
1 Introduction

Matthias Finger and Rolf Künneke

LIBERALIZATION OF INFRASTRUCTURES

Infrastructures have been significantly restructured during the past three decades. Formerly these sectors have been perceived as utilities that received special governmental supervision and support in order to provide essential services to society under politically acceptable conditions. Public ownership and regulated monopolies have been very common in order to guarantee adequate service levels and pricing schemes under close political supervision. Nowadays, infrastructures are increasingly positioned as commercial economic sectors that need to efficiently satisfy customers' needs and expectations. Accordingly, competition is introduced, private interests are accentuated for instance by private ownership and the roles and responsibilities of governments are redefined. This liberalization¹ defines a fundamental change in the governance of infrastructures with significant consequences for their operations and performance, something that is amply demonstrated throughout this book. The importance of this phenomenon is emphasized by the fact that liberalization occurred in all infrastructure sectors in one way or another and in almost all countries in the world, as illustrated in Table 1.1. Apparently liberalization is under way even under very different technological conditions of the sectors involved, different socio-political preferences and needs, and different political ideologies.

The scope and magnitude of the liberalization of infrastructures is even more remarkable if we consider that these sectors are of fundamental importance for the socio-economic development of countries. Typically, infrastructures provide services in the fields of energy (electricity, gas, oil), communication (telephony, Internet, postal services), transportation (aviation, railways, maritime transport, public transportation, roads), as well as drinking water and sewerage. These are essential services to citizens and industry that are indispensable to modern societies. Generally, liberalization is introduced as a means to improve the quality of services, increase efficiency, lower prices and stimulate technological innovations. But there are also deeply rooted worries, for instance, when it comes to guaranteeing public service obligations, national interests, security of supply, or the stimulation of environmentally sustainable developments which are not necessarily supported in a liberalized environment. However, despite these concerns, liberalization seems to be inevitable. The process of restructuring of network industries is evolving in different sectors and countries according to its own dynamics and in quite different ways with unknown outcomes.

Infrastructure liberalization is unprecedented not only with respect to its sectoral and geographical scope, but also with respect to the fundamental changes of governance structures, to political ambitions and objectives, as well as with respect to technological innovations. Many publications focus on specific sectors or countries. This handbook is one of the few attempts to provide a general overview across sectors and countries.

2 International handbook of network industries

Table 1.1 Some milestones for the restructuring of infrastructures in different sectors and countries

Country/sector	Year
<i>USA</i>	
Airline deregulation Act	1978
Staggers Act (rail deregulation)	1980
AT&T divestiture (telecommunication deregulation)	1984
FERC order 636 (gas deregulation)	1992
FERC order 888 (electricity deregulation)	1996
Telecommunication Act	1996
<i>Europe</i>	
UK privatization British Telecom	1984
UK privatization British Gas	1986
UK privatization British Airways	1987
EU liberalization directive Telecom	1990
EU liberalization directive Railways	1991
EU liberalization directive Electricity	1996
EU liberalization directive Gas	1998
Norway Energy Act	1990
Finland regulatory reform power sector	1997
<i>Other parts of the world</i>	
South America: Chile, regulatory reform of the power sector	1978
Australia power sector reform	1994
New Zealand power sector reform	1984
China: Formal establishment of the China United Communications Corporation	1994
India: Announcement of the New Economic Policy	1991
Russia: Transformation of Gazprom into a corporate group	1992
South Africa: Electricity Act Amendment	1995

Source: Based on Kessides (2004, p. 32), various chapters in Sioshansi and Pfaffenberger (2006), Gaunt (2008) and various chapters in this handbook.

AMBITIONS OF THIS HANDBOOK

This handbook provides an overview of the features and outcomes of liberalization in different sectors and parts of the world from a governance perspective. Since each sector and region is specific in its own way, and since the different authors of this book have their own interpretation of the sector's reforms, it is not possible to use a strict format for their description and analysis. However, certain general aspects can be identified.

The sector studies roughly deal with five issues. First, they provide insights into the specificities of various network industries with respect to technology, economics, institutions or policy. For example: which parts of the industry are open for competition? Which are regulated? What is the importance of this sector with respect to public services or national interests? Are there any geographic specificities, such as particular regions from any given sector's liberalization emerged or evolved? Which technological innova-

tions facilitated liberalization? A second aspect is the historical overview of the sector's restructuring. How was the sector organized traditionally and what were important drivers for change? Possibly, different periods of liberalization can be identified, pointing to different drivers of this process. As a third point, sector performance is reviewed. What are the results of the liberalization process from a socio-economic, a political or technical perspective? Important aspects include prices, costs, services, quality, public service, national interests and technological reliability. Fourthly, an overview is provided of regulatory models and approaches. Among others, regulatory governance and regulatory bodies are specified. Specific issues of regulation are addressed, such as sustainability, security of supply, innovation, risk, geopolitical considerations or the nature of competition (for instance, competition in the market, competition for the market or network competition). A final (fifth) point addresses the future challenges and problems of the sector.

The choice of the infrastructure sectors that are discussed in this handbook is somewhat arbitrary and certainly incomplete. First, the question arises, what to consider as a network industry or an infrastructure. In our perception infrastructures are related to large-scale physical networks that provide essential goods and services to society. Governments are concerned with the provision of such goods because they are considered to be a public service which needs to be accessible for citizens and industry under socially acceptable conditions. Often, the provision of these goods or services is associated with market failures, which requires governmental intervention or regulation (Firth et al., 1998).

Against this background, this handbook covers a broad range of different infrastructures in the fields of energy, transportation, communication and the provision of drinking water, as mentioned earlier. We are aware that the definitions and perceptions of infrastructures are quite different and, accordingly, the delineation of these sectors is debatable. However, we are sure that this handbook covers the most relevant infrastructure sectors.

The country studies touch on similar aspects as the sector studies. First, the technological, economic, institutional, political and geographical specificities of the region or country are highlighted. How have the infrastructures evolved over time? Which infrastructures were reformed? Which ones are still traditionally organized? What are important cultural aspects, norms or values that influence infrastructure development? As a second point, the regulatory models and approaches are summarized. This provides an overview of the different approaches or models of restructuring in different sectors in any given country or region. What are the differences or similarities between different sectors and what are the possible reasons for this? What are specific issues of regulation? Are there country-specific approaches to liberalization? Thirdly, the current challenges and opportunities of restructuring are discussed. For instance: what is the overall economic performance of the liberalized sectors in the region? What is the technical performance (reliability, security of supply), the social acceptance, or the institutional capacity for restructuring? In some countries international institutions might play an important role (for instance, the European Union or the World Bank), as well as multinational corporations or the emergence of global markets. Finally, an outlook will be offered on the future opportunities and challenges of the liberalization of infrastructures in this national or regional context. The selection of the countries or regions is certainly not

exhaustive, and primarily aims to illustrate different national or regional approaches to the liberalization of infrastructures. The range of national cases is, of course, much broader than what we are able to cover in this handbook.

In addition to the focus on specific sectors and countries, some generic issues of the liberalization of infrastructures are addressed. This includes the basic economic principles of liberalization, the scope and safeguarding of public service obligations, the institutional design and the institutional economic history of liberalized infrastructures.

STRUCTURE OF THE BOOK

This handbook consists of three parts, that is, generic aspects of infrastructure liberalization, sector studies and country studies.

Part I: Generic Aspects of Infrastructure Liberalization

Pablo Spiller reviews, in Chapter 2, basic economic principles that govern the relationships between government and the private sector in infrastructure provision, namely, the different types of contracts and the various problems related to such contracts, in particular, opportunism. These theoretical elements will be found throughout the book in situations of privatization and private sector participation, namely, in the areas of water, airports, ports, toll roads and others.

Christian Jaag and Urs Trinkner outline, in Chapter 3, some theoretical (economic) foundations of infrastructure regulation, in particular for the regulation of so-called monopolistic bottlenecks. The authors define, from a neo-liberal perspective, where such regulation is justified, as well as the criteria for assessing its effectiveness. These theoretical elements will be found throughout the book whenever competitive elements interface with monopolistic bottlenecks, such as in the case of railway, electricity or gas liberalization.

Matthias Finger and Dominique Finon address, in Chapter 4, the relevance of public service obligations in the liberalization of infrastructures. The authors crystallize the political dimensions of infrastructure services provision, which, traditionally, was its public service dimension. They show, that, in the case of Europe, this traditional idea of public service has given rise to ‘universal service’, a concept that is increasingly used around the world. The concept denotes basically the protection of consumers who do not automatically benefit from the liberalization of infrastructures.

John Groenewegen extends, in Chapter 5, the basic principles of infrastructure liberalization of Chapter 2 (for example, contracts) to transactions and the institutional arrangements (for example, the governance structures) that accompany successful infrastructure liberalization. He also builds on the considerations of Chapter 3 (regulation), inasmuch as such institutions – which generally include but are not limited to regulatory bodies – need to be efficient from an economic point view. Such considerations about designing economically efficient governance structures for the liberalized infrastructures are increasingly prevalent worldwide and can be found throughout this book.

In Chapter 6, Robert Millward approaches the evolution of the infrastructures from a historical perspective. He recalls the evolution of the main infrastructures mainly

in Europe and the USA prior to their liberalization, and highlights, once again, the important role of the public policies in their shaping.

Part II: Sector Studies

The sector studies are clustered into four categories: electronic communication (Chapters 7, 8, 9), energy (Chapters 10, 11, 12), transport (Chapters 13–17), and ‘others’ (Chapters 18, 19).

In Chapter 7 William Melody recalls the main features and outcomes of telecommunications’ liberalization in the USA, Europe and the developing countries. He focuses in particular on the pioneering role played by the Federal Communications Commission (FCC) in liberalizing and re-regulating the sector, as well as on the importance of the US telecom liberalization and regulation for the development of regulatory economic theory.

In Chapter 8 William Melody and Wolter Lemstra present the liberalization in radio spectrum management, which has been at the heart of the telecommunication reform process and is closely related to the increasing importance of mobile communication. They review spectrum characteristics and describe the evolution and structure of spectrum management and regulation and their performance. Different proposals to improve spectrum efficiency and management are reviewed, with special attention being given to economic criteria, such as spectrum markets or auctions. The authors are sceptical as to whether spectrum management institutions are able to adapt in time, and effectively, to the rapidly changing technologies and service markets.

The liberalization of the Internet is elaborated in Chapter 9 by Milton Mueller and Wolter Lemstra by defining and presenting the key characteristics of the global Internet. The authors show in particular how the development of the Internet is related to the liberalization of telecommunications’ infrastructures and how their co-evolution leads to interesting new challenges, both for telecommunications and Internet regulation (for example, net neutrality).

The next three chapters deal with the liberalization of energy sectors, that is, electricity, gas and oil. In Chapter 10 Jean-Michel Glachant and Yannick Perez present the main economic principles of the liberalization of the electricity sector. Among others, they highlight different approaches to this sector’s reform in the USA and Europe, which are rooted in the diversity of the various historical and institutional conditions.

Chapter 11, which is authored by Maarten Arentsen, highlights the two currently dominant models in the gas sector, namely, the model striving towards gas market liberalization (USA, Europe, Latin America, Australia) on the one hand, and the model stressing state ownership and resource nationalism, a model not astonishingly favoured by large gas producers (for example, Russia, Norway, Middle Eastern countries). New challenges emerge, however, from technological changes such as LNG (liquid natural gas) as well as from climate change.

The restructuring of the oil sector is addressed in Chapter 12 by Aad Correljé and Lucia van Geuns. They present the oil value chain, the power relationships among the major actors along this value chain – namely, the producer countries, the oil companies and the consumer countries – as well as their subsequent struggle for rents. Based on a historical approach, the authors conclude to a certain cyclicity in the evolution of the

oil industry, whereby the intervention of governments has less to do with markets and more with geopolitics and rents.

The liberalization of different transport sectors is presented in Chapters 13 to 17. Chapter 13, by Marc Laperrouza, deals with the railway sector. The author recalls the specificities of this network industry, which explain the comparatively slow pace of railway reforms across the world. Many challenges remain, notably technical (interoperability), institutional (appropriate regulatory framework; unbundling), and economic challenges (third-party access and corresponding pricing). The author doubts whether the unbundled railway operator will be the model for the future.

Chapter 14, on air transport, is authored by Sveinn Gudmundsson. The chapter describes air transport liberalization in the USA and Europe mainly. It covers not only airlines, but also the liberalization of the supporting industries, such as ground handling, airport slots, ticket advertising and computer reservation systems. In addition, problems with state subsidies are an issue. Overall, the author deems airline liberalization to be a success, especially when it comes to efficiency, growth, prices and competition.

Chapter 15 is about road infrastructures. David Hensher and Demi Chung present and discuss the growing and worldwide involvement of the private sector in road construction and maintenance, focusing in particular on questions of risk-sharing between governments and private sector in so-called public–private partnerships. The authors consider that toll charges may well be a precursor of much broader congestion charging.

Chapter 16, by John Stanley, focuses on the liberalization of public bus transport. The main approach to liberalizing in this sector has been competitive tendering. The author identifies and reviews the critical success factors. He argues that tendering has delivered on its promises and has led to cost reductions, as well as to growing patronage.

Chapter 17 on seaports is co-authored by Lourdes Trujillo and Marianela Gonzalez. The authors present the various activities and components, as well as the different types of seaports around the world. They show that the liberalization of seaports mainly takes the form of concessions, with the so-called ‘landlord’ model becoming the dominant way of managing seaports.

The last two sector chapters are about infrastructures in the sectors of drinking water and postal services, which we earlier categorized as ‘others’. In Chapter 18, Claude Ménard and Aleksandra Peeroo elaborate the particular characteristics of the liberalization of the drinking water sector. The particular features of this sector explain its rather slow liberalization, which takes the form of changes in decision rights, rather than property rights. By way of three significant country cases – UK and Wales, France and Germany – the authors show that the liberalization euphoria seems to be exhausted and that corporatization of water companies seems to become the model.

Chapter 19, by Michael Crew and Paul Kleindorfer, describes the recent transformation of the postal sector in the industrialized countries and highlights in particular the examples of corporatization (Sweden Post and New Zealand Post) and privatization (in the cases of Germany and the Netherlands), as well as the unique case of the USA. Overall, the authors conclude that the liberalization of the postal sector has led to efficiency and innovation but they highlight the particular challenge to balance universal service obligation, commercial freedom of the historical operator, and market opening.

Part III: Country and Regional Studies

This part covers major countries and regions in the world in order to illustrate different approaches to liberalization across network industries. As mentioned earlier, this overview is by no means complete or exhaustive.

The case of Europe is presented in Chapter 20 by Matthias Finger and Marc Laperrouza. In this chapter, the authors highlight the very particular European approach to infrastructure liberalization, which is embedded in broader policy objectives, whereby infrastructure markets are ultimately means for enhancing the competitiveness of a unified Europe. They also show how, in part as a result of such liberalization, the broader public policy objectives are currently evolving.

Chapter 21, on the USA, has been written by Mark Jamison. He highlights the quite specific nature of utility liberalization in the USA, shaped as it is by both national sector-specific and state comprehensive utility regulation. More precisely, the chapter highlights the evolution of regulation in the telecommunications (fixed and wireless), the gas and the electricity sectors, and concludes that policy-makers (and thus regulators) often lag behind the technological changes in these sectors.

Chapter 22 is about Latin America and authored by Francesc Trillas and Miguel Montoya. They present the infrastructure reforms that have taken place in this part of the world with particular attention being given to the case of Chile, which is often considered to be Latin America's success story. They also explain the special conditions of reform in Latin America, as compared to the other regions of the world, in particular the prevalent inequalities. The balance sheet of infrastructure reforms in Latin America is not, at least in light of public opinion, overall positive, and the authors conclude that such reforms should not be conducted independently of broader macroeconomic policies focusing especially on distributive questions.

China is presented in Chapter 23 by Pun-Lee Lam and Alice Shiu. They focus specifically on the reform of China's electricity and telecommunications sectors. The authors crystallize the policy steps that were taken for such successful reforms, namely, the creation of competition and industry restructure before corporatization and partial privatization. They also highlight the challenges that remain, in particular the challenges of governance of the firms, the challenges of regulatory governance of the sectors, not to mention the environmental challenges in the energy sector, along with the challenge of rural telecommunications penetration.

Chapter 24 by Leena Srivastava and Shahid Hasan discusses the liberalization of infrastructures in India. The authors highlight the, so far, profound transformations of India's infrastructure sectors, as well as the significant challenges that still lay ahead, especially in terms of accessing the rural poor, of investment needs, but also in terms of regulatory institutions and governance of the often decentralized and still state-owned operators.

The Russian approach to infrastructure liberalization is presented by Hella Engerer in Chapter 25. She describes in much detail the reform in the main Russian infrastructure sectors, namely, electricity, gas, railways, telecommunications, postal services, and water and sanitation services. The chapter highlights the difficulties and slow progress of such reform in international comparison, given the communist past of monopolistic state-owned enterprises. Not surprisingly, reform appears to be slowest where former

state-owned enterprises remain dominant, that is, especially in gas, railways, and telecommunications.

Chapter 26 is about Australia and authored by Gary Madden, Jeffrey Petchey and Aaron Morey. They highlight the reforms in the different sectors, covering railways (characterized by unbundling), roads (network extension), telecommunications (privatization), ports (minimal reforms), airports (privatization), electricity and gas (unbundling), and water (unbundling and trading). Australia being a federalist country, most infrastructure services are provided at the state level, which leads the authors to focus in particular on questions of funding. Overall, the balance sheet of the reforms is, according to the authors, not yet satisfactory, which has to do with the regulatory environment as well as with the (limited) size of the Australian market.

Finally Chapter 27 addresses infrastructure liberalization in developing countries overall. Catarina Figueira and David Parker focus on the relationship between investments in infrastructures and the regulatory environment in developing countries. In the context of such countries private sector investments into infrastructures are particularly important. The authors are able to show, however, that it is less the sector-specific regulation that determines such investments than rather broader conditions of (good) governance.

Overall, this book offers a comprehensive perspective of the main infrastructure sectors across the globe, focusing in particular on their transformation of the past 20 or more years.

NOTE

1. We use the term 'liberalization' as the all-encompassing term. Deregulation is defined as the introduction of competition, whereas privatization is either the transfer of ownership or the participation of the private sector in the management of public assets. The redefinition of the roles and responsibilities of government in this context is termed as 're-regulation'.

REFERENCES

- Firth, Lucy, Karin Boersma and William M. Melody (1998), 'Infrastructure concepts and classifications. A framework for scenario analysis of infrastructures in an economic perspective', in Margot P.C. Weijnen and Ernst F. ten Heuvelhof (eds), *The Infrastructure Playing Field in 2030*, Proceedings of the First Annual Symposium, Delft, pp. 21–40.
- Gaunt, C.T. (2008), 'Electricity distribution industry restructuring in South Africa: a case study', *Energy Policy*, **36** (11), 3448–59.
- Kessides, Ioanis N. (2004), *Reforming Infrastructure: Privatization, Regulation, and Competition*, Washington, DC: World Bank and Oxford University Press.
- Sioshansi, Fereidoon P. and Wolfgang Pfaffenberger (eds) (2006), *Electricity Market Reform: An International Perspective*, Amsterdam: Elsevier.