effective in achieving quality outcomes in the Asian region compared to PSP. Studies at the global level indicate that only 50 percent of the evidences show a positive impact on access, whereas there has been no positive impact of PSP on quality outcomes. This implies that while PSP has been effective in improving access, the same cannot be said of quality.

Table 4.26 indicates the proportion of positive evidences for various forms of PSP in different regions. As indicated previously, there are no short-term forms of PSPs in the telecom sector. Among the long-term forms, concessions seem to be more effective across all regions compared to divestitures. While the proportion of positive evidences on divestitures is not very different between Africa and Latin America, interestingly, it is substantially lower in Asia. This shows that divestiture has not been as effective in Asia compared to Latin America and Africa. Additional studies might be needed to identify the reasons behind this trend.

Table 4.26: Proportion of positive evidences for various forms of PSP in different regions

Region	Concessions	Divestiture	Unspecified	Overall
Africa	100%	82%		83%
Asia	100%	65%		72%
Latin America	100%	86%		87%
Global		30%	50%	36%

4.3.4 Water supply and sewerage

Table 4.27 indicates the evidence by type of analysis in the water supply and sewerage sector. Out of a total of 181 observations, 57 (31 percent) observations were from quantitative analysis and the remaining 124 (69 percent) of the observations were from qualitative analysis. As can be seen, there are substantial differences in the proportion of evidences between the two types of analysis. While the proportion of negative evidences is more-or-less the same between the two

types of analysis, there are large differences in the proportion of positive evidences and those having no significant impact.

Table 4.27: Results by type of analysis

Type of analysis	0	−	+	Grand total	
Qualitative	10	10	104	124	69%
	8%	8%	84%		
Quantitative	30	4	23	57	31%
	53%	7%	40%		
Grand total	40	14	127	181	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

The trend is similar to that observed in the electricity sector. Evidences from qualitative analyses indicate a higher proportion of positive evidences, whereas evidences from quantitative analyses indicate that a higher proportion does not show any significant impact on outcomes. Additional studies are needed to investigate the reasons behind these sharp differences between the two forms of analysis.

Table 4.28 provides the evidence for the water supply and sanitation segments separately. Since about 84 percent of the observations pertain to the water supply sector, it can be said that there have been more PSP initiatives in this sector compared to the sanitation sector. In a way, this is not in line with expectations, since sanitation can be considered to be an easier sector to privatise, and it is not as politically sensitive as the water sector. Since water supply is generally considered to be more vital to support the daily lives compared to sanitation services, PSP is being considered to improve the outcomes despite the political sensitivity of the sector.

Table 4.28: Results by type of segment

Segment	0	−	+	Grand total	
Sanitation	9		20	29	16%
	31%		69%		
Water supply	31	14	107	152	84%
	20%	9%	70%		
Grand total	40	14	127	181	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

The results indicate that there is practically no difference in the proportion of positive evidences for the two segments. However, water supply has a higher

proportion of negative evidence, with no negative evidence cited for sanitation. As compared to water, there is a higher proportion of evidence in sanitation indicating no significant impact.

Table 4.29 indicates the evidences for different outcomes. Though the proportion of positive evidence is the highest for all the three outcomes, their magnitudes vary. Service quality has the highest proportion of positive evidences, and product quality the least. In terms of evidences with no significant impact, product quality has the highest proportion and service quality the least. To strengthen the validity of the results, Table 4.29 also provides the number of studies behind the total evidence count for each of the outcomes. It can be seen that in each of the cases, a reasonable number of the studies contributes to the total count.

Table 4.29: Results by type of outcome

Outcome	**0**	**−**	**+**	**Grand total**	
Access	22	4	48	74	41%
	[9, 5, 4]	[3, 3, 0]	[14, 13, 1]		
	30%	5%	65%		
Product quality	10	2	17	29	16%
	[4, 3, 1]	[2, 2, 0]	[10, 10, 0]		
	34%	7%	59%		
Service quality	8	8	62	78	43%
	[7, 5, 2]	[7, 7, 0]	[19, 18, 1]		
	10%	10%	79%		
Grand total	40	14	127	181	

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative. The numbers in brackets indicate information about the observations as [number of studies, number of country-specific studies, number of cross-country studies].

This can be explained by the following. In many cases, improvements in service quality can be achieved by better management practices without any substantial capital investments. Since improvements in service quality, such as reduction in non-revenue water and losses, and increased in collection, result in direct increase in revenues and profits for the private sector, there is a higher proportion of positive evidences on service quality outcomes. Improvements in access and product quality, on the other hand need substantial capital investments. and the results also take time to manifest themselves.

Similar to the trend seen in electricity and telecom sectors, there are differences in the evidences obtained from quantitative and qualitative analysis on the three outcomes. Table 4.30 gives the results for the three outcomes for the two types of analysis. On access, evidences from qualitative analysis indicates a higher proportion of positive evidences, whereas quantitative studies indicate a higher proportion of evidences with no significant impact.

The trend for product quality outcomes is very similar to that for access outcomes. Qualitative analysis indicates a higher proportion of positive evidences, whereas quantitative analysis indicates a higher proportion of evidences with no significant impact. However, both the quantitative and qualitative analyses have similar trends with respect to service quality outcome, viz., the highest proportion of observations indicating positive evidence. Since both the forms of analysis indicate similar trends, it can be said that PSP has been more effective in affecting service quality as compared to the other two outcomes.

Table 4.31 indicates the observations based on the nature of the outcome variable. The largest number of observations is in the form of ratio variables, indicating the high quality of the evidence. There was only one observation for the growth form of outcome variable. The proportion of both absolute and ratio forms of outcome variables have similar trends, though the magnitudes vary. The ratio form of outcome variable has a higher proportion of evidences with no significant impact compared to the absolute form, whereas the absolute form has a higher proportion of positive evidence.

Table 4.30: Results on different outcomes by type of analysis

Outcomes	**0**	**−**	**+**	**Grand total**
Access	22	4	48	74
	30%	5%	65%	
Qualitative	*3*	*2*	*38*	*43*
	7%	*5%*	*88%*	
Quantitative	*19*	*2*	*10*	*31*
	61%	6%	32%	
Product quality	10	2	17	29
	34%	7%	59%	
Qualitative	*2*	*1*	*12*	*15*
	13%	*7%*	*80%*	
Quantitative	*8*	*1*	*5*	*14*
	57%	*7%*	*36%*	
Service quality	8	8	62	78
	10%	10%	79%	
Qualitative	*5*	*7*	*54*	*66*
	8%	*11%*	*82%*	
Quantitative	*3*	*1*	*8*	*12*
	25%	*8%*	*67%*	
Grand total	40	14	127	181

Notes: +: No. of positive observations; −: No. of negative observations; 0: No. of observations with no significant impact. For studies that had information on significance levels, 10 percent has been used as the significance level to classify whether the impact was positive or negative.

Table 4.31: Results by type of variable

Nature of outcome variable	0	−	+	Grand total	
Absolute	10	5	65	80	44%
	13%	6%	81%		
Growth		1		1	1%
		100%			
Ratio	30	8	62	100	55%
	30%	8%	62%		
Grand total	40	14	127	181	

The evidence by type of PSP is given in Table 4.32. The first observation that could be made is that though concession is the most common form of PSP, there are a reasonable number of studies that have findings on other forms of PSP as well. This indicates the prevalence of different models of PSP in the water sector, as compared to a few predominant modes, as seen in electricity and telecom.

Table 4.32: Results by type of PSP

Form of PSP	0	−	+	Grand total	
Concessions	15	8	84	107	59%
	14%	7%	79%		
Divestitures	11	2	6	19	10%
	58%	11%	32%		
Leases	1		18	19	10%
	5%		95%		
Management contracts	7	3	17	27	15%
	26%	11%	63%		
Service contracts	2	1	2	5	3%
	40%	20%	40%		
Unspecified	4			4	2%
	100%				
Grand total	40	14	127	181	

Long-term forms of PSP, viz., concessions and divestitures, account for 69 percent of the total observations and short-term forms of PSP, viz., leases and management and service contracts account for 28 percent. Therefore, it can be said that, among the three sectors included in this review, the water sector is the most amenable to implementing even short-term forms of PSP. In terms of overall effectiveness, the short-term forms seem to be more effective than the long-term forms. Within the short-term forms, leases and management contracts are more effective than

service contracts. In the long-term form, concessions are more effective than divestitures.

Table 4.33 provides the proportion of positive evidence for various outcomes under different forms of PSP. While leases seem to be the most effective form of PSP across all outcomes, divestitures seem to be the least effective.

Table 4.33: Proportion of positive evidences for various outcomes under different forms of PSP

Form of PSP	Access	Product quality	Service quality	Overall
Concessions	70%	76%	88%	79%
Divestitures	33%	17%	50%	32%
Leases	100%	100%	90%	95%
Management contracts	56%	33%	73%	63%
Service contracts		0%	50%	40%
Unspecified	0%		0%	0%

Among the long-term forms of PSP, concessions seem to be more effective than divestitures across all outcomes. While the difference in the proportion of positive evidence between the two forms of PSP is generally high for all outcomes, the highest difference is for the product quality outcome. This indicates that the structural factors in the concessions form of PSP are more effective in achieving improvements in product quality levels. In the short-term forms, services contracts are not as effective as leases or management contracts, and the circumstances in which a service contract can be implemented are also limited.

Table 4.34 indicates the proportion of positive evidences in different regions for the three outcomes. Since there are only few observations for Europe, we have excluded it from the analysis. The overall proportion of positive evidence is the highest for Asia, followed closely by Africa. This indicates that PSP in Asia is more successful in the water supply sector as compared to electricity and telecom. There is a substantial difference in the proportion of positive evidence between these two regions and Latin America, indicating that PSP has not been as effective in achieving the desired outcomes in Latin America in water supply and sewerage as compared to Asia and Africa. It can also be seen that the proportion of positive evidence is the lowest for Latin America compared to Africa and Asia for all the three outcomes.

Table 4.34: Proportion of positive evidences for various outcomes in different regions

Region	Access	Product quality	Service quality	Overall
Africa	88%	100%	81%	85%
Asia	82%	100%	88%	88%
Europe	100%		100%	100%
Latin America	65%	47%	76%	67%
Global	23%	0%	67%	25%

Even global studies, which generally have a low proportion of positive evidence, have a higher proportion of positive evidence on service quality. This supports the earlier statement that among the three outcomes, the effectiveness of PSP has been greatest on service quality outcome.

Table 4.35 gives the proportion of positive evidences for different forms of PSP in different regions. The evidence indicates that the diversity of PSP has been the highest in Latin America (four out of the five forms of PSP), followed by Africa (three out of the five). Regardless of the type of PSP, the proportion of positive evidence is higher for Africa and Asia as compared to Latin America. Similar to the evidence in other sectors, the proportion of positive evidence is the lowest for global studies, and the evidence for various forms of PSP is more-or-less similar.

Table 4.35: Proportion of positive evidences by type of PSP in different regions

	Concessions	Divestitures	Leases	Management contracts	Service contracts	Unspecified	Overall
Africa	100%		93%	100%		0%	85%
Asia	89%			80%			88%
Europe			100%				100%
Latin America	77%	36%		64%	40%		67%
Global	29%	20%		29%		0%	25%

4.3.5 Summary

There are more findings indicating that PSP leads to an overall improvement in access and quality outcomes, which is indicated by more positive outcomes as compared to negative. However, the number of findings showing positive evidence substantially differs by the type of analysis done in the studies. Qualitative studies show a high proportion of positive evidence as compared to quantitative studies, where the proportion indicating no significant impact from PSP is higher. Quantitative studies generally use several control variables and are able to attribute the impact of PSP on outcomes more clearly, whereas qualitative studies are often characterised by rich and nuanced discussion of the process and context rather than precise attribution of the impact of PSP. Therefore, it can be said that though PSP is associated with positive impacts on outcomes, not all of this can be attributed to PSP. Several other interventions that normally accompany PSP, such as regulation and competition would also play a role in influencing outcomes. In

addition, the difference in the proportion of positive evidence between the two types of analysis indicates that though there are a substantial number of positive evidences, many of them are not statistically significant. Therefore, it can be said that though the impact of PSP has been positive, it is more in the nature of neutral-positive than positive-positive.

Based on the duration of the contract, different forms of PSP were classified into two categories, short-term and long-term forms. The implementation of the most diverse forms of PSP were seen in the water sector, followed by electricity and then telecom. In telecom, there was no finding on the impact of short-term forms of PSP, indicating that these might not be appropriate forms in this sector. Among different forms of PSP, some are more effective than others in each of the sectors. Leasing seems to be the most effective form overall. However, since it is a short-term form, it might not be an appropriate form in all contexts. In long-term forms, while divestiture is more effective in electricity, many studies show concessions to be more effective in the telecom and water supply sectors. This indicates that the contextual and structural factors of the respective sectors influence the effectiveness of different forms of PSP.

The numbers of positive evidences differ between the three sectors for different outcomes, viz., access, product quality and service quality. In electricity, a larger number of studies have found positive outcomes in product and service quality; in telecom, a larger number of evidences have found positive outcomes in access; and in water supply, it is service quality. In each of the sectors, the number of evidences showing positive impact is the highest for those outcomes where there is a strong corresponding benefit to the private player. On those outcomes where improvements would need comparatively high levels of capital investment, and where benefits to the private player would only occur over a period of many years, the number of evidences that show a positive impact are comparatively lower.

In all three sectors, the findings from global studies do not indicate a very positive impact of PSP. In the African, Asian and Latin American regions, there is a variation in the impact of PSP on the three sectors. While the number of findings with positive evidence is uniformly high for all the three sectors in Africa, the same cannot be said of Asia and Latin America. There were no studies with a positive finding in electricity in Asia, and there is a substantial difference in the proportion of positive evidence in water supply between Asia/Africa and Latin America. This indicates that the impact of PSP is not the same across all sectors in different geographical regions.

In sum, it can be said that there are more positive findings for the impact of PSP as compared to negative findings on access and quality (product quality and service quality) outcomes in the electricity, telecom and water supply sectors. However, the strength of the impact is influenced by different factors such as the sector and its sub-segments, the type of outcome, the form of PSP and the geographical region.

4.4 Textual narration

4.4.1 Overview

In a textual narration, it is very difficult to generalise the findings from a variety of studies, because the factors that present in one need not necessarily be found elsewhere (e.g., Plane, 1999). Since the PSP programmes are not the same, different forms of PSP have different outcomes. In addition, the economic factors in the country also play a role. Studies have stated that different stages of economic development have different impacts on policy effects such as PSP (e.g.,

Nagayama, 2010). While restricting the scope of this review to just developing countries has reduced the heterogeneity in context, there is nevertheless some level of diversity. We have therefore attempted to identify only the recurrent themes seen in multiple contexts in this textual narration. A description of these themes by sector is given below.

4.4.2 Electricity sector

PSP is more effective in achieving the desired outcomes when accompanied by appropriate regulation and changes in organisational processes and practices.

Segments of the electricity sector, such as transmission and distribution (T&D), are considered to be natural monopolies. Replacing a public sector firm with an unregulated private monopoly can lead to undesirable outcomes. While PSP has a significantly positive impact on outcomes (Andres et al., 2008), the largest improvements have been possible only in combination with an appropriate regulatory framework. On its own, the impact of PSP has not been uniform (Nagayama, 2010). PSP significantly reduced T&D loss in Latin American countries, whereas it was the converse in other regions, such as the former Soviet Union and Eastern European countries. Though not significant, PSP also had the effect of increasing T&D losses in Asian developing countries. However, when combined with the existence of an independent regulator, PSP reduced T&D losses in all the regions.

Setting up an independent regulatory authority shields the private operator from the local political pressure faced by public sector managers which prevents them from focusing on problem areas such as network losses (Berg et al., 2005). By enforcing appropriate penalties, regulation also ensures that the private operator delivers the agreed performance targets. In many instances, such disincentives and penalties did not exist under public ownership. Pollitt (2008) indicates how the Argentinian electricity regulator has been able to create strong disincentives in terms of fines and public loss of reputation faced by private firms if agreed targets are not met. Using the example of Brazil, Silvestre et al. (2010) also indicate that the goals specified by the regulatory agency have led to quality improvements.

Examples exist where inappropriate regulatory policies have led to negative impacts or maintaining the status quo. For example, Brazil's policies for service improvement were focused on penalties, and there was no incentive for the private operator to go beyond the minimum requirements stipulated by the regulatory agency (Silvestre et al., 2010). In the case of Cameroon, a weak regulatory structure seems to have been the main reason for the disappointing results from PSP (Pineau, 2005). Outcomes were affected in Tanzania because there were few incentives provided for achieving improvements, and no penalties for maintaining the status quo (Ghanadan and Eberhard, 2007).

The objective function of the private sector is very different from that of the public sector. While public firms are more concerned with maximising welfare, private firms are more concerned with maximising cash flows and shareholder returns. In the electricity sector, reduction in electricity losses improves cash flows and directly contributes to the bottom line. However, incentives rarely exist in public firms to reward individual managers for achieving reduction in losses (Berg et al., 2005). In public sector utilities, 'supervision activities could not greatly improve in their efficiency due to the weak credibility of dismissal threats' (Plane, 1999). The public sector is also characterised by wage standardisation (Freije and Rivas, 2003) and low salaries that provide weak incentives for high performance. On the other hand, private-sector firms are able to design incentive schemes that reward individual employees and teams upon achievement of pre-specified

reduction in electricity losses. Other developments that emerge as a result of PSP such as loss of collective bargaining because of decentralization, use of firm-specific rather than industry-wide agreements, and reduced relevance of wage standardisation facilitate the implementation of strong governance and incentive schemes that reward high performance.

Along with strong incentive and governance systems, better management practices are usually implemented in tandem. Examples include more active monitoring (Andres et al., 2008); reduction in levels of hierarchy, decentralisation and delegation, in-house training activities and documenting standard operating procedures, and employee welfare schemes (Plane, 1999); commercial campaigns and use of innovative technologies targeted at encouraging local people to connect to the network, and increasing the number of local employees (Tremolet and Neale, 2002); use of pre-payment methods, revamping billing methods, effecting disconnections in case of non-paying customers, and improving customer service (Clark et al., 2005; Ghanadan and Eberhard, 2007).

Plane (1999) has highlighted that the following changes after PSP in the Cote d'Ivoire Electricity (CIE) company has contributed to the increase in performance. The number of levels of hierarchy was reduced from eighteen to nine and ultimately to five, resulting in decentralization and delegation. This was accompanied by a significant increase in the budget for in-house training activities. A manual that explains the standard operating procedures for various situations was developed. To remove the potential risks from decentralisation, the data processing system was strengthened. Information on energy production and distribution was handled locally using microcomputers, which enabled ready sharing of information to different levels in the organisation. Such measures increased information availability and thereby reduced the bounded rationality phenomenon that affects the efficiency of firms.

In a PSP programme, the private investor often has to retain employees on the roll of the public sector firms. Motivating and reducing the resistance of these employees to PSP is often considered a challenge. Undertaking organisational restructuring which promotes co-operation between employees and discourages collusive behaviour against the interests of the organisation, and adopting the practice of management by objectives from small groups, helped to obtain the co-operation of the employees. Other measures that enriched the dedication and loyalty of the employees to the organisation were establishing investment funds that encouraged employees to buy company shares, solidarity funds that facilitated saving and opportunities to borrow from these funds to meet special costs associated with events such as marriages, births, and funerals. World Bank (2003) also indicates that after PSP, the CIE staff have gained from better remuneration, improved working conditions and substantial skills upgrading. The development of institutional capabilities after PSP was far beyond that which was achieved in previous years.

Tremolet and Neale (2002), while analysing the positive outcomes from PSP in Gabon, highlight the following strategies undertaken by the private investor: extensive use of prepaid meters to improve collections, conducting a customer satisfaction survey with a view to identifying areas of improvement for better customer service, optimising the maintenance programme, use of incentive bonuses on personal performance linked to company profits, and circulating staff around different roles to prevent boredom and retain highly trained employees. In addition, the private player consciously limited the number of expatriate staff. The percentage of local employees after PSP increased to 98.3 percent from the previous level of 96.8 percent. To increase access, the company carried out active

commercial campaigns in small villages that encouraged people to connect to the network.

Clark et al. (2005) indicate that in Namibia, the private operator was able to increase connections through improvements in management practices such as implementing a computerised billing system, establishment of regional service centres, appointment of local vendors of prepaid electricity tokens, and a 24-hour fault reporting centre with toll-free number. Use of prepaid systems also resulted in improvement of collections in Tanzania (Ghanadan and Eberhard, 2007). In addition, active recovery of past arrears and initiating large-scale disconnections for non-paying customers also helped to increase collection rates, and thereby improve service quality outcomes. The findings of Alcazar et al. (2008) also highlight the contribution of the different management structure and incentive systems that accompany PSP in the improvement of outcomes.

Gassner et al. (2007) separately study the impact of the two forms of PSP, viz., concessions and divestitures, on outcomes. Between the two forms of PSP, divestiture provides more flexibility to the private operator to implement various change practices in the organisation. They found that divestiture leads to an increase in the number of connections, an increase in service quality, a reduction of distribution losses and an increase in collection rates. Only an increase in collection was seen in other forms of PSP. Without specifically highlighting the impact of organisational changes, this finding indicates that outcomes seem to be better when the private sector has more opportunities to implement changes in the organisation.

While strong management practices contributed to improvement in outcomes, weak management practices following PSP led to negative outcomes. Pollitt (2008) feels that the power outages in Argentina in late 1990s could have been the result of strategic underinvestment by private operators. While this was undesirable, the cause for this could be the low price levels that did not justify any additional investment. Lack of a suitable crisis management plan also aggravated the situation caused by a bad supply failure, as the company did not know how to respond to the crisis. While PSP has helped to solve some of the old problems that existed under the public sector, they have created certain new imperfections. Arango et al. (2006) indicate that the reluctance to face and manage these imperfections has affected the improvements that could have been otherwise obtained from PSP. In Tanzania, the omission of customer service from the scope of the contract led to indifferent experiences on service quality levels. The utility was left without any mechanisms to carry out needed maintenance to prevent deterioration of performance (Ghanadhan and Eberhard, 2007).

Taken together, this evidence leads us to propose the following interventions:

- Policy interventions: Before embarking on PSP in the electricity sector, it becomes very important to implement a regulatory framework. In the absence of a regulatory framework that clearly specifies the incentives and penalties, it will be difficult to enforce the desired performance from the private operator because of natural monopoly conditions. While developing a framework for PSP, the contractual clauses must provide enough flexibility to implement appropriate changes and processes in the privatised organisation.
- Contractual interventions: When the responsibility for project operations and outcomes shifts from the public sector to the private sector, this should be accompanied by corresponding changes in organisational structure, strategy, governance and process to achieve the desired outcomes. In fact, it is the successful implementation of these changes that help in realising

many of the benefits predicted by theory. Managers have an important role to play in designing and implementing these changes. However, it is important that the components of such change are relevant to the local context.

- For outcomes to improve electricity supply, supporting investments need to be undertaken in related areas such as generation and transmission, which can take time to materialise. Till that time, the real impact of PSP would tend to be muted or understated. Using examples of erstwhile Soviet Union and eastern European countries, Nagayama (2010) indicates that increases in retail connections from PSP are accompanied by rapid extension of T&D lines, which in turn leads to an increase in T&D loss. Till such time as additional investment is made that reduces such T&D losses, this will be seen as a negative impact of PSP. The experience in Tanzania supports this assertion, where technical losses increased after PSP as no new networks were added to the system to assist in the reduction of losses.

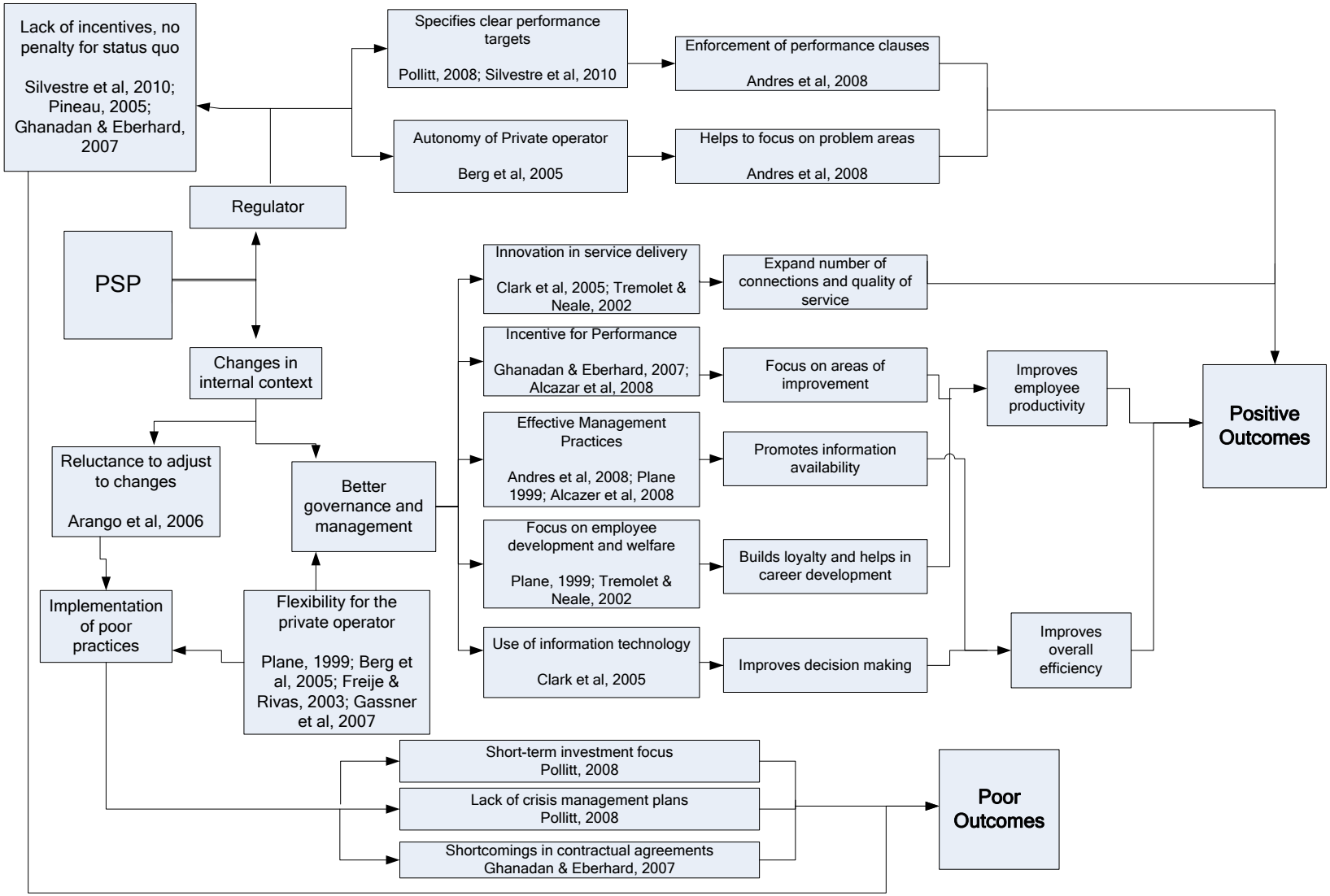


Figure 4.1: PSP should be accompanied by appropriate regulatory structure and changes in organisational structure and processes

During the transition phase, the real and full impact of PSP on outcomes will not be manifest.

Andres et al. (2008) indicate that the improvements that accompany PSP are not only due to better management of the power sector, but are also a result of additional investments that the private operator brings to develop the network. Normally, the investments from the private operator happen in the first couple of years after the contract has been signed. Since it takes time for the impact of these investments to be felt, the results of PSP during the transition phase are not likely to be very encouraging. This was supported by the study findings that distributional losses decreased significantly after the transition and improvements in other quality indicators were greater after the transition phase.

Clarke and Wallsten (2002) also support the investment doctrine as the basis for improvement in outcomes after PSP. Poor financial performance of many public utilities, combined with poor fiscal situation of governments, has resulted in utilities having insufficient resources to finance investment and maintenance. This has resulted in rationing of services and in such cases, low-income households are especially unlikely to get the service. Additional investments from private operators help in removing the supply-side constraints, thereby leading to improvements in access.

Without specifically highlighting the reasons, Gassner et al. (2007) also indicate that short-term effects are not as noticeable as long-term effects. Andres et al. (2006) find that while most changes occur during the transition period, the level of outcomes was better in the post-privatisation period. This indicates that the changes made during the transition phase resulted in the improvements in outcomes in the post-privatisation phase.

Negative outcomes immediately following PSP can also be attributed to better measurement. Sen and Jamasb (2010) indicate that outcomes tended to be adverse in the initial stages, as previously hidden distortions became apparent. Using their regression model on the impact of PSP on T&D losses, they highlight that PSP seems to have a positive coefficient on T&D losses (i.e., T&D losses increase) as the true levels of losses are revealed in the initial stages of reform. State owned companies tend to conceal inefficiencies in operations, whereas private operators tend to monitor such indicators as it is an important part of the contract. Estache et al. (2009) also use a similar argument to explain their results. When their results indicated that PSP did not impact on quality, they felt that this was probably because the measurement of actual performance improved with reform. Thus the apparent deterioration in performance simply reflected better statistics, while actual performance may even have improved.

In many instances, adequate preparatory work is not done before implementing PSP. Consequently, the contours of the PSP programme get defined with more clarity during the transition phase. The government is more lenient in enforcing the contract or provides various concessions during such a phase, which can lead to negative outcomes. Pineau (2005) indicates that power service quality deteriorated substantially in Cameroon after PSP. Consecutive droughts and record low rainfall reduced hydropower generation, the main source of power. But the private-sector operator chose not to operate the thermal power plants to overcome the shortage as these were costly to operate and would have affected its profits, because there was a three-year period in the concession contract where there were no penalties for not supplying electricity.

- **Policy interventions:** Evaluating the impact of PSP within a few years of its implementation might not give the correct results. Evidence-based public policy decision making should mainly rely on long-term evidence of PSP.
- **Contractual interventions:** Managers should not deter from implementing decisions that can portray a negative impact of PSP in the short term, provided those measures has a positive impact in the long term. It is important to realise that the progress made in the transition phase plays an important role in achieving long-term outcomes. Therefore, proposed investments and other betterment strategies should be implemented according to the plan without any delays.

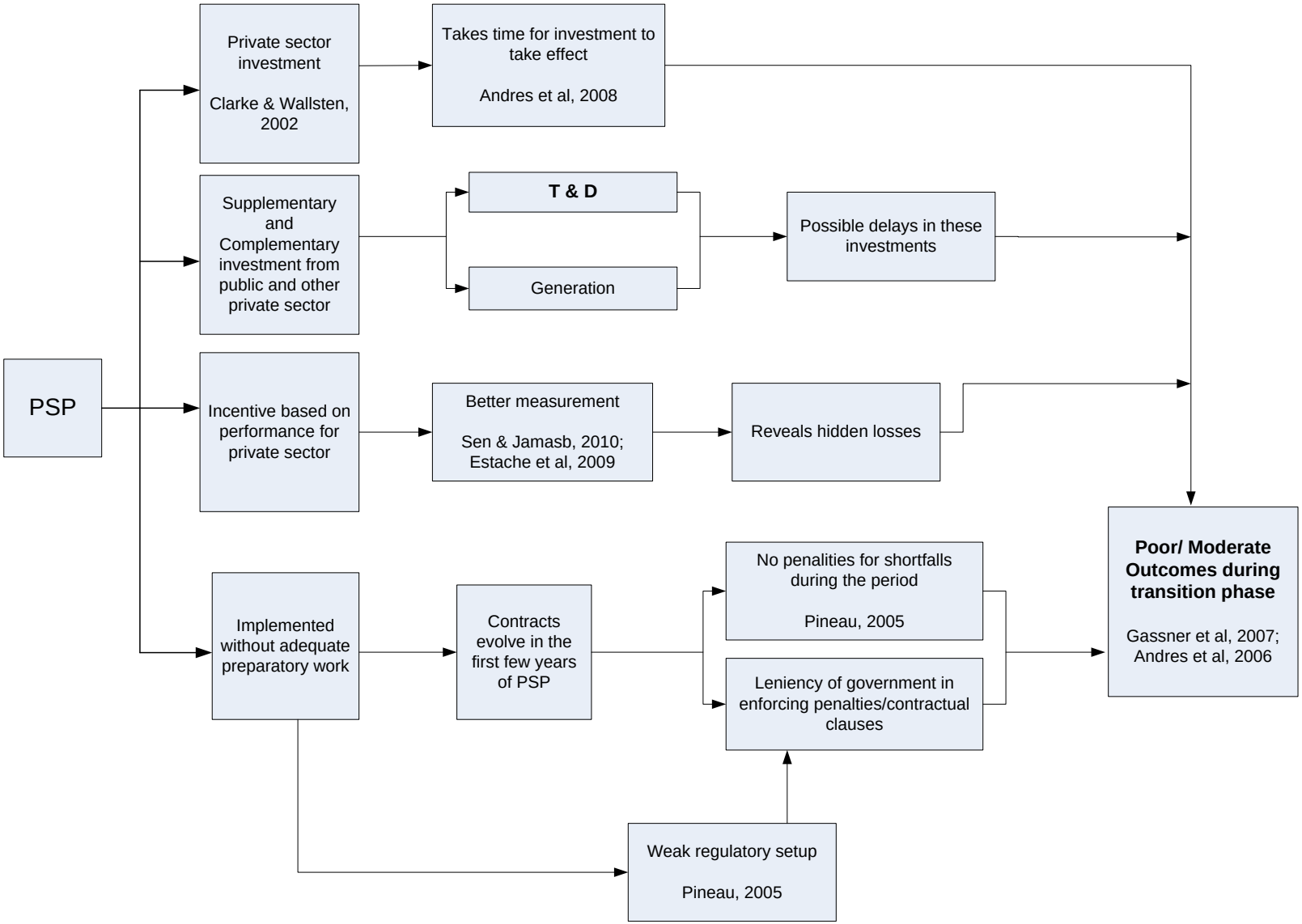


Figure 4.2: Impact of PSP during transition phase

On its own, PSP does not improve access to poor and rural areas, unless specifically supported with targeted investment programmes and different forms of assistance from the public sector.

Generally speaking, there are differences in electricity coverage for low- and high-income households as well as between coverage in urban and rural areas. Using the example of Africa, Clarke and Wallsten (2002) highlight that about 47 percent of urban households in Africa had electricity in comparison to only 7 percent of rural households.

It has been generally observed that (e.g., Freije and Rivas, 2003) the welfare gains of connecting to infrastructure services like electricity are highest for the rural and urban poor consumers. However, increases in access are always higher for non-poor and urban consumers. Several reasons could be attributed for this trend. First, rural areas are far-flung and thinly populated, and providing connectivity to such areas would need substantial capital investment. As far as the urban poor are concerned, they live in thickly populated areas, which present several hurdles (such as the difficulty in laying underground power cables) in providing connectivity. Second, the consumption per connection is not sufficiently large to be financially viable for the private operator. Third, there are restrictions on tariff increases for this segment so that costs can be recovered. Any increases in price would also result in disconnections, thereby defeating the very purpose of providing connectivity to these segments. Fourth, the objective of the private operator is not to maximise welfare gains, but to maximise shareholder returns. As indicated by World Bank (2003), 'in most countries, rural poor tend to be overlooked because private operators are reluctant to serve low-income clients given that these markets are not financially viable on a freestanding basis'. In circumstances where increasing the network is not profitable for private operators, improvements can be realised only when it is made mandatory in the contract (Andres et al., 2006).

Studies included in this review have indicated that when specific measures are implemented to address the concerns of the private operator, access has improved for rural and poor consumers after PSP. In Gabon, the cross-subsidies that existed in the tariff structure were retained after PSP, since they represented a key financing mechanism for providing services to small towns and rural areas (Tremolet and Neale, 2002).

In Peru, laws promoting rural supply helped to increase access in rural areas (Alcazar et al., 2008). Pollitt (2008) indicates that in Argentina, PSP resulted in increasing electricity access to the poor in the Greater Buenos Aires area because the government gave capital subsidies to connect to the poor, and the government also started paying for the electricity consumption of the poorest consumers. However, in other provinces in Argentina, there was limited success in connecting poor rural consumers, because of the unwillingness of provincial governments to contribute towards subsidy payments. The findings of Pollitt have been supported by Gonzalez-Eiras and Rossi (2007) in their study. They find that access for the poor increased after PSP because Argentina handled the problem of giving financial incentives for companies to supply electricity to the poor in an economically efficient way.

Tremolet and Neale (2002) indicate that the private operator met the coverage targets in Gabon all areas except the underserved areas. The problems in meeting the coverage targets in these areas were due to delays in government delivering on its planned investments. For example, the private operator indicated its inability to expand coverage as fast as possible due to many areas being inaccessible by road. Delays in completing transmission networks also affected electricity connectivity in

many areas. World Bank (2003) also states that the poor will not benefit from the expected growth in access because of PSP, until T&D projects are carried out.

In their study on Africa, Clark et al. (2005) find that PSP has led to an improvement in levels of rural electrification. However, they indicate that the improvements were not a result of power sector reform or PSP, but rather stemmed from special government and utility programmes that had occurred either prior to, or in parallel with, the reform process. Many countries had set up dedicated national rural electrification fund or similar programmes which provide capital grants or investment subsidies to private operators engaged in rural electrification.

- **Policy interventions:** With the increase in usage of electricity in all aspects of day-to-day life, having access to electricity is becoming important for participation in various social and economic activities. Since electricity connections to the rural and urban poor may not be financially viable on their own, there is no incentive for the private operator to increase electricity connections to such disadvantaged segments. On the other hand, since private operators are often incentivised for reducing losses and increasing connections, they pursue various strategies (such as stopping theft and disconnecting non-paying customers), leading to further reductions in electricity connections among poor consumers. Since electricity provision would increase the overall welfare gains in the economy, governments should continue to provide capital support for rural electrification initiatives. While there should be appropriate legal support for the collection drive undertaken by private operators, penalties should be levied if agreed-upon investments to increase rural access are not made.

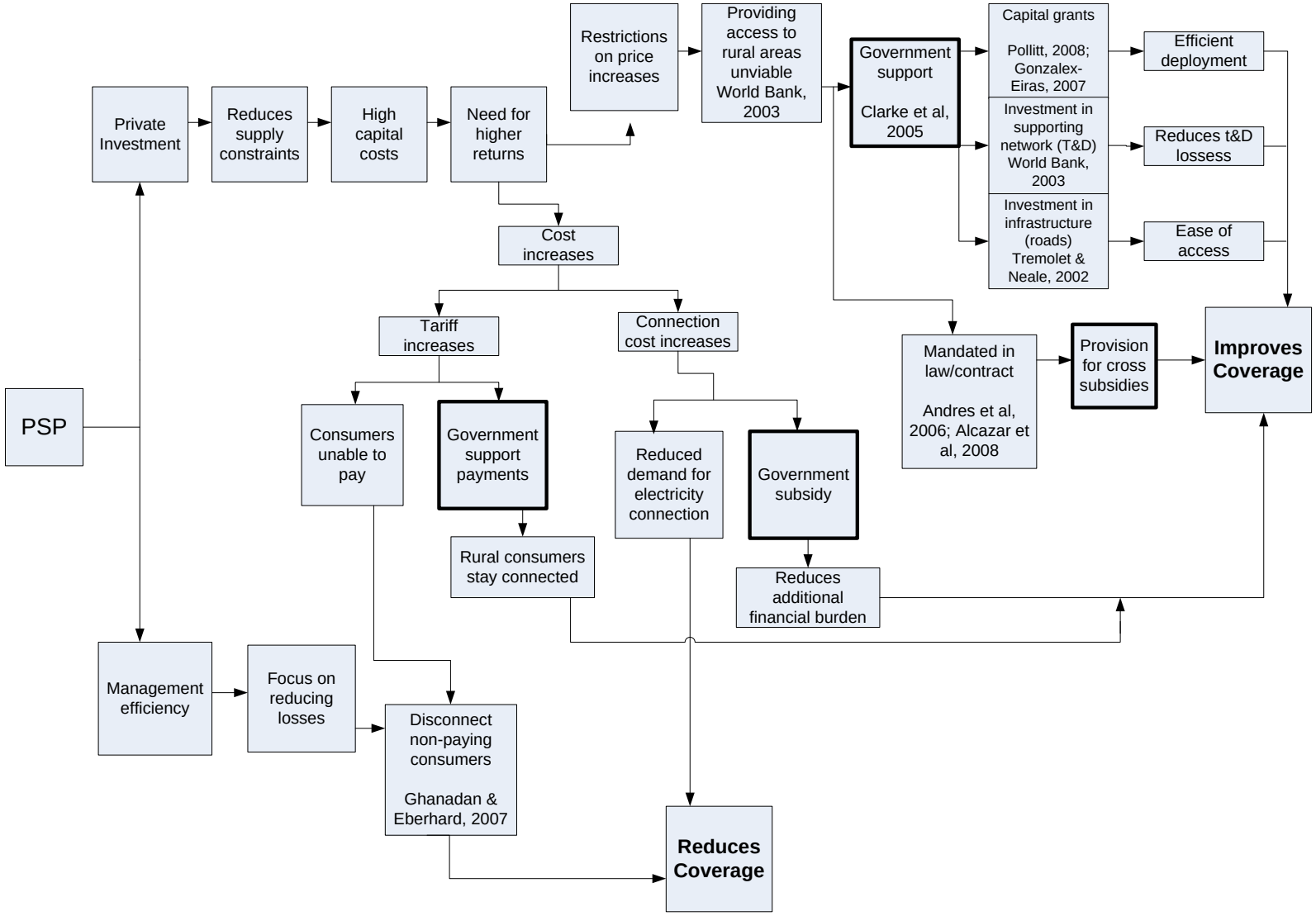


Figure 4.3: Improving access to under-served areas need to be supported by targeted assistance and support from the government

4.4.3 Telecom sector

The context of reforms and PSP process in the telecom sector has many differences from the other two sectors studied in this report. First is the influence of technology developments. Apart from common aspects like fiscal constraints, poor performances by the incumbent public operator and patronage of development agencies that triggered PSP in the sector, the sector underwent dramatic changes because of new technology. The technological wave that had swept in by the late 1980s and early 1990s overshadowed the impact of various policy initiatives undertaken by reformers. Second, the sector does not retain the kind of natural monopoly characteristics that can be seen in electricity distribution and water supply. Today, telecom is considered to be a competitive sector like so many other non-infrastructure sectors. Third, unlike electricity or water supply, telecom is characterised by a multiplicity of products based on different technologies, such as fixed line, cellular services and internet telephony. This gives the customers the choice of service as well as of service provider.

The content analysis of studies under the telecommunications sector is discussed in this section. We observed three common themes repeated across different studies that have an influence on quality and access in the provision of telecommunication services. They are: 1) Effective management of the exclusivity period sows the seeds of successful reforms in the telecommunications sector; 2) Private-sector led competition in mobile telephony can play a key role in improved access to telecommunication services; and 3) Optimal design of effective reforms has to take into consideration context specific issues of the telecommunications sector in a particular country; also, the design of reforms in the telecommunications sector has implications on the improvement in access and quality of telecom services.

<u>Effective management of the exclusivity period sows the seeds of successful reforms in the telecommunications sector</u>

The study analyses indicate that developing countries have followed a step-by-step approach to reforming the telecom sector, consisting primarily of privatisation, competition and independent regulation (Azam et al., 2002; Gillwald, 2005; Lee, 2001). Often, the process of reforms began with privatisation of existing public sector telecom organisation, by selling shares to the strategic private partner (Gillwald, 2005; Makhaya and Roberts, 2003; Samarajiva, 2000; Singh, 2000). As a result, the public sector telecom organisation becomes an 'incumbent operator'. The studies have reported various rationales behind the creation of an incumbent operator as a first step in the reform process such as: 1) it provides government sufficient time to test the waters of the telecom reforms; 2) the regulatory agencies, administrative procedures and laws necessary for a fully-fledged opening up of the telecom sector are a resource-consuming exercise and can be carried out over a period of time; 3) the government commitment to telecom reforms and lucrative market opportunities can be showcased to the private players with the performance of the incumbent operator (Gillwald, 2005; Samarajiva, 2000).

Governments provide a monopoly to the incumbent operator for a fixed period known as the 'exclusivity period'. During this period, the incumbent operator retains the sole rights to provide fixed-line telephony services and has to face limited/organised competition in the provision of mobile telephony services (Azam et al., 2002; Gillwald, 2005; Lee and Findlay, 2005; Makhaya and Roberts, 2003; Samarajiva, 2000; Singh, 2000). The exclusivity period provides assurance to the incumbent operator of faster returns on capital invested and drives heavy investments in the expansion of fixed-line telephony services (Gillwald, 2005; Gonzalez et al., 1998; Makhaya and Roberts, 2003). The incumbent operator also sees the investment as a necessary condition for preparing for full competition.

The concession agreement also provides the expansion targets to be achieved during the exclusivity period (Azam et al., 2002; Frempong and Atubra, 2001). Due to these drivers, the incumbent operator achieves a remarkable expansion of fixed-line connections (Azam et al., 2002; Frempong and Atubra, 2001; Gillwald, 2005; Lee, 2001; Lee and Findlay, 2005; Makhaya and Roberts, 2003; Samarajiva, 2000). A few studies have reported that there is a tendency for the incumbent operator to neglect the poorer and disadvantaged sections of society, and focus on the more profitable and wealthier sections (Gillwald, 2005; Makhaya and Roberts, 2003). The lack of proper regulation has been blamed by the studies for increasing disparity in access to telecommunications services between the richer and poorer segments of society (Gillwald, 2005; Gonzalez et al., 1998; Lee, 2001; Makhaya and Roberts, 2003; Singh, 2000).

Although the study analysis has indicated a positive side to an exclusivity period in terms of improved fixed-line connections, there are also negative outcomes. The incumbent operator tries to protect its interest and maintain primacy in the telecom sector, by creating various hurdles to the functioning of private operators involved in the provision of mobile, internet and other value added services. The incumbent operator is often in an advantageous position owing to the vertically integrated market structure of the incumbent and proximity to government (Makhaya and Roberts, 2003). The studies have indicated that private operators come across challenges in the areas of: interconnection charges (Clarke et al., 2003; Lee and Findlay, 2005; Makhaya and Roberts, 2003; Azam Singh, 2000); interconnection capacity (Frempong and Atubra, 2001; Samarajiva, 2000); switching infrastructure (Frempong and Atubra, 2001); and internet telephony (Makhaya and Roberts, 2003). This is because of to the anti-competitive behaviour of the incumbent operator. The absence of clarity in the concession agreement over resolution of these issues, as well as a strong regulatory structure, led to disputes between the incumbent operator and other private operators, and adversely affected the expansion and quality of mobile telephony services (Frempong and Atubra, 2001; Makhaya and Roberts, 2003). Also, the behaviour of the incumbent operator and disputes deterred new entrants in the telecommunications sector.

This dynamic is shown in Figure 4.4. The contractual and policy interventions for improving the above scenario are:

- **Policy interventions:** During the roll-out of the reform programme in the telecom sector, the governments have to give adequate attention to the creation of an institutional environment for sustainability of reforms. The regulatory agency is one important piece of this institutional environment. Governments have to ensure that the regulatory agencies are in place at the start of the reform process and it is equally important to strengthen the role of these agencies with necessary powers, legislation and skilled human resources over time. Governments can create alternate financial mechanisms for increasing telephone connections in underserved areas (Gillwald, 2005).
- **Contractual interventions:** The contractual agreements for telecom licences have to be carefully drafted to address issues such as interconnection, switching costs, network expansion targets in poor areas and so on. The targets for the expansion of fixed-line telephony have to be set by taking into consideration the existing state of the telecommunications sector. Contractual incentives can be created for bringing poorer sections of society under the ambit of the telecom sector. Governments should be able to monitor the process followed by the private operators for the fulfilment of the terms and conditions of the contracts.

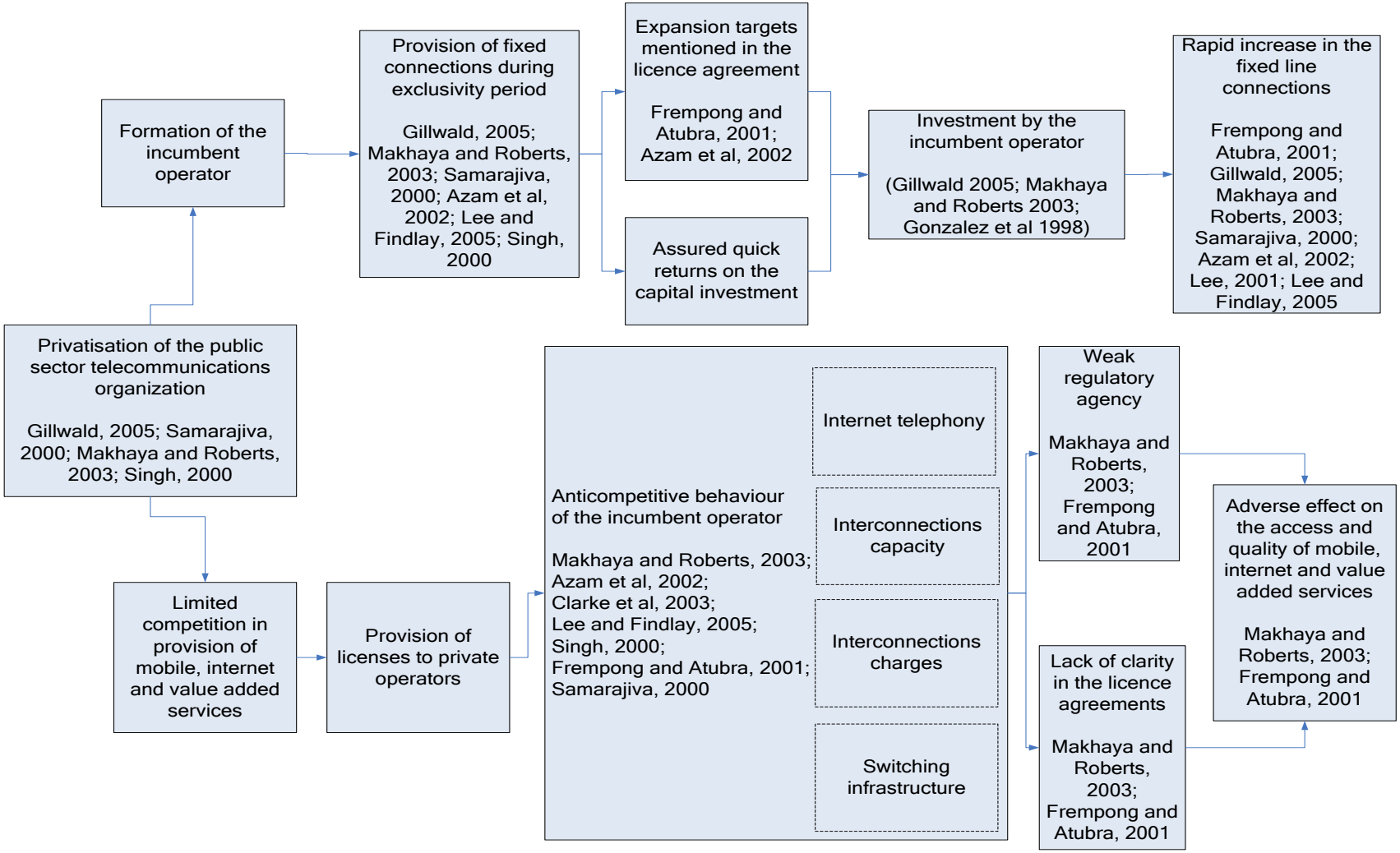


Figure 4.4: Management of the exclusivity period

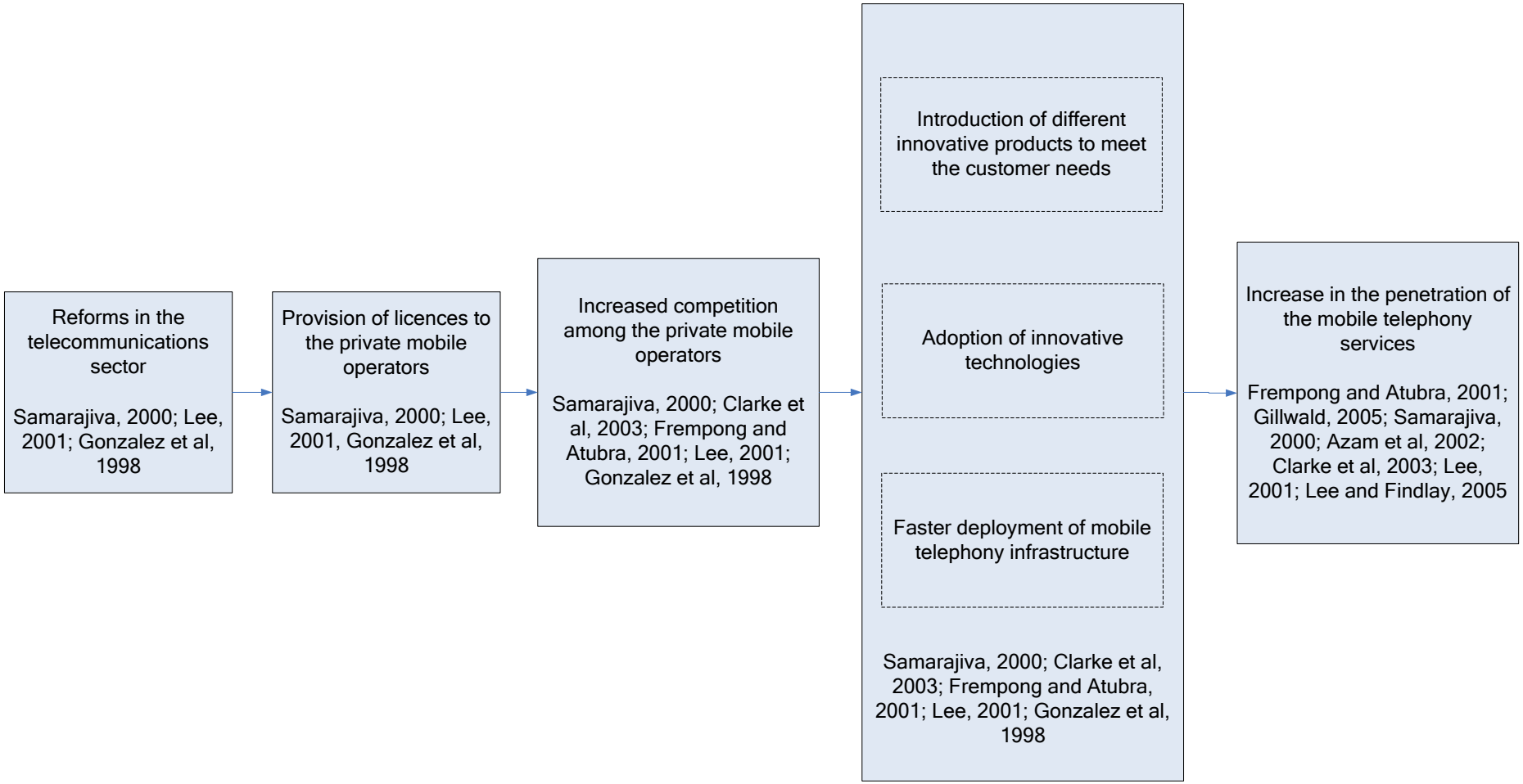
Private-sector led competition in mobile telephony can play a key role in improving access to telecom services

Developing countries decide to tread the path of reforms in the telecom sector for reasons such as poor performance of the existing public sector telecommunications organisation, pressure by developmental organisations, fiscal constraints for the improvement of telecom infrastructure, and inability to keep pace with rapid technological advancement (Azam et al., 2002; Samarajiva, 2000). Currently, mobile telephony is on the forefront of rapid technological advancement (Lee 2001). Mobile telephony services also score higher over fixed-line services due to greater growth opportunities and lower start-up costs in terms of infrastructure investments (Lee, 2001). There is growing realisation among developing countries of the potential of mobile telephony for improvement of access and quality of telecom services. As a result, the market for mobile telephony services has been opened up for PSP in developing countries with the provision of licences to the private mobile operators (Gonzalez et al., 1998; Lee, 2001; Samarajiva, 2000;).

The existence of multiple operators for the provision of mobile services results in intense competition among private players to grab market share. The mobile operators adopt multiple strategies, such as faster deployment of mobile telephony infrastructure, introduction of innovative products and services according to customer needs, and adoption of innovative technologies (Clarke et al., 2003; Frempong and Atubra, 2001; Gonzalez et al., 1998; Lee, 2001; Samarajiva, 2000). The outcome of these strategies is an increase in the penetration of mobile telephony services across sections of the society (Azam et al., 2002; Clarke et al., 2003; Frempong and Atubra, 2001; Gillwald, 2005; Lee, 2001; Lee and Findlay, 2005; Samarajiva, 2000).

This dynamic is shown in Figure 4.5.

Figure 4.5: Mobile telephony leads to improvement in access and quality of telecom services



The design of reforms has implications in the improvement in access and quality of telecom services

The study analyses have shown wide variation in the ways and means adopted by developing countries for reforming the telecommunications sector. There is no single dominant theme or path which can be followed for successful outcomes of the reform process. The studies, however, draw attention to two aspects: various factors that have to be addressed in the design of the reforms and the necessity of crafting the reform design according to the needs of the telecom sector in a particular country. The second aspect has been discussed by Samarajiva (2000), based on lessons from Sri Lanka's experience. He mentions that there are three components of institutional reforms in the telecommunications sector, which are organisational reform of the incumbent, including corporatisation and privatisation, the introduction of competition, and the establishment of regulation. However, there is a lack of consensus on the relative weight to be given to each component and the sequencing. He has stressed that the policy choices must be made within the overall design of effective institutional reform.

The factors to be addressed include:

Number of telecom operators: Privatisation-led competition in the telecom sector is recognised as the one of the reasons behind the success of telecom reforms. However, governments often faced dilemmas over the degree of deregulation. Lee (2001) has described the telecom reforms in Malaysia, wherein most of the existing operators were heavily indebted and the industry was facing diminished foreign participation. In this context, he mentions that it is necessary to investigate the issue of the optimal number of operators to ensure that investment costs can be recouped and excessive duplication avoided.

Anti-competitive behaviour of telecom operators: As observed in many studies, the incumbent operator has a tendency to resort to anti-competitive behaviour and policy makers have to consider strategies for avoiding this. While discussing the experience of telecommunications reforms in Malaysia, Lee (2001) mentions that competition policies and laws are virtually non- existent there. Under these circumstances, he stresses the creation of a national competition law to deal with anti-competitive conduct rather than leaving it to the regulatory commissions in the different sectors (telecommunications, power, ports).

The ordering of reforms: Clarke et al., (2003) draw attention to the disputes that arose over interconnection agreements and the government's commitment in the issue of mobile licences in the telecommunications reforms in Malawi. They mention that if the regulator had been operational before the agreements were signed, the disputes might have been avoided. But in the same breath, they mention that 'given the questions about the independence of regulator and the government's ability to involve itself in regulatory decisions, it is difficult to conclude that these problems would have been completely avoided even if this has been the case'.

Regulatory framework: Effective regulation has been mentioned as the cornerstone of successful telecom reform in many studies. However, there are varied experiences with regard to the actual performance of the regulatory agencies. Based on the telecom sector reform in South Africa, Makhaya and Roberts (2003) mention that the regulatory framework plays an important role in achievement of gains from the reform process. They stress that too much attention is paid to the legal independence of the regulator than to its powers and the interests determining its roles. As a result, the regulator has struggled with the behaviour of the incumbent and had rules overturned. Frempong and Atubra (2001)

illustrate the Ghanaian experience with liberalisation of the telecom sector. They mention that although the National Communication Authority was established in Ghana for regulating and managing the sector, it was not able to provide comprehensive regulations for the sector during its three years in operation.

Summary

The adoption of the PSP reform process leads to changes in various dimensions of the telecom sector, viz., investments, technological innovations, competition, pricing, organisational structures and so on. The outcomes of the PSP process depend on the sum total of the management of these different facets. The reform programme should include appropriate ways and means of managing these factors in accordance with the local context.

4.4.4 Water sector

We observed three common themes repeated across different studies that have an influence on quality and access in the provision of water supply and sanitation (WSS) services. These themes are: 1) Considerable challenges are faced in improving access for WSS services in poor areas; 2) Substantial reduction in non-revenue water can be achieved only through strong co-operation between the public and private sector in the provision of WSS services; and 3) PSPs can lead to a focus on short-term improvements as opposed to long-term network robustness, if contractual and policy safeguards are not present.

Improving access for WSS services in poor areas

The study analyses indicate that private-sector participation in the provision of WSS services thus far has primarily been a result of fiscal constraints faced by the governments of developing countries in upgrading and improvement of WSS infrastructure. Out of 17 qualitative studies included in the analysis of the water sector, 14 studies report the drivers behind the adoption of the PSP model. There are 10 studies that report 'fiscal constraints' as one of the reasons for the adoption of the PPP model. Other reasons described in the studies are a focus on improving efficiencies in the provision of WSS services, advocacy by developmental organisations, political championing for using PSPs, and the use of PSP as part of an overall reform or liberalization process. As a result, the concession type of PSP model that involves private-sector investment has become quite popular among decision makers in the public sector. The count of evidence in the water sector by type of PSP also indicates that concessions form a major proportion of PSP projects (see Table 4.34: Results by type of PSP).

With the adoption of the concession model, the private sector is expected to channel private capital as well as making efficiencies in the provision of WSS services. It is quite natural that the private sector desires an appropriate return on investment along with recovery of capital invested for tasks such as expansion of the network, repairs and maintenance. However, in a majority of cases, the connection costs and tariff structures prevalent prior to the involvement of the private sector are well below levels that can ensure financial sustainability. As a result, in most cases that we have analysed, involvement of the private sector is followed by an increase in connection costs and tariffs (Bakker, 2007; Sohail, 2000; Casarin et al., 2007; Maranon, 2005; Menard and Clarke, 2002; Mustafa and Reeder, 2009).

These increased costs adversely affect the poorer sections of society. The poor face difficulties in mobilising financial resources for the payment of connection fees (Bakker, 2007; Sohail, 2000; Casarin et al., 2007; Maranon, 2005; Menard and Clarke, 2002; Mustafa and Reeder, 2009). This then results in reduced demand for new connections from the poor, halting of network expansion by the private

operator in poor areas, and a reduction of access in poor areas (Bakker, 2007; Casarin et al., 2007, Maranon, 2005). In a similar vein, payment defaults, due to the inability of the poor to pay the increased tariff, show an upward trend when PSPs are used for the provision of WSS services. Disconnections therefore result (Bakker, 2007; Sohail, 2000; Maranon, 2005; Mustafa and Reeder, 2009). Mustafa and Reeder (2009) throw light on the increase in the disconnection rates in Belize City owing to the increase in connection costs and tariffs. They note that the disconnection rates in the first three years of operations of the private sector were 113 percent of the customer base, with many customers getting disconnected repeatedly. The lack of affordability is seen as a major factor for these high disconnection rates. Similarly, the study by Menard and Clarke (2002) highlight that the increase in the number of connections in Conakry, Guinea, after the reform process, was lower than anticipated, and coverage remained low. They stress the high price for water as the main reason behind low connection rates. Many connections in Conakry were inactive due to non-payment, and in some cases, the private sector even disconnected water supply to the standpipes which were installed to serve non-connected residents.

Sohail (2000) illustrates the impact of PSP on the provision of WSS services to the poor with a case study of Queenstown, South Africa. He observes that the poor faced hardships in the payment of the increased tariffs, resulting in low levels of payments and substantial accumulation of arrears. Consequently, the private sector cut off the connections, which created much dissatisfaction among the poor about the way in which services were charged.

Bakker (2007) mentions that, in academic and practitioner literature, the failure of water utilities to reach the poor is often attributed to the inability of users to pay high user charges and connection fees, and inappropriate pricing. She stresses that a set of non-economic factors, which equally affect the provision of WSS services in poor areas, should receive greater attention. Some of these non-economic factors are high connection costs in poor areas, and availability of water by private vendors at lower cost.

Poor areas in developing countries often share similar characteristics – location in far-off areas, highly congested urban development and lack of land-use planning. As a result, the cost of providing connections in poor neighbourhoods increases substantially, making the provision of water connections in poor areas an unattractive proposition for the private sector. Bakker (2007) and Maranon (2005) for instance, have described the reluctance of the private partner to connect the poor in Jakarta, Indonesia and Mexico City respectively.

The lack of access to water supply networks in poor neighbourhoods leads to the emergence of alternate sources of supply such as private water vendors. The cost of water provided by the such vendors is substantially lower than the water provided by the private operator. Therefore, the initial cost of water becomes a decision making factor for the poor in choosing a source of water supply, and reduces the demand for newer network connections (Bakker, 2007).

This dynamic is shown in Figure 4.6.

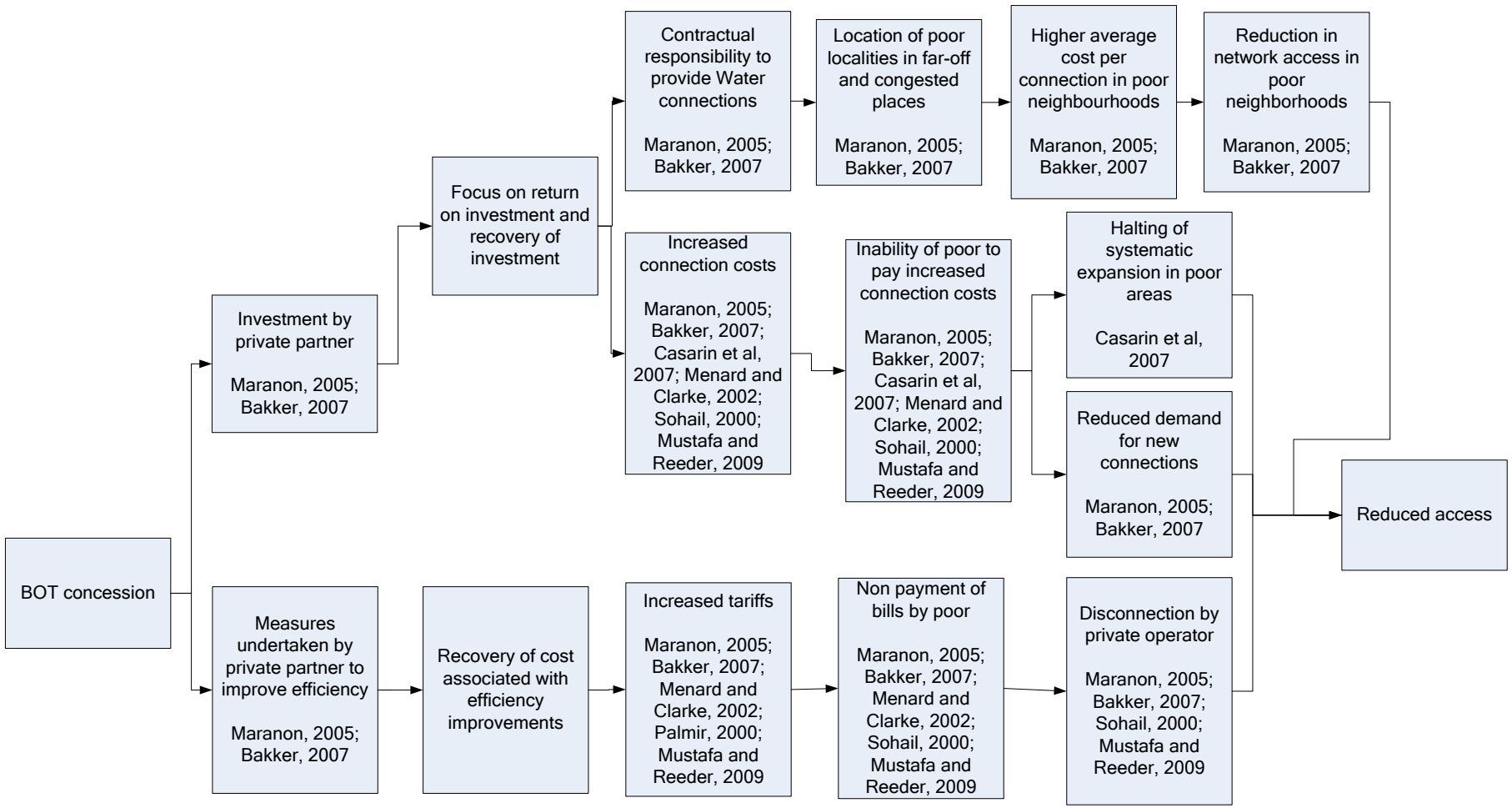
The contractual and policy interventions for improving the above scenario are discussed below:

- **Contractual interventions:** The public sector/government can create appropriate incentives for the private partner to expand water supply networks in poor areas. These incentives can be in the form of sharing the cost of network expansion in poor areas between the public and private sector, provision of a fixed sum to the private partner for connecting a user

in the poor category and so on. The payment of connection fees can be allowed in different instalments to avoid undue burden on the poor. The timeframe for issue of bills can be reduced, providing avenues for payment of user charges in smaller instalments (Bakker, 2007).

- **Policy interventions:** The government has to lay down a clear policy framework for bringing clarity on issues such as provision of WSS services by private vendors in the concession area, and financial support to the concessionaire for network expansion in poor areas (Bakker, 2007). Information, education and communication (IEC) activities among users of the WSS network (including the poor sections of society) should be a mandatory step to be followed for educating users about the rationale behind the adoption of PSP in the provision of WSS services. The benefits of using piped water supply over water supplied by private water vendors and the necessity of ensuring financial viability in the delivery of WSS services can be stressed in IEC campaigns (Maranon, 2005, Wu and Malaluan, 2008).

Figure 4.6: Pro-poor measures in PSP projects



Achieving reduction in non-revenue water

Water utilities in many developing countries are grappling with the problem of reducing unaccounted-for or non-revenue water. This reduces the quantum of water supply and erodes the financial viability of PSP in WSS service provision. Contractual incentives play an important role in the reduction of non-revenue water. Menard and Clarke (2002) present the experience of water sector reform in Conakry, Guinea. They note that the private partner in the Guinea water project was paid based on bills collected, not on water produced or treated and delivered. Also, the private sector did not pay for raw water supplied to the private partner; the private partner therefore lacked the incentive to ensure judicious use of water.

Apart from the presence of contractual incentives, investment by a private partner in the provision of water services improves avenues for reduction in non-revenue water. This comprises three components: physical (or real) losses, commercial (or apparent) losses, and unbilled authorised consumption. The private sector can reduce physical losses through technological improvements and creation of an operation and maintenance strategy. A number of studies have presented the private sector's ability to reduce physical losses (Sohail, 2000; Maranon, 2005; Rivera 1996; Wu and Malaluan, 2008).

Wu and Malaluan (2008) compare the performance of two concessions awarded by Manila's Metropolitan Waterworks and Sewerage System (MWSS) to Mayniland Water Services, Inc. and Manila Water Company, Inc. They find that the dramatic success of Mayniland Water Services, Inc. in the substantial reduction of non-revenue water was due to two innovations in its operations management: territory management and the Water for the Community programme. As part of Manila Water's territory management programme, the service areas were partitioned into smaller and more manageable clearly defined territories. The managers and employees of Manila Water were given clear tiered division of responsibilities, evaluation and compensation, which led to an improvement in performance. Similarly, the Water for the Community programme focused on extending water supply services to areas containing numerous clusters of low-income families. This initiative brought water only to the edge of community, next to a main road and it was the responsibility of the community to distribute the water from thence to individual households and to protect against leakage and illegal connections.

The case study of a PSP project in Queenstown, South Africa, reported by Sohail (2000), mentions that a number of technical improvements were implemented by the private operator, leading to a reduction in water losses. These improvements were replacement of ageing water pipes, implementation of a telemetry system (remote recording and control) for the reservoir and pump station, development of a comprehensive hydraulic water distribution system, installation of five bulk meters, and implementation of an accelerated meter replacement and upgrading programme.

Maranon (2005) describes how the use of PSP in the provision of potable water has made a positive impact on the reduction of non-revenue water by carrying out activities such as: 1) a metering improvement programme which includes installation of new meters, maintaining them in the best operational condition, correcting any damage or defects that emerge, and supervising and controlling the work done by contractors; and 2) a programme for detection and elimination of leaks, which includes replacement of asbestos tubing with PVC, which is more durable and flexible and thus is less susceptible to fracture on a sloping terrain.

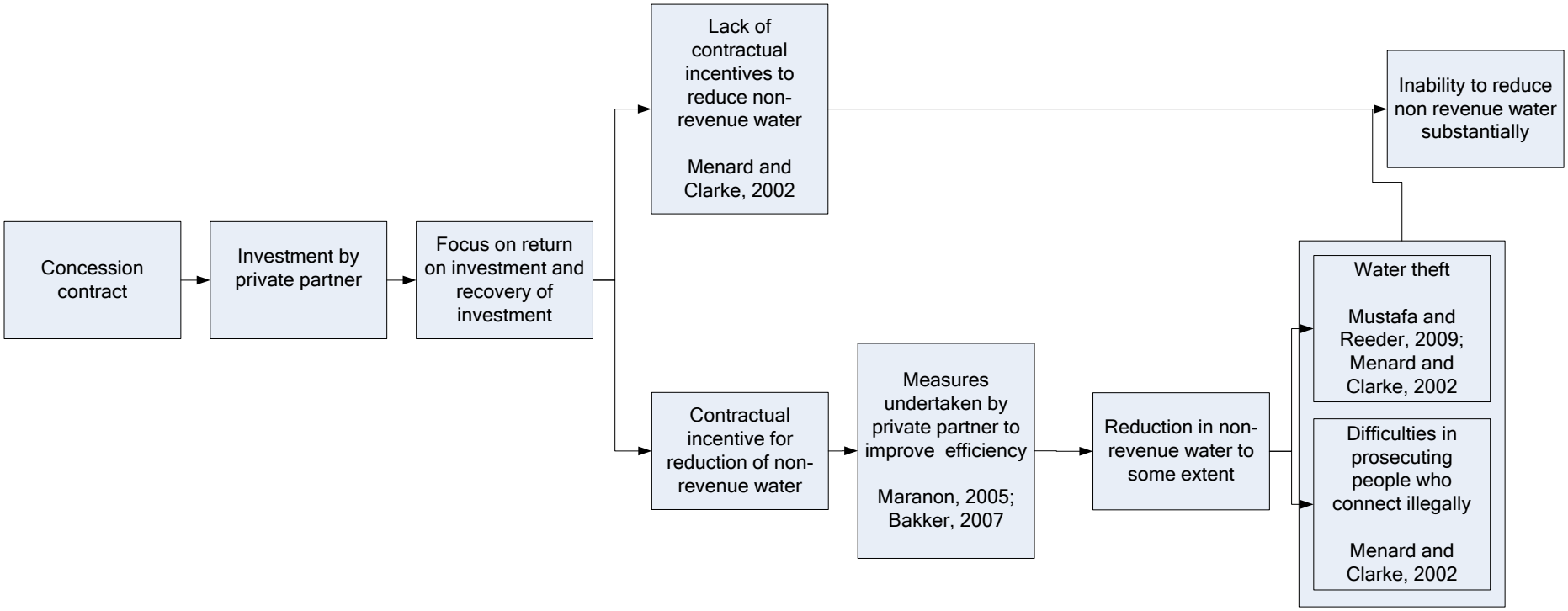
Similarly, customer management through preparation of a register of users, improvement in meter reading procedures and so on lead to a reduction of non-

revenue water. The private sector has a greater degree of influence in the reduction of physical losses, metering inaccuracies and data handling errors than in water theft – one of the main components of commercial losses. Menard and Clarke (2002) have drawn attention to a key issue of 'water theft' through the case study of the Conakry water supply project. In this project, the private partner faced legal and regulatory hurdles in prosecuting people who connected illegally to the water supply network. As a result, the private partner could not achieve substantial reduction in non-revenue water. Similarly, the water supply privatisation project in Belize, which was analysed by Mustafa and Reeder (2009), indicated that the private partner claimed water wastage due to criminal behaviour, e.g. tampering with meters, illegal water connections, as the main problem with the water supply network and not system leakages. An arrangement whereby the private-sector manages physical losses and the public sector manages commercial and billing losses may therefore be the ideal composition for reduction in non-revenue water.

This dynamic is shown in Figure 4.7. The contractual and policy interventions for improving the above scenario are:

- **Contractual incentives:** The public sector has to take utmost care in the creation of an incentive structure for the reduction of non-revenue water. The private sector can be asked to come up with an operational and maintenance strategy in line with the existing status of the water supply infrastructure. The private partner can be given encouragement to adopt innovative water-loss-reduction technologies and procedures. Apart from reduction of physical losses with PSP, which in most cases becomes a central theme in reduction of non-revenue water, the contractual framework can provide roles to the private sector for managing the 'softer side' of the infrastructure, i.e., in terms of meter reading, preparation of customer registers, issuing of bills and customer interaction for identification of leaks and their resolution; this has substantial potential for commercial losses (Haggarty et al., 1999; Maranon, 2005; Menard and Clarke, 2002; Rivera, 1996).
- **Policy interventions:** Water theft is a political and social issue in developing countries. Therefore, it is necessary to garner strong support and commitment from politicians and societal members for addressing this issue. Legislation which bans water theft and enables prosecution of people with illegal connections and other unlawful acts can create a necessary foundation for reduction of water thefts (Menard and Clarke, 2002; Mustafa and Reeder, 2009). However, it needs to be understood that in the absence of political and administrative commitment, creation of legislation will not translate into actual reduction in water theft. This commitment will also ensure that regulatory agencies are not sidelined during decision making processes, and their rulings, if any, on the issue of water theft are upheld in practice. Appropriate representation to community/non-governmental organisations, consumers groups and society leaders can be provided in the policy framework for addressing this issue. These groups can play an active role in information dissemination, educating the public, monitoring service delivery and reporting instances of water thefts (Wu and Malaluan, 2008).

Figure 4.7: Non-revenue water in PSP projects



Focusing on long-term robustness through the use of PSPs

In general, the public sector decides to involve the private sector in the provision of WSS services due to challenges faced in operating the existing infrastructure, as well as expanding the infrastructure to meet the demands of new users. After signing the concession agreement, it is expected that the private sector will work on both fronts. However, there are some factors that influence the private sector to focus primarily on improvement of the existing infrastructure. First, the start-up phase of an infrastructure project is surrounded by many uncertainties – legal, regulatory, political and so on. The private sector is often reluctant to lock up capital investment in these early phases. Second, from a political gains perspective, existing infrastructure provides ample opportunities for showcasing improvements to stakeholders, with a much lower amount of investment.

Mustafa and Reeder (2009) describe how the private-sector water utility in Belize City focused on short-term revenue maximisation efforts, and compromised on the long-term strategic expansion of the system and improvements in terms of conveyance efficiency and quality. The private utility gave more emphasis to tasks such as streamlining the management systems, reconfiguration the water supply network for improved metering, and installation of water meters.

The ability of the private partner to improve the financial viability of WSS utility operations with short-term revenue maximisation efforts has been highlighted by Maranon (2005), with a case study of the water utility in Mexico City. Under this project, the private sector performed the tasks of meter reading, billing, updating the registrar of networks, meter maintenance and pipeline repairs.

There is another set of studies wherein the issue of long-term improvement in the supply network and service has been addressed with a slew of measures. These measures are: 1) performance targets for water coverage, sewerage coverage and unaccounted-for water are specified in the contract document (Rivera, 1996); 2) a contractual requirement is given where the private provider must create a strategy for investment in network expansion (Artana et al., 1999; Menard and Clarke, 2002; Tremolet and Neale, 2002); and 3) regulatory oversight is present to control and maintain service quality, protect consumers and approve and supervise the execution of expansion plans and investments according to contract specifications (Rivera, 1996). As a result of these measures, the private partner allocated sufficient resources for improving access and quality in the long run.

This dynamic is shown in Figure 4.8. The contractual and policy interventions for improving the above scenario are:

- **Contractual interventions:** There is a set of studies which have highlighted the contractual incentives for ensuring long-term improvement in WSS infrastructure (Artana et al., 1999; Menard and Clarke, 2002; Rivera, 1996; Tremolet and Neale, 2002). One strategy is the specification of performance targets for water coverage, sewerage coverage and UFW in the contract agreement. Another is a contractual requirement to create a strategy for deciding investments in network expansion.
- **Policy interventions:** Although contractual interventions are effective to a certain extent, regulatory oversight can ensure the private sector's commitment to long-term improvement in the WSS infrastructure. The potential role of a regulatory agency can be to control and maintain service quality, protect consumers, and approve and supervise the execution of expansion plans and investments according to contract specifications.

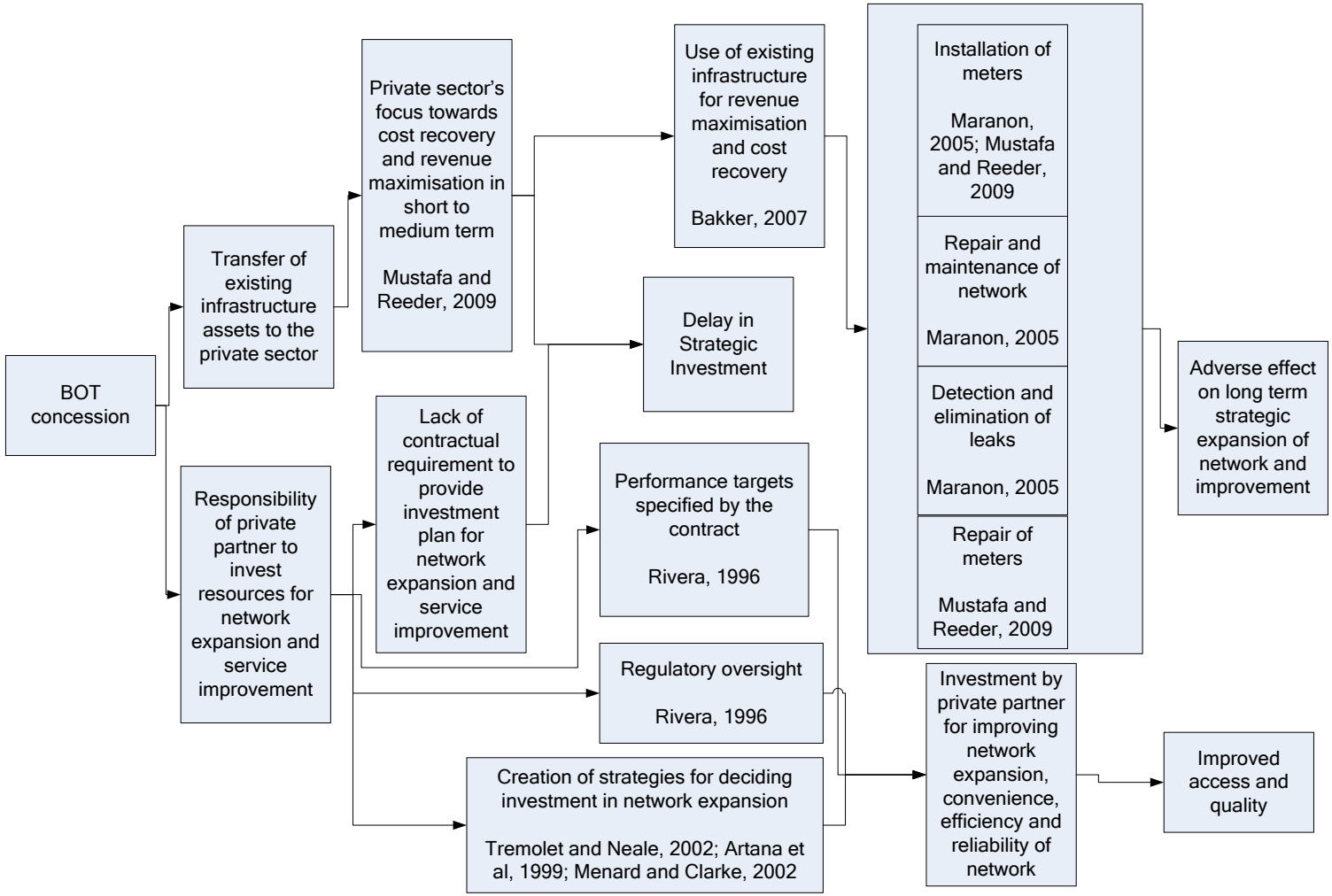


Figure 4.8: Investment planning by the private partner in PSP projects

Summary

The content analysis of studies in the water sector highlights the key issues faced in the improvement of access and quality in the provision of WSS services through the PSP model. The two key drivers that predicate PSP outcomes are: 1) allocation of resources by the public and private sector in tune with the requirements of the PPP project; and 2) creation of an institutional and policy environment to nurture relationships between the public and private partners, to achieve public policy outcomes. The public sector should be able to programme in pro-poor initiatives during the project development exercise, create incentives mechanisms for the reduction of non-revenue water and ensure long-term improvement in the WSS infrastructure. The private sector should respond to these opportunities in a clear fashion. However, there are many innate features of the public and private sector which may hinder achievement of public policy outcomes. The public sector may shy away from stringent action in reduction of non-revenue water due to social and political pressure, may lack the interest or initiative to partner with the community for improvement of WSS services, may fail to take due care in the protection of consumers and in monitoring the performance of the private partner, and may lack clarity on the level of financial support to be provided to the private partner to address the needs of the poorer sections of society. In a similar vein, the private sector may resort to measures that ensure profit maximisation, and which in turn may run counter to societal objectives. In this scenario, the institutional and policy environments with the presence of related laws, regulations and institutions, will play a key role in keeping the PPP project on track and guide relationships between the public and private sectors. Overall, PSPs can lead to beneficial outcomes with regard to access and quality in the water sector. However, careful managing of the contract and the policy environment are required in order to avoid unintended consequences.

5. Implications

5.1 Main findings

There are more observations that show a positive impact of PSP on access and quality than ones which show a negative impact. However, an analysis of the evidence by the type of studies indicates a degree of divergence in the evidence between qualitative and quantitative studies. While qualitative studies show a higher proportion of positive observations, observations of quantitative studies indicate that the highest proportion do not show any significant impact of PSP on outcomes. Meta-regression analysis on a sub-set of quantitative studies also does not indicate any systematic relationship between PSP and outcomes.

Based on the duration of contract, PSP can be broadly classified into two categories – short-term and long-term forms of PSP. Examples of short-term forms include leasing, management contracts and service contracts, while examples of long-term forms include concessions and divestitures. The overall evidence is that short-term forms are more effective than long-term forms.

The results indicate substantial variance in the strength of positive evidence across sectors and outcomes. The evidence for positive impact of PSP is the strongest in electricity for service quality, in telecom for access, and in water supply for product and service quality.

There are potential trade-offs between access and quality. Unless the objectives of the PSP specifically address each of the outcomes, improvements in one of the outcomes can negatively affect the other. For example, when access is improved by increasing connections to far-flung areas, T&D losses would tend to increase, leading to a negative impact on service quality outcomes. To avoid such a negative impact, additional investment is needed in T&D to strengthen the distribution network. Unless there is a specific focus on improvements in service quality, such T&D investments are unlikely to happen, leading to a drop in service quality levels.

While it is possible to replicate a successful PSP programme in different contexts, it might not be possible to replicate the impacts. The impact not only depends on the features of the PSP programme, but is also influenced by other contextual factors, such as macro-economic characteristics, social and demographic conditions, sector-level factors such as regulation and competition, and various institutional and organisational factors. Since it is virtually impossible to replicate many of these factors, PSP programmes should be specifically developed by taking into consideration the local context. Weak positive evidence in this review could also indicate that currently many PSP programmes are not adequately customised to suit the local context.

Some of the factors that contribute towards a strong impact of PSP are as follows.

- When achieving improvements in outcomes leads to direct benefits to the private participant, the impact has been positive. For example, reduction of losses and better bill collection ratios directly increase the revenues and profits of the private investor. In many instances, improvements in these dimensions can be achieved by way of superior management practices without incurring any major capital expenditure. Therefore, in such contexts, PSP has been able to show a strong positive impact on these outcomes.
- PSP impact is also positive when the private sector has an interest in achieving a positive impact for furthering its business objectives. When there is a possibility of several other PSP opportunities following initial success, private

players take additional efforts to show success. Prior success strengthens their ability to capture follow-on PSP opportunities.
- There should be adequate support from the government and other agencies for the functioning of the private sector. For example, providing access to far-flung areas might not be remunerative to the private sector, and if the government does not provide any subsidy for increasing access in rural areas, PSP would lead to a decline in access. However, if the government has continued to provide a similar level of assistance as under the public sector regime, the impact on access has been much higher than what was achieved under the public sector.

Some of the factors that contribute towards a weak impact of PSP are as follows.

- The occurrence of *force majeure* events, soon after the implementation of PSP. General evidence indicates that, compared to the public sector, the private investor is not able to adequately handle the impact of events such as droughts, monsoon failure or fire that occur within a couple of years of implementation of PSP. However, it needs to be stated that the private sector has responded adequately to such events if they occur many years after PSP has been implemented.
- When regulatory regimes do not recognize improvements in product quality with suitable incentives, there is no inducement for the private sector to achieve improvements in outcomes, even though such improvements might be possible. Improvements on some outcome indicators involve substantial capital investment. For example, improvements in product quality need more capital as compared to improvements in service quality. When regulatory regimes do not provide incentives for higher levels of product quality but levy penalties for not meeting benchmark measures of performance, the private sector will just be interested in meeting the benchmark, and not surpassing it.

5.2 Strengths and limitations of this systematic review

5.2.1 Strengths of the review

As far as the authors know, this is one of the first systematic reviews in the infrastructure sector. While there have been previous reviews on PSP, they were not systematic reviews, in that the process of identifying studies for the review and appraising them for quality were not clearly documented. Generally, the impact of the interventions (such as PSP) is analysed in reviews in relation to a variety of outcomes. By reviewing only specific outcomes, viz., access and quality, this study brings more depth into the discussions.

With high levels of economic growth in developing countries, there is an imperative to develop high-quality infrastructure that will support this growth. While developed countries have well-developed infrastructure facilities in general, the same cannot be said for developing countries. Learning from the experiences of developed countries can be limiting, given the substantial heterogeneities in context between developed and developing countries. By focusing only on developing countries, this study has been able to synthesise findings that are more relevant in this context.

The synthesis captures several characteristics of the studies as well as the evidence. For example, at the study level, we have captured the type of study, i.e., qualitative or quantitative, and type of outcome variable, i.e., absolute, ratio or growth, in our analysis. In addition, the synthesis also captures the variation in the forms of PSP (such as concessions, divestitures, leasing, etc.) and the regional differences. Including such details in the analysis has made the findings more

enriching. Previous reviews have largely looked at analysing the impact as a binary outcome. In this review, we have consciously highlighted the three different types of impacts – positive, negative and no significant impact.

A rigorous methodology was used to select the studies that would be included in the review. Since this review is based on only the evidence that met the inclusion criteria, it is felt that the validity of the findings is also strong. More importantly, multiple modes of synthesis have been used. Not only were the findings from these different modes consistent, but they also complemented each other, thereby increasing the robustness of the results, while providing a more holistic perspective on the evidence.

The review was not limited to a particular type of studies, such as quantitative or empirical. All studies that qualified for inclusion after applying the exclusion and inclusion criteria were included in the review. Therefore the studies included in the review used diverse methods, such as case studies, econometric, statistical and qualitative analysis. While this posed issues in terms of heterogeneity, this diversity ensures that the findings of the evidence are more representative.

5.2.2 Limitations of the review

There are several outcomes, such as efficiency, cost, welfare gains and inequality that can be attributed to PSP. As indicated in an earlier study (Annamalai et al., 2012) several of the outcomes are related, and in many cases involve trade-offs. By choosing to study only access and quality outcomes, the review has excluded the impact of PSP on other areas. Therefore, the findings of this review do not constitute a comprehensive representation of the impact of PSP and pertain to only access and quality outcomes.

A second limitation of this review is that it is specifically focused on the experiences of developing countries. While this limits the contextual heterogeneity, it does not give opportunities to contrast the experiences between developing and developed countries. The scope of a future review could include the comparison of experiences between developing and developed countries.

Thirdly, the findings pertain to the evidence available so far. PSP is not just an indication of changes in ownership, but is also an indication of economic transitions and changes in industry structure and organisational processes. While changes in ownership can be easily observed and can be implemented fairly quickly, the results of economic transitions and implementing the changes in process and organisational culture take time. Therefore, it takes a long time for the complete impact of PSP to reveal itself. Since active implementation of PSP in developing countries has been happening only since the late 1990s, the evidence in the studies included in the review may not have been able to analyse the full impacts of PSP. Over time, developing countries learn to manage better the factors that make PSP more effective, and the changes in industry structure and organisational processes that accompany PSP start taking effect. As a consequence, the trend of evidence on the impact of PSP may be different in the future from what has been found in this review.

5.3 Implications

5.3.1 Policy

Need to recognize trade-offs between different outcomes: The impact of PSP differs for different outcomes and the change between different outcomes need not be always in the same direction. As indicated previously, improvements in access can negatively impact on quality if no specific measures are taken to

address this. Policy makers need to recognize this, and being aware of such trade-offs can help in designing an effective PSP programme.

Need to recognize the trade-offs between objectives: Short-term forms of PSP are more effective than long-term forms in achieving the desired outcomes. In addition to having lower risks, short-term forms also lead to faster results. However, in many developing country contexts, a main objective of PSP is to attract private-sector capital for capacity expansion and to overcome supply-side constraints. However, short-term forms of PSP are not appropriate for attracting large amounts of private capital as compared to long-term forms. Long-term forms, though, may not be as effective in improving access and quality outcomes, but are more suitable for achieving the overall objective of attracting long-term private-sector capital in infrastructure.

The impacts of PSP differ among different segments: Overall evidence indicates that PSP benefits urban more than rural consumers, and affluent more than poor consumers. However, estimation of welfare gains indicates that rural and poor consumers benefit more from infrastructure services than urban and affluent consumers. But, since the private investor does not benefit much from the provision of infrastructure services to rural and poor consumers as compared to urban and affluent consumers, the impact of PSP on the former segments is not as beneficial compared to the latter segments. Therefore, policy makers who are keen to enhance the positive impact of PSP should include clear provisions that support the improvement of services for the marginal and disadvantaged segments.

The effectiveness of PSP varies between regions: The impact of PSP differs between sectors in different regions, and the relevance of PSP in achieving the desired outcomes should be specifically examined for individual sectors. For example, PSP in Latin America has been more effective in the electricity and telecom sectors compared to water supply. However, in Asia, PSP in water supply has been more effective compared to the other two sectors. Therefore, policy makers should specifically take into consideration sector-specific institutional and other factors while analysing the appropriateness of PSP for the desired outcomes.

Effectiveness varies between outcomes within sectors: Even though the evidence has been positive, the strength of the positive evidence varies among outcomes. PSP should not be seen as a magic bullet that can achieve improvements across all outcomes. PSP is associated with greater improvements in access in telecom, with improvements in service quality in the electricity sector, and with product and service quality in water supply. This indicates that policy makers should also consider evaluating other reform strategies, such as regulation or liberalization to achieve a better bundle of outcomes.

PSP programmes need to be customised to suit the local context: Since the outcomes of PSPs vary differently across areas, it is suggested that the interventions should be tailored to suit the context in which they are being implemented. For example, in instances where regulatory capability is high, those forms of PSP (such as divestiture) can be implemented that can provide for a high degree of autonomy to the private investor. In places where the regulatory institutions are not very strong or do not exist, the public sector authority should closely monitor the performance of the private investor, to prevent it from taking advantage of the natural monopoly conditions that exist in many infrastructure sectors. Therefore, in such circumstances, appropriate forms of PSP would be those where unambiguous and specific contracts can be written (such as leasing, or management or service contracts), which clearly specify the respective roles of the public and private sectors.

Need for a robust institutional environment: PSP leads to a transformation in the role of the public sector. From being an infrastructure service provider, the state should now focus on creating an enabling institution environment that can create conducive conditions for the private sector to operate. For example, law enforcement machinery should give appropriate protection and freedom to the private sector to disconnect non-paying consumers. At the same time, contractual provisions should include appropriate provisions for penalties if the private investor has not been able to achieve the desired outcomes. In the absence of such a transparent and enabling environment, the full benefits of PSP could be difficult to realise, as private investors could be seen as benefiting at the cost of consumers or vice versa.

Policy and contractual interventions pertaining to PSP should be implemented in parallel and not sequentially: Elements of PSP can be classified at two levels – at the level of policy and at the level of individual contracts. A well-thought-out PSP policy without supporting features in the actual contract can lead to problems in ground-level implementation. On the other hand, an unfavourable policy environment cannot be very successful in attracting and sustaining PSP, however strong the actual contract may be.

5.3.2 Practice

PSP invariably leads to changes in organisational structure, process and culture. Several qualitative studies indicate that many of the benefits of PSP can be traced to these changes. To the extent that these changes are effective, the impact of PSP is also positive. Therefore, managers have an important role to play in identifying and implementing these changes, which in turn can help in realising the desired outcomes from PSP.

Akin to a knife that cuts both ways, the outcomes from PSP largely depend on the way in which it is implemented. As it is virtually impossible to find two different contexts having the same conditions, it would be inappropriate to replicate a successful PSP programme in a different context without any modifications. Managers have an important role to play in adapting the elements of PSP to suit the realities on the ground.

The possibility of achieving positive outcomes from PSP becomes higher when the interests of private investors, government and consumers are aligned. When signing a PSP contract, managers should ensure that the interests of all the parties are taken care of to achieve a win-win situation. An arrangement which compromises the interests of any one of them might not lead to beneficial results in the long term.

5.3.3 Research

This review indicates that there is some degree of divergence in the evidence between quantitative and qualitative studies. While both the studies indicate that positive observations outnumber negative, the difference is in the proportion of observations where there is no significant impact as a result of PSP. Further research needs to be done to determine the reasons behind this divergence. In addition, the following strategies can help to reduce this divergence: undertake a more rigorous analysis of evidence in quantitative studies and include additional variables that capture the contextual parameters in quantitative studies.

Findings from count of evidence synthesis indicate that there are regional differences in the impact of PSP. The number of studies showing a positive impact of PSP is smaller in Asia for the electricity and telecom sectors, compared to the water sector. However, a converse trend could be observed in Latin America,

where the number of studies with a positive impact is comparatively higher in electricity and telecom compared to water supply. Additional studies that help in understanding the reasons behind these differences would help in designing more effective PSP strategies.

While many studies are able to identify a strong association between PSP and outcomes, additional research is needed on the causal pathways between the intervention and the outcomes. This is particularly so, because of the possibility of multiple causal pathways for similar outcomes. Various internal context factors (i.e., utility-specific factors) and external context factors (i.e., macro- economic and sector-level factors) play a strong role in influencing outcomes. Since the contextual factors are most likely to be different in different countries, tracking as many causal pathways as possible in different contexts would help in furthering our understanding of how PSP impacts access and quality.

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Appendices

Appendix 1.1: Authorship and acknowledgements

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Acknowledgements

- AusAID: Tymon Kennedy and Steve Taylor
- 3iE: Hugh Waddington
- EPPI-Centre: Professor Sandy Oliver, Carol Vigurs, Dr. Mukdarut Bangpan, Phil Rose, Sylvia Potter
- We would also like to thank several of our colleagues who responded to our request by suggesting suitable studies for our review. We are grateful for their prompt response to our request for help.
- Peer reviewers: Professor George Clarke, Dr Alison O'Mara-Eves
- Others: Anonymous reviewers of our protocol; our respective institutions for permitting us to undertake the study

Appendix 2.1: Search strategy for electronic databases

A2.1.1 List of journals that were hand searched

- *Energy Policy*
- *Telecommunications Policy*
- *Utilities Policy*
- *Water Policy*

A2.1.2 List of websites that were searched

We went through the relevant sections in each of the websites listed in Table A2.1, looking under various headings like infrastructure, private sector, energy, electricity, working papers, telecommunications, infrastructure, economics and finance, transport, urban development, water supply and sanitation. All the documents or studies under these headings were examined for inclusion. When the lists of documents or studies were large, we searched using keywords.

Table A2.1: Details of website search

Website	**Sections**	**Keywords used**	**Types of document**	**Number of documents / hits**	**Number included for review**
African Development Bank	Publications	None	Working papers	117	None
Asian Development Bank	Publications	None	Papers in English	598	None
Centre for Global development	Publications (Private investment)	None	Working papers	32	None
Inter-American Development Bank	Publications (Electricity, Energy, Private sector, Water and sanitation)	None	Working papers	33	1
Managing Infrastructure Reform and Regulation (Graduate School of Business, University of Cape Town)	Publications (Private sector participation in power, power sector reform)	None	Working papers, study reports, etc.	28	1
Public Utility Research Centre (University of Florida)	Research papers	None	Research papers	128	1

Website	Sections	Keywords used	Types of document	Number of documents / hits	Number included for review
World Bank	Publications	(privat* AND electri*), (privat* AND water*),(privat* AND telecom*),(reform* AND electri*), (reform* AND water*),(reform* AND telecom*), (private sector* AND participation*), (private sector* AND partner*), (private sector* AND collaboration*),(public private* AND participation*), (public private* AND partner*), (public private* AND collaboration*),*) ,(Business* AND participation*), (Business* AND partner*) and (Business* AND collaboration*)	Books, journals and working papers	83	4

A2.1.3 Details of electronic database search

Databases searched

The electronic databases that were searched for this review are as follows:

- **ScienceDirect:** Contains many popular journals like *Utilities Policy*, *Journal of Development Economics*, *Telecommunications Policy*, *Energy Policy*, *Transportation Research*. ScienceDirect also connects other search tools in Scopus and SciVerse. Given the extensive coverage of this database, our first search yielded an unmanageable number of hits. To make the number of hits more manageable, we selected the list of subjects that would be included in the search given the scope of the review. These were business management and accounting, economics, econometrics, finance and social sciences. Within these subject areas, 86 journals were chosen based on their coverage, focus and objectives to search for potential studies. For more relevant hits, we also excluded a list of topics from the search in the

identified journals. The list of journals and the topics that were excluded are given in Box A2.1.

Box A2.1: List of ScienceDirect journals searched and topics that were excluded within these journals

Business Horizons, China Economic Review, Cities, The Columbia Journal of World Business, Developments in Environmental Economics, Ecological Economics, Economic Modelling, Economic Systems, The Electricity Journal, Emerging Markets Review, Energy, Energy Economics, Energy Policy, European Economic Review, European Journal of Political Economy, European Management Journal, Global Finance Journal, Government Information Quarterly, Government Publications Review, IIMB Management Review, International Business Review, International Journal of Critical Infrastructure Protection, International Journal of Transport Management, International Public Management Journal, International Review of Economics and Finance, International Review of Financial Analysis, International Review of Law and Economics, Journal of Accounting and Economics, Journal of Accounting and Public Policy, Journal of Air Transport Management, Journal of Applied Economics, Journal of Asian Economics, Journal of Banking and Finance, Journal of Corporate Finance, Journal of Development Economics, Journal of Econometrics, Journal of Economic Behavior and Organization, Journal of Economic Dynamics and Control, Journal of Economic Theory, Journal of Economics and Business, Journal of Empirical Finance, Journal of Energy Finance and Development, Journal of Financial Economics, Journal of Financial Intermediation, Journal of Financial Markets, Journal of International Accounting, Auditing and Taxation, Journal of International Economics, Journal of International Financial Markets, Institutions and Money, Journal of International Management, Journal of Macroeconomics, Journal of Management, Journal of Policy Modeling, Journal of Public Economics, Journal of Rural Studies, Journal of Urban Economics, Journal of World Business, Land Use Policy, Landscape and Urban Planning, Long Range Planning, The North American Journal of Economics and Finance, North American Review of Economics and Finance, Policy and Society, The Quarterly Review of Economics and Finance, Regional Science and Urban Economics, Regional and Urban Economics, Research in Economics, Research in International Business and Finance, Research in Transportation Economics, Resource and Energy Economics, Resources and Energy, Resources Policy, Review of Financial Economics Scandinavian International Business Review, Scandinavian Journal of Management, Scandinavian Journal of Management Studies, Telecommunications Policy, Transport Policy, Transportation Research, Transportation Research Part A: General, Transportation Research Part A: Policy and Practice, Transportation Research Part B: Methodological, Transportation Research Part C: Emerging Technologies, Transportation Research Part D: Transport and Environment, Utilities Policy.

Examples of topics excluded: Exchange rate, CO2 emission, Delta, FDI, Theta, Human Capital, Climate Change, Ecological Economics, Renewable Energy, Natural Gas, GHG Emission, GDP, Internet, Issue, Green Certificate, Kyoto Protocol, Homeland Security, Japan, Fuel Cell, Website, Market Power, Netherlands, ISO, Standard Cost, Ecosystem Management, etc.

- EBSCO- Business Source Complete
- ProQuest: This also includes the SSRN database. The data source used in ProQuest was Business ABI/INFORM Global.
- Emerald
- Wiley Online Library
- JStor
- Springer Link
- SSRN

While we understood that there would be overlaps between the different databases (particularly EBSCO and ProQuest), we included all the above in our searches to ensure that we would not miss any relevant studies.

Table A2.2 indicates the search phrases used in the different databases and Table A2.3 indicates the type of documents that were captured from the search. In order to cast the net wide and capture as many relevant studies as possible, the 'all available' option was chosen for the type of documents in the databases except for EBSCO and ProQuest. In EBSCO the captured documents were articles, reports, case studies and working papers (with available references), and in ProQuest, working papers, dissertations and scholarly journals. Publication types were also different for each database. In ScienceDirect the publication type were journals and books; in EBSCO, they were academic journal, book, and primary source document (with available references); in ProQuest they were all type of publications except newspapers; in Emerald it was journals and books.

Table A2.2: Search phrases used for different databases

Database	**Search phrase**	**Field**
EBSCO – Business Source Complete	(privat* OR reform*) AND (electri* OR water* OR telecom*)	Article title
ProQuest	(privat* OR reform*) AND (electri* OR water* OR telecom*)	Article title in Scholarly journals
Wiley Online Library	(privat* OR reform*) in Article Titles AND (electric* OR water* OR telecom*)	Article title
JStor	('private' OR 'reform') AND ('electricity' OR 'water' OR 'telecom')	Article title
Emerald	(private OR reform AND electricity OR water OR telecom in All fields)	Article title
Springer Link	(private* OR reform*) AND (electricity* OR water* OR telecom*)	Article title in Scholarly journals
SSRN	(privat* OR reform*) AND (electri* OR water* OR telecom*)	Article title
ScienceDirect	(privat* OR reform*) AND (electri* OR water* OR telecom*)	Article title

Table A2.3: Document and publication types searched in different databases

Database	Subjects	Publication type
EBSCO – Business Source Complete	All covered in the database	Academic Journals (except periodicals, Trade publications, Newspaper, Books, Primary source documents, Industry profile, Country report)
ProQuest	All covered in the database	All (except all company research, Company profiles, Annual reports, All market research, Industry reports, Market reports)
Wiley Online Library	Business, Economics, Finance and Accounting	All
JStor	Economics	All (except Review, Misc, Pamphlet)
Emerald	Selected journals	Journals (except books, bibliographic databases, case studies, website pages)
Springer Link	Business and Economics	Journals (except books, Book series, Electronic products, Imprints, Online available, Springer reference, Web Pages, Book series)
SSRN	Economics Research Network	All
ScienceDirect	Social science and Humanities Economics, Econometrics, and Finance Business, Management and Accounting	Journals (not books)

Appendix 2.2: Critical appraisal tool

Coding tool for assessing quality of studies that are shortlisted

Section I: Study aims and rationale

		Tick Relevant	Details
1	What are the broad aims of the study? (Please write in authors' description if there is one. Elaborate if necessary, but indicate which aspects are reviewers' interpretations. Other, more specific questions about the research questions and hypotheses are asked later.)	☐ Explicitly stated ☐ Implicit ☐ Not Stated/ Unclear	
2	Was the study informed by, or linked to, an existing body of empirical and/or theoretical research? (Please write in authors' description if there is one. Elaborate if necessary, but indicate which aspects is reviewers' interpretation.)	☐ Explicitly stated ☐ Implicit ☐ Not Stated/ Unclear	
3	Do authors report how the study was funded?	☐ Explicitly stated ☐ Implicit ☐ Not Stated/ Unclear	
4	When was the study carried out? (State the year the authors have stated. If not, give a 'not later than' date by looking for a date of first submission to the journal, or for clues like the publication dates of other reports from the study.)	☐ Explicitly stated ☐ Implicit ☐ Not Stated/ Unclear	
5	What are the study research questions and/or hypotheses? (Research questions or hypotheses operationalise the aims of the study. Please write in authors' description if there is one. Elaborate if necessary, but indicate which aspects are reviewers' interpretations.)	☐ Explicitly stated ☐ Implicit ☐ Not Stated/ Unclear	

Section II: Study identification

		Tick and give details where relevant	
6	Identification of report (or reports)	☐ Website citation ☐ Contact ☐ Hand search ☐ Electronic database ☐ Unknown	
7	Status	☐ Published ☐ In press ☐ Unpublished ☐ Not known	
8	Linked reports	☐ Not linked ☐ Linked ☐ Not known	
9	The countries in which the study was carried out.	☐ South America ☐ Africa ☐ Asia ☐ Europe ☐ Central and North America (including Caribbean) ☐ Others/Not Stated	
10	Sector coverage	☐ Electricity ☐ Internet ☐ Telecommunication ☐ Water supply	
11	Main assumptions of the study		

Section III: PSP programme or intervention description in the study

		Tick Relevant	Details
12	Type of PSP (You can tick more than one where appropriate)	☐ Service Contract ☐ Management Contract ☐ Leasing/Affermage ☐ BOT Concessions ☐ Divestiture ☐ Any other (specify)	
13	Aim(s) of the intervention	☐ Not stated ☐ Not explicitly stated (Write in, as worded by the reviewer) ☐ Stated (Write in, as stated by the authors)	
14	Has the study stated the causal pathways or theory of change for the intervention?	☐ Not stated ☐ Not explicitly stated ☐ Stated	
15	Summary of the theory of change		
16	How long has it been since the intervention was implemented?	☐ Not stated ☐ Not applicable ☐ Unclear ☐ < 2 years ☐ 2-5 years ☐ > 5 years	

Section IV: Results and conclusions

		Tick and give details where relevant				
17	Indicators/Outcomes captured	Sector	Outcome Area (Access/ Quality)	Indicator	Finding	Significance level
		N	t-stat/z value	P-value	S.E.	
18	What are the results of the study as reported by the author?					
19	What do the author(s) conclude about the findings of the study?					
20	What are the limitations of the study?	☐ Not stated ☐ Not explicitly stated ☐ Stated				

Section V: Study method

		Tick Relevant	Details
21	Study Timing (Please indicate all that apply and give further details where possible.)	☐ Cross-sectional ☐ Panel Data ☐ Longitudinal ☐ Before After ☐ Only after ☐ Not stated/Unclear ☐ Any other	
22	What is the overall design and method of the study? *(Please tick all relevant.)*	☐ Quantitative ☐ Qualitative ☐ Both ☐ Other	

Section VI: Methods - Data Collection

		Tick and give Details where Relevant	
23	Which methods were used to collect the data? (Please indicate all that apply and give further detail where possible.)	☐ Primary ☐ Secondary	
24	Details of data collection instruments or tool(s). (Please provide details including names for all tools used to collect data, and examples of any questions/items given. Also, please state whether source is cited in the report.)	☐ Explicitly stated ☐ Implicit ☐ Not stated/unclear	
25	Data period	☐ Explicitly stated ☐ Implicit ☐ Not stated/unclear	

Section VII: Methods: data analysis

		Tick Relevant	Details
26	Which methods were used to analyse the data?	☐ Explicitly stated ☐ Implicit ☐ Not stated/unclear	
27	A) Do the authors describe strategies used in the analysis to control for bias from confounding variables?	☐ Yes ☐ No ☐ Not applicable	
	B) Do the authors describe strategies used in the analysis to control for bias from endogeneity?	☐ Yes ☐ No ☐ Not applicable	
	C) Do the authors describe strategies used in the analysis to control for bias from heterogeneity?	☐ Yes ☐ No ☐ Not applicable	
	D) Do the authors describe strategies used in the analysis to control for bias from sample selection?	☐ Yes ☐ No ☐ Not applicable	
28	Do the authors describe any ways they have addressed the repeatability or reliability of data analysis? *(e.g. using more than one researcher to analyse data, looking for negative cases*.)	☐ Yes ☐ No ☐ Not applicable	
29	Do the authors describe any ways that they have addressed the validity or trustworthiness of data analysis? (e.g. internal or external consistency, checking results with participants. Have any statistical assumptions necessary for analysis been met?)	☐ Yes ☐ No ☐ Not applicable	
30	If the study uses qualitative methods, were the findings of the study grounded in/supported by the data? (Consider whether:	☐ Well-grounded/supported ☐ Fairly well grounded/	

	*enough data are presented to show how the authors arrived at their findings *the data presented fit the interpretation/support the claims about patterns in data *the data presented illuminate/ illustrate the findings *(for qualitative studies) quotes are numbered or otherwise identified and the reader can see they don't come from one or two people.)	supported ☐ Limited grounding/ support	
31	If the study uses qualitative methods, consider the findings of the study in terms of their breadth and depth (Consider 'breadth' as the extent of description and 'depth' as the extent to which data has been transformed/ analysed) * A range of issues are covered *The perspectives of participants are fully explored in terms of breadth (contrast of two or more perspectives) and depth (insight into a single perspective) *richness and complexity has been portrayed (e.g. variation explained, meanings illuminated) *There has been theoretical/ conceptual development.)	☐ Good/Fair breadth, but little depth ☐ Good/ fair depth but very little breadth ☐ Good/ fair breadth and depth ☐ Limited breadth and depth	

Critical appraisal questions

Section VIII: Quality of study: reporting

		Tick Relevant	Details
32	Is the context of the study adequately described? (Consider your previous answers to questions on study aims and objectives.)	☐ Yes ☐ No	
33	Are the aims of the study clearly reported?	☐ Yes ☐ No	

34	Is there an adequate description of the methods used in the study to collect data?	☐ Yes ☐ No	
35	Is there an adequate description of the methods of data analysis?	☐ Yes ☐ No	
36	Do the authors avoid selective reporting bias? (e.g. do they report on all variables they aimed to study, as specified in their aims/research questions?)	☐ Yes ☐ No	

Section IX: Quality of the study: methods

		Tick Relevant	Details
37	Was the choice of research design appropriate for addressing the research question(s) posed?	☐ Yes ☐ No	
38	The research design and methods employed able to rule out any other sources of error/bias which alternative explanations would lead to the findings of the study	☐ Yes ☐ No	
39	The study results are widely generalized	☐ Yes ☐ No	
40	The reviewers reasonably agree with the authors over the findings or conclusions of the study	☐ Yes ☐ No	

Section X: Overall assessment of the study

41	What is the overall quality of the study? (taking into account all the quality assessment issues)	☐ High (quality) ☐ Medium (quality) ☐ Low (quality)	For Qs. 32 to 40, Yes = 1; No = 0 Scores obtained from summation of the responses from Q 32 to 40 would be used to determine the overall quality of the study. The rating criteria is as follows: Scores >6 – high quality; >3 medium quality and; ≤ 3 low quality
42	Reason(s) for inclusion		

Appendix 2.3: Characterisation of included studies

Alcazar et al. (2008)	
Countries of study	Peru
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	The study aims to compare the differences in access, service quality and other outcomes of the provision of electricity for the rural poor. In particular, it compares the differences in welfare between people with private provision of electricity and people in regions where electric companies were not privatised.
Data sources and data collection instruments	Secondary data obtained from the National Survey of Rural Energy Demand of Peru
Outcomes analysed and indicators	○ Access • Percentage of customers having electricity • Percentage of poorer segments having electricity • Number of customers added to network ○ Quality • Number of monthly failures • Proportion of households reporting frequent dimming in electricity service • Number of hours without electricity due to cuts or blackouts during the month prior to the survey
Methods used to analyse data, including details of checks on reliability and validity	Statistical methodology Reliability and validity: • Survey data has been used for a comparison of households with private access versus ones with public access to electricity • Since it uses a two-step matching procedure- Town Matching and Household Matching - the possibility of sample selection bias is taken care of • The study analyses the impacts on different indicators of quality and also provides quite a lot of information on various aspects relating to the intervention, which has helped to validate the findings of the study
Summary of results	• The coefficient of electrification has increased significantly. For example, presently 100 percent of EDELNOR customers, 83 percent of whom belong to poorer segments of Lima's inhabitants, have electricity. • 'households that use distribution from privatized providers have better quality of electricity provision. Specifically, households report less dimming, a smaller number of monthly failures, and lower monthly hours of blackouts. This implies that they have a better quality of provision and a subsequent reduction in costs.' (p.190) • 'households with private provision have significantly higher

	expenditures on electricity, both as share of their total expenditure and also as share of their expenditure on energy sources. This result, together with the fact that prices are lower, implies that there is a clear increase in the amount of electricity consumption by these households.' (p.190) • 'there is a significant reduction in the number of sources of energy used by households linked to private providers. Households can access energy from 14 possible sources, but given improvements in the quality and hours of electricity provision, they reduce their overall sources of energy from 3.169 to 2.84.' (p.191)
Conclusion	'The results can be summarized as follows: first, there is a significant improvement in the quality of the provision of electricity when distribution firms are managed by the private sector. This result is consistent with solid work that supports the proposition that privatization improves the operating and financial performance of firms' (p.197)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Andres et al. (2006)	
Countries of study	10 Latin American countries
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'This paper analyses the impact of privatization on the performance of 116 electric utilities in ten Latin American Countries.' (p.1)
Data sources and data collection instruments	Secondary data obtained from the official data reported by firms to their investors and statistical reports of the regulator agencies of each country
Outcomes analysed and indicators	○ Access • Number of connections • Number of residential subscribers per 100 households ○ Quality • Energy lost in the distribution • Average duration of interruption per consumer (hours/year) • Average frequency of interruption per consumer (no./year)
Methods used to analyse data, including details of checks on reliability and validity	Econometric methodology - semi-logarithmic functional form estimated using feasible generalised least square estimates Reliability and validity: • The panel fixed-effects method used in the analysis takes care of the country-specific heterogeneity in the model • As the study follows a before and after analysis there is less chance for the occurrence of sampling bias

	• The study has included only a very few policy and control variables • The utility-specific characteristics have been accounted for by the inclusion of utility fixed-effects
Summary of results	• The average annual increase in coverage was 5.3% during the transition, while the average increase after that was 8.4% per year. However, the average growth across periods did not fluctuate significantly. This means that the changes across time in terms of coverage were driven by a firm-specific time trend, and not necessarily by the change in ownership. • The estimates show important improvements in frequency and duration of service interruptions due to the change in ownership both during the transition and after. To be precise, the average annual level of interruptions was reduced by 10.1% for frequency and by 13.4% for duration during the transition. After that, estimates show additional improvements of 23.8% and 25.2% for frequency and duration of interruptions respectively. • The growth estimates provide some evidence that the improvements were greater during the transition than during the pure public and pure private periods, though the results for frequency of interruptions were not significant.
Conclusion	'The results suggest that changes in ownership caused significant improvements in labor productivity, efficiency, and product/service quality in the near term. However, the improvements do not appear as remarkable two years after the change in ownership. This suggests that the change in ownership has the strongest effect on firms during the transition period.' (p.25)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Andres et al. (2008)	
Countries of study	Latin America
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'we combine our data on electricity agencies' governance with data collected at the company level and assess the impact of regulatory agencies on utility performance in the electricity sector of the LAC region.' (p.3)
Data sources and data collection instruments	Secondary data from two databases, i.e., Electricity Benchmarking data (World Bank, 2007) and data on regulatory governance from the previous work of the authors (Andres et al., 2007)

Outcomes analysed and indicators	○ Access • Number of residential subscribers per 100 households in the concession area ○ Quality • Energy losses in distribution per year • Average duration of interruption per subscriber (hours/year) • Average frequency of interruption per subscriber (no./year)
Methods used to analyse data, including details of checks on reliability and validity	Econometric methodology - panel data method (semi-logarithmic functional form estimated using feasible generalised least square approach) Reliability and validity: • Since the study uses a before and after analysis, it avoids sampling bias • The panel fixed-effects model used in the analysis accounts for individual heterogeneity • The study has included sufficient confounding variables • The fixed effects for utility takes care of utility-specific characteristics
Summary of results	• The results suggest that the mere existence of a regulatory agency, independent of the utilities' ownership, has a significant impact on performance. • Private-sector participation exhibits significant effects in improvement in the quality of service. Though some additional changes did happen after this period most of the changes occurred during the transition period. So, coverage of the service, when the estimation accounts for utility-specific time trends, presents no significant change. • Distributional losses decreased significantly after the transition, resulting in a 13.2 percent reduction. • Quality of the service, measured as duration and frequency of the interruptions presents significant reductions in both indicators during and the transition. During the former, 11.7 and 6.1 percent reduction were observed for duration and frequency. After the transition, an improvement of 30.0 and 32.7 percent was observed respectively. • When the existence of a regulatory agency is accounted for, the results for the post-transition period remain significant, with a 10 and 17 percent reduction of impact of the change in ownership respectively
Conclusion	• 'after controlling for the existence of a regulatory agency, the ownership dummies are still significant and with expected signs.' (p.25) • 'Our results indicate a significant improvement in utility performance through the involvement of a regulatory agency even in the case of state owned enterprises. The results strongly support that the highest achievements are reached with the combination of private-sector participation regulated through a regulatory agency that exhibits good governance.' (p.25)

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Arango et al. (2006)	
Countries of study	Argentina, Brazil, Chile and Colombia
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'In this paper, we will make comparisons among four countries in South America, to achieve a better understanding of how the different models of deregulation have shaped the evolution of their electricity systems since deregulation.' (p.197)
Data sources and data collection instruments	Secondary data from the Electricity Regulators
Outcomes analysed and indicators	○ Quality • Grid losses • Number of yearly interruptions • Non-technical losses • Average duration of interruptions • Average number of interruptions • General perception of customer satisfaction • Hours of disruption
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study has discussed the methodology for the selection of the four countries in South America to achieve a better understanding of how the different models of deregulation have shaped the evolution of their electricity systems since deregulation • The procedure for the case study analysis has been discussed in detail • Adequate data is presented on the electricity markets' performance in the four countries • The authors have discussed general learning points based on the experience of these four countries for improving electricity reforms in the developing world and contribute towards the body of knowledge on regulation

Summary of results	○ In the case of Argentina: • The number of yearly interruptions was among the lowest in South America in 2001: 12 interruptions for a total of 12 hours • Companies exhibit significant improvements in both personnel indicators (number of employees, customers/employee) - in excess of 75% and performance indicators (sales, reduction of losses, etc.) above 60%. ○ In the case of Brazil: • The grid losses has become low which is improving further • Quality of services has not shown much improvement in terms of customer satisfaction • The improvement in non-technical losses is not significant ○ In the case of Chile: • The grid losses have become extremely low when compared to other Latin American countries • There has been some improvements in the average number of interruptions ○ In the case of Colombia: • The grid company, ISA, reported 21% losses in 1994. After deregulation, losses fell to around 15% in 2000, with important differences between regions
Conclusion	'The first impression is that Latin America did well overall during the years after deregulation; however, when one takes a closer look the complete picture is more ambiguous.' (p.205
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Artana et al. (1999)	
Countries of study	Argentina
Sectors	Water supply
Type of PSP	Concessions
Type of study	Qualitative
Aims of study	The study demonstrates the impact of the institutional and political context on the outcomes of concession arrangements in Argentina and highlights the strengths and weaknesses of the various actors involved in the process of improving services with private-sector participation.
Data sources and data collection instruments	Secondary data from various reliable sources

Outcomes analysed and indicators	○ Access • Population served with water (in terms of number of inhabitants) • Population served with sewers (in terms of number of inhabitants) ○ Quality • Metering • Repair of water pipe system (in kilometres) • Unaccounted-for water (in percentages) • Meter installation (number of installations) • Water pressure (percentage of connections with over 8 meters water pressure at consumer site) • Water pressure (percentage of connections with water pressure under 2 meters at consumer site) • Delay in resolving water complaints (in terms of hours taken) • Delay in resolving sewerage complaints (in terms of hours taken) • Collection (in percentages)
Methods used to analyse data, including details of checks on reliability and validity	Archival analysis of annual reports of the concessionaire, annual reports of the regulatory agencies, performance of the public water utility, newspaper clippings etc. Reliability and validity: • The rationale behind the selection of the two case studies has been justified, thus accounting for sample selection bias • A range of issues related to the concession processes, regulatory frameworks and institutional contexts of the case study projects have been covered • The authors have presented sufficient data, which has been used systematically to analyse the performance of the case projects • The strengths and weaknesses of the two concessions have been described, with detailed analysis of contractual frameworks, regulatory design and actual performance of the project on the ground
Summary of results	• The concession has moved in a satisfactory direction, both in terms of meeting expansion and improvement goals and in the bottom line achieved by operations • The performance by Aguas de Corrientes has been reasonable, although its inability to collect payment for services has hindered its development
Conclusion	• There has been an improvement in the provision of water services with private-sector participation. However, the outcomes of the concession arrangements have been affected by the surrounding institutional and political context. • The performance results for both concessionaire companies are consistent with expectations. • The expansion goals envisioned in Buenos Aires were met (the first three years of the concession were evaluated).

	• In the case of Corrientes, as the political situation grew more complicated, the company fulfilled the contract less and less.
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Azam et al. (2002)	
Countries of study	Senegal
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'The present paper describes the reforms that took place in the telecom sector of Sénégal in two steps.' (p.4)
Data sources and data collection instruments	Secondary data obtained from Sonatel
Outcomes analysed and indicators	○ Access • Number of mainlines used ○ Quality • Fraction of faults repaired within 2 days in percentages • Fraction of faults repaired within 8 days in percentages • Rate of successful international calls in percentages • Rate of successful local calls in percentages
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study relies on firm-level secondary data sources • Sufficient data points have been used for the analysis of trends relating to access but the specific methodology followed for the analysis has not been described • Improvements in quality indicators are mentioned, but the data sources and analysis procedures have not been mentioned • Though the study discusses a variety of outcomes, in-depth analysis has not been done
Summary of results	• The number of mainlines used has almost doubled in 1999 relative to the 1994-96 average. Between 1997 and 2001, fixed-line telephone penetration grew from 1.32 to 2.45 per hundred people, while mobile penetration skyrocketed from 0.08 to 4.04. • The expansion of the use of international phone calls, in terms of millions of minutes, shows a fast increase in the number of calls from abroad than from the country. • Sonatel has also shown an improvement in the quality of services; for example, the fraction of faults repaired within two and eight days respectively reached 89.88% and 99.73% in 1999.

	The rate of successful calls was 32.7% for international calls, and 64.79% for local calls.
Conclusion	Reform has significantly changed the landscape of Senegal's telecommunications sector and has brought with it tremendous improvement in sector performance. Moreover, fixed-line penetration increased in areas where the operator faced competition from a mobile provider. While penetration increased, the operator did not meet objectives regarding rural telephony.
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Bakker (2007)	
Countries of study	Indonesia (Jakarta)
Sectors	Water supply
Type of PSP	BOT concessions
Type of study	Qualitative
Aims of study	'This article examines the performance of the private sector with respect to network connections for poor households in Jakarta, Indonesia.' (p.855)
Data sources and data collection instruments	• Primary data from a household survey of poor households in six neighbourhoods in Jakarta and interviews with the project participants • Secondary data obtained from documents and archival data
Outcomes analysed and indicators	○ Access • Number of connections to poor households
Methods used to analyse data, including details of checks on reliability and validity	• Analysis of interviews • Questionnaire analysis • Archival analysis Reliability and validity • A step by step process was adopted for data collection and analysis • Multiple sources of evidence have been used and discussed with appropriate theoretical constructs • The condition of the water sector in Jakarta before the adoption of PSP has been described in detail • The study has looked into disincentives for the concessionaire to connect to the poor as well as the disincentives for the poor to connect to the water supply system
Summary of results	• Privatisation has indeed led to increased coverage, but the distribution of new connections has not been targeted towards poor customers in proportion to their representation

	in the urban population • Two direct disincentives to target poor customers for new connections are pricing levels and higher average costs per connection in poor households • The total costs of the networked water supply being higher than alternate sources, insecure tenure, lack of flexibility in payment etc. discourage poor consumers from connecting to the water supply system
Conclusion	When the majority of studies on urban water supply in the south attribute the failure of water utilities to reach the poor to economic factors such as an inability to pay or to inappropriate pricing, this study has revealed non-economic factors, like the nature of urban governance and the inequitable specialisation of network access, that act as disincentives for poor households to choose to connect to the water supply system
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Barrera-Osorio and Olivera (2007)	
Countries of study	Colombia
Sectors	Water supply
Type of PSP	Leasing/affermage
Type of study	Quantitative
Aims of study	To evaluate the impact of water privatisation on access, price and quality of water and health outcomes in Colombia
Data sources and data collection instruments	Secondary data from reliable data sources
Outcomes analysed and indicators	○ Access • Coverage in terms of whether a household is connected to the water service or not ○ Quality • Presence of visible particles • Water treatment in terms of the need for treatment for consumption • Frequency of service in terms of continuity of service through the week
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - difference-in-difference methodology with variation across time (before and after privatisation) Reliability and validity: • The authors have used various alternate and sub-specifications of the model • Treatment and control groups: municipalities with and without privatisation have been considered

	• A number of municipal and household-level control variables have been used • To tackle endogeneity in the model the authors assumed that the unobservable characteristics of the treatment and control groups were time-invariant
Summary of results	○ For access, there is no evidence of positive impact from privatisation ○ Quality • Households in localities that have been privatised, especially in urban areas, have to treat the water less than households in non-privatised areas • Frequency of service is higher in non-privatised urban municipalities • The appearance of the water is better in privatised areas, especially urban
Conclusion	• The study finds overall positive outcomes from privatisation • It is working better in urban areas than in rural areas
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Berg et al. (2005)	
Countries of study	Ukraine
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'investigate the performance of distribution utilities empirically and explain the results in terms of regulatory incentives and differential managerial behavior within state-owned and privatized firms.' (p.261) 'The purposes of this study are to identify the impacts of regulatory incentives and to determine whether public and private RECs have responded differently to the same set of incentives. In addition, we examine relative performance of RECs under both ownership types.' (p.268)
Data sources and data collection instruments	Secondary data collected by using a NERC questionnaire mailed to distribution companies have been used for the analysis. Operational cost data were adjusted for inflation to the 2002 level by using the National Bank of Ukraine statistics on the Consumer Price Index.
Outcomes analysed and indicators	○ Quality • Electricity delivered (to indicate network losses)

Methods used to analyse data, including details of checks on reliability and validity	Econometric methodology - stochastic frontier analysis Reliability and validity: • The study has considered a sufficient number of confounding variables • Inclusion of treatment and control groups in the analysis avoids sampling bias • Since the study is for a particular country, the findings are not generalisable
Summary of results	• Privatisation is shown to exert a positive and significant impact on reducing network losses
Conclusion	• In response to the regulatory environment, it is found that when compared to state-owned companies, private regional electricity companies are more interested in deferring maintenance and reducing network losses to improve cash flows (primarily by reducing non-payment by residential and some large customers and reducing electricity theft) • Both state-owned and privatised companies have incentives to reduce electricity losses to target levels; otherwise, a private company's profit (shareholders' value) falls and a state-owned company can face financial distress. However, there is evidence that state-owned companies do not address electricity distribution network losses as effectively as privatised companies, perhaps due to low managerial motivation (weak governance systems) • The results also suggest that, in contrast to state-owned firms, privatised companies responded aggressively to the regulatory incentives associated with the cost-plus price formula
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Brocklehurst and Janssens (2004)	
Countries of study	Senegal
Sectors	Water supply
Type of PSP	BOT concessions
Type of study	Qualitative
Aims of study	This case study seeks to examine the reasons for the success of the reforms in Senegal and to look in detail at its components - institutional, contractual and financial. The outcomes of the reform process are also examined, in particular how poor consumers have fared.
Data sources and data collection instruments	• Primary data obtained through interviews with consultants, government officials and officials of developmental organisations • Secondary data from the performance reports of the utility

Outcomes analysed and indicators	○ Access • Extensions to the network in kilometres • Number of social connections and stand posts for the poor ○ Quality • Leakage in terms of technical losses (unaccounted-for water) in percentages • Physio-chemical quality (percentage of samples meeting WHO standards) • Bacteriological quality (percentage of samples meeting WHO standards) • Frequency of water shortages and pipe bursts for the poor • Overall customer service
Methods used to analyse data, including details of checks on reliability and validity	• Analysis of interviews • Archival analysis Reliability and validity: • The authors have provided detailed description about the outcomes of PPP in the water supply sector by looking into dimensions such as connection renewal, service to the poor etc. • A wide range of parameters pertaining to the performance of the Senegal project has been covered • However, no attempt has been made towards theoretical or conceptual development
Summary of results	'Nine years after the reform was initiated and seven years after the creation of SONES and the engagement of a private operator, there have been major improvements to service levels in the water supply sector, with more water, of better quality, getting to more people. The benefit appears to be relatively well distributed, with many of the urban-poor receiving service for the first time and more reliable service in low-income neighborhoods.' (p.43)
Conclusion	Primary factors which contributed to the success of the reform process and the strengthening of the urban water sector are: • The use of a particularly appropriate form of contract • Strong political will and good leadership within the government • A well-designed process • Flexibility and innovation when necessary
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Cabanda and Ariff (2002)	
Countries of study	Malaysia
Sectors	Telecommunications
Type of PSP	Unspecified
Type of study	Quantitative
Aims of study	This study tries to determine the long-term effects of the simultaneous adoption of both privatisation and competition reforms on performance and efficiency in Asian telecommunications
Data sources and data collection instruments	Secondary data collected from the Telecommunication Data and Statistics Unit of the International Telecommunications Union (ITU)
Outcomes analysed and indicators	○ Access • Teledensity, measured as telephone lines per 100 inhabitants • Waiting list for telephone lines • Number of cellular subscribers • International outgoing traffic minutes
Methods used to analyse data, including details of checks on reliability and validity	Statistical method - one-tailed *t*-test Reliability and validity: • The authors have analysed data from five years before and ten years after privatisation • The data had been collected during field visits from several sources
Summary of results	• Teledensity in Malaysia has shown a dramatic increase of 9.92 percent growth after privatisation • The statistics shows a decline in the size of the waiting list for telephone lines. The mean numbers on the waiting list before and after privatisation were 157,000 and 128,000 respectively • The number of cellular subscribers increased from 11,000 in 1986 to 2,000,000 in 1997 • The mean number of international outgoing telephone calls before and after privatisation was 36 versus 287 million
Conclusion	The findings of the study show evidence that performance and efficiency improved after simultaneous adoption of privatisation and competition reforms in Malaysia. The outcomes have increased significantly and there is improvement in consumer welfare
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Carrillo et al. (2008)	
Countries of study	Ecuador (Quito and Guayaquil)
Sectors	Water supply
Type of PSP	Concession contract
Type of study	Quantitative
Aims of study	• To provide an objective comparison of several indicators of water coverage, quality and price in the cities of Quito and Guayaquil (both before and after the privatisation in Guayaquil) • To document why such an exercise cannot identify the effects of the privatisation of water supply
Data sources and data collection instruments	Secondary data from the national income and expenditure surveys conducted by the Ecuadorian Institute of Statistics (INEC)
Outcomes analysed and indicators	○ Access • Households connected to water network for poor in Guayaquil • Households connected to water network for non-poor in Guayaquil
Methods used to analyse data, including details of checks on reliability and validity	Econometric methodology: • Coverage has been analysed using a binary probit model • Water quality has been analysed using a linear model as well as an ordered probit model Reliability and validity • Control bias from confounding variables has been taken care of • Heterogeneity across income quintiles has been considered
Summary of results	• In the case of coverage, the coefficient of private fixed effects suggests that on an average, there is no significant change in the probability of having access to water services before and after concession in Guayaquil. Households in the lowest income quintile have a smaller chance of receiving water after concession • The probability of having access to water services in Quito has increased during the past decade • The change in quality and water continuity in Guayaquil is not significantly different from that in Quito
Conclusion	• The quantitative indicators of water performance in the two cities give evidence that water coverage levels in Guayaquil have decreased during the period under consideration • The water pressure has also worsened in Guayaquil when compared to Quito • These indicators cannot be used to assess the effects of privatisation per se as Quito is not a suitable control group for studying the effect of water concession in Guayaquil
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low The study suffers from sample selection bias

Casarin et al. (2007)	
Countries of study	Buenos Aires, Argentina
Sectors	Water supply and sanitation
Type of PSP	BOT concessions
Type of study	Qualitative
Aims of study	'This paper examines the performance of the Buenos Aires sanitation concession throughout the period of private management' (p.235)
Data sources and data collection instruments	Secondary data from a household expenditure survey carried out by the National Institute of Statistics and Census in the Buenos Aires metropolitan area as well as archival data from the performance or annual report of concessionaire and government departments
Outcomes analysed (indicators)	○ Access • System/coverage expansion in terms of percentage of households connected
Methods used to analyse data, including details of checks on reliability and validity	Archival analysis Reliability and validity: • The authors have presented in-depth data pertaining to the privatisation objectives of expanding coverage and reducing consumer tariffs, which have been used appropriately to arrive at the findings • The authors have explored the finer details of the concession agreement and the tariff structure so as to find the reasons behind the failure in meeting privatisation objectives
Summary of results	• 'The comparison of the contract's targets against the firm's outcomes shows that, despite a noteworthy increase, coverage rates remained behind targets by a half in the case of water and by about three-quarters in the case of sewerage. The non-fulfilment of goals implied the failure to supply water to more than one million people. Failure to comply has been more severe in the poorest areas.' (p.246) • 'the data suggests that the difficulties in the collection of initially high access costs seem to have contributed to restrain network expansion mainly to the poorest areas and to have led towards contract renegotiation that introduced fundamental changes in key features of the concession.' (p.246) • 'On the whole the addition of all tariff changes indicates that the actual bill for an average residential customer has increased more than 80 percent in real terms. Contrary to privatization objectives, several contract negotiations turned an initial and still unsolved access problem into an affordability one.' (p.246)
Conclusion	'Still a good number of the concessions failures seem in turn to have been explained by the presence of a weak and in-expert regulator, which had to confront several issues not clearly addressed by the government at the time of privatization.' (p.246)

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Castro et al. (2003)	
Countries of study	Mexico
Sectors	Water supply
Type of PSP	Management contract
Type of study	Qualitative
Aims of study	'In this report the focus is on comparing and contrasting the experiences of two poor communities on the outskirts of Mexico City in the context of the wider experience of private-sector involvement in water services in Mexico. One community, Huicholes, is served by a semiprivate operator; the other, Piru, by a public operator.' (p.7)
Data sources and data collection instruments	• Primary data collected through in-depth interviews with users, officials and insiders • Secondary data obtained from documentary evidence such as bibliographical sources, official documents, press and mass media releases.
Outcomes analysed and indicators	○ Quality • Quality of water supplied • Maintenance and promptness of response
Methods used to analyse data, including details of checks on reliability and validity	• Analysis of interview transcripts • Archival analysis Reliability and validity: • The authors have looked into dimensions such as pricing and tariff, water awareness, health and hygiene, connection and disconnection, water service and quality, as well as environment and regulation, while comparing the performance of water supply by the private sector and government in two poor communities in Mexico • The authors have presented sufficient primary and secondary data related to these dimensions
Summary of results	'In the experiences of Piru and Huicholes there is a mixed picture. The Huicholes community is suffering more because of the higher price it has to pay for water, but it may have benefited by gaining better water awareness, and valuing more the service they now have. It seems wrong that Huicholes, a poorer community than Piru, is paying significantly more for its water, which is also of poorer quality.' (p.6)

Conclusion	'Contrary to the prevailing ideology, that the private operator is more efficient, the public sector is much quicker at repairs and provides a better quality of water. Many of the problems being experienced could be solved by community accountability mechanisms for the providers, and regulation by the government.' (p.6)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium The study lacks finer insights into a specific issue or the identification of reasons behind a phenomenon and no attempt has been made towards the development of a conceptual framework based on the observed findings

Clark et al. (2005)	
Countries of study	Mali, Namibia, South Africa, Tanzania and Uganda
Sectors	Electricity
Type of PSP	Divestiture and management contract
Type of study	Qualitative
Aims of study	The aims of this study are: • to develop an in-depth understanding of the impact that power sector reforms are having on the continent's poor people; • to suggest innovative ways of ensuring that power sector reforms improve poor people's livelihoods.
Data sources and data collection instruments	Primary data collected through interviews with individuals in the case study countries and focus group discussions as well as sector-wide data from reliable secondary sources
Outcomes analysed and indicators	○ Access • System extensions • Access to electricity as a percentage of population • Number of connections • Growth in number of subscribers • Percentage of households having access ○ Quality • Uninterrupted service • Amount of load shed • Percent of bills collected
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study gives a detailed description of the research methodology, data sources and procedure followed for data analysis • The impact of reform on electricity access levels, quality and reliability of supply etc. is discussed with relevant primary and secondary data • The authors have used lessons from the power sector reform and its impact on the poor for suggesting useful elements in the design and implementation of reforms

Summary of results	• It can be seen that in some of the case study countries, access to electricity has more than doubled over the past decade (Mali and South Africa) and for other countries for which data are available, there has been a substantial increase in access (Tanzania, Uganda), although with the exception of South Africa, it still remains at very low levels, especially among rural populations. This increased electrification, however, cannot be definitively attributed to reform initiatives. Instead, it appears to be a result of policies, programmes and subsidies intended specially to expand access to electricity • Among the case study countries, the quality and reliability of the electricity supplied to poor people is found to vary largely in proportion to the level of private-sector involvement. In Uganda and Mali, private investment has been followed by significant improvements in the quality of the electricity supply. In contrast, in South Africa, where the industry has not yet been restructured and remains almost entirely state-owned, quality still varies regionally • The reforms have also affected the quality of power in Africa through special customer service arrangements.
Conclusion	'Broad trends across the case study countries suggest that the impacts of power sector reform on the poor are neither direct nor inevitable. Although the introduction of private actors may actually increase prices and not necessarily expand access to electricity, reform also provides opportunities that would not otherwise exist to improve quality and reliability, expand networks, and divert public finances to the poor and rural communities rather than big businesses … While the direct benefits to the poor in these cases may not be dramatic, they did provide opportunities for governments to implement special additional programmes with social benefits.' (p.7)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Clarke and Wallsten (2002)	
Countries of study	Bolivia, Brazil, Colombia and Peru
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative and qualitative
Aims of study	'This paper reviews the evidence on universal access in developing countries. We first discuss the rationale for universal access laws and review the different ways subsidies can be financed and allocated, along with the implications of those various methods. We then evaluate the historical effectiveness of monopoly enterprises in providing service to the poor and how privatisation has affected coverage.' (p.4)

Data sources and data collection instruments	Secondary data obtained from the MEASURE DHS + Demographic and Health Surveys
Outcomes analysed and indicators	○ Access • Coverage to households (urban and urban poor)
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study uses large data sets for the analysis • Only simple statistical illustrations are made to arrive at the findings, which implies that they might not be robust. However, the authors have used various other study results to validate their findings
Summary of results	• Coverage for urban consumers, which was already high prior to reform, increased following privatisation in all four countries. Since this occurred despite increased prices in three of the four countries, this suggests that capacity was constrained prior to reform • Coverage also increased for the poor in three out of four cases, despite large price increases in two of the three countries • Although total coverage increased slightly in Colombia - it was very close to 100 percent even before reform - coverage of households with heads with no education fell slightly
Conclusion	While PSP presents a challenge to ensuring access to the poor, in the light of the almost complete failure of service provision to the poor under monopoly provision in many developing countries, the reforms also provide an opportunity to completely rethink the role of subsidies and of the way to ensure access by the poor
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Clarke et al. (2003)	
Countries of study	Malawi
Sectors	Telecommunications
Type of PSP	Management contract
Type of study	Qualitative
Aims of study	To analyse the regulatory, legal, political and institutional factors that have influenced the outcome of reform in Malawi
Data sources and data collection instruments	Secondary data obtained from the International Telecommunications Union (ITU) and World Bank databases

Outcomes analysed and indicators	○ Access • Number of cellular subscribers ○ Quality • Provision of new services
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have used data from reliable data sources for analysing trends on outcomes. These are supported by field-level insights and archival data to arrive at the conclusions
Summary of results	• One of the key goals of the reform was to increase coverage. 'Despite the large increase in cellular prices following the entrance of Celtel, cellular coverage has increased greatly in Malawi over the past three years. At the end of 1998, before Celtel entered the market, there were only about 7,000 cellular subscribers in Malawi. By the end of 2002, there were about 65,000.' (p.48)
Conclusion	'Although the introduction of competition in cellular telephony resulted in growth, it was not as rapid as it was in countries that reformed more aggressively. Furthermore, cellular prices increased dramatically as soon as they were freed.' (p.50)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Clarke et al. (2004)	
Countries of study	Argentina, Bolivia and Brazil
Sectors	Water supply and sewerage
Type of PSP	BOT concessions
Type of study	Quantitative
Aims of study	To explore empirically the effect of PSP on water and sewerage coverage over time (before and after participation) across cities, compared to control cities that were never privatised
Data sources and data collection instruments	Secondary data from various household-level surveys
Outcomes analysed and indicators	○ Access • Share of urban population with piped water • Share of urban population with sewerage connections

Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel methodology Internal validity: • Use of treatment/control samples: data included cities that did not privatise their water systems • Before/after data: data sets included data from one year before and two to five years after privatisation • Use of appropriate control variables like population and income • Potential endogenous variables on the decision to privatise have not been considered
Summary of results	• Controlling for the existence of the control (public ownership), the impact of PSP on access turns out to be negative but insignificant • Taking into account the control sample, PSP does not have a statistically significant impact on sewerage connection rates
Conclusion	• Piped water and sewerage coverage generally increased following PPP, which is broadly consistent with the existing literature • However, since coverage improved even in cities that did not introduce PSP, it is felt that PSP in itself did not lead to the improvements • Although PSP does not improve coverage, it does not harm the poor either
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Estache et al. (2006)	
Countries of study	204 countries (153 developing countries)
Sectors	Telecommunications
Type of PSP	Unspecified
Type of study	Quantitative
Aims of study	To undertake a cross-country analysis on the impact of reforms on telecom performance.
Data sources and data collection instruments	Secondary data obtained from the International Telecommunications Union (ITU)
Outcomes analysed and indicators	○ Access • Number of telephone subscribers defined as total telephone (fixed plus cellular) subscribers per 1,000 inhabitants ○ Quality • Number of reported telephone faults per 100 mainlines

Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel methodology Reliability and validity: • To control for bias from confounding variables, the authors have considered policy variables like privatisation and regulation, governance variables like corruption and investment risk and the interaction between governance and policy variables • The study has controlled for population and per capita income • The panel methodology controls for bias from heterogeneity • The policy variables are assumed to be conditionally exogenous to the error term as the GDP per capita has been included and the presence of country effects and linear trend has been controlled for
Summary of results	• The presence of private capital is associated with an increase in number of telephone subscribers per 1,000 people • The decline in telephone faults is not statistically significant in developing countries, implying that most of the improvements observed in the poorest countries can be attributed to technological change rather than to access to private operators
Conclusion	• The presence of private capital influences more dimensions of performance across country groups than establishment of an independent regulatory agency (IRA) • Developing countries would benefit from private capital in terms of access and labour productivity
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Estache et al. (2009)	
Countries of study	153 developing countries
Sectors	• Electricity • Telecommunications (fixed) • Water supply
Type of PSP	Not stated
Type of study	Quantitative
Aims of study	To analyse the impact of reforms and corruption on access, affordability and quality in electricity, fixed telecom and water services delivery
Data sources and data collection instruments	Secondary data obtained from web search, ITU database and various commercial databases

Outcomes analysed and indicators	Telecom ○ Access • No. of telecom subscribers per thousand population ○ Quality • Telephone faults in terms of reported faults per hundred mainlines Water ○ Access • Percentage of population with access to improved sources of water
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel estimation for each sector Reliability and validity: • Control/treatment group: The authors have taken into consideration both reformed and non-reformed countries so as to reduce sample selection biases • Individual heterogeneity has been taken care of as a panel model has been used for estimation • The authors have used a number of confounding variables like income, urbanization, corruption.
Summary of results	• The introduction of PPI in telecommunications affects access and affordability while it has no effect on quality indicator • In the case of water, PPI improves access
Conclusion	• The reforms helped to improve some dimensions of performance, but they had no impact on the others • Increasing PPI or IRAs may help in improving access, quality or affordability in some cases, but are not certain to make everyone better off overall, contrary to what was hoped based on theoretical papers 15 years ago
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Fink et al. (2001)	
Countries of study	12 Asian countries
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	To assess econometrically the impact of alternative policy and regulatory reforms in 12 developing Asian economies over the period 1985-1999 using the data contained in the World Bank/ITU database on telecommunications policy

Data sources and data collection instruments	Secondary data from the database on telecommunications policy and regulation created by the World Bank in collaboration with the International Telecommunication Union (ITU) and from the World Bank's World Development Indicators
Outcomes analysed and indicators	○ Access • Number of mainlines per 100 inhabitants ○ Quality • Share of digital mainlines in total mainlines
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel data methodology Reliability and validity: • To control for bias arising from confounding variables, the authors have considered confounding variables like time trend, population density, privatisation and competition in the analysis • Country-specific heterogeneity has been captured by making use of a panel fixed-effects model • Treatment and control groups have been used to control for bias from sample selection
Summary of results	The estimated coefficients for the policy variables suggest that: • corporatised incumbents are associated with significantly higher mainline penetration • while privatisation and competition are not significant by themselves, the variable capturing their interaction yields a statistically significant and positive influence on mainline penetration
Conclusion	• Corporatisation, as an indicator of the public sector's determination to improve sector performance, was found to have a significantly positive effect on mainline availability and service quality • The implementation of comprehensive reform - measured by the state of privatisation, competition and regulation - also led to higher level of mainline availability and service quality
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Fink et al. (2003)	
Countries of study	86 developing countries across Africa, Asia, the Middle East, Latin America and the Caribbean
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	The study addresses the following research questions: • What impact do specific policy changes - relating to ownership, competition and regulation - have on sectoral performance?

	• How is the impact of any one policy change affected by the implementation of complementary reforms? • Does the sequence in which reforms are implemented affect performance?
Data sources and data collection instruments	Secondary data from database on telecommunications policy and regulation created by the ITU and the Stanford-World Bank database
Outcomes analysed and indicators	○ Access • Number of mainlines
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel data methodology Reliability and validity: • The study has taken into consideration confounding variables like mobile penetration, per capita GDP, and interaction between privatisation and competition, to control for the bias from confounding variables • The endogeneity of mobile penetration has been corrected using the instrumental variable technique • Using Kmenta's cross-sectionally heteroskedastic and timewise autocorrelated (CHTA) approach, the authors have controlled for country-specific heteroskedasticity and accounted for first-order autoregressive serial correlation in the error terms • Both treatment and control groups have been used in the study so as to avoid sample selection bias
Summary of results	• It is found that both privatisation and competition - confined to observations that exhibit a good regulatory framework - positively impact on teledensity and productivity • The coefficients of privatisation and the interaction of privatisation and competition are also found to be positive and statistically significant at the 1 and 5 percent levels respectively • It is found that the effects of privatisation and competition differ in the presence of an independent regulator
Conclusion	○ The econometric evidence presented in this study may provide some guidance on possible priorities for telecommunications reform: • First, it is found that complete liberalization pays off • Second, both privatisation and competition improve performance and the latter reinforces the former • Third, sequences matter ○ An interesting supplemental finding of the paper is that the impact of policy reforms has in the previous fifteen years been outweighed by the improvements in telecommunications performance not directly attributable to the policy variables considered in it
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Freije and Rivas (2003)	
Countries of study	Nicaragua
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'we investigate the possible effects of privatization on income distribution and welfare.' (p.2) 'we hope to capture the welfare effects of changes in access, prices or service quality brought about by the reforms.' (p.4)
Data sources and data collection instruments	Secondary data from different surveys such as the Living Standard Measurement Survey for the years 1993 and 1998 and the Household Income Expenditure Survey for the year 1999
Outcomes analysed and indicators	○ Access • Percentage of households that gain access to electricity (overall, rural and urban)
Methods used to analyse data, including details of checks on reliability and validity	• Econometric methodology - decomposition analysis • Reliability and validity: • The authors have given a detailed description of the sources of the data and the procedure used for its analysis • Detailed analysis is carried out to examine the impact of reforms on the price, access and quality of electricity services • The authors have not used the study findings for the development of a conceptual framework
Summary of results	• The analysis shows that households in the poorer deciles had a lower expansion of electricity access when compared to richer households • It was also found that the growth in electricity access was higher in the urban area than in the rural area as well as faster in the top five deciles than in the bottom five deciles
Conclusion	'When accounting changes in access to electricity, the gains concentrated among households in deciles two to six. Adding up all the effects, i.e. prices and access, the welfare effect of the reforms in the Nicaraguan electricity sector were slightly progressive for the period under study. However, simulations of the impact of this welfare effect, in money terms, upon indexes of poverty and inequality was negligible.'
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Frempong and Atubra (2001)	
Countries of study	Ghana
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This paper assesses the performance of telecoms in Ghana since it has been liberalised.' (p.198)
Data sources and data collection instruments	Secondary obtained from Ghana Telecoms, International Telecommunication Union (ITU) and various mobile telephone operators
Outcomes analysed and indicators	○ Access • Number of direct exchange lines (DELs) • Teledensity, Concentration of payphones (%) • Number of payphones • Number of mobile phones ○ Quality • Call completion rate (%) • Average faulty direct exchange lines per line per year (%) • Average down time per line per year (days) • Congestion in cellular mobile operators' networks
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have made use of secondary data sources at the firm level for analysing access trends • The methodology used for analysis has not been described in detail • The authors have made claims of a cursory survey on the quality of the service for cellular mobile phones, but the methodology and procedure for this analysis have not been mentioned
Summary of results	• The number of DELs increased from 48,681 in 1993 to 133,000 in 1998,indicating an annual growth rate of 22.3% • Remarkable increases have been registered in the cellular mobile phone subsector. Comparing Ghana to the other African states in cellular mobile phones, the penetration increased from 1,742 in 1993 to almost 29,000 in 1997. • Significant increases have been registered in the penetration of payphones in the country, despite being skewed towards the urban areas, especially Accra. The number of payphones in the country, which had been 25 in 1993, increased to 1,815 by 1998 • The increased penetration has negatively affected the quality of services of these companies. Congestion on cellular mobile operators' networks has been very high and this has increased consumers' frustration in making successful calls • The problem underlying the poor quality of service was caused by a lack of adequate switching capacity to take care of the increases in network.

Conclusion	'Liberalisation has facilitated telecoms penetration and has given the subscribers the ability to choose between operators. However, certain actions such as evaluation of the capacity of Ghana Telecoms to take care of added volume were disregarded and this has undoubtedly affected the quality of service. Lack of a strong regulatory agency has contributed, inter alia, to problems in interconnection negotiations. One clear implication is that the National Communication Authority (NCA) will be strengthened to enable the effective development of firmer regulatory oversight.' (p.209)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Galiani et al. (2004)	
Countries of study	Argentina
Sectors	Water supply
Type of PSP	BOT concessions
Type of study	Quantitative and qualitative
Aims of study	To evaluate the impact of privatisation on access to water services in Argentina using data from the 1991 census and the 1997 Encuesta de Desarrollo Social (EDS)
Data sources and data collection instruments	Secondary data from the 1991 census and the 1997 Encuesta de Desarrollo Social (EDS), and case studies of water privatization in Argentina
Outcomes analysed and indicators	○ Access • Proportion of households connected to the water network
Methods used to analyse data, including details of checks on reliability and validity	Statistical method - difference-in-difference estimation using the z-test Reliability and validity: • Privatised and non-privatised municipalities in Argentina have been considered as treatment and control groups respectively
Summary of results	• A significantly larger increase has been found in the proportion of households connected to water in the municipalities that privatised than in municipalities that did not. The estimated impact is even higher when we exclude the capital city, where 98 percent of the households were already connected to water services before privatisation • For the sample considered, the results suggest that the number of households connected to the water network increased by 4.2 percentage points as an outcome of privatisation

Conclusion	• By comparing the contract targets with the firms' outcomes, the study observed that, despite a noteworthy increase, coverage rates remained behind targets for both water and sewerage • Failure to comply has been more severe in the poorest areas • Still, a good number of concession failures seem to have happened due to the presence of a weak and inefficient regulator which favoured opportunistic behaviour from the licensee
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low

Garn et al. (2002)	
Countries of study	Cambodia
Sectors	Water supply
Type of PSP	Concessions
Type of study	Quantitative and qualitative
Aims of study	'The objective of this paper is to assess and compare the performance and customer satisfaction with service provided by the newer private companies and the more traditional public utilities. Specifically the paper: (1) analyses the level and quality of water services provided by private water companies and public utilities, and consumer reactions to these services; and (2) assesses whether there has been any significant change in the level and quality of water services provided as a result of private sector involvement' (p.1)
Data sources and data collection instruments	Primary data obtained from a questionnaire survey of households served by the water utility and a technical assessment of the performance of water utilities by a water engineer
Outcomes analysed and indicators	○ Access • Lower-income households served (in terms of number of households) ○ Quality • Customer satisfaction with the quality of piped water (in terms of percentage of households) • Household satisfaction with attributes of piped water - clarity and overall quality (in terms of percentage of households) • Availability of water to households every day (in terms of percentage of households) • Availability of water to households by the number of hours per day (in terms of percentage of households) • Service interruptions (in terms of percentage of households) • Provision of new connections (in terms of number of days)

Methods used to analyse data, including details of checks on reliability and validity	Statistical method (analysis of questionnaire and analysis of performance as well as maintenance of the water utility in each town) Reliability and validity: • To compare the performance of the private and public utilities, four provincial towns served by public utilities were selected randomly in addition to the four towns served by private companies • The authors have provided a detailed description of the method followed for sample selection and survey as well as the procedure for the analysis of questionnaires • The interpretation of the data analysis has been carried out in a systematic manner • The questionnaire survey has covered diverse dimensions such as water quality, water availability, reliability of service, frequency of service, though the authors have not provided the rationale behind the patterns observed in the questionnaire survey
Summary of results	• 'The results indicate that the households served by private utilities are significantly more satisfied with the piped water than customers of public utilities. The daily availability and quality of piped water is better in the households served by private than by public utilities. Also, customers of private utilities experience fewer service interruptions.' (p.32) • 'However, according to results, this improved service does not come for free. Households served by private utilities pay for the piped water service significantly more than customers of public utilities. The connection fees as well as unit tariffs charged by private utilities are higher than fees and tariffs of public utilities. Some lower-income households that are not served by private utilities are partially limited by the high connection fees (as opposed to the regular monthly payments).' (p.32)
Conclusion	'Overall, this paper indicates that the bold effort of a few towns and private sector participants to introduce private sector involvement in the water sector is encouraging in many ways. But the full gains, which are possible, have not yet been realized.' (p.32)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Gasmi and Virto (2010)	
Countries of study	86 developing countries
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative

Aims of study	'Using data on the telecommunications industry in developing countries, we attempt to simultaneously evaluate the impact of the reforms on network expansion and investigate the role that infrastructure deployment, institutional risk, and access to public funds have played in the decisions to introduce competition, privatize the state-owned incumbent operator, and create a separate regulatory authority. The link between sectoral reforms and infrastructure deployment variables is explored by means of a systematic investigation of two-way causal relationships between these variables.' (p.276)
Data sources and data collection instruments	1985-1999 time-series cross-sectional database on 86 developing countries
Outcomes analysed and indicators	○ Access • Number of telephone lines per 100 inhabitants that connect the subscribers' terminal equipment to the public switched telephone network (PSTN)
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel data estimation Reliability and validity: • A number of confounding variables have been used in the analysis • The panel estimation technique used for estimation takes care of the country-specific individual heterogeneity • The authors have taken care of sample selection bias and endogeneity
Summary of results	The study finds that: • competition in the analogue cellular segment has a negative impact on fixed-line deployment whereas competition in the digital cellular segment has a positive impact on it • the creation of a separate regulator does not have any significant impact on fixed-line penetration • privatisation is found to have a significant positive effect on fixed service segment
Conclusion	'Developing countries with higher institutional risk and tighter financial constraints are more likely to promote policies, such as allowing entry into the digital cellular segment and privatizing the fixed-line incumbent, that attract a larger number of investors whose rents can be extracted through the license fees, red tape, or else. By the same token, these countries are less supportive of those reforms that are likely to provide them with less cash, such as cellular competition in the analogue segment and the creation of a regulator. Except in extreme cases of high corruption, the economically profitable reforms promoted by the governments are those that are likely to be successful, in particular, those that are expected to have a significant positive impact on the telecommunications infrastructure.' (p.285)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Gassner et al. (2007)	
Countries of study	South America, Africa, Asia, Europe and the Caribbean
Sectors	• Electricity • Water supply and sanitation
Type of PSP	• Management contract • Leasing/affermage • BOT concessions • Divesture
Type of study	Quantitative
Aims of study	To analyse the performance effect of PSP in the context of electricity distribution and water and sanitation services, using longer time series and more comprehensive coverage than previous research
Data sources and data collection instruments	Secondary data from different studies on PSP in electricity and water distribution in developing and transition countries
Outcomes analysed and indicators	Access o Water, sanitation and electricity • Residential coverage Service quality o Water • Water pipes break per connection o Sanitation • Sewerages blockages per connection o Electricity • Electricity lost in distribution • Annual interruption frequency
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel estimation Reliability and validity • Privatised and state-owned enterprises have been used as the treatment and control groups respectively • The model specification itself controls for heterogeneity • An instrumental variable procedure is used to address endogeneity • The authors have used the nearest neighbour matching procedure to control for estimation bias
Summary of results	In the case of the electricity sector: • A reduction in distribution losses in electricity has been found In the case of water and sanitation: • There has been an increase in service quality • An increased number of residential connections has been observed in the water sector and residential coverage has increased in the sanitation sector
Conclusion	• The results obtained suggest that PSP does fulfil its promise of improved company performance

	• A cause for the practical problems encountered by private participation was found to be the decrease in the labour force and a lack of evidence on increase in investment after PSP
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Ghanadan and Eberhard (2007)	
Countries of study	Tanzania
Sectors	Electricity
Type of PSP	Management contract
Type of study	Qualitative
Aims of study	'This paper reviews the evidence on universal access in developing countries. We first discuss the rationale for universal access laws and review the different ways subsidies can be financed and allocated, along with the implications of those various methods. We then evaluate the historical effectiveness of monopoly enterprises in providing service to the poor and how privatization has affected coverage.' (p.4)
Data sources and data collection instruments	Primary data from discussions and interviews with stakeholders connected to the management contract in Tanzania and secondary data from policy documents and archival materials related to reforms and the contract
Outcomes analysed and indicators	○ Access • Number of new connections ○ Quality • Power losses • Benchmark quality of supply and service • System reliability • Customer service related and reconnections
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have listed the data sources for primary and secondary data to analyse electricity utility management contracts in Tanzania. However, the methodology adopted for data analysis and collection has not been described • The authors have presented in-depth information and analysis of the scenario leading to adoption of the management contracts and the performance of these contracts

Summary of results	• 'The management contract did not generate sustained reductions in power losses. Losses initially decreased from 28% in 2001 to 21% in 2002 but increase again in 2003-2005 to 26 percent. In 2006, losses were reduced to 22%, but still above levels of the first year of the contract.' (p.23) • 'Poor performance in technical losses reflects increases in energy sales with no real improvement in the technical systems … These losses reflected insufficient investment in transmission and distribution.' (p.23) • Non-technical distribution losses resulted from poor customer management, non-payment or billing issues or theft. • There has been an improvement in the quality of supply and service • No improvement has been noted in system reliability during the management contract and the company had to implement extensive load shedding as demand outstripped supply under drought conditions and eroded hydro reserves • The rate of new connections has not increased substantially • Little attention was given to customer service issues within the formal scope of the management contract
Conclusion	'Management contracts are, in principle easier to implement than other forms of private sector participation in the electricity sector, such as concessions or leases, but they nevertheless incorporate a number of complexities and challenges. These instruments depend on effective relations between parties, clear incentives and goals, and a coherent wider vision for the sector. Tanzania's experience offers lessons for electricity management contracts and more effective power reforms throughout Africa.' (p.49)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Gillwald (2005)	
Countries of study	South Africa
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This paper seeks to provide an understanding of the shortcomings of South African telecommunications reform since 1996, and in so doing it tries to distinguish between instances of failure by the regulator and instances where the failure or shortcoming results from government or political circumstances beyond the control of the regulator.' (p.472)
Data sources and data collection instruments	Main sources of data are annual reports of telecom companies, policy documents of the Republic of South Africa, and reports on telecom reforms in South Africa

Outcomes analysed and indicators	○ Access • Number of fixed-line connections ○ Quality • Disconnections due to non-payment
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study does not provide a detailed description of the data sources and methodology used for the analysis
Summary of results	• The number of residential subscribers on fixed networks has declined in South Africa since 1996 when the reform process began. Telkom's 5-year licence in 1997 required it to roll out 1.7 million new fixed-line connections in underserved areas by the middle of 2002. It met the target, but due to the estimated number of lines disconnected since 1997, largely due to non-payment, the net effect is that 75% of the licence's obligation for network extension has not being fulfilled • 'When fixed and mobile growth are combined, South Africa's figures showed impressive annual growth during the key reform period, with 95% of this growth generated by the increase in mobile subscribers' (p.477)
Conclusion	'The time for a policy and regulatory approach biased towards maximisation of the value of the vertically integrated incumbent is now long past. The focus of policy now must be to ensure that the market is structured in a manner that minimises regulatory complexity, allowing the regulator to focus on measures to induce investment in network roll-out, encourage services innovation, improve consumers' choice and service quality, develop market efficiencies, and effectively target subsidies to those who most need them. Policy must enable fair competition that will drive down costs, so that services become more widely affordable. The increased demand will give operators the economic incentives to expand the coverage of their networks and services.' (p.490)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low

Gonzalez et al. (1998)	
Countries of study	Mexico
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative

Aims of study	'This paper focuses on the evolution of the regulatory framework and the process of privatization and deregulation in Mexico. In particular, the achievement of goals set by the government at the beginning of the process are discussed.' (p.341)
Data sources and data collection instruments	Main sources of data are reports of telecommunications regulatory body and telecom companies, and reports on telecom reforms in Mexico.
Outcomes analysed and indicators	○ Access • Number of subscribers • Lines per 100 inhabitants • Number of public telephones • Growth in telephone lines ○ Quality • Percent of digital lines
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • Firm-level secondary data from reliable sources are used to discuss the trends • The specific methodology adopted for the analysis of data has not been stated • The data provided highlights the findings regarding performance • The study lacks an in-depth analysis
Summary of results	'In 1996, the Telmex network comprised 8.8 million lines, up from 6 million in 1991. Density in telephone lines increased to almost 10 lines per 100 inhabitants from 6.6 in 1990. More than 33,000 km of fibre optic cable was installed. The number of public telephones tripled to approximately 240,000 with at least one in every locality with more than 500 inhabitants. And the percentage of digital lines increased from 29 to 90%.' (p.343)
Conclusion	'Based on historical facts and recent trends, one can conclude as follows: • The privatisation and deregulation processes have resulted in a steady increase in the number and the type of telephone facilities in Mexico. Prices of long-distance services have decreased, while those of local services have increased thereby reducing the level of cross-subsidy over time. • Mexico is unlikely to achieve the 'Universal Service' target of 20 lines per 100 inhabitants by the year 2000. Further, the government will need to find new mechanisms to encourage companies to expand their networks into areas with a low concentration of wealth. • The lack of proper regulation will tend to increase the disparity between the richer and the poorer segments of the society. By allowing companies to limit their participation to the areas where more profits are available, the richer segment of the population will enjoy more and better services, while the poorer segment will remain behind. • Overall, the quality of telephone services has increased significantly over the last decade, and Mexico is likely to benefit from increasing investment by international telecommunications companies.' (p.357)

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Gonzalez-Eiras and Rossi (2007)	
Countries of study	Argentina
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'This paper uses provincial-level data for Argentina to test for the causal relationship between electricity distribution and health. It examines the impact of privatization on two output measures: incidence of low birth weight and child mortality rates caused by food poisoning.' (p.3)
Data sources and data collection instruments	Secondary data obtained from the annual reports of various firms in Argentina and Census reports of 1991 and 2001
Outcomes analysed and indicators	○ Access • Proportion of households with access to electricity network ○ Quality • Frequency of interruption per customer • Total time of interruption per customer
Methods used to analyse data, including details of checks on reliability and validity	Statistical methodology Reliability and validity: • The authors have used sufficient data obtained from several reliable sources in order to make claims in terms of improvements on access and quality • Multiple sources of evidences are used to substantiate the findings of the study
Summary of results	• 'Results from the difference-in-differences estimator … show a larger increase in the proportion of households connected to electricity services in provinces that privatized than in provinces that did not. The estimated coefficient indicates that the total number of households with access to electricity increased by 2.3 percentage points as a result of privatization.' (p.6) • Total time of interruption per customer (TC), decreased for the group of five firms (EDENOR, EDESUR, EDELAP, EDEMSA and EDEERSA) from an average of 21.72 minutes before privatisation to 9.74 minutes after privatisation. Analogously, mean frequency of interruptions per customer (FC), decreased from 14.15 before privatisation (1991) to 6.00 after privatisation (2002) • 'we have information on minutes of interruptions and number of customers suffering interruptions in EDELAP's concession zone in 1999 and 2000, which shows that 96 percent of the minutes/customer interrupted and 87 percent of customers suffering

	interruptions were caused by problems originating in the distribution stage.' (p.8)
Conclusion	'there is evidence that the privatization programs of the electricity sector have had an important impact on increasing both access to service and quality of service.' (p.8)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Gutierrez (1999)	
Countries of study	Trinidad and Tobago, Belize, Barbados, Chile, Argentina, Mexico, Jamaica, Peru, Venezuela, Bolivia and Guyana
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This study examines the trends in the telecommunications sector in Latin America and the Caribbean.' (p.1)
Data sources and data collection instruments	Main sources of data are International Telecommunication Union (ITU) database, Pyramid Research (1998), and Harper (1997).
Outcomes analysed and indicators	○ Access • Growth rate of mainlines per 100 inhabitants
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have used reliable data sources for making across country comparison of pre- and post-privatisation reforms in Latin American and Caribbean countries • The study covers very limited aspects of the reform and an in-depth analysis has not been made
Summary of results	• All the countries except Trinidad and Tobago, Belize and Barbados have experienced an increase in percentage annual growth since privatisation • 'it seems that after privatization, the growth rate of teledensity for the countries that embarked on ownership reform did grow more rapidly than that of the countries that kept their (main) phone operators in public hands.' (p.9)
Conclusion	'The liberalization of the main telecom markets has, however, been slow. Unfortunately, at the time of privatization, governments across the region gave monopoly power to the new owners, reducing the beneficial impact of the ownership reform. For some countries, the exclusivity periods are about to end, and open or partial competition will be possible. A by-product of the concession of exclusivity period has been the entrenchment of the incumbents and the appearance of anti-competitive behaviours.' (p.26)

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low

Gutierrez (2003)	
Countries of study	22 Latin American countries
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	The study investigates the effect that a specialised regulatory body has on telecommunications sector performance
Data sources and data collection instruments	Main sources of data are the International Telecommunications Union (ITU) Database *World Telecommunications Indicators*, and the World Bank- *Economic and Social indicators*.
Outcomes analysed and indicators	○ Access • Network deployment measured as main phone lines per 100 inhabitants
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - dynamic panel model (Arellano-Bond estimation) Reliability and validity: • Variables such as regulation, competition, privatisation, exports and imports as a percentage of GDP, ration of population to area have been taken into consideration to avoid control bias from confounding variables • The endogeneity of regulation, privatisation and liberalisation has been considered • The methodology used for analysis takes care of country-specific heterogeneity in the model • The authors have included both treatment and control groups for analysis • Sargan's serial correlation tests are used to ensure that the *t*-statistics are robust to heteroskedasticity
Summary of results	• The regulation variables have a positive but insignificant association with the access indicator • Privatisation is found to be positively associated with greater network deployment
Conclusion	'Although the sample of countries chosen in this study is restricted to the Latin American region, the inferences may be valid for countries with some similarities. The main lesson is that the building of a sound and strong regulatory environment, the opening of market to more competition and the free entry of private investors in basic telecommunications services will propel network expansion and efficiency across the sector.' (p.279)

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Haggarty et al. (1999)	
Countries of study	Mexico
Sectors	Water supply
Type of PSP	Service contract
Type of study	Qualitative
Aims of study	'This paper seeks to address the following questions: What were the factors motivating and constraining reform – and why did the reform take the form it did? Once implemented, to what extent did the reform follow the intended path, and produce expected outcomes? To the extent that there was divergence from the intended path, why did this occur?' (p.5)
Data sources and data collection instruments	• Primary data obtained through interviews with stakeholders associated with the projects, namely administrative officials from the urban local body, senior officials from the concessionaire company, elected members at federal, state and local levels, urban citizens, non-governmental organisations and senior officials of the regulatory agency • Secondary data from archives pertaining to the economic context, the reform process, design of the reform and the reform outcomes.
Outcomes analysed and indicators	○ Quality • Total number of bills issued per year (in terms of number and increase in percentage) • Collection of bills (in thousands of Pesos) • Quantity of water supplied • Interruptions in service
Methods used to analyse data, including details of checks on reliability and validity	• Interview analysis • Archival analysis Reliability and validity: • The study has analysed and reported different dimensions of the project, namely the design of the reform, the implementation experience and the reform outcomes • It gives an in-depth description of each of the dimensions to show the complexities involved in the adoption of PPP in the provision of water supply services • Diverse perspectives are provided in order to explain the building of a phenomenon • The authors have collected relevant primary data through interviews with stakeholders associated with the project

	• They have also collected information through analysis of archival data, contract documents, correspondence, financial reports and so on
Summary of results	• Information: One important accomplishment of the contracts was to improve information about the water distribution system and the client base in the Federal District of Mexico (D.F). Thanks to the contracts, the D.F. now has an electronic map of the entire water system for overall planning, a customer census that has allowed regularisation of previously unregistered connections and meters for most customers • Metering, billing and collection: Nearly 1.2 million meters were installed as a result of the reforms. As of June 1998, 64% of customers were billed on a metered basis while another 16% were billed the average of the metered customers in their zone. This is a major improvement on the pre-reform state of affairs where, because of the large number of unregistered connections, at least 22 percent of customers did not receive a bill at all and those that did were being billed at a fixed rate, regardless of usage • Service: The effect of the contracts on service has been mixed. The contractors expanded the number of customer centres, and have responded more rapidly to questions on billing and meter readings or to reports of leaks or lack of water. Furthermore, the operators have opened 24 customer service centres and each has telephone hotlines in their area. Service problems remain, however, including poor quality of water and interrupted service, especially in the southern and south-eastern portions of the Mexico City
Conclusion	• Service contracts, which are often portrayed as a stepping stone to management contracts, leases or concessions, do not necessarily create circumstances that make further reform more likely. In fact, the experience of firms to date, particularly with politically motivated pricing and unpredictable renegotiation, may actually make further private-sector involvement less likely • The use of bidding for the market – or the use of multiple zones – are not in themselves sufficient to sustain a competitive environment. For competitive pressures to be created and maintained, attention must be paid, first, to making the basis of the bidding highly transparent, and, second, to the development of clear benchmarks, and agreed processes for benchmark comparisons and associated allocation of penalties and rewards • Fragmentation of water system management among many poorly coordinated, politicised public agencies makes reform much harder to implement and the realisation of potential benefits less likely. • In the absence of prices that correctly signal the scarcity and cost of a resource, including the relative prices of treated to new water, attempts to change behaviour will not succeed. The price signals must apply to all actors in the system, including governments, operators and consumers; thus, large central government subsidies to local government will be a barrier to greater efficiency

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Kazimbaya-Senkwe and Guy (2007)	
Countries of study	Zambia (Copperbelt province)
Sectors	Water supply
Type of PSP	Management contract
Type of study	Qualitative
Aims of study	'Using the case of the Copperbelt, this paper explores the role of the private sector in the domestication of water and resultant access to water between 1900 and 2000' (p.870)
Data sources and data collection instruments	• Primary data obtained from interviews • Secondary data from primary archival documents
Outcomes analysed and indicators	○ Quality • Quantity of water supplied in terms of gallons per household per day
Methods used to analyse data, including details of checks on reliability and validity	• Archival analysis • Analysis of interview transcripts Reliability and validity: • The data pertaining to the historical development of the Copperbelt and the domestication of water there has been well presented • To enrich the discussion, the authors have reproduced interview quotes and archival data wherever necessary
Summary of results	• The water system builders had been successful in domesticating water for drinking purposes • The success in domestication of water was unfortunately not matched by the development of an egalitarian or reliable water system. After 100 years of development, neither the mines nor the local authorities have been able to provide an adequate and reliable water service to their consumers
Conclusion	• Involvement of the mines in the water sector tied urban water supply inextricably into mining and through that into the global economy • By establishing service standards that varied on the basis of race and class, the mines served very well the ideology of racial segregation and cultural domination that prevailed in the colonial era • Because of the obduracy of technology and policy, the influence of this differentiated access did not end at independence, but lives on today in the form of Zambian design standards

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Kirkpatrick et al. (2006)	
Countries of study	African countries
Sectors	Water supply
Type of PSP	• Concession contract • Management and lease contract
Type of study	Quantitative
Aims of study	To explore the issues of efficiency and social welfare objectives and whether or to what extent privatisation is critical to achieving Millennium Development Goals for safe, accessible and affordable water services by examining the impact of privatisation of water services in Africa
Data sources and data collection instruments	Secondary data obtained from the Water Partnership for Capacity Building in Africa's Service Providers' Performance Indicators and Benchmarking Project (SPBNET) database
Outcomes analysed and indicators	○ Quality • Share of population served • Unaccounted-for-water as a percent of total • Availability of piped water in hours per day
Methods used to analyse data, including details of checks on reliability and validity	Statistical method - descriptive statistics and F-test
Summary of results	• The private sector has lower water losses when compared to the state-owned firms but other measures of customer service suggest smaller differences • F-test results for difference in means for public and private utilities performance ratios show that the differences are not statistically significant • Privately owned utilities are twice as large as state-owned ones in terms of volume of water distributed and have more connections in their systems
Conclusion	The results, when taken together, do not provide strong evidence for differences in the performance of state-owned water utilities and water utilities involving some private capital in Africa. The descriptive statistics provide no statistically significant differences

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Laffont and Guessan (2002)	
Countries of study	Cote D'Ivoire
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This work aims at analysing the main features of the reform as well as its main consequences. First, we will comment on the economic and political factors that gave rise to this reform. We will also draw a broad picture of the technical and financial state of the public operator before its privatization. Then, we will analyze several aspects of the reforms undertaken trying to pin down not only its results but also the problems linked with its implementation.' (p.3)
Data sources and data collection instruments	Main sources of data are the International Telecommunications Union (ITU), IMF, telecom company - CI-Telecom, and regulatory institution-ATCI
Outcomes analysed and indicators	○ Access • Number of fixed lines • Teledensity (for 100 inhabitants) • Number of call boxes ○ Quality • Percentage of failures repaired in 48 hours • Percentage of successful local calls • Percentage of successful long-distance calls • Percentage of successful international calls
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • Secondary data from reliable sources have been used for the analysis • Adequate data points have been used for appropriate comparisons • The data patterns illustrate the findings of the study and support the claims made • A range of issues pertaining to access and quality, before and after privatisation, has been covered
Summary of results	• There was a 39.4% increase in the number of fixed lines during the first two years of the concession operating since the end of 1996. The growth rate was especially high in 1998 and this increase had a positive impact on the teledensity.

	• An increase in the number of call boxes has also been found, though it is still very low when compared to international references • 'For several domains, the quality of the service is lower than the ITU norms and the concessionaire will need to increase its effort to attain the objectives planned for the year 3. Nevertheless, a recent survey of the ATCI has shown that 83% of the people believe that there has been an improvement in the quality of the service whereas 75% feel an improvement in customers' service.' (p.37)
Conclusion	• 'Concerning performance, one must stress that after a difficult first year, CI-Telecom has met the objectives of the concession contracts for mainlines and call boxes in 1999 and 2000. Objectives concerning rural telephony and quality of service have not been met.' (p.56) • 'To conclude, one can say that the regulatory institutions carefully put in place before privatization are functioning reasonably well (much better than competition policy for example) for an African country.' (p.56)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Lee (2001)	
Countries of study	Malaysia
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This paper reviews the recent history and development of the telecommunications sector in Malaysia.' (p.1)
Data sources and data collection instruments	Secondary data from Sixth Malaysia Plan; Mid-term Review of the Sixth Malaysia Plan; Seventh Malaysia Plan; Mid-term Review of the Seventh Malaysia Plan; Eighth Malaysia Plan; Malaysia Communications and Multimedia Commission; Department of Statistics has been used for the analysis

Outcomes analysed and indicators	○ Access
	  • Fixed-line subscribers
	  • Cellular phone subscribers
	  • Fixed-line penetration ratio (per 100 population)
	○ Quality
	  • Percentage of responses to customer complaints within 24 hours

Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study draws data from various reliable sources to analyse the trends, but no detailed description of the methodology used has been given • It has given sufficient before and after data points to assess the impact of privatisation • The study covers a number of aspects in the sector though it lacks an in-depth analysis
Summary of results	• 'Significant gains in the fixed-line penetration were made after telecommunications reforms were undertaken beginning 1987. By 1995 and 2000, the fixed-line penetration ratio had risen to 16.6 per 100 population and 21.0 per 100 population respectively (note: the direct exchange line penetration rate is around 20 per 100 population).' (p.2) • 'cellular phone subscriptions have grown very rapidly since the early 1990s. The total number of cellular phone subscribers stood close to 84,557. By the year 2000, this had increased to 5.1 million subscribers.' (p.2) • The percentage of responses to customer complaints within 24 hours increased from 80 percent in 1980 to 91.5 percent in 1997.
Conclusion	'The impact of reforms has to be evaluated against the objectives of implementing them, namely efficiency and equity. Based on several indicators (such as return on assets, revenue per subscriber, production per employee, direct exchange lines per employee and response rate to customer complaints), TMB's financial performance seems to have improved after it was privatized in 1987 … But these are achievements that were made over a period of ten years.' (p.16)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Lee and Findlay (2005)	
Countries of study	Indonesia
Sectors	Telecommunications
Type of PSP	Concessions
Type of study	Qualitative
Aims of study	'The main purpose of this paper is thus twofold: first, to assess the performance of the 1989 reform and to examine the policy factors that have constrained further refinement; and second, to identify challenges that might impede achievement of the objectives of the current reform phase.' (p.342)

Data sources and data collection instruments	Main sources of data are the International Telecommunication Union (ITU) and regulatory body—the Indonesian Telecommunication Regulatory Body (Badan Regulasi Telekomunikasi Indonesia, BRTI)
Outcomes analysed and indicators	○ Access • Teledensity - percentage of inhabitants connected to a telephone line • Number of fixed-line subscribers • Number of mobile subscribers
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study has used reliable secondary data sources to illustrate the findings but it has not given a detailed description of the methodology used for analysis
Summary of results	'Despite the collapse of the KSO [kerja sama operasi, or joint operation] scheme, rapid improvements in both fixed-line and mobile teledensity were recorded. While fixed-line teledensity has grown at a steady pace over the last decade, the significant improvement in Indonesia's telecom performance is highlighted by the remarkable growth rate of the mobile sector. In fact by 2002 the number of mobile subscribers exceeded the number of fixed lines, to make mobile telephony the most accessible and most used telecommunications service in the country' (p.350)
Conclusion	'Telecom reform in Indonesia offers a good example of how the selection of a reform model affects the achievement of policy objectives. Specifically, it demonstrates that partial liberalisation, in the form of PPP contracts incorporating exclusivity rights, provides only short-term policy solutions without significantly improving performance. This is consistent with the findings of the literature that the combination of full competition in the fixed-line market and privatization leads to greater increases in both operational efficiency and network availability than does partial liberalisation.' (pp. 362-363)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Maiorano and Stern (2007)	
Countries of study	30 low- and middle-income countries
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'The focus of this paper is the relationship between measures of telecommunications development and regulatory governance, while taking explicit account within a system framework of (a) the role of income; and (b) other institutions and country governance.' (p.167)

Data sources and data collection instruments	Secondary data from International Telecommunications Union (ITU), the World Telecommunications Indicators and World Development Indicators from the World Bank
Outcomes analysed and indicators	○ Access • The number of mobile subscribers per hundred inhabitants
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel methodology Reliability and validity: • A number of confounding variables such as the price of mobile services, the price of fixed-line services, per capita income, have been used to control for bias from confounding variables • The authors have corrected per capita income and regulatory governance variables for endogeneity • The panel fixed-effects model takes care of country-specific heterogeneity • The sample has both treatment and control groups • The estimates from the system of simultaneous equations are compared with those obtained from the single equations for robustness
Summary of results	The results indicate that privatisation and other such policy variables do not have a significant impact on the mobile penetration rate while the economic variables such as GDP per capita seem to have a significant impact on it
Conclusion	The evidence shows that the existence of an autonomous infrastructure industry regulator increases penetration rates for mobile telecommunications in developing countries
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Makhaya and Roberts (2003)	
Countries of study	South Africa
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'The article reviews the debates on privatisation and international experience with a particular emphasis on issues of economic development and regulation. The experience of South Africa is then analysed in terms of different indicators of performance, the regulatory record and the progress on service extension.' (p.41)
Data sources and data collection instruments	Secondary data obtained from Telkom Annual Reports (2000 and 2002)

Outcomes analysed and indicators	○ Access • Number of fixed-line connections • Mainlines per 100 population • Ratio of non white African households having service to ratio of whites having service ○ Quality • Percent of digitalisation of network • Time taken for installation • Time taken for remedying faults • Disconnections due to non-payment
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • Though the data sources have been provided, there are not enough data points for comparison • The methodology has not been described in detail
Summary of results	Provision of telecommunications services in South Africa has undoubtedly been improved. Telkom had almost met target for new lines to be installed between 1997 and 2002, the network was almost fully digitalised and the time taken for installation and for remedying faults has decreased dramatically. However the total number of lines did not increase by the same amount due to the higher disconnection rate on account of non-payments
Conclusion	'The South African case also illustrates that competition issues should not be ignored during privatisation. The evidence indicates that under private sector imperatives, Telkom has had an even greater incentive to exploit its vertical integration and incumbent position. By providing very limited access to lines required for the provision of data services and instituting high price rises it has stifled competition in the market for value-added network services and has favoured its own operations. The full potential returns to the economy from new investments and technological upgrading are therefore not being realised, and instead barriers to entry have been increased.' (p.57)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low

Maranon (2005)	
Countries of study	Mexico (Mexico City)
Sectors	Water supply
Type of PSP	Management contract
Type of study	Qualitative
Aims of study	This article analyses the process of private-sector participation in water management in Mexico City

Data sources and data collection instruments	• Primary data from interviews with officials, businessmen, academics and members of the public • Secondary data from archival records of the city's water users, collection of charges for potable water service and efficiency indicators for the management of potable water
Outcomes analysed and indicators	○ Quality • Measurement of consumption in percentage • Detection and elimination of leaks (in terms of quantity of water saved) • Collection rates in percentages • Number of users registered
Methods used to analyse data, including details of checks on reliability and validity	• Archival analysis • Interview analysis Reliability and validity: • Though the study is primarily based on interview data, archival data has been presented in support of arguments and findings wherever necessary • The author has explored diverse perspectives to substantiate the arguments • Through interviews with the general public, the author has enquired into the specifics of improvement areas • A range of issues, such as maintenance of a register of users, measurement, detection and estimation of leaks, which were target areas of improvement in the contract as well as in the debates supporting PSP, has been taken into consideration
Summary of results	According to the Federal District Water Commission (CADF), potable water management in the Federal District with private-sector participation has led to several important results in terms of metering, maintenance of information about networks and users etc. The authorities now have basic information on the system in terms of the networks and users, metering has been applied in most of the cases, income has risen, and consumption has been reduced, as has level of physical losses.
Conclusion	'The consensus view of the new strategy is favourable among the main players, including the businessmen, academics and representatives of the institutions involved and society in general. The main advantages have been the establishment of updated registers of networks and users, the mass installation of meters, the change from fixed quotas to measured consumption and the increase in the volume of consumption and of collection in real terms. The same positive view is held of attention to users, thanks to the offices for that purpose and the call centres set up by the companies' (p.178)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Mattos and Coutinho (2005)	
Countries of study	Brazil
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'The purpose of this paper is to present the BMTR, addressing the main economic rationale regarding the restructuring of TELEBRAS and cross-ownership constraints in privatization …, duopoly policy …, entry assistance policy …, universal service policy …, tariff …, and interconnection regulations' (p.450)
Data sources and data collection instruments	Secondary data from ANATEL
Outcomes analysed and indicators	○ Access • Fixed lines for 100 inhabitants (%)
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The study does not give a detailed description of the methodology used for data analysis • The authors provide appropriate data points from firm-level data sources for making comparisons • Very few aspects relating to outcomes are in the study and it also lacks an in-depth analysis of the facts
Summary of results	Tele-density has increased from 8% in 1994 to 10.7% in 1997 and then to 22.1% in 2001
Conclusion	'The paper recognizes that there is a current trend toward more competition in telecommunications worldwide, including Brazil. Furthermore, it acknowledges that this trend is transforming the role of regulation in telecommunications. However, the adoption of a policy of full deregulation in the Brazilian case is premature.' (p.464)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low

Menard and Clarke (2002)	
Countries of study	Guinea (Conakry)
Sectors	Water supply and sanitation
Type of PSP	Leasing/affermage
Type of study	Qualitative

Aims of study	The study describes the performance of Conakry's water system, after implementation of various reforms. The lease contract for the operation and maintenance of the urban system is a part of this reform. The study has a primary focus on the outcomes of this lease contract.
Data sources and data collection instruments	• Primary data from interviews with beneficiaries (urban citizens), officials from the concessionaire companies and public sector officials • Secondary data obtained from archival records of performance dimensions of water supply sector
Outcomes analysed and indicators	○ Access • Number of connections • Number of standpipes ○ Quality • Water quality (in terms of chemical and bacteriological contamination) • Customer service (in terms of procedure for filing complaints and application for new connections, payment of bills) • Rapid metering in percentages • Bill collection in percentages • Unaccounted-for water in percentages • Public collection rate in percentages
Methods used to analyse data, including details of checks on reliability and validity	• Analysis of interviews • Analysis of archival records and documents Reliability and validity: • The authors have presented adequate data on the performance parameters of Conakry's water system, though the procedure adopted for data collection and analysis has not been described in detail • There is a very clear link between the data and the findings
Summary of results	There is little doubt that the situation of the provision of water supply and sanitation services in Conakry has improved considerably since the reform. However, there were economic, institutional and technical factors which have brought about a significant improvement in sector performance
Conclusion	The fundamental cause of problems in the sector are found to be as follows: • lack of strong and stable institutions • contracts without adequate mechanisms for solving disputes among the parties involved • constitutional support and expertise lacked by the judiciary • absence of independent authority to monitor the lease contract effectively
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Morris and Gallardo Cabrera (2003)	
Countries of study	Mexico (Aguascalientes)
Sectors	Water supply
Type of PSP	Concession contract
Type of study	Qualitative
Aims of study	'This paper seeks to examine the challenges that the urban poor typically encounter in meeting their household water needs when the private sector has responsibility of service provision' (p.36)
Data sources and data collection instruments	Primary data obtained through interviews with local governments and informed household survey
Outcomes analysed and indicators	○ Access • Number of water connections ○ Quality • Availability of water service • Physical quality of water supplied
Methods used to analyse data, including details of checks on reliability and validity	Analysis of the data collected through interviews and household surveys Reliability and validity: • Sufficient amount of data has been presented, but it has not been explained in detail • A range of dimensions related to the quality of water servicing have been covered • Rich insights are provided to justify the interpretation of the findings • The authors have referred to the theoretical dimensions of an issue wherever required
Summary of results	• The increasing inability of block tariff policy to effectively meet the needs of the population is demonstrated by the high number of poor households falling into arrears and being disconnected from the network • Households in poor areas typically only receive water in the mornings and because of this, several households felt that they were not receiving sufficient water to sustain their families • There are very few incentives for the private company to address the question of water quality pertaining to naturally occurring contaminants that cause long-term health problems
Conclusion	The authors have proposed opportunities for improvement in operations according to the principles of sustainability. Also they have suggested ways to address harmful effects on the urban poor, such as: • a more comprehensive process of determining tariffs • widespread use of subsidies • incorporation of efficiency incentives into policies • more attention to quality of servicing to the poor

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Mustafa and Reeder (2009)	
Countries of study	Belize (Belize City)
Sectors	Water supply
Type of PSP	BOT concessions
Type of study	Qualitative
Aims of study	'In this article ... we present the results of the ethnographic, questionnaire based research on the failed water privatization in Belize city' (p.790)
Data sources and data collection instruments	Primary data obtained through ethnographic questionnaire survey and focus group discussions
Outcomes analysed and indicators	○ Access • Water connections ○ Quality • Physical quality of water supply
Methods used to analyse data, including details of checks on reliability and validity	Analysis of data collected through questionnaires and focus group discussions Reliability and validity: • A range of issues, such as quantity, quality, accessibility, have been covered with adequate and appropriate qualitative data • The steps involved in the research process have been well described, and detailed interview quotes have been given • The authors have presented different perspectives about a single phenomenon • The findings from the ethnographic questionnaire and focus group discussions have been supported by project information and literature wherever required • Secondary data on Belize's geographical context as a Caribbean country is meshed with primary data on people's subjectivities about privatised water in the city
Summary of results	• Motivation for undertaking the privatisation was partially the acceptance on the part of the Belizean decision-making elite • The actual experience of service delivery from privatisation was much more mixed • The decrease in the affordability of water supply was unreasonable for most Belizeans • Three popular privatisation narratives point to the emblematic nature of water privatisation in the Belizean sense of nationalism, good governance and their place within the globalized world

Conclusion	'The challenge in outright privatization of water utilities will continue to be how to bridge the discursive and practical divide between water users as citizens and water users as customers, as well as between water as an economic good and as a human right' (p.805)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Nagayama (2010)	
Countries of study	Asia, Latin America and Soviet and Eastern Europe
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'This paper examines the impacts of power sector reform measures on performance indicators (capacity per capita, transmission/distribution loss) in 4 regions (developed countries, the countries of the former Soviet Union and eastern Europe, Latin America, and Asian developing countries) from 1985 to 2006 based on original panel data from 86 countries (Latin America: 21, the countries of the former Soviet Union and Eastern Europe: 27, Asian developing countries: 13, developed countries: 25).' (p.3453)
Data sources and data collection instruments	Secondary data obtained from various government materials
Outcomes analysed and indicators	○ Quality • T&D losses
Methods used to analyse data, including details of checks on reliability and validity	Econometric methodology - panel fixed-effects model Reliability and validity: • Separate data sets for different regions have been considered in the study, which avoids sampling bias • The fixed-effects model adopted for the analysis accounts for individual heterogeneity • A sufficient number of confounding variables has been included in the model for analysis
Summary of results	• The introduction of foreign independent power producers (IPPs) decreased T&D losses in Asian developing countries, the countries of the former Soviet Union and Eastern-Europe with/without independent regulators. For Latin American countries, the introduction of foreign IPP increased T&D losses, but coexistence with independent regulators decreased T&D losses

	• Privatisation reduced T&D losses in Latin American countries with/without independent regulators. For the former Soviet Union and eastern European countries, privatisation itself increased T&D losses, but coexistence with an independent regulator decreased T&D losses
Conclusion	• The reform policy variables helped to reduce T&D losses • The fact that T&D losses increased with privatisation and the establishment of regulatory agencies in the former Soviet Union and eastern European countries was due to the increase in generation capability by introduction of IPPs and corresponding rapid extension of T&D lines • Singapore is the only country in Asia that introduced retail competition and the T&D losses were found to have increased with its high economic growth; T&D losses were still tending to increase
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Pineau (2005)	
Countries of study	Cameroon
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'The objective of this article is threefold. First, to document and put in perspective the Cameroonian electricity reform process. Second, to assess the reform from a general set of criteria and from its own objectives. Finally, to develop a general framework to help understand what type of electricity market reform is desirable in Cameroon and other sub-Saharan countries in a similar situation.' (p.134)
Data sources and data collection instruments	Secondary data from Electricity Sector Regulatory Agency - ARSEL, and private electricity company - AES Corporation and AES-Sonel
Outcomes analysed and indicators	○ Quality • Hours of power interruptions
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have not presented the process of data collection and analysis • The study has used secondary sources of data to arrive at the findings. However, the authors have not made an attempt to support these claims with primary data or multiple sources of evidence

	• The authors have observed the failure of the Cameroonian electricity reform from different angles • The authors have carried out an institutional endowment analysis of Cameroon in order to establish a theoretical point of view to explain the reform and what could be done
Summary of results	• The service quality was found to have worsened after privatisation of the utility but low rainfall could have been an important factor in causing the hydro-electricity supply shortages • Despite the privatisation and existence of a legal and regulatory framework liberalising and introducing competition in the electrical subsector, there were still huge shortcomings in the supply of electricity and the quality of service rendered to the public
Conclusion	'Even if the World Bank and the IMF do not fully acknowledge the failure of the reform, the Cameroonian government now takes some initial steps to rectify the situation. It seeks investment in partnership with international development agencies. Further and stronger steps are however recommended. The first ones relate to ARSEL, whose role should be strengthened and modified to give more focus on planning and control, and less on theoretical attempts to increase competition. This recommendation is made as institutions have to be strengthened before competition can work. Governmental initiatives in investment should continue, with the creation of and support for an independent national electrical engineering industry. Transparency should be monitored by an independent international body as long as local institutions are lacking the capacity to do so.' (p.158)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Plane (1999)	
Countries of study	Côte d'Ivoire
Sectors	Electricity
Type of PSP	Lease contract
Type of study	Quantitative and qualitative
Aims of study	'The objective of the present paper is to investigate the economic consequences of privatization in the case of the Ivoirian electricity company.' (p.344)
Data sources and data collection instruments	Secondary data obtained from the enterprises and the World Bank
Outcomes analysed and indicators	○ Access • Number of consumers ○ Quality • Average power cut time

Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have used secondary data from various reliable sources to arrive at the findings
Summary of results	'better electricity service was provided to consumers as evidenced by average power-cut time, which fell from 50 h per year at the time CIE was created to 20 h in 1995 ... Meanwhile, the number of consumers increased from 410,522 to 476,920 (+16.2%) and, as far as we know, the private regulated firm did not follow a cream-skimming strategy, although the risk of cutting of supply to those who do not pay has effectively increased.' (p.357)
Conclusion	'In a very difficult macroeconomic context, estimation of a stochastic production frontier has shown that private management could improve the organisational structure and thus, the technical efficiency of the firm. Did this improvement benefit the whole community? By deploying the surplus accounts method, we have been able to measure the productivity gain as well as its pattern of distribution over 1990-1994. Considering the monopoly situation of the private contractor and the limited means of the regulatory body, we have seen that the consumers were, surprisingly, the main beneficiaries of the privatisation through a significant decrease of the relative price of electricity.' (p.357)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Pollitt (2008)	
Countries of study	Argentina (Greater Buenos Aires)
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This paper serves three purposes: to document the successes of the 1992–2002 period; to discuss some of the problems that arose during this period; and finally to highlight the mistakes of the post-crisis period.' (p.1537)
Data sources and data collection instruments	Secondary data obtained from the World Bank and websites and reports of various companies like CAMMESA, ENRE, and CAISE
Outcomes analysed and indicators	○ Access • Percentage of households with electricity • Connections to rural users ○ Quality • Number of hours of supply lost per year • Speed at which power was restored in the case of a blackout

Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The process adopted for data collection and analysis has not been presented • The study has reported the performance of the Argentine electricity sector, with in-depth secondary data pertaining to investment, financial performance, shantytown electrification, quality of supply, major problems in the pre-crisis period etc.
Summary of results	Some of the lessons from Argentina's experience are as follows: • The long-term contract market was negatively affected by the seasonal price that distribution companies paid for power • The system of regulated third-party access charges for existing transmission lines did successfully ensure the revenue adequacy of the transmission operator • The system of competitive tendering for new lines was successful • The Argentine system implemented an untried model of transmission expansion which proved controversial • There is a need for proper regulation of third-party access charges in order to correctly regulate the access to the monopoly distribution network by third-party suppliers • Private ownership of distribution utilities combined with clear incentives to increase connections for poor customers can dramatically improve access amongst the poorest households • The system of penalties for supply outages combined with the pass-through of nodal prices to customers created perverse incentives for distribution companies
Conclusion	'Argentina's electricity reform contains two sets of lessons for developing countries. First, comprehensive electricity reform can work in a developing country. Second, well organised markets and effective network regulation are undermined if there is undue political interference in the pricing of electricity.' (p.1565)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Rivera (1996)	
Countries of study	Argentina, Chile, Colombia, Guinea, Mexico and Poland
Sectors	Water supply
Type of PSP	Management contract, lease and concessions
Type of study	Qualitative
Aims of study	'This study is meant to highlight the gains and the limitations of recent experiences with private sector participation in the water supply and wastewater sector in developing countries. It aims to draw

	out valuable lessons that will be useful for developing countries to consider when planning and implementing current and future projects linked to private sector participation.' (p.vii)
Data sources and data collection instruments	• Primary data collected through interviews with stakeholders associated with a project • Secondary data obtained from different archives
Outcomes analysed and indicators	○ Access • Number of city's inhabitants connected to the water system • Number of city's inhabitants connected to the sewerage system • Length of water network • Length of sewerage network • Sewerage coverage • Share of population with access to safe water • Number of water connections • Number of sewer connections • Percentage of households with water connections • Percentage of households with sewerage connections • Percentage of population in the water system • Percentage of population with sewers ○ Quality • Water pipes rehabilitated (kilometres) • Sewerage pipes drained (kilometres) • Overall quality of water supplied • Non-revenue water/metering • Customer service and responsiveness • Metering of consumers • Share of unaccounted-for water • Drop in billing complaints • Physical quality of water supplied • Number of pipe breaks • Average repair time • Number of water connections metered/non-revenue water meters installed • Repair of water pipe system (kilometres) • Unaccounted-for water (percentage) • Pressure at which water supplied • Delay in resolving water complaints (hours) • Delay in resolving sewerage complaints (hours) • Collection (percentage) • Water loss (percentage of production)
Methods used to analyse data, including details of checks on reliability and validity	• Archival analysis • Interview analysis Reliability and validity: • The authors have presented sufficient data on the level and quality of services in six case study projects • There is a well-connected logical link between the data and the conclusions presented • The authors have also presented other aspects of the case study projects, namely, regulation, financial aspects, gains in performance and efficiency, and of services to the customers

Summary of results	'Private sector participation has led to substantial benefits to consumers in terms of expanded coverage and quality of services as well as significant improvements in productive efficiency. However, consolidating these gains and reaping additional benefits in the future will depend heavily on strong leadership and continuous political commitment, as well as on the ability of governments and financial institutions to implement complementary reforms, especially in the areas of water pricing, financing, and regulation.' (p.71)
Conclusion	• 'Private operators have been able, to a greater or lesser degree, to both expand the quantity and improve the quality of water and wastewater services.' (p.25) The differences in improvement among case studies seem to endorse the view that the magnitude of these gains may depend not on the particular model but on the quality of the incentives perceived by the water companies themselves • Many of the initial improvements were achieved by introducing relatively simple management and operating procedure that did not require large investments or sophisticated technologies. Private firms have shown remarkable capacity to optimise the operation of the existing infrastructure shortly after taking control • Private-sector participants have given first priority to increasing the flexibility and improving the reliability of water and wastewater systems
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Ros (1999)	
Countries of study	Low- and middle-income countries with GDP per capita less than $10,000
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'The purpose of this paper is to examine what effect, if any, has privatization or competition had on key telecommunications variables, such as network expansion and efficiency.' (p.66) 'Throughout the data analysis, I examine the effects of privatization and competition for all countries regardless of income level. I then conduct similar analyses focusing on those countries that are classified as low or middle-income countries.' (p.66)
Data sources and data collection instruments	Secondary data obtained from the International Telecommunications Union (ITU) report (1997) and the United Nations Statistical Yearbook (1996)
Outcomes analysed and indicators	○ Access • Network expansion measured as mainlines per 100 inhabitants ○ Quality

	• Waiting list for mainlines, in thousands • Faults per 100 mainlines per year
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel data analysed using a semi-logarithmic functional form and parameters estimated using a fixed-effect model Reliability and validity: • The sample set includes data from those countries that have privatised and or permit competition and those countries that have not, to avoid sample selection bias • The fixed-effect model takes care of country-specific heterogeneity in the data • The author has corrected for the presence of endogeneity in the model • A number of confounding variables have been included
Summary of results	• Privatisation is found to be positively associated with a greater number of mainlines per 100 inhabitants for all countries • There is no evidence that privatisation leads to higher growth in mainlines per 100 inhabitants in those countries whose GDP per capita is less than USD10,000 • The fixed-effects models with waits and faults as dependent variables indicates that privatisation and competition lead to less waits and fewer faults, but the impact was not significantly different from zero
Conclusion	• It is seen that in countries with a GDP per capita less than USD10,000, privatisation leads to a greater number mainlines per 100 inhabitants though there is no evidence of any positive effect on growth in mainlines per 100 inhabitants • Competition is not found to affect network expansion. As a result the countries that privatise their networks and do not permit competition in basic services are likely to benefit from the technical efficiency losses caused by competition
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Ros (2003)	
Countries of study	11 Latin American countries
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'The purpose of this paper is to investigate the impact that the regulatory process has had on telecommunications development in Latin America' (p.271)

Data sources and data collection instruments	Secondary data from the International Telecommunications Union database
Outcomes analysed and indicators	○ Access • Mainlines per 100 inhabitants • Growth in telephone mainlines per 100 inhabitants
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel fixed-effects model Reliability and validity: • The author has included control variables like population density, percentage of network with digital lines, annual investment in telecommunications assets • Policy variables, like privatisation, the existence of an independent regulator, have been included • The presence of endogeneity in dummy variables has been tested using the Hausman test • The use of fixed-effects model eliminates the presence of individual heterogeneity in the explanatory variables
Summary of results	• In the case where mainlines per 100 inhabitants is considered as the independent variable, privatisation and competition were both found to be positive and highly significant • When growth in telephone mainlines per 100 inhabitants was taken as the independent variable, none of the regulatory variables, including privatisation, had any significant effect
Conclusion	• The existence of an independent regulator is associated with improvements in general telecommunications performance • Privatisation is found to be positively and significantly associated with network expansion • Price cap regulation and competition are found to be strongly associated with network penetration in Latin America • From a policy perspective, it is correct for policy makers to open these markets and put in place policies that are pro-competition
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Ros and Banerjee (2000)	
Countries of study	23 Latin American countries
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	The authors have examined the impact of privatisation after controlling for other accompanying factors, such as tariff rebalancing, on key variables like access and service quality and waiting lists

Data sources and data collection instruments	Secondary data from the International Telecommunications Union (ITU)
Outcomes analysed and indicators	○ Access • Mainlines per 100 inhabitants • Excess demand measured as waitlist for basic service as a percent of total demand, i.e., mainlines in service plus waitlist
Methods used to analyse data, including details of checks on reliability and validity	Econometric method - panel fixed-effects model Reliability and validity • The authors have used 10 countries that had privatised telecommunications between 1986 and 1995 as the treatment group and 14 countries that had not privatised by 1995 as the control group • Endogeneity in the variables has been tested using the Hausman test • The presence of individual heterogeneity in the sample has been addressed, as a panel fixed-effects model has been used • The authors have considered the problem of sample selection bias • The only confounding variable used is the first lag of per capita GDP
Summary of results	• The results show that privatisation is a significant factor positively affecting network expansion • The effect of privatisation, though somewhat less statistically significant, has led to reduction in the waitlist percentage
Conclusion	There is definitely evidence from the region that privatisation altered incentives sufficiently to relieve the supply bottlenecks from the days of public ownership and increased the supply of mainlines. Also, the all-important role of tariff rebalancing and compensatory pricing cannot be overlooked in sustaining the expansion and reducing unmet demand
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Samarajiva (2000)	
Countries of study	Sri Lanka
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	'This article assesses the institutional reform process in Sri Lanka with the view of clarifying the policy choices necessary to consolidate the inchoate reforms in all developing countries, especially the relative importance of competition.' (p.700)

Data sources and data collection instruments	Secondary data from the Telecommunications Regulatory Commissions and the International Telecommunication Union (ITU)
Outcomes analysed and indicators	○ Access • Fixed-access teledensity (per 100 population) • Mobile teledensity (per 100 population) • Payphones per 1,000 population ○ Quality • Call completion rate (%) • Complaint rate (average complaints per month)
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • No mention of the specific methodology followed for the analysis has been made • The improvements are mentioned with reference to certain data sources • The study does not quote enough data to support the findings of the quality indicators
Summary of results	• Sri Lanka showed an exceptional growth rate in fixed-access connectivity over 1995-1998, compared to ITU averages for low-, lower-middle-, upper-middle- and high-income countries • Fixed-access tele-density increased from 0.73 in 1991, at the start of the serious reforms, to 3.55 by end of 1999 • Mobile tele-density increased from 0.01 in 1991 to 1.35 by the end of 1999. The combined fixed-mobile tele-density was 4.9 by the end of 1999 and the fixed/mobile ratio was 2.63 • Most of the connections (fixed and mobile) were still in urban areas, but growth was accelerating in the rural areas. Payphones per 1,000 population grew from 0.03 in 1992 to 0.3 in 1999 • The networks of most operators continue to be plagued by low call completion, partly because of high rates of growth and partly because of periodic constrictions of interconnection by the incumbent • Complaint rates increased dramatically in 1998-1999
Conclusion	'While a certain degree of context-specific variation must be allowed, the Sri Lankan experience shows that competition not only yields good sector performance but, perhaps even more importantly, energizes organisational reform of the incumbent and contributes to consolidating and legitimating the regulatory process. Without the external impetus provided by competition, internal reform of incumbents and efforts to create modern regulatory agencies are likely to succumb to the inertial forces that have held back telecommunication developments in the first place.' (p.713-714)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Low

Sen and Jamasb (2010)	
Countries of study	India
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'This study analyses the determinants and impact of electricity reform in Indian states using the econometric investigation of panel data, whilst accounting for the influence of political economy factors.' (p.2)
Data sources and data collection instruments	Secondary data from public sources and some protected portions, with requisite permission (specifically, the Power Ministry and State Electricity Regulatory Commissions). Sources included the Planning Commission, Power Finance Corporation, Central Electricity Authority, Central Statistical Organisation (CSO), the EPW Research Foundation, the Energy and Resources Institute) as well as the World Bank's PPIAF Database
Outcomes analysed and indicators	○ Quality • Percentage of T&D losses
Methods used to analyse data, including details of checks on reliability and validity	Econometric methodology - panel fixed-effects model and panel random effects model Reliability and validity: • The study has considered a sufficient number of confounding variables, like per capita GDP, presence of an independent regulatory agency • Individual heterogeneity has been addressed using the panel fixed-effects model • The study avoids sampling bias, as it has considered both treatment and control groups as well as before and after scenarios
Summary of results	Privatisation of the distribution segment has a positive, significant impact on the transmission and distribution losses, as true levels of losses are revealed in the initial stages of the reform
Conclusion	'The results of this empirical analysis indicate that once begun, if left half-way, this impact could quickly turn negative. Substantial changes in economic variables begin to occur only once a *baseline level* of reform has been undertaken; in the *Reform Index* used in this analysis, this would pertain to the measures undertaken beyond 3 (out of 6), or beyond *structural* reform measures.' (p.39) *Italics is by original authors.*
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Silvestre et al. (2010)	
Countries of study	Brazil
Sectors	Electricity
Type of PSP	Divestiture
Type of study	Quantitative and qualitative
Aims of study	'this paper aims to address this gap and analyse whether the privatization policies, which began 20 years ago, has influenced the financial and technical performance of privatized electricity distribution companies (EDCs) when compared to those still under public control.' (p.7001)
Data sources and data collection instruments	Main data sources are the firms' annual administration, financial and technical reports, public information on the electricity market, government publications, sectoral associations' presentations and reports, and the SÉRIES database Interviews and direct contact with managers and engineers from the firms studied through phone calls and visits to their headquarters
Outcomes analysed and indicators	○ Quality • Duration of power outages • Frequency of power outages
Methods used to analyse data, including details of checks on reliability and validity	Statistical methodology - indicator analysis Reliability and validity: • A step-by-step process has been adopted for data collection and analysis has been described • Multiple sources of evidences have been used and discussed with appropriate theoretical constructs • The study has analysed the performance of five distribution companies in the north-east of Brazil using technical and financial indicators, which are commonly used in electricity distribution studies and specifically in Brazilian studies • The five distribution companies considered in the analysis consist of two public distribution companies and three privatised ones • The study has taken into consideration two financial indicators and two technical indicators and has carried out an in-depth analysis of them to verify its two proportions • The authors have made an attempt to develop and validate of a framework that classifies the impact of privatisation on shareholder and consumers
Summary of results	• 'Based on the empirical results of this analysis, we found that the two public EDCs had weaker financial performance compared to the three privatized firms. CEAL and CEPISA had the worst average EBITDA before and after 2000. While CEAL had a relatively stagnant decrease of 3% in their average EBITDA, CEPISA had very poor performance at - 85%, and particularly poor if compared with the privatized EDCs. These two public firms also had the two worst variations in the average Annual Net Income during the period under study. While CEAL had a slight increase (yet still negative), CEPISA's Annual Net Income was reduced in 82%. In contrast, the privatized

	EDCs showed consistent and much stronger financial performance.' (p.7009) • 'For the technical indicators, the public firms showed trends compatible with the privatized EDCs, and on several occasions performed better. For the average SAIDI, CELPE and CEMAR, both privatized in 2000, had weaker technical performance than the public EDCs after privatization. For the average SAIFI, the public firms had better performance than for example CEMAR after the year of privatization.' (p.7009)
Conclusion	'Our empirical evidence suggests that, in the Northeast of Brazil, the privatization process was beneficial from the investors' perspective. However, it was not possible to generalize that privatization improved service quality for consumers.' (p.7011)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Singh (2000)	
Countries of study	Malaysia and China
Sectors	Telecommunications
Type of PSP	Concession and divestiture
Type of study	Qualitative
Aims of study	'This article evaluates the effects of privatization and market liberalization in telecommunication with respect to the creation and enforcement of property rights.' (p.885)
Data sources and data collection instruments	Main source of data is International Telecommunication Union (ITU)
Outcomes analysed and indicators	○ Access • Mainlines per 100 population • Compound annual growth rates of mainlines (%) • Tele-accessibility (residential mainlines as percent of total) • Cellular mobile subscribers per 100 population ○ Quality • Waiting list (in thousands)
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • Secondary data from reliable sources are used for examining the trends in outcome indicators • A detailed description of any specific analytical framework has not been provided
Summary of results	• Mainlines per hundred population in Malaysia were found to have increased from 8.97 in 1990 to 19.8 in 1998, and the mainline growth

	rates increased from 7.98 in 1985-90 to 13 percent in 1990-95; however, this dipped to 6.13 percent during 1995-98, which is attributable to the economic downturn in east Asia • 'in spite of service enhancement, Malaysia's waiting list for telephones which decreased in the 1980s, increased again in the 1990s, from 82,000 in 1990 to 160,000 in 1998.' (p.897) • The number of cellular mobile subscribers per 100 population was found to be extremely low due to over-licensing and a low subscriber basis • The study finds that there has been an expansion in the cellular segment in China as a result of privatisation. The cellular mobile subscribers per 100 population increased from 0.3 before privatisation to 1.9 afterwards
Conclusion	'This article shows that in terms of supply, sequencing and the fit between domestic institutions and the degree of privatization and liberalization are important. From the demand side, well-organized large user groups are clear winners from reforms but universal service in countries like South Korea and Singapore resulted from state prerogatives. To make the beneficiaries of reforms less dependent on powerful user groups or the state's internal prerogatives, we need an appreciation of the internal mechanisms of states and their interaction with civil society to understand how societal preferences are articulated and arbitrated to shape property rights.' (p.905)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Sohail M (2000)	
Countries of study	South Africa (Queenstown)
Sectors	Water supply and sanitation
Type of PSP	Management contract
Type of study	Qualitative
Aims of study	To investigate the impact of a public-private partnership in the provision of water and sanitation services on poor residents living in the Queenstown Transitional Local Council (TLC) area
Data sources and data collection instruments	Primary data collected through key informant interviews, in-depth household questionnaires and focus group discussions
Outcomes analysed and indicators	○ Access • Extent of coverage in terms of number of people served • Number of disconnections ○ Quality • Unaccounted-for water in percentages • Number of reported bursts • Percentage of ageing water pipes replaced

	• Level of payment in percentages • Dissatisfaction about water charges
Methods used to analyse data, including details of checks on reliability and validity	• Analysis of household questionnaires • Coding of interviews and focus group discussions Reliability and validity: • The methodology, consisting of three steps, has been described in detail • A similar set of issues was covered in household interviews and group discussions • Rich data has been provided by the authors in support of their arguments • A wide range of issues related to the functioning of water supply and sanitation, like service coverage, customer management, have been covered. After discussing the true issues, the authors have examined how these issues have an impact on the poor • The authors have also explained the reasons why the poor have not been able to experience the benefits that are mentioned in earlier studies
Summary of results	'The findings of the case study indicate that while the quality of supply has improved significantly at a broad scale, these improvements are not tangibly felt by the poor households. Quality of service for poor households goes beyond technical improvements. It is strongly dependent on customer management and tariffs. Both these factors are the core of the problem for the poor living in Queenstown. The poor people do not have access to effective customer management practices, do not have a choice of service levels, are charged for services in a way that results in high bills before they have consumed anything and are faced with strict credit control measures should payment not forthcoming. The result for some is being permanently disconnected from services as they cannot afford to re-enter the system because of financial barriers' (p.23)
Conclusion	The author has suggested areas of improvement, namely, interface between municipality and residents, tariff policy, pro-poor tariff and range of services
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Tremolet and Neale (2002)	
Countries of study	Gabon
Sectors	Water supply and electricity
Type of PSP	Concessions
Type of study	Qualitative

Impact of private-sector involvement on access and quality of service in electricity, telecom, and water supply sectors

Aims of study	'The objective of this report is to examine the experience of the private sector operator Société d'Energie et d'Eau du Gabon (SEEG) at providing water and electricity services in rural areas and to review whether private multi-utilities can help expand services to rural areas. It also seeks to extract lessons from the design of contracts with incentives for expanding service beyond the immediate circles of major urban centres.' (p.i)
Data sources and data collection instruments	Primary data obtained from interviews with officials from the concessionaire, public institutions, users or customers, and international donors; secondary data from archives on the performance of the concessionaire
Outcomes analysed and indicators	Access o Water • Coverage of water services (in percentage) • Number of new water connections o Electricity • Electricity coverage % • Number of electricity connections Quality o Water • Turbidity levels • Water losses (in percentage) • Cash collection • Customer satisfaction o Electricity • Number of minutes of electricity supply lost • Customer satisfaction and responsiveness • Voltage levels, power cuts, etc.
Methods used to analyse data, including details of checks on reliability and validity	• Analysis of interviews • Archival analysis Reliability and validity: • The authors have described the operating performance of the concessionaire with qualitative data from both interviews and archival sources • The reasons for both better and poor performances has been discussed wherever necessary • The concessionaire's performance in five areas which cover all aspects of performance, namely investment, operations, commercial, management and financial performance, has been discussed in detail
Summary of results	• SEEG's performance in the first 5 years of operation has shown substantial improvement in the quality of service, both in technical terms and in commercial terms • SEEG is found to have overshot all of its service coverage targets, except in new isolated centres, where expansion largely depended on government investments • Commercial satisfaction has gone up, although customers in Gabon remain very demanding • As a proof of its success, the financial performance of the

	company has been satisfactory (with positive results being generated very early on during the life of the concession) and shareholders have received regular dividends
Conclusion	• There are merits in allowing time for building consensus around the privatisation and carrying out the transaction in a transparent manner • If some contractual clauses are to be negotiated between the parties during the life of the contract, it is important to set realistic deadlines for doing so and that safeguards are in place to allow proper contract regulation in the absence of an agreement. Granting exclusivity to the main operator may exclude small-scale operators where they could provide valuable solutions for expanding service coverage quicker • It is possible to attract private investors for carrying out substantial investments even in rural settings, but the definition of investment obligations is an important factor in the success of a concession contract • Regional coverage obligations with significant penalties can definitely play a role in extending services in the most remote areas, but care must be given to the way they are defined, so as not to make them too restrictive or too complicated to assess • Some level of flexibility is required in providing services to rural areas, where different quality standards might be sufficient and more affordable. But regulatory approval is often required for this and hard to come by
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Wallsten (2001)	
Countries of study	30 countries in Africa and Latin America
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Quantitative
Aims of study	'I explore empirically the effects of privatization, competition and regulatory changes on telecommunications performance.' (p.5)
Data sources and data collection instruments	Secondary data obtained from the international Telecommunications Union (ITU)
Outcomes analysed and indicators	○ Access • Number of mainlines per capita • Number of pay phones per capita • Network connection capacity per capita
Methods used to analyse data,	Econometric method - panel methodology Reliability and validity:

including details of checks on reliability and validity	• Various control variables, such as per capita income, population, urbanization, a dummy variable indicating whether a country has passed telecom reform legislation, have been used • A fixed-effects model was used to control for country-specific heterogeneity • To deal with the problem of endogeneity, the analysis included country and year fixed-effects and a variable indicating whether the country passed reform legislation
Summary of results	• Competition is the most effective agent of change • Privatisation by itself is significantly associated with decreased connection capacity and positively correlated only with payphones • Privatisation combined with the existence of a separate regulator, however, is significantly associated with increases in connection capacity • Privatising a monopoly without concurrent regulatory reforms may not necessarily improve service
Conclusion	'..this paper suggests that reform efforts tend to be concentrated in the right areas: encouraging competition and emphasizing building regulatory capacity when privatizing an incumbent telecom provider. The benefits associated with competition over privatization, however, should cause policy makers to think carefully when granting exclusivity periods to privatized incumbents and, at the very least, should pay careful attention to the regulatory authority.' (p.17)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Wellenius (2005)	
Countries of study	Chile
Sectors	Telecommunications
Type of PSP	Divestiture
Type of study	Qualitative
Aims of study	This paper aims to describe and assess the Chilean government's efforts to narrow the gap in access to rural communication through July 2001.
Data sources and data collection instruments	Main Sources of data are the International Telecommunications Union (ITU), CTC, Alfa Centauro, and SUBTEL
Outcomes analysed and indicators	○ Access • Number of telephone mainlines • Mainlines per 100 inhabitants • Households with telephone (%) • Percent of population without payphones • Total number of rural payphones in service

	○ Quality • Percent of telephone digitalization (%) • Outstanding applications
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • Reliable secondary sources of information have been used and enough data has been presented and compared • The data presented illustrates the study conclusions • The study does not mention any specific methodology followed for data analysis • A large amount of information on different aspects of the scheme is provided, which has highlighted the different processes of the scheme and its success
Summary of results	• 'Privatization of state-owned enterprises was completed in 1988 … By 2000 the number of fixed and mobile phone connections had multiplied ten-fold, service had become widely available, and more than 70 percent of households had a telephone.' (p.29) • The telecommunications development fund, largely financed by private companies, has succeeded in extending access to basic voice communication services to virtually all Chileans living in rural areas • 'By 2002 a total of 6,093 rural localities with about 2.2 million inhabitants will have been provided with payphones' (p.31) • 'Only some 150,000 inhabitants, or 1 percent of the population, are likely to remain excluded, compared with about 15 percent in 1994 when the fund was created' (p.31)
Conclusion	'This review confirms the continuing validity of the Chilean model for extending basic communication service throughout the population of a developing economy: remove impediments from the effective working of the market, then mobilize additional investments through the market. Following successful sector reforms, the fund reduced the remaining gap in rural access telephone service by an order of magnitude in five years, its efforts funded primarily by the private sector and catalysed by miniscule amounts of public money. The fund remains one of the most efficient and effective schemes worldwide for extending basic service beyond the market.' (p.41)
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

World Bank (2003)	
Countries of study	Côte d'Ivoire, Argentina, Brazil, Bolivia, Chile, El Salvador, Panama and Peru
Sectors	Electricity
Type of PSP	Lease
Type of study	Qualitative
Aims of study	'This chapter discusses these sector level outcomes, focusing on the Bank's performance in fulfilling its mandate to promote PSDE through reforms, with support from IFC and MIGA transactions.' (p.31)
Data sources and data collection instruments	Primary data obtained from a task manager survey, the Europe and Central Asia (ECA) study on private participation in the power sector, and Operations Evaluation Department - OED's Evaluation Summaries and Project Performance Assessment Reports
Outcomes analysed and indicators	○ Access • Number of consumers • Percentage of household with access to electricity • Service coverage (in percent) • Electrification coverage ○ Quality • Number of hours of outage per year per consumer • Percent of consumers settling their bills on time and irrecoverable arrears • Non-technical losses (in percent) • Energy losses (in percent) • Distribution losses (in percent) • Payment delays, theft and unpaid bills (in percent) • Length of interruptions per year per consumer • Percentage of losses • T&D losses (in percent)
Methods used to analyse data, including details of checks on reliability and validity	Qualitative approaches Reliability and validity: • The authors have described the data used for the assessment of sector outcomes. However, the methodology used for the data analysis has not been described clearly • The majority of the findings reported in the study are not supported by multiple sources of evidence • The observed phenomenon has not been described in detail, the study lacks detailed exploration of the factors behind this phenomenon • The study findings are prone to be biased, as the promotion of private-sector development is reported to be the main objective behind this study • Overall, the study has discussed the diverse perspectives related to sector level Private sector development in the electric power sector (PSDE) outcomes

Summary of results	• PSDE is worth pursuing as it can be seen that in committed countries with advanced power reforms it has brought good outcomes • PSDE is still a work in progress, in some cases it gives a mixed outcome and in some others the effort is a failure • There is evidence to show that PSDE has brought an increase in access and sales • In cases where the private sector has taken over the retail supply, the have brought a drastic reduction to payment delays, theft and unpaid bills • Outage indicators have decreased
Conclusion	• The country-specific factors are the major driving forces behind the successful reforms and the good PSDE performances. So while designing PSDE interventions, it is important to build up the country's ownership and leadership role • Government commitment is of paramount importance for the realisation of success in the reform process • The reforms in transmission and distribution are as important as the reforms in generation of power
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Wu and Malaluan (2008)	
Countries of study	Philippines (Metro Manila)
Sectors	Water supply
Type of PSP	Concessions
Type of study	Qualitative
Aims of study	'The co-existence of two concessionaires in the same city offers a rare opportunity to study the role of internal factors in the privatisation of urban water systems because the effects of many important external factors, such as political support, regulatory structure and unforeseen events, are effectively controlled.' (p.207)
Data sources and data collection instruments	• Primary data obtained through an interview with a senior manager in Maynilad in July 2006 and an interview with the CEO of Manila Water in May 2006 • Secondary data from archives on the performance of the concessionaires in three areas, namely corporate governance, financial management and operations management
Outcomes analysed and indicators	○ Access • Number of connections (in percentage) • Extending water supply services to areas containing numerous clusters of lower-income families (in terms of number of people in poor communities benefitted)

	○ Quality • Non-revenue water (in percentage) • Average time to repair leaks (in terms of number of days) • Resolution of customer complaints (in terms of number of days and percentage)
Methods used to analyse data, including details of checks on reliability and validity	• Interview analysis • Archival analysis of the records pertaining to the bidding process, tariff rates for water services etc. Reliability and validity: • The two concessionaires selected for water service in the study are faced with the same external factors, which rules out bias from the sample selection • While comparing the reasons behind the success of one concession and the failure of the other, in-depth data about three dimensions namely, corporate governance, financial management and operations management, have been presented • The authors have made use of multiple sources of data, which adds to the reliability of the study • They have also given the details of the interviews, as well as presenting appropriate quantitative data to illustrate the findings • The study has established theoretical linkages between internal factors and the success of water privatisation
Summary of results	• Although the system expansion still falls short of what was specified in the concession contracts, the two concessions had increased connections by 30 percent during their first five years of operation — a feat that Manila's Metropolitan Waterworks and Sewerage System would have taken 30 years to achieve on the basis of its historical performance. • Impressively, much of that expansion occurred in economically distressed areas, directly benefiting the urban poor, who had formerly relied on more expensive water supply alternatives
Conclusion	'Our analysis suggests that decisions regarding internal factors such as corporate governance, financial management and operations management were key factors in the divergent paths taken by the two concessionaires after privatisation. First, while both concessionaires involved family conglomerates (Lopez and Ayala) and multinational companies (Suez, United Utilities and Bechtel), corporate governance practices differed considerably between the two from the outset. Secondly, the concessionaires' different financial management practices were critical determinants of their success in the years following privatisation. Thirdly, the concessionaires' relative success with water privatisation was linked to their attention to two critical factors that have seldom been managed well: the transformation of a public utility into a private company; and, management of public expectations about the services the utility is pledged to deliver.' (p.225)

Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Zaki and Amin (2009)	
Countries of study	Thailand
Sectors	Water supply
Type of PSP	Leasing/affermage and BOT Concessions
Type of study	Quantitative
Aims of study	To study the effect of water supply privatisation on the urban poor
Data sources and data collection instruments	Primary data from a questionnaire survey among urban households, to collect information on performance indicators namely household-level changes (increase/ decrease) in access to piped water, its water quality and service quality, connection cost and monthly charges (water rates) from the pre-privatisation year of 1998 to the post privatisation.
Outcomes analysed and indicators	○ Access • Metered piped water connection to household's dwelling ○ Product quality • Colour (clarity) • Drinkability • Turbidity ○ Service quality • Pressure measured in bars • Reliability measured as hours per day availability of water • Response to consumer complaints
Methods used to analyse data, including details of checks on reliability and validity	Statistical method - chi-square test
Summary of results	○ Impact on the poor • The highest gain seems to have accrued to the poor living in small informal settlements • There was a positive change in the water quality indicators and the response was highest for clarity • Service quality indicators showed more positive outcomes than product quality indicators, and out of twelve indicators, ten showed significant positive change for the poor ○ Comparison between poor and non-poor • Access to piped water has increased more for the poor than the non-poor • The poor have experienced slightly better outcomes in relation to water quality • In relation to service quality, the non-poor showed larger gains in terms of all indicators except response to consumer

	complaints
Conclusion	• There has been improvement in access for affected households in general and for the urban poor in particular • There is improvement in water and service quality after privatisation • These might have resulted from a mix of market- and welfare-oriented policies
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	Medium

Zhong et al. (2008)	
Countries of study	China
Sectors	Water supply
Type of PSP	BOT concessions
Type of study	Qualitative
Aims of study	Since the 1990s, China has started experiments with new modes of urban water management and governance in which the private sector is involved. The study has reviewed developments in private-sector involvement in China's water management
Data sources and data collection instruments	• Primary data from face-to-face semi structured interviews with relevant local officials and managers of water service providers • Secondary data obtained from the reports of provincial authorities

Outcomes analysed and indicators	○ Access
	  • Total length of pipes in kilometres
	○ Quality
	  • Service quality, Water leakage in percentages
	  • Volume of water provision in cubic meters

Methods used to analyse data, including details of checks on reliability and validity	• Analysis of interview transcripts • Archival data analysis Reliability and validity: • The data pertaining to the performance of case study projects is presented in a systematic manner. The process adopted for data collection has also been clearly reported • The findings about the different parameters of the water sector, like quality and coverage, have been explained in detail and have been supported by adequate primary and secondary data
Summary of results	The different forms of private-sector participation have led to: • improved service quality and quantity of water • decreased water leakage

Conclusion	From the three case study projects with private-sector participation, we can draw some lessons on the way to successfully involve the private sector into the provisions of water services: • a balance between the water tariff level, the profits of investors and governmental subsidies is required • the selection of the PPP form has a close relationship with the level of local water tariff • it is critical to accelerate the establishment of a systematic and comprehensive government regulatory framework
Overall assessment of the study findings relevant to the review based on the critical appraisal questions	High

Appendix 3.1: List of outcome indicators

Illustrative outcome indicators on access and quality by sector

Sector	Access	Product quality	Service quality
Electricity	• Number of electricity connections • Coverage (proportion/percentage of households with electricity connections) • Growth in number of connections	• Duration of power outages • Frequency of supply • Frequency of dimming of electricity	• Frequency of power outages • Energy losses in distribution (T&D losses) • Percentage of bills collected • Customer service
Tele-communications	• Number of fixed lines installed • Number of cellular/mobile subscribers • Number of public call boxes • Number of direct exchange lines • Fixed-line coverage (proportion of population with a mainline connection) • Payphones coverage (per capita) • Mobile coverage (proportion of population with a cellular connection) • Growth in mainlines • Network connection capacity (per capita)	• Reported telephone faults (proportion per year) • Average down time • Network digitalization (proportion) • Call completion rate (percent) • Congestion in cellular network	• Waitlist for telephone lines • New services • Complaint rate • Time taken for remedying faults • Disconnections due to non-payment
Water and Sanitation	• Number of water supply/ sanitation connections • Water/sewage network expansion (kilometres) • Coverage (proportion/ percentage of population with access to water supply/sanitation)	• Water turbidness (turbidness units) • Aspect ratio • Pressure of water supply • Water pipe breaks per connection • Sewerage blockages per connection	• Frequency of service (average hours of supply per day/week) • Water leakages repaired per year • Loss from water leakages • Sewerage blockages repaired per year

			• Renovation of water pipes/sewerage network • Delay in attending water/sewerage repairs • Customer service and responsiveness • Non-revenue water • Payment rate

The authors of this report were supported by the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) and the Australian Agency for International Development.

The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) is part of the Social Science Research Unit (SSRU), Institute of Education, University of London.

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This research was funded by the Australian Agency for International Development (AusAID). The research was commissioned as part of a joint call for systematic reviews with the Department for International Development (DFID) and the International Initiative for Impact Evaluation (3ie). The views expressed are those of the authors and not necessarily those of the Commonwealth of Australia. The Commonwealth of Australia accepts no responsibility for any loss, damage or injury resulting from reliance on any of the information or views contained in this publication. The report was first published in 2013 by:

Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)
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ISBN: 978-1-907345-59-3