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Railway Reform:

Toolkit for Improving Rail Sector
Performance

Chapter 1:

Introduction

Railway Reform:

*Any change in policy,
investment plans, or
structure seeking to
improve performance*

1 Introduction

This Railway Reform Toolkit aims to provide an easy-to-use resource on the rail industry—what it is and what it does best—and to provide an experience-based set of best practices to aid in the planning and execution of railway reforms. This toolkit is based on international experiences with railway reform under a range of railway organizational forms—state agencies, state-owned, or private enterprises. The toolkit should be particularly useful to those thinking about transitions from one organizational form to another and for those seeking to improve railway performance through investment, reorganization, or changes in government policy.

1.1 Target Audience

The toolkit will help transport professionals and practitioners—all those responsible for railway performance—by explaining railway fundamentals and how performance can be improved. Professionals and practitioners include government policy makers, legislators, regulators, railway management personnel, international financial institutions, and other stakeholders—including railway customers and employees—who seek improvements in railway financial and operational performance.

1.2 The Role of Transport in Economic Development

Efficient transport is a critical component of economic development, globally and nationally. Transport availability affects global development patterns and can be a boost or a barrier to economic growth within individual nations.⁶ Transportation investments link factors of production together in a web of relationships between producers and consumers to create a more efficient division of production, leverage geographical comparative advantage, and provide the means to expand economies of scale and scope. Transport's contribution to economic development includes the following:

- Network effects—linking more locations exponentially increases the value and effectiveness of transport
- Performance improvements—reducing cost and time for existing passenger and freight movements increase transport's contribution to economic growth
- Reliability—improves time performance and reduces loss and damage, thus reducing economic drag
- Market size—access to wider markets adds to economies of scale in production, distribution, and consumption, thereby increasing economic growth
- Productivity—transport increases productivity gained from access to a larger and more diverse base of inputs such as raw materials, parts, energy, and labor, and broader markets for more diverse outputs

Transport has affected economic development from the beginning of human civilization. Economic development focused on the confluence of transport systems –

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⁶ See Paul Krugman on New Trade Theory, *Journal of International Economics*, 1979; and New Economic Geography, *Journal of Political Economy*, 1991

early cities grew up on natural bays and ports, and on rivers and lakes where transport was available. Romans built roads to unify and provide access to their far-flung empire. Geographic characteristics such as proximity to oceans, seas, and waterways, plains, mountains and the location of oases defined early transport systems (*e.g.*, the “Silk Road” went from oasis to oasis, and city to city, where there were no reliable water or road routes).

The industrial revolution generated new transport demands, which required higher volumes of coal, iron ore, and other materials; this led to canal construction that extended water transport, and to early railway development.

1.3 Railway Costs and Cost of Alternatives

Railways are an efficient transport mode—concentrating people and goods and transporting them over a fixed route using one prime mover and multiple carriages and freight wagons.

Rail freight transport uses two-thirds less energy per ton-km than road transport in the US.

Rail transport is generally more fuel efficient than road transport; in the US, rail freight is on average 63 percent more fuel efficient than road transport.⁷ Railways use a unique technology that has very low friction – based on steel wheels and steel rails. The most significant forces that must be overcome, besides the weight of the goods being transported, are rolling resistance and aerodynamic drag as speeds increase. Next to water transport, rail transport is the most energy efficient means of moving large volumes of goods and passengers. On average, inland water transport, using barges and a towing or pushing ship, is about 35 percent more fuel efficient than rail freight, but compared to water transport, rail is often less circuitous and thus, often as energy efficient.

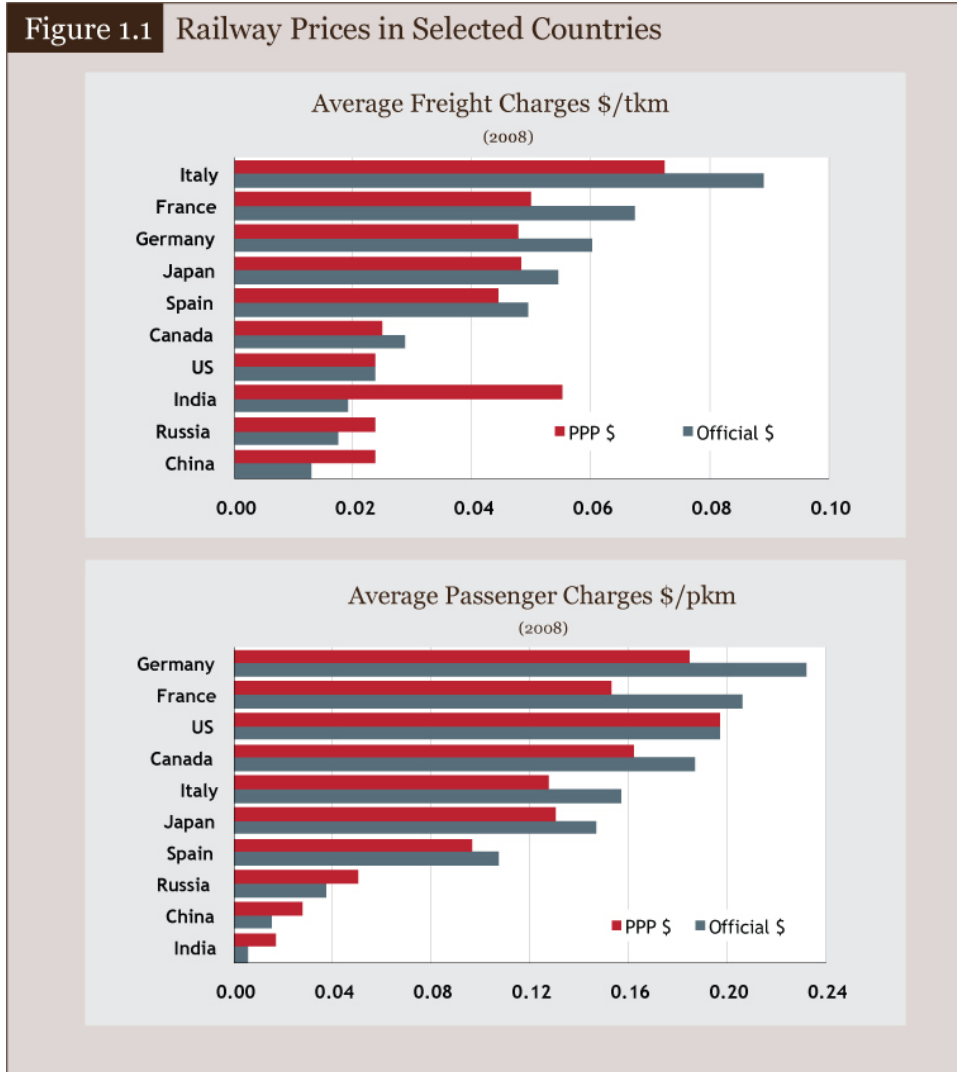
Beyond energy efficiency, transport by inland water or rail can also achieve significant economies of scale in that a single vessel (barges + tow) or rail train (locomotives + wagons or carriages) can move many tons of freight or passengers at once making it operationally highly efficient when there is enough volume to use available capacity.

Railways are ideal to transport high volumes of bulk commodities or passengers. Rail transport costs for bulk materials are generally quite low—typically less than \$0.03 per ton-kilometer; passenger transport is equally inexpensive, typically less than \$0.10 per passenger-kilometer. On relatively dense freight oriented railways, rail transport can average less than \$0.02 per ton-kilometer; rail passenger transport can be much less than \$0.10 per passenger-kilometer, depending on how transport is subsidized and on the density of passengers.

⁷ According to the US DOT, inland water transport averages about 576 ton-miles/gallon (224 tkm/liter); rail averages about 426 ton-miles/gallon (165 tkm/l); road transport about 155 ton-miles/gallon (60.3 tkm/l). Of course, energy efficiency varies greatly depending on circumstances.

Price variations arise from government policy choices, management effectiveness, design characteristics, and differences in volume, cost structures, competitive environments, commodity mixes, geography, haul lengths, among many other factors.

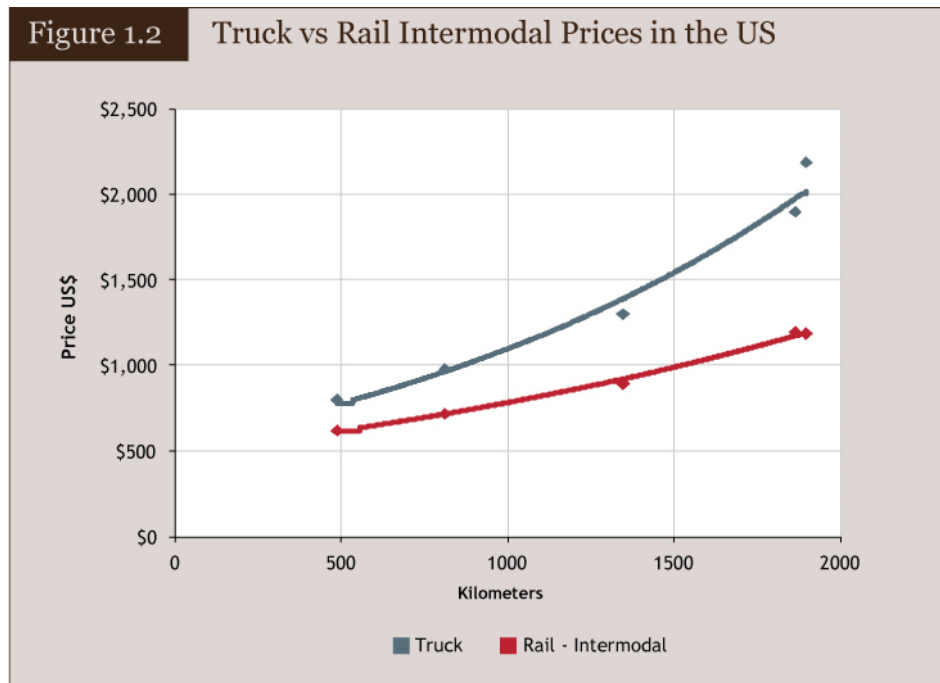
The two charts below show average passenger and freight charges for a sample of railways around the world.⁸



Since efficiently run railways can provide an inexpensive means of transporting high volumes of freight and passengers, low transport costs improve the competitive positions of shippers and entire economies. Many commodities are traded at world market prices and transport costs come out of producer profits, thus, low transport costs can help marginal producers be more competitive and give competitive producers a distinct advantage. Containerization of goods has expanded transport network effectiveness by reducing costs and friction between transport

⁸ Figures based on 2008 World Bank data. It is interesting that on a PPP adjusted basis, India has the highest freight rates and the lowest passenger rates among the world's largest railway systems.

modes, thereby extending rail transport value beyond bulk commodities to include manufactured goods.



The chart above compares the cost of transporting containers by rail (rail-intermodal) with similar road transport movements in the United States. For distances greater than 500 kilometers, rail transport of containers costs about 20 percent less and the cost advantage continues to increase as distance increases. Local drayage adds cost, and changing modes at a terminal adds time to rail movements so rail may not have such a significant advantage for domestic movements, especially shorter movements. Cost comparisons between road and rail transport for general commodities are difficult to obtain, but the advantages of rail transport of bulk commodities such as coal, ores and grain, would be much greater than for container transport.

The cost advantages of efficient well-run rail transport can boost competitiveness among manufacturers and shippers in domestic and global markets and exert competitive pressure on road transport prices. Similarly, efficient well-run passenger transport can increase labor mobility—expanding the labor pool and economic development outward from urban centers.

1.4 Environmental and Land Use Benefits

Modern railways are a green transport alternative when their infrastructure and trains are heavily utilized. In general, they are more energy efficient,⁹ have substantially lower environmental impacts¹⁰ on water and air, and are less expensive to build than other transport modes. Modern and well run railways often offer significant environmental, land-use, and capital investment benefits – they are usually more energy

⁹ Often more energy efficient than inland water transport, considering circuitry factors.

¹⁰ Ocean transport can have lower CO₂ and other emissions because circuitry is rarely a factor.

efficient than road transport and much more environmentally friendly because they have lower emissions per traffic unit (passenger/kilometer or ton/kilometer) than nearly any other mode. Many of the world's railways are electrified, which can reduce emissions associated with rail transport, depending on the energy source used to generate the electricity.

Railways generally also have a much smaller land requirement for right-of-way than highway transport. Although railway freight lines generally require lower gradients and more gentle curves than road transport, which increases rail circuitry in mountainous terrain, railways usually have a much smaller environmental and land use foot-print than road transport and often require substantially less investment per kilometer than water or road transport with equivalent capacity. Rail right-of-way is also environmentally friendly in other ways – it is porous and railway lines have much smaller impact on water drainage and nearby waterways than road transport.

Inefficiently managed railways, and railways with light usage may not be so environmentally (or economically) efficient. Railways with very light axle-loads can be less energy efficient than road transport for freight because rail freight wagons typically weight much more than highway vehicles. High-speed trains with low load factors can be less efficient than even automobiles or airplanes. Environmental and efficiency benefits depend upon an efficiently designed and managed railway system. Of course, this is true of other transport modes as well.

1.5 What Is Railway Reform? Why Do It?

Railway reform is any significant change in government policy, investment strategy, or management structure that seeks to improve railway performance. Railways are complex institutions with multiple measures for performance—costs, transport charges, service levels, and investment needs, among other factors. In the past, most interested parties sought industry improvements that would reduce government subsidies, introduce competition, improve capacity and reliability, and increase responsiveness to user needs to expand the client base.

Defining the goals and objectives of railway reform is a crucial first step in developing and defining a reform program. This will define the performance metrics that need to change. For example, railway reform may seek to tap private capital markets for railway investments, to alleviate the state burden for replacing state-owned rail sector assets because government has many competing budget obligations. Typical reform goals include the following:

- Reduce government expenditures and liabilities associated with providing railway services
- Improve railway financial performance and sustainability
- Attract private capital to the rail sector to alleviate government investment requirements
- Eliminate transport capacity constraints to economic growth
- Increase customer responsiveness and improve services, including through efficiency gains so transport charges can be reduced

- Adopt requirements to increase competition, provide access to strategic national infrastructure, or introduce new rail transport laws and regulations
- In the initial stages, railway reform requires a set of clear and prioritized goals that specify desired outcomes of the reforms. These goals are crucial to establish the types of reforms needed and how to implement them.

1.6 What Can Be Expected From a Reform Effort?

Rail reform outcomes are as varied as reform goals and methods.

Canada's reform and sale of the Canadian National railway (CN) gained Government over US\$2.0 billion from the initial public offering (IPO) and resulted in a highly competitive and low-cost rail sector. Tariffs declined, service improved; CN rail operations now rank among the best for global railway financial performance and CN has reduced costs and improved services. Rail sector investment in Canada has increased dramatically. In the United Kingdom (UK), the success of reforms has been widely debated but results include a tremendous increase in competition among rail service providers, significant increases in private investment in the rail sector, and substantial gains in rail freight and passenger market shares.

The primary focus of reforms in Latin America and Africa has been to revitalize moribund railways while reducing government subsidy requirements. In most cases, rail reforms have revitalized important parts of the railways and substantially reduced government subsidies and investment requirements.

This toolkit includes many case studies of railway reform results. Typically, governments achieve most of their reform objectives, but the path can be long and arduous, and compromises are inevitable along the way.

1.7 How Long Will Railway Reforms Take?

The time investment is substantial—but so are the benefits. The most critical step in railway reform is when the responsible authorities agree that something must be done and they take the first step to begin the process.

Railway reform is a multi-year effort—depending on the number and complexity of the reform goals and objectives, reform can take five to ten years. Often the first set of reforms is followed by a period of adjustment, then further reforms, usually less dramatic, to refine the outcomes. For example, EU rail sector reforms have now been underway for over two decades and most stakeholders expect these efforts to continue indefinitely as the reform process is rolled out across many EU countries.

Typically, it takes months and sometimes several years to reach any agreement on reform goals and objectives. Often, a strategy study is required to consider reform alternatives and their implications and prioritize objectives. Public consultations should be integral to the strategy study. When agreement is reached, governments usually need to pass legislation and may need to build new institutions for regulatory oversight—then, more time is needed to staff and equip the oversight institutions. In parallel, the railway itself must be audited and valued; its institutional

Railways are often very powerful institutions with a long history and many employees. Reforming them usually takes a crisis.

Expect railway reforms to take some time – five to ten years; if the initial reform program is successful, the process will likely continue.

structure must be designed and implemented; its employees counted and their skills assessed. Each element can take a year or more. Even simple concession-type reforms require several years to move from recognizing that reform is needed to completing the concession deal.

Railways, especially state-owned railways, are powerful institutions; they are typically the largest single employer in a country and generally have a longstanding institutional life. Due to their size and importance, railways have considerable political clout, which is a significant factor to consider in designing reform efforts. Because railways are so powerful, successful reform efforts are often precipitated by a crisis to rally sufficient political will to surmount the inevitable difficulties involved. The larger the railway—measured by staff numbers, revenues, or share of state budgets—the more profound the crisis must be to find sufficient political support for sustained rail reform efforts. Some preliminary aspects of the reform process can be completed before a crisis is imminent, but implementation of significant sector reforms will require substantial and sustained efforts by responsible government entities and a crisis sharpens their resolve and focus.

International experience with reforms has proven that a comprehensive communications strategy is essential. The larger and more powerful the railway reform targets, the more thorough the outreach effort must be. Most successful reformers have hired professional communications firms to design and coordinate a sophisticated outreach and information dissemination program to consult the public, employees, shippers, and other stakeholders about their concerns, to explain the need for reforms and the resulting benefits, and to keep stakeholders informed of progress.

1.8 Structure of this Resource

This document and accompanying website are a comprehensive resource for those involved in railway reform, covering issues that may arise in designing, implementing and consolidating railway reforms.

The first part introduces railway reform. Chapter 1 describes the role of railways in an economy, introduces railway reform and explains why countries undertake railway reform. Chapter 2 provides information about railways markets and technology—a useful base of knowledge for understanding the later chapters.

The second part explains the elements of railway economic and financial sustainability. Chapter 3 explains the economics of railways and how this affects their market power, pricing and cost recovery. Chapter 4 discusses the elements of financial sustainability for railways. This part is supported by Annexes on financial modeling, benchmarking and costing.

The third part—Chapter 5—describes the options for the rail industry structure along the dimensions of business organization, competition and separability. It also discusses options for non core activities.

The fourth part discusses the roles of government in the railway sector. Chapter 6 provides an overview of the roles of government. Chapter 7 provides more detailed

information about how government should exercise its role as owner of the railway. Chapter 8 discusses government as the purchaser of services from the railway. Chapter 9 addresses the role of government as regulator. This part is supported by Annexes on concession and service contracts.

The fifth part discusses how to improve the railway's efficiency and market responsiveness by managing the railway in a commercial fashion, and is applicable to both government and private sector owned railway entities. Chapter 10 discusses best practices in corporate governance. Chapter 11 explains how commercial railways organization structures differ from traditional, non-commercial organization structures. Chapter 12 covers commercial management practices for strategy development, market responsive service design and pricing, investment planning and staffing.

The sixth part, in Chapter 13, discusses how to harness the private sector in railways. It is also supported by the Annexes on concession and service contracts.

The last part consists of nine case studies that illustrate various types of railway reform in railways from Africa, Asia and Europe. Each case represents a unique mix of reform choices for business organization, competition and separability. The cases range from introduction of commercial practices (Moroccan Railways) to corporatization and partial introduction of competition (Russian Railways), private competitive rail operations (Virgin), and concessioning (Camrail). Links are provided to additional case studies and other reports that provide more detailed information about the railway reform process.