Reinventing Infrastructure Economics: Theory and Empirics

Shagun Mehrotra

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Abstract

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My dissertation is a study of the conditions under which state-owned enterprises improve infrastructure services—transport, energy, and water—particularly in developing countries. This research is relevant because, despite successful privatization of infrastructure that yielded over trillion and a half dollars in investments since 1990, infrastructure provision remains dominated by state-owned enterprises (Estache & Fay, 2007; Gomez-Ibanez, 2003). The OECD estimates that over the next two decades, US $35 to 40 trillion will be required to meet the global infrastructure deficit. At least half of this investment will be made by governments, particularly in, but not limited to, developing countries (OECD, 2007). In contrast to conventional wisdom, my research identifies mechanisms for reforming public infrastructure utilities through a new recipe for an *inclusive reform framework* that, unlike the textbook approach, jointly optimizes equity and efficiency without privatization.

This dissertation contrasts the world's largest public utility, the Indian Railways, with the *ideal-type* textbook privatization, illustrated with the case of the British Railways' privatization. I focus on the Indian Railways as a paradigmatic example of how to reform infrastructure-providing state-owned enterprises while balancing equity with efficiency concerns. I analyze primary data gathered through 100 in-depth interviews

and on-site observations. The fieldwork was conducted over a period of two years, including half a year at the Office of the Minister for Indian Railways. In addition, I utilize secondary data through archival review of policy documents and analyze fifty years of the Railways' statistics.

My dissertation shows how the Indian Railways was transformed, between 2005–2008, counter intuitively, without privatization, retrenchment, or fare-hikes for poor passengers, under the leadership of a populist politician, the then Minister of Railways. I explain how the Railways' was rescued from near bankruptcy in 2001 to realize US $6 billion annual surplus in 2008. An essential element of the Indian Railway's complex strategy was to leverage existing assets by operating faster, longer, and heavier trains on the supply-side, as opposed to investing in asset accumulation. On the demand-side, the Railways shed a monopoly mind-set in favor of customer centric, dynamic, and differential pricing and service provision.

Based on the positive case of Indian Railways, I derive an equitable alternative to infrastructure reform: A tripartite *inclusive reform framework—diagnostic, invention, and agency*. First, crafting space for reform by diagnosis and navigation of conflicting and competing interest groups to isolate apolitical variables that *jointly increase efficiency and equity outcomes*. Second, reinventing reforms by focusing on *all manipulable variables* for supply optimization and demand responsiveness, because profit in public utilities is a function of several manipulable variables, not only fares and wages. Third, agency, through *radical incrementalism,* an approach to minimize the risk of catastrophic errors, and yet yield rapid transformations.

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Keywords: Sustainable Development, Development Economics, Infrastructure Economics, State-Market, Equity-Efficiency Tradeoffs, Privatization, Indian Railways, Transport.

Table of Contents

List of Figures and Tables

Acronyms

ABC	ABC analysis
BCN	Covered wagon type
BCX	Open wagon type
BOT	Build-Operate-and-Transfer
BOX	Covered wagon type
BOX-N	Covered wagon type
BPC	Break Power Certificate
CAGR	Compounded Annual Growth Rate
CANAC	CANAC Incorporated, Savage Company
CBC	Centre Buffer Coupler
CC	Carrying Capacity
CEO	Chief Executive Officer
CFTs	Cross-Functional Teams
CONCOR	Container Corporation of India
CORE	Central Organization for Railway Electrification
CRB	Chairman Railway Board
DC	Washington District of Columbia
DEMU	Diesel-Electric Multiple Units
DNA	Deoxyribonucleic Acid
GDP	Gross Domestic Product
GTKM	Gross Ton Kilometer
GTR	Gross Traffic Receipts
IBM	International Business Machines
IBS	Intermediate Block Signal
IIM	Indian Institute of Management
IIT	Indian Institute of Technology
IMF	International Monetary Fund
IPWT	Industrial Performance and Workplace Transformation
IR	Indian Railways
IRCON	Indian Railway Construction Company Limited
IRCTC	Indian Railway Catering and Tourism Corporation
IRWO	Indian Railway Welfare Organization
LIBOR	London Interbank Offered Rate
MEMU	Mainline-Electric Multiple Units
MT	Million Tons
NBC	National Broadcasting Company
NDTV	New Delhi Television

NTKM	Net Ton Kilometers
OECD	Organization for Economic Co-operation and Development
OUP	Oxford University Press
OWE	Ordinary Working Expenses
PKM	Passenger Kilometer
PMO	Prime Minister's Office
PNR	Passenger Name Record
PPIAF	Public-Private Infrastructure Advisory Facility
RDSO	Research Design and Standards Organization
RITES	Rail India Technical and Economic Services
SMS	Short Message Service
SOC	Social Overhead Capital
TRAI	Telecom Regulatory Authority of India
UIC	International Union of Railways
US	United States
WAG4	Electrical engine type
WCG2	Electrical engine type
WIIR	Weighted Index of Inputs for Railways
WSJ	Wall Street Journal
XE	Steam engine type
XG	Steam engine type

Currency Exchange Rates

One US $ = 43 Indian Rupees

All data is from the Statistics and Economics Directorate, Ministry of Railways, Government of India, New Delhi, unless stated otherwise.

For Nina

Chapter 1: Reinventing Infrastructure Reforms: An Empirical Study

Global Infrastructure Deficit—A 40 Trillion Dollar Crisis

Infrastructure stock and flow of services, essential for economic development and poverty reduction are in crisis. In most developing countries infrastructure quantity and quality of supply far exceeds demand (World Bank, 2010a, p.3). In developed countries the infrastructure assets are aging and need urgent replacement (OECD, 2007, p. 13). Economic growth, population increase, rapid urbanization, and eventual climate change will pose unprecedented additional demands on infrastructure. Over the next two decades, US $35 to 40 Trillion is estimated as the global cost of meeting this infrastructure deficit. Half of this investment will be made by governments (OECD, 2007, p.13; and Airoldi, Biscarini, and Saracino, 2010, p. 2). And developing countries will need half the total investment in infrastructure. In the post-financial-crisis world economy, global growth is likely to be led by emerging markets within developing countries (Canuto, 2010, p.10; and, IMF, 2010, p.2 and 8).

Furthermore, while in the next quarter of a century the world's urban population will increase by about 2 billion people, doubling the number of city dwellers for the first time, half the world's population is already urban and urban economies are inherently infrastructure intensive (Garau et al., 2005, p. 11) and this will exacerbate the demand for infrastructure. Much of the future expansion will result in the further growth of

slums in Tropical cities. Thus, the lack of physical infrastructure will disproportionately burden the poor. Moreover, public provision of infrastructure services has been overwhelmed with under-investment and poor management, resulting in dilapidation of the existing stock (World Bank 2010a, p.3, and World Bank, 1994, p.4). Thus, efficient and effective management of public infrastructure stock and flows in developing countries is an important, but neglected, area of research that this dissertation addresses.

Dissertation Overview

The purpose of this dissertation is to expand the understanding of ingredients and recipes for reforming infrastructure utilities, particularly in developing countries. It focuses on the world's largest public utility, the Indian Railways, as a paradigmatic (and, for some aspects, a critical) case of reforming infrastructure-providing state-owned enterprises (Flyvbjerg, 2006, p. 230). Few things in the policy world have been as contentious as privatization. On occasions it has stirred passions associated with globalization, with animated street protests, threats to the very survival of governments (and their overthrow), and (on occasions) violence and civil disobedience. An extreme example is the water war in 2000, Cochabamba, Bolivia. This makes infrastructure reforms a *thing*, an object of dispute (Latour, 2004, p. 233) and calls for further research on re-conceptualizing the economics that inform infrastructure reforms.

Theoretical Basis in Infrastructure Economics

The theoretical basis for this dissertation is grounded in infrastructure economics (public economics for infrastructure sectors), essentially revisiting the framework for efficiency gains and expansion of service coverage that are presently restricted to privatization. The primacy of a market-dominated framework is inadequate. Ample empirical evidence gathered since the 1990s demonstrates that privatization or corporatization of utilities is often politically infeasible (or undesirable). A recent important example is the Indian Railways, one of the world's largest public sector employers. Some of the leading scholars that have studied infrastructure are categorized into three thematic areas: (1) ***Conceptual economic theory*** focused on role of institutions, market failure, and firms: Coase (1960), Hayek (1944), Hirschman (1958); Keynes (1936), North (1987), Polayni (1944), Smith (1776), Stiglitz (1998), Williamson (1985); (2) ***Political economy*** of infrastructure reform: Gómez-Ibáñez (2006), Hirschman (1968), Nelson (2005), Sclar (2000), Yarrow, (1999); (3) ***Empirical studies*** of recent infrastructure reform: Eustache & Fay (2007), Grindle (1997), Kikeri & Nellis (2004), OECD (2007), Rammamurti (1992), Shirley (1999), Sclar (2003, 1997), (Tendler (1998), World Bank (2010b).

Argument

The core argument of my research is that in a restricted policy space—where privatization of a state-owned infrastructure enterprise is not politically desirable or feasible—

conflicting commercial (efficiency) and social (equity) objectives can be met through reforms that focus on apolitical components. Apolitical refers to attributes of the railways that are not of immediate interest to the political leadership, and are predominantly technical choices as opposed to political ones. For instance, passenger fares are politically contentious world over, but freight charges for moving bulk commodities are not. Thus, Railways that commercially manage the apolitical freight market segment can make significant efficiency gains without compromising equity concerns. However there are exceptions in the freight segment as well. Freight charges can be political in nature. For example, railways in many market economies have to adhere to politically determined preferential freight services for national priorities like transportation for national defense needs, food grains to public distribution centers, supply of coal to public power plants, or fertilizers to farmers. Yet, there is no restriction on providing priority service to more efficient clients within the priority sectors, like, preferential service to the power plants that place bulk orders in advance and make payments on time.

Counterfactual

In order to demonstrate how public utilities can improve infrastructure services in the absence of privatization, I undertake a comparative case study to explore how an alternate approach was crafted and what general lessons can be derived from it. The

counterfactual for the Indian Railways case is the ***ideal type***, that is the text-book policy prescription of privatization—independent regulation, retrenchment, and fare-hikes. Where appropriate, the Indian Railways is contrasted with unsuccessful or less successful cases, such as that of the British Railways and a variety of infrastructure privatization efforts in developing countries.

This study focused on the successful case of Indian Railways because as Regan (2006, p. 644) pointed out "It is the intensive study of the 'best instances' of an outcome that provides the deepest understanding of 'how' an outcome occurs." Further, my approach to the case is one that seeks a deliberative understanding as opposed to seeking paradigms because as Hirschman (1970) has warned, paradigms are a hindrance to our understanding because ideological presuppositions yield biased justifications rather than insight. Thus, this research relies on data collected from the Indian Railways and its customers, regulators, advisors, private and public collaborators, as well as comparable cases like the British Railways and other reformed utilities, using interviews, observations, archival research and document review, and statistical data spanning the past 50 years.

Policy Relevance

The research is policy relevant because infrastructure provision in the developing world remains dominated by state-owned enterprises, yet, despite limited progress with

privatization in the 1990s, most research and policy interventions remain focused on the role of the private sector, associated management strategies, and investments. Moreover, developing countries have large infrastructure deficits (World Bank, 2010a, p.3; World Bank 2004, p.20–21). Most affected by this deficit are the poor, millions of whom pay by shorter life expectancy, high morbidity and lost opportunities. Additionally, small and medium size firms suffer because, unlike large firms, they are unable to internalize the cost of self-provision. As both poor households and small firms form the backbone of an unskilled labor intensive economy—representative of most developing countries—reducing an extreme deficit in physical infrastructure is essential to development. In response to the challenge posed by infrastructure deficits, policy makers have responded with privatization, which has had a limited impact (Birdsall & Nellis, 2003; Estache and Goicoechea, 2005; Estache and Trujillo, 2008; Rammaurti, 1999). Consequently, scholars and practitioners alike, seek theoretical and empirical insight into policy alternatives to improve infrastructure services, dominated by state-owned enterprises.

Purpose

The purpose of this dissertation is three fold. First, to review pivotal literature on state-market issues in economic development with a focus on infrastructure privatization, and associated equity-efficiency trade-offs. The review assesses the theory and

empirical outcomes of the traditional approach to infrastructure reforms for efficiency improvements and service expansion. Second, to explain in-depth why the traditional text-book approaches to reforms assessed in the literature review, and applied by British Railways, was not applicable to the Indian Railways. A detailed analysis unpacks how the Indian Railways transformed from near bankruptcy in 2001 to a US $6 billion annual surplus in 2008 without compromising equity considerations. Third, to distill lessons from the above for other infrastructure state-owned enterprises, with the aim of developing a theoretical framework that differs from the traditional approach on two fundamentals: Transfer to private ownership is not a prerequisite for efficiency gains, and social (equity) obligations and commercial (efficiency) objectives can be jointly met and need not be trade-offs.

Research Contributions

Indian Railway Case Summary

This dissertation provides a thick account of how the Indian Railways were transformed in four years, between 2005–2008, counter intuitively, under the leadership of a grassroots politician, Lalu Prasad, the Minister of Railways (2005–2009). The study unpacks the unconventional approach that rescued the Railways from near bankruptcy to an annual surplus of US $6 billion while retaining state ownership. Thus, this

research explores an important theoretical as well as a practical concern in public sector economics about how public enterprises can improve basic services.

The Indian Railways is a unique state-owned enterprise because of its size, ownership structure, and 150-year history. These attributes, among others, make it a complex and intriguing subject to understand. The Indian Railways is one of the world's largest state-owned enterprises; a utility under a single management structure, second in size only to China's Railways. With 1.4 million employees and 1.1 million pensioners and one of the world's largest railway networks—over 63,000 kilometers of routes—running approximately 13,000 trains each day, including 9000 passenger trains, the Railways is a Ministry within the Government of India. Indian Railways carries over two million tons of freight and some 17 million passengers between 7,000 railway stations each day. A fleet of 200,000 wagons, 40,000 coaches, and 8,000 locomotives achieves this. To fathom the scale, consider the fact that Indian trains, each day, cumulatively travel four times the distance to the moon and back.

Like many state-owned infrastructure service providers, the Indian Railways was over manned and charging subsidized fares, as it uneasily attempted to balance conflicting commercial and social objectives. In the financial year 2001, the railway defaulted on dividend payments to its primary investor, the Government of India. The cash balance shrunk to US $83 million (Indian rupees 359 crore) and its operating ratio—a key measure of efficiency: operating expenditure over operating revenue—

peaked to 98 percent. While nominal improvements were made in the years until 2004, the financial condition remained precarious.

However, in the next four years, under a populist political mandate that did not allow conventional policy prescriptions—in the words of the Railways Minister, "no privatization, no retrenchment, and no fare-hike" the finances of the Indian Railways, as well as the quality of service provided, were transformed. The Railways' operating ratio improved to 78 percent, thereby generating a cash surplus of US $6 billion (25,000 crore rupees) with astounding growth in freight volumes, as well as market share and earnings. However, what makes this transformation unique are the counter-intuitive approaches and their swift implementation. Precluding the pursuit of textbook solutions, namely, privatization, retrenchment, fare-hikes, and the like, the financial solvency of the Railways was restored without imposing a burden on the millions of poor Indian travelers and employees. The Indian Railways' transformation is attributed to a management strategy that optimized the functioning of this complex institution along its apolitical variables. The core supply side strategy can be summarized into three words: *faster, longer* and *heavier* trains; each word was worth more than a billion dollars in annual surplus. Likewise, the gist of the demand side strategy is dynamic and differential pricing which is customer centric. Drawing on lessons learned from the Indian Railways case, the details of a new framework for reforming infrastructure state-owned enterprise is articulated.

Framework for Reforming Infrastructure State-Owned Enterprises

In the traditional *ideal* text-book policy prescription, an efficient utility (Y) is a function of independent regulation, ring-fenced finances, clear goals, retrenchment, and fare hikes. Thus, it assumes that, if and only if utilities privatize (treatment, denoted by X) can they be efficient (outcome). Through the counter-intuitive approach of the Indian Railways, I demonstrate through the Indian Railways case that an efficient utility (Y) is not a function of privatization (X), but there are at least three other relevant vectors: a programmatic approach to market analysis and response, organizational management, and political environment which defines the feasible set of reform options. Thus, the case of the Railways establishes that privatization is not a necessary condition for efficiency, and it provides insights into alternative theoretical and practical policy approaches. Additionally, through the case of British Railways failed privatization, and other such cases, I demonstrate that privatization is not sufficient for efficiency gains, either.

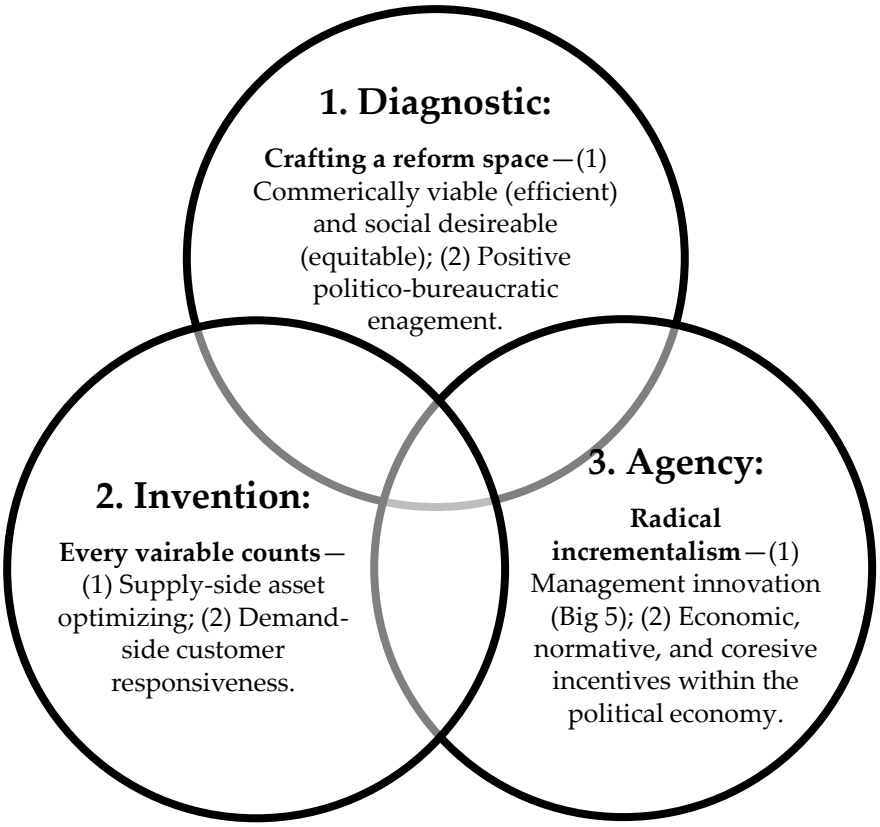
Traditional text-book solution

> **Infrastructure Utility Efficiency (y)=** *f* [Inefficient Public Utility (x) + Privatization *f* (Separation of asset owner and service provider, independent regulation, competition at entry, ring-fencing of utility finances + user-fee based on commercial pricing, and the like)]

New framework for equitable reform

Infrastructure Utility Efficiency (y) =*f* [[{***Inefficient Public Utility*** (x)} + {***Market analysis*** to identify competitive advantage} + {***Political Economy analysis*** to identify apolitical business segments}] + {**Supply-side strategy** to optimize on existing assets by investing in short-gestation-high-return-projects} + {***Demand-side strategy*** to be customer centric dynamic and differential pricing} + {Management strategy to deploy radical incrementalism including the use of non-economic incentives }]]

Figure 1. **Inclusive reform framework**



Dissertation Structure

Every chapter is structured to be stand-alone and focuses on a specific sub-topic so that it may be read independently of the rest of the dissertation. However, the chapters are structured into three broad sections corresponding to the three objectives of the research: Establish the theoretical basis and scope of traditional approach to infrastructure economics, through a counter-intuitive case of Indian Railways; expand the scope of the present theory and practice; and present a new theoretical basis for reinventing infrastructure economics.

First, chapters one to three, that is *Introduction*, *Literature Review,* and *Research Design*, provide the context for the study and are primarily aimed at establishing the limits of the existing literature and associated methodological choices.

Second, chapters four to eight unpack in detail the unconventional approach of the Indian Railways transformation from near bankruptcy in 2001 to super solvency in 2008 without burdening poor customers. Chapter four, *Bankruptcy to Billions*, provides a snapshot of the transformation and focuses on the management strategy adopted to implement change. The fifth chapter, *Political Economy of Reforms*, captures the fine balancing act between commercial and social obligations of the Railways, including the political mandate of 'no privatization, no retrenchment, no fare-hikes' and how

creatively the space for reforms within this mandate was identified. The sixth chapter, *The Market*, captures the analysis that allowed for the development of a socially responsible and commercially viable understanding of specific business segments that offered opportunities for transforming the Railways without burdening poor consumers. The seventh and eighth chapters, *Milking the Cow* and *Service with a Smile*, articulate the mechanism of the reform strategy. The former captures the supply-side strategy while the latter unpacks the initiatives that led to market oriented reforms in the freight, passenger, and other coaching segments.

The third and final section articulates a new theoretical framework for diagnosing and reforming large infrastructure firms. This section consists of Chapter nine, *Towards a New Theory for Infrastructure Economics*, which summarizes not just the financial gains made by the Indian Railways, but gains in productivity, political capital, and a host of other vectors. Further, challenges to sustaining the present generation of reforms, as well as the scope for their replication, is explored for other public sector dominated services like water supply, electricity, irrigation, and public transportation. Finally the chapter summarizes a new theoretical framework for diagnostics and reforms along with avenues for future research.

Chapter 2: Literature Review

Introduction

The pivotal literature on public economics and development economics is engaged through three substantive areas: (a) the role of the state in economic development with a focus on creation, maintenance, and growth of markets in a variety of developed, just-developed, and developing market economies; (b) evaluation of a subset of applied economics literature to infrastructure with a focus on the traditional approach of privatization, its rationale, results, critiques, and alternatives to reforming large infrastructure state-owned enterprises; (c) reflection on the theory and empirical evidence associated with equity-efficiency trade-offs of infrastructure reform. This engagement of the literature identifies gaps in the traditional approaches to achieving efficiency in infrastructure sectors—water, energy, transport—that requires transfer of ownership from public to private as a prerequisite for efficiency gains; it also argues for efficiency gains at the cost of at least short-term equity concerns. My research question is crafted to extend the bounds of the literature on infrastructure economics and associated policy prescriptions in the context of developing countries and emerging markets. In particular, my research re-conceptualizes infrastructure reforms in the context of contract markets as opposed to spot markets and the associated choices of make-or-buy decisions in the production and provision of infrastructure services

including internalizing the externalities of production and provision of infrastructure services.

Role of the State in Economic Development

To determine the extent to which governments should intervene in the market, this review first presents a historical account of how governments actively participated in the creation of modern industrial free markets (also known as self-regulating markets). Second, an economic analysis of how the state actively intervened in achieving early industrialization is discussed. Third, the analytical approach of economic sociology, the preconditions for state's agency in economic development, is articulated. Fourth, through a historical assessment the complementary and contradictory relationship between the state and the market economy are presented in an effort to calibrate the extent of desirable state intervention and its justification for economic development. In conclusion, for determining the degree to which governments intervene in market economies, it is deduced that not quantity, but quality of state intervention is what matters most.

Birth of Modern Markets

Free markets emerged as a result of an ever diminishing role of the state, according to Friedrich von Hayek in *the Road to Serfdom* (1944). However, this is based on a

restrictive interpretation of Adam Smith's natural state of commerce (1776). Concurrently and in contrast, in the Great Transformation, Polyani (1944) articulated the unusual characteristic of the free-market economy: markets 'disembeddedness' from society and market liberalism's subordination of society. Polanyi argued that formation of such a liberal-market economy was not an outcome of natural evolution of the pre-capitalist markets; rather, it was formed by conceited efforts of philosophers and legislators during the early 19th century. Then, did free markets naturally emerge or where they created?

Markets: Old and New

In his treatise on *Ancient Law*[1], Maine (1861) articulates the evolution of markets from ancient societies to post industrial ones as characterized by transition *"from status to contractus*[2]*"*. From a state of deeply "embedded" markets to ones that are "disembedded" in society, and in theory function, disengaged with society and

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[1] Maine, Henry Sumner. (1861). *Ancient Law: Its Connection With the Early History of Society, and Its Relation to Modern Ideas*, London: John Murray.

[2] "*Status* is set by birth—a man's position in the family—and determines the rights and duties of a person. It derives from kinship and adoption; it persists under feudalism and, with some qualifications, right up to the age of equal citizenship as established in the nineteenth century. But already under Roman Law*status* was gradually replaced by *contractus*, i.e., by rights and duties derived from bilateral arrangements." Polanyi (1957, p. 69, italic as in original text).

government. To illustrate the social embeddedness of markets as well as *status* and *Gemeinschaft* characteristics of markets, In Aristotle Discovers the Economy, published in Trade and Markets in Early Empires[3], Polanyi (1957) articulates the attributes of pre-capitalist markets that are at odds with liberal markets. In old markets, as understood in a thick account of the Arapesh of New Guinea by Margaret Mead, the notion of property rights, labor, and transactions are not permanent; these change with time and space. Rights are overlapping, at times communal, at other times individual. Land use rights are divorced from land ownership rights[4], such that one may own the land while another may hold user rights; a complex combination of such rights were distributed across the community and within and between families. Such old markets are deeply embedded in society. Like the Arapesh of New Guinea, ancient societies lacked the basis of free-market—well defined property rights, definite ownership, rules of economic exchange including liquidity, fungibility, profit motive, production of surplus for sale, and so forth. Thus, free markets needed to be created as they were a departure from traditional (old) market principles and notions of commerce. In *Birth of a Liberal*

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[3] Polanyi, K. Arensberg, C., & Pearson, H., (eds.) (1957). *Trade and Market in the Early Empires: Economies in History and Theory,* Chicago: Henry Regnery Company

[4] Contemporary example of such overlapping ownership and use rights are the uncommon. For example, this overlap can be seen in mining rights where the state, on behalf of society, may have rights to mineral resources below privately owned land.

Creed (Chapter 12 in The Great Transformation) Polanyi articulate the contradictions between the desirability and distrust, of state interventions in market creation:

> "The road to the free market was opened and kept open by an enormous increase in continuous, centrally organized and controlled (state) interventionism. … contrary to expectation…(people) whose whole philosophy demanded the restriction of state activities, could not but entrust the self-same state with the new powers, organs, and instruments required for the establishment of laissez-faire." (Polanyi, 1944, p.146-47, emphasis and text in brackets added)

In a countermovement aimed at protecting social welfare and minimizing the negative effect of the new market, a pragmatic additional state response emerged through series of new legislation. Ironically, "while laissez-faire economy was the product of deliberate State action, subsequent restrictions on laissez-faire started in a spontaneous way. Laissez-faire was planned; planning was not."(Polanyi, 1944, p. 147). The response is assumed to be spontaneous because it occurred simultaneously in multiple jurisdictions with support from a broad spectrum of ideologies and disparate set of interest groups. Thus, creating free markets (a weakly-utopian concept) required, not absence, but active state intervention.

Government Intervention in Early Industrialization

Chang (2002), based on the works of Friedrich List (1841) *National System of Political Economy*, accounts for how England became the first industrialized economy, through a combination of protection of infant industry and a series of government interventions to facilitate economic development. List goes on to argue that the subsequent promotion

of free trade by British scholars and government was deceptive and intended to push nationalist interests.

> Any nation which by means of protective duties and restrictions on navigation has raised her manufacturing power and her navigation to such a degree of development that no other nation can sustain free competition with her, can do nothing wiser than to throw away these ladders to her greatness, to preach to other nations the benefits of free trade, and to declare in pertinent tones that she has hitherto wandered in the paths of error, and has now for the first time succeeded in discovering the truth" (List, in Chang, 2002, p.5)"

Most advanced industrial countries were interventionist in the early stages of economic development. A common feature of government support was infant-industry protection (List, 1889). Protectionism was more prevalent in Britain and America (than acknowledged in neoclassical economics) than in the interventionist countries of France, Germany, or Japan. Governments financed or subsidized mega projects (railroads) in infrastructure and (steel) manufacturing. Governments also legally financed technology transfer by financing research in other countries and illegally through industrial spying and acquisition of trained workers; spread of technology awareness through expositions and show casing "model factories". Publicly financed or subsidized research and development through the establishment of universities and other science and technology research institutions was common (Chang, 2003).

In essence, it is incorrect to summarize that state intervention was an exception in the postwar era in an otherwise evolving free-market capitalist global economy. Up to the 19th Century, limits to state intervention were due to a number of constraints—no income tax, balanced budget, constrained deficit financing, limited monetary policy, no

central banks until the late 19th century, not many nationalized industries, no state run banks, little investment planning, no anti-trust or environmental regulation. By the early 20th century, state intervention had increased and peaked post World War II due to failure of free markets (for details on economic growth rates during these periods see Chang, 2003 and Amsden, 2003).

Preconditions for State's Agency

A deeper and diversified role for the state in the economy and society of developed countries (advanced capitalists, industrialized economies) was instrumental in enabling twin aspects of economic development—economic growth and management of socioeconomic strife. However, based on historical comparative analysis of Polanyi, and Gershenkron in Economic Backwardness in a Historical Perspective, (1969).the state's ability to intervene in promoting growth and equity is constrained by its internal composition as well as the ability to associate with the prevailing composition of society.

Rueschemeyer and Evan's (1985) analysis reveals two prerequisites for states to prevail over such constraints. First, the bureaucracy should have the structural coherence of a corporate-form. Second, it should have adequate autonomy to conceive a coherent strategy as well as provide public goods that cannot be provided in a Pareto

optimal manner, instead require compromising the interests of structurally key economic and social agents and stakeholders.

How does state intervention affect its autonomy and corporate coherence in bureaucratic action? Autonomy and coherence are often mutually reinforcing experiences—acting builds coherence and augmenting state resources increases autonomy (as observed by Amsden, 1985, in the case of Taiwan's economic development)[5]. However, it is essential to dispel the notion of the inevitability of mutual reinforcement. First, to stem concerns of exponential growth in state power that often result in call for state minimalism. Second, not to discourage weak states to intervene when they lack capacity to act. In practice, as state interventions permeate the basic institutional arrangements of market and society, the resulting socioeconomic transformations interactively reshape the state. Likewise, as state interventions evolve, on occasions they fragment a states' autonomy with respect to dominant social and economic interest groups. "[T]he contradictions of civil society become more

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[5] In the case of Taiwan, major state interventions include: (1) agriculture land reforms; (2) industry liberalization (accompanied by defense manufactures state-owned enterprises having collaborations with major American private high end defense equipment manufacturers, giving the military industrial complex comfort with liberalization). Through a mutually reinforcing arrangement between the state, market, and society, the state interventions have persisted from the Japanese colonial period in agriculture and import substitution and industrialization to a strong military establishment that evolved into a developmental state focused on export-led growth. "Taiwan, then, is more than a case in which the essential contribution of state intervention to economic development can be observed. It is a case that demonstrates the reciprocal interaction between the structure of state apparatus and the process of economic growth." (Amsden, 1985, p. 101)

embedded in the state as the state more deeply penetrates civil society, potentially undermining both its coherence as a corporate actor and its autonomy" (Rueschemeyer, and Evans, 1985, p.69).

However, in my view, coherence is an inappropriate prerequisite—state fragmentation offers numerous opportunities. Inter-Ministerial autonomy, is in fact lack of coherence of the State as a whole, but is proof of Ministerial autonomy within the state. It is essential in countries where the multiple Ministries within the State manage an increasing proportion of economic and welfare service provision. As documented in my book *Bankruptcy to Billions: How the Indian Railways Transformed* (2009), I articulate how the Indian Railways, a Ministry within Government of India, acted in the interest of various factions, while opposing other factions, both within the Ministry and the State apparatus as a whole, as well as segments of society (in favor of the poor, at times, at the cost of the middleclass) and the economy (in favor of domestically oriented firms at the cost of exporters, who had windfall profits from souring global commodity prices). Complexity offers possibilities; if America had waited for cooperation and coherence on climate change within the American state, no city or state government would have acted over the last decade.

Complements and Contradictions: Calibrating the Extent of Desirable State Intervention

All markets have state interventions, some less than others. Definitions vary by geography and with time.—For instance, child labor or slavery was defended on grounds of efficiency until the early 19th century in the United States and is still illegally practiced in many countries, but laws banning it are not considered state intervention anymore (Chang, 2003). In response to the Great Depression, Keynes, in The General Theory of Employment, Interest and Money (1936) articulated an active role of the state in macroeconomic stabilization through a combination of both monetary and fiscal policies, including counter-cyclical spending by governments. The *dirigisme* of the 1950s, (a central planning paradigm of economies with substantial government intervention in the post war era) was criticized for the failure of regulation and massive inefficiencies and rent-seeking due to the interventionist state, giving way to neoclassical economics in the 1980s and 90s (a market oriented paradigm). At the same time, in Empowerment, "Movement politics" Friedman argues for an alternative approach to development which calls on the role of social movements in democratization of politics with the aim of converging socio-economic and political inequalities and refocusing development on people as opposed to profits (Friedman, 1992, p.9). Most recently, with the collapse of the financial sector and associated publicly financed bailouts of investment banks, and coordinated stimulus plans around the world, state intervention is back. Thus, state interventionism versus market mechanism is not a simple dichotomous choice because 'contradictions and

complementarities' exist between the state and the market; there are also costs and benefits of state action due to its bureaucratic organizational structure (Bardhan, 1990, p.3).

While there are several arguments in favor of the role of the state—provision of security, law and order, anti-trust regulation, developmental role through welfare considerations ranging for pro-poor subsidies to judicious use of eminent domain—the two most important rationales for economic development policy interventions are "market failure in signaling investment allocations" and "importance of economies of coordination" through central planning. Likewise, there are ample critiques of the failure of state intervention (most notably by Scott, 1998). In the context of economic development policy, excessive intervention results in sluggish growth and rising inequality because excessive regulation results in rent-seeking[6](see Bhagwati 1982, and Krueger, 1974), which is the misallocation of resources due to market distortions. The neoclassical solution is to 'get the price right', essentially requiring state-minimalism, an argument that received traction due to some spectacular state failures.

For instance, a number of centrally planned large-scale state interventions in the 20th century utopian social engineering efforts - failed to deliver the intended welfare

[6] Bhagwati (1982), Kruger (1974) on welfare implications of rent-seeking and more broadly Directly unproductive activities (DUP)

benefits. For example, from Corbusier's Brasilia or Chandigarh, Chinese Great Leap Forward, Tanzanian, Ethiopian, Mozambique compulsory Ujuma villages, to Russian collectivization. Failure conditions and logic articulated by Scott include imposition of utopian schemas of physical planning into complex interdependent socio-economic and ground realities. Further, the following four conditions, when overlapping, ensure large scale failures of state intervention. First, organizational management that requires administrative coding and simplification to geometricize nature and space, so as to enhance bureaucratic legibility. Second, knowledge assumptions based on high modernist ideology—rational comprehensive model, a belief borrowed from scientific and technological engineering, to analyze, identify, and solve complex large scale developmental changes. Third, imposition by authoritarian state—use of state's monopoly over power to implement large scale development projects. Fourth, weak civil society that is unable to resist imposition of state interventions (Scott, 1999, p.4).

However, quite like state failure, there are new types of market failure like imperfect information (Stiglitz, 1999). With imperfect information, market determined prices do not reflect all information, and dispersed markets with proprietary information lack adequate coordination. But such information asymmetries plague central planning as well. Another type of new market failure relates to capturing positive externalities from accessing and internalizing technological advancements. In developing countries, non-market actors like large corporations internalize this market

failure. But developing countries lack large corporations, thus the 'activist state' like those of the "East Asian Miracle" Hong Kong, Indonesia, Japan, the Republic of Korea, Malaysia, Singapore, Taiwan (China), and Thailand facilitates this learning. Likewise, these states filled the gap of inadequate capital markets (for details on the interventionist recipes of East Asian economies see Stiglitz, 1996, and for the case of Taiwan's economic transformation see Amsden, 1985). However, not all governments are capable of making such interventions. The abilities vary as governments differ in capabilities and associated functioning. For instance, fiscal volatility (as observed in Latin America over 80s and 90s) may diminish macroeconomic space for government action. In sum, it is not sufficient to just get prices right; organizational abilities and incentives matter. Likewise, as planners and development economists call for central planning of investment, the same issues of organizational learning, incentives, and management remain a constraint.

Quality, Not Quantity, of Intervention is What Matters

In most developing countries (and many industrial ones as well), the default condition is that the state substantially intervenes, so the key question is not quantity but quality of state intervention for economic development. Why does the quality of intervention vary despite the use of similar instruments of intervention? Why are the results so

varied? The Marxist as well as neoclassical theory of 'rent-seeking' states provides a better explanation for failures as opposed to successes.

Some common characteristics of a successful developmental state are: Degree of centralized decision making, agility in responding to shifts in markets and adapting to new technology (requiring collaboration between the bureaucrats and entrepreneurs), discretionary space and autonomy of technocrats involved in economic planning, meritocratic recruitment and incentives within the bureaucracy, and the political space within a nation state to make structural changes that require trade-offs between the interests of farmers, workers, and firms (Stiglitz, 1999, based on the experience of East Asia, and Bardhan, 1990).

Further, instead of a simplistic classification of states as authoritarian (China) versus democratic (India), state characteristics such as the extent of autonomy of decision-makers, provides insight into the degree of agency in economic development policy making. A key challenge is to craft a lasting coalition of interest groups where durability is a function of their ability to tackle thick economic development issues—particularly prosperity with equity. First, addressing broad equity concerns, as opposed to focusing merely on narrow state allocative efficiency, matters. Second, to address opposing interests and strike a bargain through participatory processes is important. Both of these are more difficult to achieve in societies that have highly

unequal income distributions and heterogeneous social groups, because finding common ground among unequal and different groups is more challenging.

An analysis of the *East Asian experience* (Datta-Chaudhuri, 1990, on Korea contrasted with India and Westphal, 1990, Amsden, 1985 on Taiwan, Stigltiz, 1996) suggests three key characteristics that *determined the extent to which governments succeeded in intervening in the market*. First, state interventions were crafted in tandem with markets. Second, active state cajoling and support of 'infant industries' helped domestic firms respond to international market opportunities, creating dynamic comparative advantage as opposed to protectionist lobbies. Three, despite imperfect markets in developing countries competitive pressures hasten innovation in firms. Thus, one returns to the paradox of free markets: Dynamic competition, a prerequisite for well functioning markets, requires an active, not minimalist state.

Finally, not economy wide, but targeted interventions are more effective—not hatchets, but scalpels—choosing to intervene in key sectors and policies at various stages during the struggle to industrialization or more broadly economic development. This targeted approach to interventions allows for efficient and effective use of limited resources of the bureaucracy, and identification and redressing of the social implications of policies in the dynamics of the market.

The next section explores the literature on state to market transition in the

context of infrastructure sectors that are often characterized by inefficient public utilities and in many cases have been treated with the antidote of privatization.

Infrastructure Economics

Privatization

Privatization is a retreat of the state, from the state as provider to enabler of goods and services. For this evaluation of the literature, the working definition[7] of privatization includes all "… initiatives to introduce market relationships into the bureaucratic production of public services" (Sclar, 2000, p.3). However, privatization is not a new concept. In the 19th century, the British Empire contracted out railroad construction, and New York City has been experimenting with contracting of solid waste collection for the last two centuries, both with varying degrees of success[8] .

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[7]The scope of definitions vary susbtantially. At the peak of privatization in 1995 the Wall Street Journal provided a boarder definition, "Privatization means relying less on government to meet people's needs for goods and services, and more on private institutions such as the marketplace, the family and voluntary organizations." (WSJ, 1995a). While Yarrow provided a more restricted definition, "… the sale of state owned assets; thus, a company is no longer state-owned when management control (measured as the right to appoint the managers and board of directors) passes to private shareholders." Although this definition has some limitations, (see Yarrow, 1986, p. 325).

[8] In15th century the Spanish Emperor contracted Columbus to discover new a new route to India where Columbus was financed by a pooled fund that was composed of Italian investors and the Spanish Monarch. In addition to a fixed income, Columbus had a revenue sharing agreement with his financiers for the potential earnings from his colonial discoveries (McDonald, 2005).

Likewise, in the 19th century, railroads were constructed through private contracts that were provided guaranteed returns on investment—although soon this led to rent seeking by private contractors and the state intervened. The challenges to outsourcing provision of infrastructure services and more broadly public goods is illustrated in Adler's (1999) account of contracting out solid waste

Rational—State Minimanlism

In the 19th century, while capitalism and associated urbanization and industrialization had created enormous prosperity and had solved production of private goods, it was accompanied with negative externalities, namely environmental degradation, slums, and inequality. In response, Webberian bureaucracies, that were hierarchical, autonomous, and meritocratic, were sought to address distributional challenges, including the provision of public goods. Depending on the degree of state intervention three typologies emerged—capitalist democracies, socialist welfare democracies, and socialist states. However, since the 1980s, with the collapse of the Soviet Union and rise of fiscally conservative governments, led by Margaret Thatcher in Britain, scholars and practitioners sought a retreat of the state. While the state had become less interventionist up to the financial crisis of 2007, regulation in multiple domains subsequently increased. Governments remain at the center of addressing social concerns, but "People merely expect government to do more with less." Sclar (2000).

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management to private providers in New York in the 19th century where repeatedly the private contractors shirked responsibility, cuts costs to maximize profits as the cost of quality of service. Many of these issues remain part of the contemporary debate on privatization of municipal services.

To achieve this state minimalism, a seven-fold rationale for privatization of economic infrastructure, that is electricity, water, and transport, was articulated. First, reduce public debt by raising funds from disinvestment in public assets. Particularly in the transport sector, assets were sold or leased to raise revenue as part of a macroeconomic stabilization strategy. In a similar vein, reduce expenditure by eliminating subsidies and introducing cost-recovery tariffs in the context of a shrinking public purse. Second, seek efficiency gains in public enterprises by creating new incentives and eliminating conflicting objectives of equity and efficiency in public utilities in favor of focused commercial objectives. Third, leverage private investment, particularly foreign direct investment, through reform of public services. Fourth, disperse ownership to facilitate for and within market competition. Fifth, foster growth of nascent local capital markets. Sixth, return to the private sector assets that were recently nationalized (Estache and Trujillo, 2008, p. 150, as well as Estache and Fay, 2007, p. 31). Seventh, expand infrastructure services to the poor. Eight, ideological commitment to reduce the role of the state. However, some of these rationales were inconsistent. For instance, increasing efficiency is at odds with the objective to fundraise because investors value relatively inefficient monopoly arrangements at higher prices than firms in competitive markets (WSJ, 1995a).

Latin America was the developing-country region to initiate privatization early and at scale. The emphasis laid on the above objectives varied and was a function of

initial in-country conditions. Countries like Argentina, Bolivia, and Peru had less bargaining power, as they were in the midst of a financial crisis requiring urgent privatization of politically contentious infrastructure, while Mexico and Brazil had greater bargaining power and thus adopted gradual reforms. Eastern Europe also experience rapid privatization after the fall of the Soviet Union. Smit (1994) provides an overview of *legal, economic, and social aspects* in Eastern Europe.

Evidence in Support for Privatization—Mostly Theoretical, Less Practical

Mostly theoretical, less practical, evidence was put forth in support of infrastructure privatization. Theorists argued in the 1980s that there was a renewed potential for markets and competition to improve infrastructure service production and provision due to technological change and regulatory innovation. This was a departure from the post World War statist era where public monopoly provision of infrastructure was justified due to economies of scale (unit costs decline as output increases) and economies of scope (joint production and delivery of service costs less than separate production). In the past, to prevent abuse of market power, these monopolies had been publicly owned and managed. In addition to economies of scope and scale, infrastructure services were bundled into integrated monopolies to allow for cross subsidies from profitable segments to service unprofitable ones, specially the poor (World Bank, 1994, p. 52). However, other critical reasons for public provision of

infrastructure remained unaddressed, including issues of eminent domain, environmental management, and strategic concerns.

Technological innovation, in the cases of telecom and power generation, allowed for achieving competitive unit cost at lower scales. Institutional innovation in regulation allowed for unbundling of activities that no longer benefited from economies of scale from those that continued to benefit in this regard. The idea was to allow for the introduction of competition in non-monopoly market segments. It was argued that potential abuse of market power by private monopolists, who tend to limit output so as to hike prices and profits, was less of a concern in developing country markets where demand for infrastructure services far exceeds supply. The assumption was that it would be in the interest of monopoly providers to expand services rather than restrict them (World Bank, 1994, p. 52). While challenges to unbundling were posed by increasing transaction costs that result from fragmentation of a monopoly firm, in theory it was argued that new technology allowed for some of these costs to be overcome.

In practice, privatization had been successful in the production and provision of private goods like cars, cement, and steel. To enhance opportunities for private participation and associated competition in infrastructure, two types of unbundling were possible. First, vertical unbundling of the supply chain - for example, separating power generation from power transmission and distribution. Second, horizontal

unbundling of market segments by separation along geographically distinct domains or by types of service (Gomez-Ibanez, 2006). For example, unbundling railways by geographic zones they serve, or splitting fixed-line telephony from wireless, and similarly, local calling service from international.

Four market-based solutions were proposed to substitute government monopolies: First, indirect competition from substitutes; Second, direct competition within the market (contested or contestable markets); Third, indirect competition for the market; fourth, private ownership of monopolies.

To calibrate degree of private participation for competition for the market, four types of contracts were proposed: First, service contracts in which public utilities outsource specific tasks to private firms (short term, time bound, usually annual); Second, management contracts where utilities remain government owned but operation and management is outsourced to private firms (1to 3 years); Third, lease contracts, these are longer term management contracts where the government finances assets while the private firm has access to the revenue stream but bears commercial risk (6 to 10 years); Fourth, concessions contracts where assets remain publicly owned, but in addition to lease arrangements, investment in fixed assets is included (up to 30 years). Here, the private provider bears both commercial and financial risk (Triche, 1993).

Results—Uneven and Account for Small Fraction of Total Demand

In infrastructure that has public good characteristics, the privatization results are uneven and account for a small fraction of total demand. Privatization has been successful where outputs do not have public good characteristics, production and provision do not require monopolies, and are not associated with large positive or negative externalities. In other words, the production of private goods characterized more by spot market attributes than those of contract markets.

British Railways, A text-book case of railroad privatization by unbundling

By the mid-1980s, Railways around the world faced stiff competition from alternate modes of transport that resulted in declining market share for rail freight and passenger transport. Private Railways in the U.S. and Canada were facing bankruptcy while publicly owned Railways, like British Railways, were confronted with rising fiscal burdens from subsidies required to sustain operations. (Gómez-Ibáñez, 2006, p. xi).

Governments introduced two types of competition to improve the performance of Railways. First, ***vertical unbundling*** aimed at competition within Railways—through unbundling and separation between infrastructure ownership and operations so that various train operators could compete like truck operators, power producers, or wireless telephone operators. This approach was adopted in Europe and Australia, at times accompanied with privatization.

Second, ***horizontal unbundling*** aimed at competition for the market—privatization of Railways with the aim of harnessing efficiency gains from competition among investors. Competition for private ownership or management was expected to induce incentives for efficient management.

The rest of the reformers adopted privatization and deregulated while maintaining vertically integrated Railways.

Introducing competition through vertical unbundling was at the center of British rail privatization that began in 1993 (Glaister, S. 2006). Competition for passengers and freight, for labor and rolling stock, and for train operations and engineering was introduced (Forester and Castles, 2004). After Margaret Thatcher's government during the 1980s had privatized various utilities—telecom, electricity, water, gas, bus—several forms of vertical and horizontal unbundling of British Railways were considered. In 1993 with the arrival of John Major, another Conservative Prime Minister, British rail privatization was implemented to dismantle a vertically integrated public monopoly, organized quite like the Indian Railways, which was inefficient and unresponsive to customer needs. As a first step, through vertical unbundling, the ownership of tracks (Railtrack), stations and other infrastructure was separated from train operations and management. Initially the focus was on unbundling train operations and privatizing train operating companies, while keeping Railtrack (track infrastructure management) under public ownership. The Conservative government, unsure of winning in the next

elections, rushed into privatizing Railtrack by 1996 through public stock options (Gomez-Ibanez, 2006, p. 6–7). British Rail was unbundled into 70 firms, including Railtrack and 25 train operating firms (based on service class and destinations). Franchises for 7 to 15 years were auctioned for train operating firms. An independent regulator was established to determine the user-fee Railtrack would charge train operators for accessing tracks and stations. While the regulator allowed open access to freight operators, subject to capacity limits, passenger franchises were protected from competition as they faced severe competition from alternate modes and required subsidies to remain viable. The passenger franchises were awarded to the firms that sought the least subsidies for a given route, and restricting competition on these routes allowed for bids with relatively lower subsidies. The motivation for vertical unbundling was primarily to introduce train-on-train competition. This was achieved through liberalizing access to train operations and separation of train and track ownership. While entry barriers were removed, not many challengers to incumbents emerged as train operation requires specialized stock and staff that were not easily available in the short run. As British Railways reforms demonstrated, vertical unbundling possessed serious coordination problems. While in the past rail track maintenance and train operation were with one firm, the state-owned enterprise, now these tasks were split into two separate entities. After the unbundling, coordination had to be negotiated through contracts. Gomez-Ibanez (2005, p.19) argues that

unbundling of Railways is less effective than outright privatization as train-on-train competition offers no incremental gain over intermodal competition. Additionally, quality of service depends on train-track coordination, which is harder to achieve when these functions are split between independent firms. This coordination failure was the case for British Railways as well.

In 2001, during the Labor government, Railtrack was confronted with costs due to high profile train accidents and associated disruption of service and challenges in track upgrading leading to bankruptcy. The Labor government restructured Railtrack into Network Rail, a non-profit firm under state-management and ownership. Several explanations are provided for this unsuccessful privatization. First, instead of vertical unbundling of tracks and trains, perhaps geographically distinct horizontal unbundling (similar to the structure of British rail pre-nationalization in 1948) would have yielded better results because unlike roads, telecom or electricity, railroads have special coordination requirements that require joint management of track and trains. (Gomez-Ibanez, 2005, p. 19; also see Gomez-Ibanez, 2003, p. 331–337) Second, competition was not effectively introduced, and hard budget constraints were not enforced during rail privatization due to political interference, particularly during Labor party rule. Thus, while British Rail incurred the cost of privatization, but prior to reaping benefits of privatization the process was disrupted (Glaister, 2006, p. 49). Third, rail privatization, while unsuccessful in Britain, has worked well in other parts of Europe.

There were several critiques of unbundling Railways. Given intermodal competition train-on-train competition is unnecessary, and is observed to be slow to materialize in practice. Unbundling makes coordination difficult, both among operators as well as between operators and infrastructure asset managers**.** Lack of coordination resulted in cost overruns and reduced safety leading to the bankruptcy of Britain's Railtrack in 2001. There was a trade-off between benefits from train-on-train competition and the additional costs of coordinating train and track operations undertaken by separate firms; the benefits did not exceed the costs.

The benefits of unbundling Railways were identified as the following. First, unbundling has worked outside Britain. Second, British failure is attributed to a lack of political commitment on the part of the Labour Government. Third, outright privatization has limited success in developing countries as the state and private operators disagree "over tariffs and conditions of services." (Gómez-Ibáñez, 2006, p. xii).

In sum, deregulation, the reduction in government control of tariffs and type of service, was the text-book solution. Unbundling requires a greater role of government in regulating the market to avoid mergers which lead to vertical integration; furthermore, coordination is required among train operators and the operators of train and track companies respectively. Deregulation is common where competition from alternate modes of transport and locational competition is intense. In practice, a

combination of unbundling, privatization, deregulation, or both were experimented with in developed as well as developing countries with a spectrum of results. For the purpose of this dissertation, the substantive lesson is that privatization is not a sufficiency condition for efficiency gains, and may be accompanied with equity losses.

In developing countries—some efficiency gains, not much investment outside telecom

Privatization of infrastructure in developing countries brought some efficiency gains in public utilities, but little investment given the scale of the challenge for expanding much needed infrastructure services (Table 1).

Table 1. **Infrastructure deficit in developing countries disaggregated by income**

Country income level	% of population with access to networked electricity (2000)	Number of fixed and mobile telephone subscribers per 1,000 people (2005)	% of population with access to improved water sources (2005)	% of population with access to sanitation (2005)
Low	31	114	75	61
Lower-middle	82	511	82	77
Upper-middle	87	901	94	91
Developing	58	523	83	80

Source: World Development Indicators, 2007

Data on private sector finance for infrastructure are limited to commitments, not actual disbursements. Thus, the figures that follow are overestimated. Between 1990—2005, about US $1 trillion was committed and these private international financial flows

peaked in 1996 after which, along with the Asian financial crisis, these commitments steadily declined (Estache and Goicoechea, 2005). The investments were geographically and sectorally uneven. First, Latin America, followed by East Asia, gained the most, while Africa and South Asia each received only 5% of the total financial flows. Even within these poor regions, investment is concentrated among a few countries. Second, telecom followed by power generation, received 75% of the investment, while water and electricity (transmission and distribution) as well as transport received the remaining 25%. Third, of all investments from 1990 to 2005 in developing country infrastructure, only 20 to 25% was from the private sector. The rest was provided by the state. In sum, private participation in developed countries is much less than widely assumed by scholars and practitioners. A review of privatization investments in infrastructure sectors indicates that private financial flows[9] remained a small fraction of total demand, which is estimated at US $900 billion a year for developing countries alone (World Bank, 2008). Fourth, where large public and private firms have failed to serve the poor, small-scale providers play a central role. For example, in 23 African countries small-scale-private providers supply water to the slums (Mehrotra et. al., 2005

[9] In lower and upper middle income countries, between 2000—05 committed private flows for infrastructure, as 0.85% of GDP, or about 25 % of estimated demand. In Least Developed Countries, during the same period, 0.69% of GDP was committed, accounted for 10% of estimated demand.

as well as Kariuki and Schwartz, 2005). Finally, local large private investors account for up to half of the different types of privately financed projects.

Latin America was the region that received the most private investment, although the results were mixed. The variance in privatization results within Latin America can be explained by some of the following characteristics. First, as new technology allowed for divisibility in production and provision of services, like wireless telecom or power generation, multiple providers could compete with relatively lower levels of investments. Thus, telecom and power drew private interest, while the rest did not. Second, sectors where user fees are charged and that are less dependent on equity considerations, telecom for instance (but not water), had more success in drawing private firms. Third, countries facing large fiscal deficits were able and willing to take politically difficult disinvestment decisions and liberalize markets, including for infrastructure[10], when necessary. Fourth, the privatization of infrastructure through lease or concession of public asset *stock* had positive effects in the short-run as cash infusion allowed the reduction of the fiscal debt burden and helped macroeconomic stabilization. However, in the medium-term the *flow* effects are eroding these gains. Renegotiation of contracts by private providers are reducing private investment

[10] Infrastructure privatization is highly contentious politically and thus unless absolutely necessary, governments in developing countries avoid quick disinvestments.

commitments and increasing demands on public subsidies. Thus, the gains from stock effect are being eroded by the flow effect. Moreover, high expectations from increased private investment crowded out public flows, resulting in a net reduction in total infrastructure spending. Fifth, privatized infrastructure had productivity gains and quality of service improvements. Labor was retrenched in the short-run, leading to productivity gains per employee as well as improvements in service quality when compared to pre-privatization levels. However, public opinion surveys continue to demonstrate large dissatisfaction among people (Estache and Trujillo (2008). Details of such equity-efficiency trade-offs are discussed later in this Chapter.

Critique

There were two main theoretical shortcomings of the privatization assumption in infrastructure. **First, infrastructure privatization was conceptualized within the neoclassical market models of price mechanisms built around spot markets.** However, infrastructure sectors are characterized by incomplete contractual markets and need to be re-conceptualized in the context of transaction cost economics[11] (Coase,

[11] As Demsetz (1988) in Theory of the Firm Revisited, points out firms choose to centralize within their hierarchically organized structures various forms of production in order to reduce transaction costs (Coase, 1937) associated with the price mechanism in a decentralized neoclassical market arrangement. Privatization debate has neglected this crucial area of research that provides insight into why both public and private sector firms choose to have large hierarchical organizational structures. Furthermore, unlike

1937, Williamson, 1985, North, 1987, Demsetz, 1988). Unlike perfect spot markets where multiple profit maximizing producers compete to engage with utility maximizing consumers mediated by the price mechanism; in practice, infrastructure markets are imperfect due to information asymmetries (Stiglitz, 2000), barriers to entry, externalities, bounded rationality (Simon, 1947; 4th ed., 1997), and incomplete markets requiring national security as well as equity consideration. Moreover, even where perfect markets exist they yield Pareto-optimal distributions that neglect initial wealth inequalities and thus avoid broader distributional concerns (Arrow, 1974) that are essential to basic infrastructure services. As a result, markets in practice exemplify imperfect competition, and firms in many sectors associated with public goods provision have market power. Additionally, firms attempt to consolidate markets so as to extract monopoly rents. The efficient market hypothesis is further compromised in case of public goods provision because political considerations coexist with contradictory economic objectives. Furthermore, the choice between public or private production is not obvious in the case of delegated arrangements[12] where government

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individuals, organizations process and respond to incentives in complex ways as they balance reactions to a combination of external and internal pressures (Hirschman, 1970, in Exit, Voice and Loyalty).

[12] The make or buy decision is central to privatization. If the decision is to buy the choice is between 'spot markets or a contract market' (Sclar, 2000, p. 18). In spot markets that tend to exist for standardized goods and are competitive markets, the decision is based on cost of internal production versus external purchase. Here transaction costs are negligible. In contrast, contract markets, that tend to be less

(principal) contracts a private or public sector (agent) to deliver public goods. Operating natural monopolies or addressing externalities creates complex contractual choices and associated transaction costs due to uncertainty and information asymmetry that pose similar challenges to both private and public providers (Sappington and Stiglitz, 1987).

In sum, the privatization debate has neglected the new institutional economics literature, in particular, organizational issues involving transaction costs of contracting out production. Instead, simplified assumptions such as public monopolies with centralized hierarchical in-house production are inefficient, and competitively procured contracting can yield efficient production are erroneously held. Thus, privatization is considered to be the optimal solution. However, in practice contracting out services to private players for public goods often lacks sustained competition (direct or indirect), and long-term contracts for complex tasks leave ample room for unanticipated contingencies that cannot be provided for in contracts. In these incomplete contracts the issue of discretion associated with residual rights is a critical factor in determining

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competitive and cater to provision of specialized tasks (defense, space travel, or even infrastructure services) involve complex transactions and associated high costs. The process requires prices to be bargained as markets are imperfect (require price discovery), oversight to ensure consistency in quality, and mechanisms to tackle high social cost contingencies.

the choice between governments making or buying public goods. These discretionary residual rights are not limited to infrastructure contracts. Mavroidis (2007) provides a comprehensive case-law based account of complexities associated with incomplete contracts in the context of international trade agreements. The outcomes of contracted services are difficult to determine and are contingent on the tripartite combination of competition at entry (screening), maintaining contestability of markets, and public control over residual rights. In sum, competition through contracting is an assumption that holds only under very specialized market conditions and should not be taken for granted in privatization of infrastructure.

Second, user-fee-based financing to replace tax-based financing led to wide spread unpopularity among poor consumers. First, the poor greatly value basic services as demonstrated by the very high prices they are willing to pay for water and electricity to informal vendors in African slums; however, in many cases, non-budget constraints such as inability to access formal institutions mean that the poor are unable to access adequate services. Second, user-based financing neglected positive externalities from access to basic services for the poor, leaving positive externalities of private provision uncompensated. Third, the poorest are unable to afford market prices for services and private firms focused on profit maximization were unwilling to subsidize and provide access to the poor. The cost of capital for private firms and associated rate of return in developing countries is over two times greater than that for equivalent infrastructure

investments in developed countries due to exchange rate fluctuations, variability in demand and regulatory and political risks. The cost of capital is escalating due to the recent financial sector crisis and associated credit rationing. This makes cost recovery tariff levels rather high and politically infeasible to implement, especially in basic services like water supply and mass transit. This mismatch between the needs of the poor and their ability to afford services as well as private benefits (access to services) and public benefits (public health gains and so forth) should have been bridged through publicly financed subsidies instead of regulatory coercion of the private sector to serve the poor.

Alternatives

There is a spectrum of alternatives being researched by scholars and implemented by policymakers. Alternatives range from privatization to corporatization, which is operating public utilities under private company law. Such considerations include fiscal federalism accompanied by decentralization of service provision and innovations in independent regulation through a combination of need-based contracting and in-house experts. Hansmann (1980) and Krashinsky (1986) articulate the role of non-profits to compensate for contract failure in public goods provision, particularly when the evaluation of quality of services rendered is difficult in the short-term and where cost of service is borne by individuals that are not the beneficiaries of the service—for

example in the case of donations made by Americans to feed hungry children in India or, to a lesser degree, when parents pay tuition for the education of their children. Two other alternatives that I consider critical are discussed.

First, focus on pro-poor service expansion—be it public, private, or both. In the privatization reforms conceived under the neoclassical price mechanisms, subsidies were seen as market distortions. In contrast, practitioners, while agreeing to some degree of ineffectiveness (poor targeting, capture by middle class) and distortions due to subsidies, argue that these are essential for increasing access to the poor in order to make services affordable. Yet, a neglected attribute is the market failure in pricing total benefits of improved services. The basis for subsidies need not be for equity reasons alone. As access to improved services has positive externalities for public health to society, as well as industry (economy), these benefits should be covered through subsidies (instead of constituting a proportion of the user fee). Users, particularly the poor, should pay for the private benefits of these services only. This is an area that needs further research for developing a programmatic approach to enhancing infrastructure services to the poor. Four illustrative instruments to increase access to the poor include: First, specific service obligation contracts for utilities to serve the poor, rather than avoid them, for example through output-based aid or slum franchises like sub-network master-operator arrangements (Mehrotra, 2005); Second, reducing the upfront cost of new connections through amortization of costs built into the tariff, or

direct and targeted subsidies for connection to the poor; Third, reducing institutional and location-based barriers to bill payments by the poor; Four, enhancing consumer voice through citizen report cards; this is a utility benchmarking process that places citizen involvement at the center of accountability and transparency.

Second, reinventing the state. Given the above constraints to private investment in infrastructure, the role of the state needs to be re-conceptualized keeping three central issues in mind: The extent of public provision; the type of regulation in politically sensitive sectors with market failures; and appropriate distribution of provision and regulation responsibilities among levels of government. Public ownership and provision dominate economic infrastructure. Most infrastructure assets in developing countries remain publicly owned (Table 2). 80% of new infrastructure investments in developing countries between 1990–2005 were publicly financed. Of the remaining 20% that was privately financed, some contracts have been renegotiated, seeking increased public assistance for both capital investments and operation and management.

Table 2. **Extent of public ownership**
(Percent of countries *without* large private outlays in infrastructure2004)

Income Level	Electricity generation	Electricity distribution	Water and sanitation	Railways	Fixed-line telecoms
Low	59	71	82	66	50
Lower-middle	52	63	50	74	38
Upper-	42	52	63	40	28

middle					
Developing	53	64	65	64	41

Source: Estache and Goicoechea 2005. Note: Data for Railways are from 2002.

However, public investment is about "50 to 120%" less than the estimated demand for infrastructure that would support high economic growth rates. In resource-scarce economies, infrastructure investment tends to be demand-driven, as opposed to supply oriented, (see Hirschman's (1958) development via shortages). However, this shortage in public funds, in part, was the motivation for privatization.

Implications for policy makers are to seek mechanisms to improve the performance of existing state-owned enterprises and public expenditure effectiveness. Most scholars recommend corporatization but this approach confronts many of the challenges that privatization faces. Further, the private sector has cherry-picked the less politically contentious and easier to fix utilities, leaving more difficult utilities to be addressed (Gomez-Ibanez, 2006). This makes understanding the conditions under which state-owned enterprises improve infrastructure services an important area of research that has been neglected over the last two decades (Mehrotra, 2009, Sclar, 2000, p. 61). This dissertation serves to fill this gap.

Equity-Efficiency Trade-offs

Policy reforms for infrastructure privatization during the 1990s articulated that short-run equity losses were inevitable for greater efficiency in the medium-term, which

would eventually lead to long-term equity gains. This section weighs up the theoretical arguments and empirical outcomes of these equity-efficiency tradeoffs with regard to privatization of infrastructure state-owned enterprises in developing countries to evaluate the conditions under which such trade offs hold true.

Economics Theory

There are two broad debates on equity-efficiency trade-offs in public economics. The first, concerns the terms of trade, which is how much efficiency is lost to gain a unit of equity? The second is value-laden: How much does a society value reducing inequality versus inefficiency? (Stiglitz, 2000, p94). Differing levels of prosperity among nation states can be explained according to North (1990), in large part, due to developed country preferences for productivity-oriented institutions over redistributive ones. However, both of these debates assume a fixed-pie scenario where equity can only be achieved at the cost of efficiency or visa versa, an assumption that is questioned below. For this reflection on the literature, efficiency gain is defined as more output for a unit of input, essentially a measure of productivity. Equity gain concerns the redistribution of benefits that accrue to marginal populations, namely from non-poor to poor, or that benefit only the poor without taxing the non-poor, as in the case of pro-poor Pareto-efficient outcomes.

Equity and Efficiency In Infrastructure Privatization

The policy case of infrastructure privatization argues that public utilities are vertically-integrated, inefficient, state-owned-infrastructure monopolies, whose efforts to achieve equity are ineffective. Public utility subsidies are untargeted, often captured by the middle class and the rich, and only indirectly serve the poor consumers, if at all. Moreover, the subsidies are large enough to cause fiscal deficits that threaten the very viability of public utilities. In order to continue infrastructure services, it is imperative to enhance the commercial viability of these utilities—ostensibly through efficiency gains from privatization (Kessides, 2004, Yarrow, 1999, Shirley, 1999). Thus, infrastructure privatization poses the equity-efficiency conundrum.

It is argued that in the short-run, equity will be compromised, at least in the popular perception, due to retrenchment, fare-hikes or the sale of national assets that may benefit local elite and 'foreign corporations'. In return, privatization will yield much needed efficiency gains through: a reduction in subsidies, better targeting of residual subsidies, a reduction in non-revenue services (disconnection of illegal services that tend to benefit the poor), improved profitability, gains for investors, and broader growth and welfare benefits to society. In the long-term, with these efficiency gains, firms get better access to services and new jobs are created. As the utility becomes financially viable, it further expands services to previously underserved poor

neighborhoods, resulting in equity gains. Thus, in the short-run, equity needs to be compromised so that the utility can pursue efficiency gains that eventually yield long-term broader equity goals. In sum, a vicious cycle is converted to a virtuous one. However, privatization of state-owned enterprises in developing countries over the 1990s yielded a wide-variety of outcomes. An analytical framework is discussed to articulate the conditions under which equity-efficiency trade-offs occur, or not.

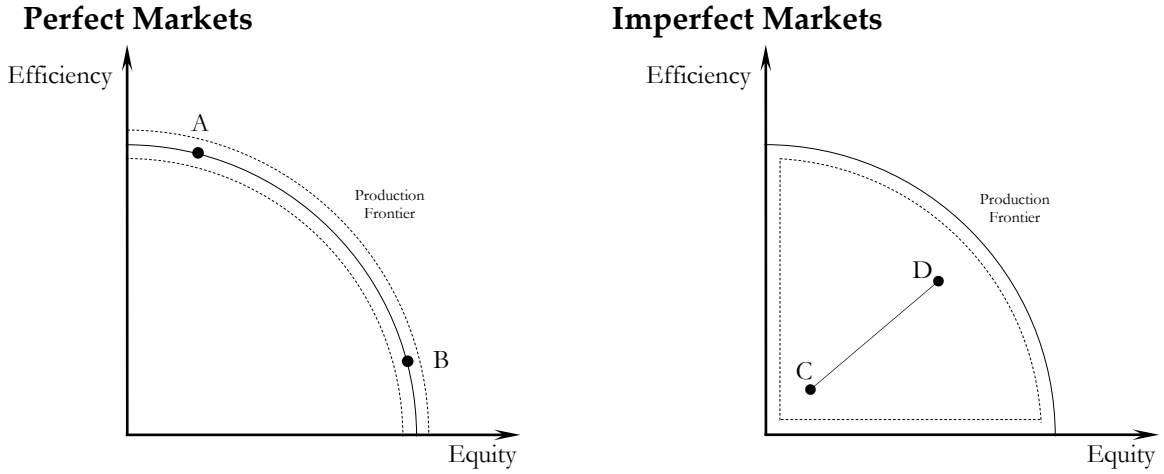
Framework For Assessing Equity-Efficiency Trade-Offs

Trade-offs between equity and efficiency are imminent when an economy is at its production frontier and perfectly competitive with no asymmetries of information, no incomplete markets, no externalities and so forth.

Conditions Under Which Trade-Offs are True—Strictly Substitutes

Case 1: In perfect markets, efficiency accrues only at the cost of equity. For a given level of technology, capital, labor, and institutions, when the economy is on the production frontier (perfectly competitive), equity gains are possible only by compromising efficiency. This requires moving along the production frontier, that is from A (more efficient, but less equitable) to B (more equitable, but less efficient), see Figure 2. Under such rare perfect market conditions, efficiency-equity trade-offs hold true.

Figure 2. **Perfect and imperfect markets**



CASE 1
Efficiency-Equity can only be substitutes
Perfect markets, movement along production frontier

CASE 2
Efficiency-Equity can be complements or substitutes
Imperfect markets, movement within production
Frontier

Source: Adapted from Birdsall and Nellis, 2003

Conditions Under Which Efficiency-Equity can be Complements, Substitutes, or Both

Case 2: Imperfect markets offer opportunities to simultaneously enhance efficiency and equity

Most economies around the world are not perfectly competitive, particularly so in developing countries. As these economies are not at their production frontier, simultaneous efficiency and equity gains can be achieved which makes the trade-off unnecessary. That is moving from C (inefficient and inequitable) to D (more efficient and equitable), see Figure 2.

In principle, given that efficiency and equity can be simultaneously addressed, as economies are not perfectly competitive and within the production frontier, it should be possible to privatize so as to achieve both objectives. "To the extent that privatization reduces monopoly rents held by the wealthy, for example, it is likely to increase both efficiency and equity in the economy as a whole." (Birdsall and Nellis, 2003, p. 1619). However, in practice, depending on the initial socio-economic conditions and the process of privatization, a variety of outcomes occur when infrastructure is privatized. Some stylized country cases illustrate these concerns.

In Russia, initially low levels of efficiency, along with the assumption that privatization of public monopolies will result in competitive markets, had unexpected outcomes. First there were efficiency gains due to privatization but at the cost of equity. Infrastructure privatization benefited a few oligarchs at the cost of many working class and poor people who lost jobs, and who also sold shares in public utilities at low prices. Second, the private monopolies further eroded competition, leading to loss in efficiency gains and further loss of equity as services were cut and prices rose to seek monopoly rents (Roland, 2008, Sclar, 2000, Kikeri and Kolo, 2006). Efficiency and equity were initially substitutes; this was followed by profitability and efficiency being substitutes, where profits accrued at the cost of efficiency, leading to adverse impacts on equity.

In Peru, the privatization of a state-owned electricity company that was inefficient and inequitable, because it did not serve the poor and subsidized service was

provided to the rich and middle class, had initial gains in efficiency. Subsequently, there were gains in equity as services were extended to the urban poor, although the rural poor remained underserved. Thus, privatization in this case had efficiency gains that preceded equity gains, and the equity gains were unequally distributed among urban and rural poor. Here, efficiency and equity were simultaneously complements and substitutes.

In a study of infrastructure privatization in Argentina, Bolivia, Mexico, and Nicaragua, McKenzie and Mookherjee (2003) found that while on average price of services remained the same, poor workers lost jobs due to utility restructuring. Improvements in the quality of service and expansion of services to poor neighborhoods disproportionately benefited the poor more than non-poor households. However, the poor who lost jobs where not the ones who were supposed to benefit from better services. Here again, while equity and efficiency were strictly complements, equity was achieved for some at the cost of others.

In Britain's electricity privatization, by contrast, while there were unexpectedly large efficiency gains, these gains were captured by the newly appointed private firms because the regulators were not effective in transferring benefits to the consumers (Hunt, 2002). This resulted in efficiency being achieved at the cost of equity even though production occurred within the production frontier (due to incomplete markets). In this case, while efficiency and equity were potential complements, in

practice they were substitutes. For British Railways, introducing competition, in passenger and freight, labor and rolling stock, train operation and engineering, was at the center of privatization efforts that began in 1993. After Britain privatized telecom, electricity, water, gas, and bus services, the Railways were vertically unbundled such that the ownership of tracks, stations and other infrastructure was separated from train operations and management. British Rail was unbundled into 70 firms, including Railtrack, that managed track infrastructure and two dozen train operating firms (based on service class and destinations). A series of complex transactions followed where certain groups of passengers, freight customers, laborers, franchise owners won while others lost, through a complex arrangement of equity-efficiency gains and losses. Eventually, competition was not effectively introduced and hard budget constraints not enforced during rail privatization due to political interference. While British rail incurred the cost of privatization, prior to reaping benefits the process was disrupted (Glaister, 2006, p. 49, and Gomez-Ibanez, 2006, p. 6-7). This resulted in a loss of equity in the short run due to retrenchment of labor and reduction in unprofitable services, while the long-run efficiency gains were lost owing to a misjudged privatization process. In sum, while there were no efficiency gains, equity was compromised as consumers paid the price of failed privatization. Table 3. Summarizes a range of considerations that affect distributional and productivity outcomes of infrastructure privatization.

Table 3. **A Summary of distributional effects of privatization**

	Privatization	Potential equity and efficiency outcome
Assets distribution	Public asset sold to private sector	• If asset is sold below value (due to distress sale or corruption) equity declines
Labor asset utilization	Often improves return on labor	• Retrenchment of unskilled workers that find it difficult to get new jobs reduces equity • Growth and productivity gains in the economy can create new job that enhance equity
Capital asset utilization	Often improves return on capital	• If new owner utilizes assets better efficiency gains, else losses
Fiscal effects	Increase or decrease tax burden, benefit from improved public services, privatization receipts may be consumed to reduce debt burden	• Tax burdens may shift among income groups • Poor tend to rely more on public services but access and benefits differ by communities
Price and access	Increase, decrease, or both	• Prices decrease if stiff competition or some efficiency gains are transferred to consumer due to regulation. However, in infrastructure price increase is common, as in past under pricing was the norm or regulation of monopolies is weak • Price for rich and poor may also change differentially as quality of service and willingness-to-pay varies. Additionally, for the same nominal price, lower quality of service results in a higher real price. • In infrastructure the poor are disproportionately burdened by cost recovery tariffs, disconnection of illegal connections, collection of arrears, fees to expand network in underserved areas (usually poor communities,

	slums), improved service quality for higher user fee

Source: Author's compilation

Finally, the conditions for near perfect markets (Case 1) and imperfect markets (Case 2) can also coexist, or one can evolve into another within a country context. For example, in the case of India's liberalization and associated competition in telecom markets, which had been dominated by an inefficient and inequitable state-owned enterprise, dramatic efficiency and equity gains were achieved. Wireless service rapidly improved in quality with new technology that allowed divisibility and lowered the barriers to entry (due to significantly lower initial costs); this increased competition and lowered the cost of service, making it more affordable for the poor. This is a classic example of how infrastructure can successfully be provided by the private sector when competition is possible due to new technology, low negative externalities and the interests of the consumer can be protected by effective regulation[13]. While the Telecom began as a Case 2 example of an imperfect market, it is rapidly evolving to resemble Case 1 like conditions of a competitive market, where, eventually, hyper-efficiency gains will accrue at the cost of equity. For now, efficiency and equity are complements.

[13] However, in later 2010 due to discretionary allocation of spectrum bandwidth a large scale loss in public revenue was uncovered.

Equity and Efficiency Outcomes Offer Lessons

Based on two decades of infrastructure privatization in Latin American the following ten attributes illustrate the complex relationship between the privatization assumptions and associated equity and efficiency gains or losses over the short and long-run, offering lessons for future consideration. First, the fiscal costs of infrastructure provision remain to be addressed. Despite privatization, infrastructure requires continued public investments in capital stock and public subsidies in operation and management (flow). Thus, the assumption that market distorting subsidies will be eliminated with efficiency gains from privatization do not hold in practice. Second, in non-competitive sectors (Case 2 conditions) the rate of return has a greater spread than cost of capital, which continues to increase due to political and regulatory risks, thereby making private participation riskier and more difficult to sustain (Estache and Trujillo, 2008). Third, regulatory authorities were unable or unwilling to transfer a portion of productivity gains (and associated profits) from utility privatization to the poor. This lack of equity gains or distribution of benefits is a source of grave discontent, even as efficiency gains have been achieved. Fourth, retrenchment, although small in proportion compared to the total labor force, gains attention. While jobs were lost in the short-run, subsequently, with the expansion in the supply of services, many workers were re-employed in the medium-term. Additionally, grievances with job losses associated with macroeconomic conditions were also ascribed to privatization, leading

to large-scale discontent. Fifth, regardless of whether price increases were accompanied by better services, or prices decreased for the same level of service, in most cases government subsidies decreased with the aim of improving cost recovery. In general, when the total cost to the poor for basic services increased, it led to widespread discontent. This was epitomized in Bolivia's failed water concession between Cochabamba city water works and Bechtel, a British water conglomerate. Sixth, taxes on privatized services increased the burden on the poor. Various levels of governments have been imposing taxes on privatized infrastructure, all of which is passed on to the consumer by the private providers. Furthermore, private utilities are sharing efficiency gains with the government rather than the user, and under regressive tariff regimes this disproportionately burdens the poor. Thus, to analyze the equity implications in diverse contexts, tariff comparisons need to consider taxation levels, as taxes vary by country. Seventh, frequent negotiations by private operators have resulted in a reduction in investment commitments, increase in subsidies, or rate hikes, all of which have created uncertainty for consumers and public coffers, posing challenges to the true cost of efficiency from privatization. Eight, competition for the market in infrastructure services has been weak with two or three bidders on average for any given concession, posing challenges to ex-post efficiency gains (Estache and Trujillo, 2008). Ninth, each infrastructure market has a small number of dominant players that account for most of the transactions. This further dampens potential for competition. For instance, water

privatization was dominated by 5 major European firms. Tenth, corruption scandals associated with privatization have also shaken public confidence. In sum, the efficacy of privatization needs to be assessed in the context of the broader socio-economic transformations that have often resulted in a complex mix of equity and efficiency outcomes that vary by sector, with time, and for different socio-economic groups.

Causal Inference of Equity and Efficiency Outcomes Needs Caution

While equity gains or losses (or in some cases efficiency gains that preceded equity gains or losses) correlated with privatization, they may be affected by several confounding or non-confounding covariates such as other concurrent processes of liberalization or other state-market transformations. Some of these covariates in the context of Latin America's privatization were discussed earlier. Thus, equity impacts of privatization require studying them on a case-by-case basis contextualized within the broader the political economy of reforms. Likewise, privatization is neither necessary nor sufficient for efficiency gains. This is because efficiency is a function of several variables including market conditions, regulation, competition policy, and access to credit, among other things. Short-run gains from privatization are from sale receipts that provide a one-time infusion to the public coffers. The longer-term gains occur with reduction in public subsidies for the provision of these services and higher tax revenue from more profitable private firms. In sum, the efficiency and equity impacts of

privatization can have a variety of outcomes contingent on initial conditions of the economy, the nature of privatization process, social, political, and economic context post-privatization.

Gap in the Literature—Neglect of Public Infrastructure

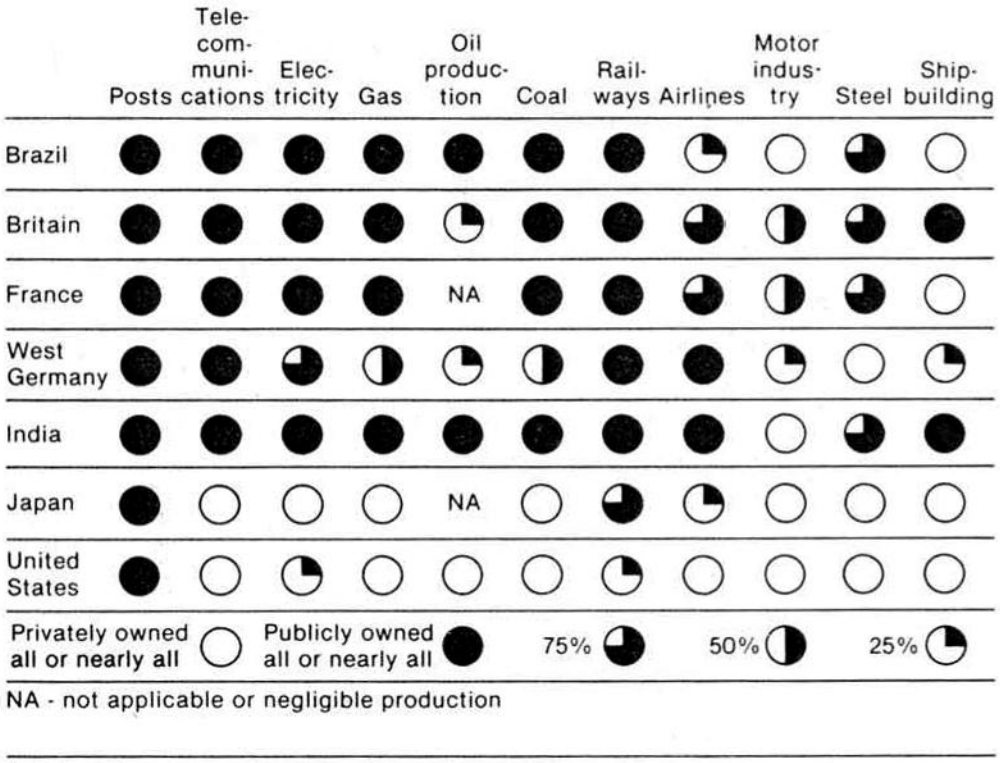
To extend the bounds of the literature on infrastructure economics and associated policy prescriptions in the context of developing countries and emerging markets, this section identifies gaps and articulates my research question. In particular, my research re-conceptualizes infrastructure reforms in the context of contract markets as opposed to spot markets and the associated choices of make-or-buy decisions in the production and provision of infrastructure services, including the internalization of externalities.

Presented here is a review of the gaps in pivotal literature focused on an overview of the debate between theory and practice, and addresses the following issues. First, from a historical perspective based on the earlier discussions, despite the private origins of infrastructure, I explore why state-owned enterprises exist and what their limitations are. Second, the motivations for governments to privatize their public utilities are presented. Third, there is a discussion about the implications of the next generation of reforms like corporatization, and its critique. In conclusion, if there is inevitability to state-ownership in infrastructure, then what are the approaches to improving infrastructure efficiency?

State or the Market?

Many kinds of infrastructure services have had private origins, be it the railroads sparked by the invention of the steam engine by James Watson, the telephone by Graham Bell or electricity by Thomas Edison. Further, after World War II, with the birth of nation-states in Africa and South Asia, and reconstruction efforts in Europe, many of these services were nationalized (Figure 3). However, with the expectation of enhancing efficiency, inviting private investment, and expanding supply, in the early 1990s many developing countries followed the liberal reforms pioneered under Margaret Thatcher in England (Shirley, 1999, p.26). Yet, Gomez-Ibanez (2003, p.1), notes that in the long-term the policy emphasis on privatization and nationalization has been cyclical.

Figure 3. **Extent of state ownership in seven countires, 1980s**



Source: McCraw 1986.

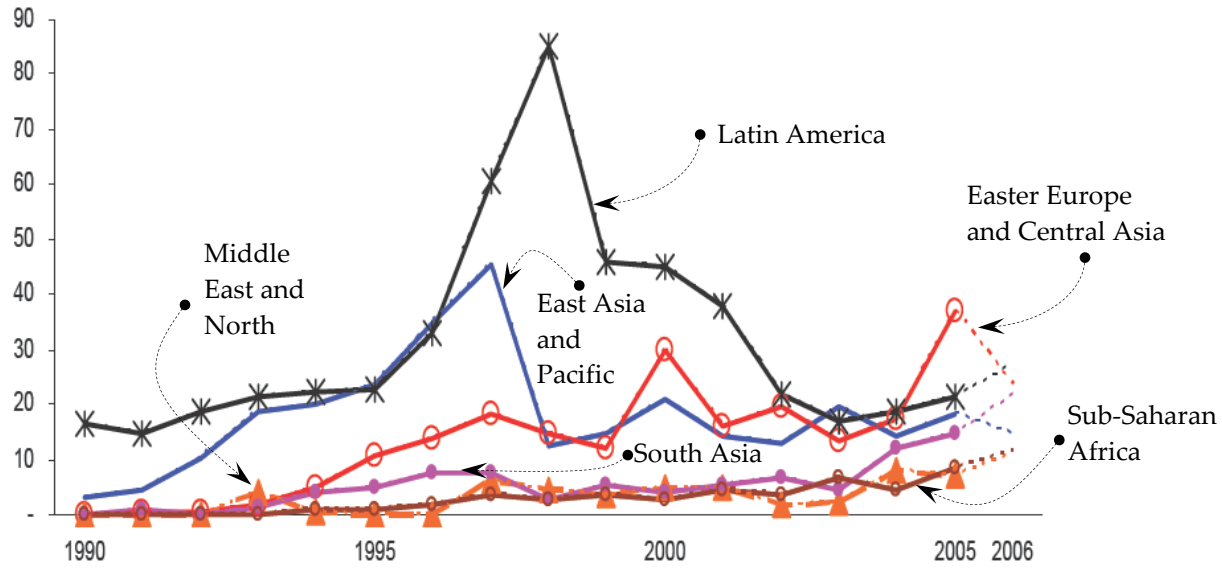
Government intervention in infrastructure stems from several concerns. First, the natural monopoly characteristics resulting from scale economies; these are a consequence of the high initial costs of developing service provision networks, which require lumpy and immobile investments with returns accruing only in the long-run. Second, there are high barriers for competitors to enter the market. Third, often there is a need to use eminent domain to acquire the right of way. Fourth, given positive and negative externalities, it is desirable to the citizens that a socially optimal level of service is provided. Finally, governments intervene due to the public good characteristics—

non-rival and non-excludable—and equity considerations such as cross-subsidies for extremely poor consumers. Not surprisingly, after a decade of unimpressive outcomes from deregulation in the developing countries, private investors sought the highest returns, selectively choosing investments. As a result, the benefits of privatization have been unevenly distributed, both geographically as well as sectorally: Latin America and East Asia received most of the investment and, among sectors, telecommunications has benefited most (Izaguirre, 2002, p.3), (see Figure 4a and 4b).

Between 1990 and 2006, sub-Saharan Africa and South Asia received little or no investment (Figure 4a), especially in sectors like water, electricity, and transportation (Figures 4b). Therefore, the importance of understanding the role of state-owned utilities in infrastructure provision was retrieved by this and similar World Bank reviews of privatization between 1990–2001. Consequently, it is fair to conclude that an ideological oscillation of policies between privatization and nationalization is unlikely to result in better infrastructure. Moreover, Goulet (1986) has observed that competing rationalities driven by technological, political, and ethical concerns that attempt to dominate the reform arena predominantly by contradicting or negating each other in a counter-productive ideological battle, essentially impede meaningful action.

Figure 4. **Investment commitments to infrastructure projects with private participation in developing countries by region (1990–2006)**

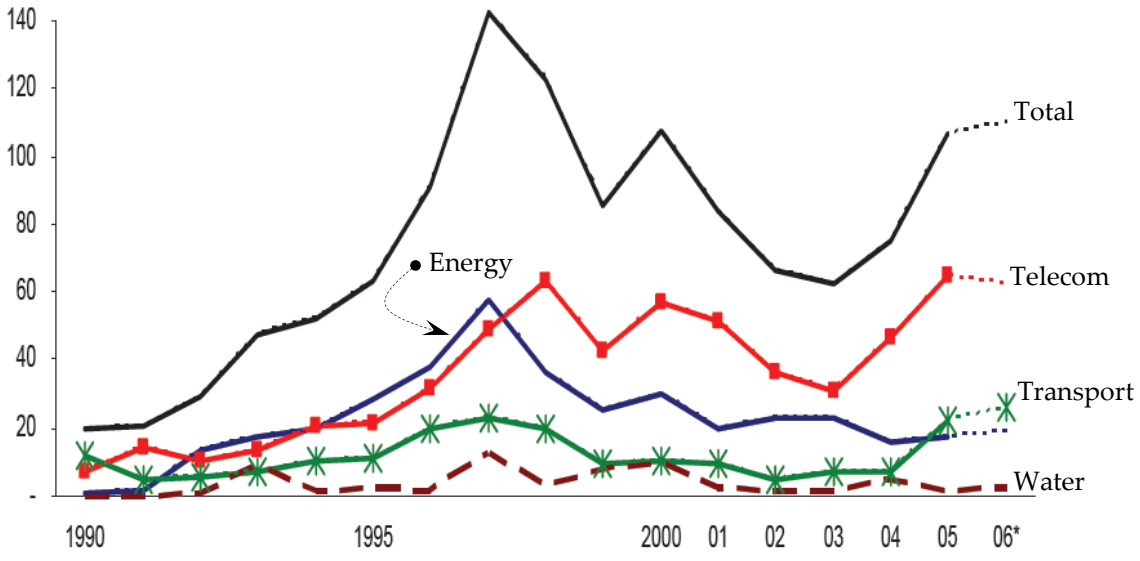
2006 US$ billion



Source: World Bank and PPIAF, 2007

Figure 5. **Investments commitments to infrastructure projects with private participation in developing countries by sectors (1990–2006)**

2006 US$ billion



Source: World Bank and PPIAF, 2007

Yet, the general debate on state-owned enterprise reform favors privatization as a solution. But the debate has been inconclusive. Early observation by Yarrow (1986, p.332) is still relevant. He notes that "…it cannot be expected that one form of ownership will be superior to the other in all industries and in all countries". Among the various types of state-owned enterprises, the opportunities for exercising market power to seek monopoly profits and compromise on equity objectives are by far the greatest in infrastructure, due to the natural monopoly characteristics that persist in incumbent state-owned utilities; this remains the case despite recent technological and institutional innovations. These characteristics of state-owned enterprises make their privatization controversial and the resultant risks have constrained private engagement, especially in the developing world, where sophisticated and truly independent national regulatory authorities[14] remain a distant goal. The regulatory agency can play "catch-up" as privatization muddles through, but infrastructure is often associated with basic

[14] The lack on independence in regulation is not limited to the developing countries. For example, see the Aviation Safety Oversight Hearing: Aviation Operations, Safety, and Security of the United States Senate committee on Commerce, Science, and Transportation, Thursday, April 10, 2008 (SR–253). This hearing was regarding the inability of the regulator--Federal Aviation Administration—to exercise oversight over Southwest Airlines in ensuring safety inspection.
http://commerce.senate.gov/public/index.cfm?FuseAction=Hearings.Hearing&Hearing_ID=377ee05b-346e-4ae6-82a8-79a489a024b9

services, and the associated political risks constrain political support. Thus, most of the infrastructure service delivery remains with state-owned enterprises[15] (Shirley, 1999).

Moreover, as Tendler (1998) points out, there are several misconceptions regarding state enterprise reforms among the donors and their policy makers: First, most literature focuses on failures of public enterprises as opposed to learning from successes. Second, best practices are drawn predominantly from developed countries or the recently industrialized East Asian "tigers", making them less relevant for poor developing countries. Third, the overriding view of many scholars and practitioners is simplistically nationalistic and categorizes countries as good or bad as opposed to seeking to understand intra-country variations and local successes. Fourth, a bias towards market solutions inherently discounts the performance of public enterprises when on occasions it has been observed to be efficient. Fifth, there is a neglect of lessons learned in the industrial performance and workplace transformation literature (IPWT) for understanding poor performance of firms in the Tropics. Sixth, there is an over-reliance on user-led or consumer-voice-fed reforms, thus neglecting supply-side issues such as the need for motivation and responsive frontline workers. Seventh, there is a simplistic understanding of labor unions as resisters of reforms (Tendler, 1998).

[15] The one exception is telecommunications where changes can be largely attributed to technological shifts that lowered barriers to entry, allowed for competition and thus private engagement, see Kessides, (2004, p. 41) for further details.

Thus, there is a need to revisit public enterprises in developing countries with a *curiosity* to seek a nuanced understanding of the conditions under which public enterprises can improve infrastructure services.

Further, policymakers assume that corporatization is a close substitute for privatization. This is because corporatization aims to create market conditions for state-owned enterprises, simulating the conditions that private firms operate in. Shirley (1999) identifies five key aspects for such a commercialization: Incorporation of state-owned enterprises under commercial law; repealing barriers to entry, subsidies, and special privileges; equal competition for private finance; and equal autonomy and incentives to public managers as their private counterparts. Corporatization is a substitute because it does not involve politically difficult interventions associated with efficiency gains in privatization: retrenchment, removal of subsidies, economic as opposed to politically patronizing use of resources and so forth (Baietti 2006). Moreover, public enterprises, often shielded from bankruptcy and acquisition, do not face the threat from predatory firms as their privatized counterparts. Second, due to its public ownership, public managers do not have the same property rights and authority that allow for sale of assets or large structural changes in the firm's operations (Stiglitz, 1989). The post-privatization solution that governments and their international policy advisors seek is corporatization, a close, yet inferior, substitute for privatization.

But does the assumption that corporatization is a poor substitute for privatization withstand scrutiny? It is possible that state-owned enterprise reforms are likely to face similar constraints in implementation and will confront similar controversies as privatization. Shirley (1999) conducted an empirical analysis of 12 countries in 1995 at the peak of the privatization era. The research concluded that reforms, whether privatization or corporatization, had three prerequisites: political desirability, feasibility, and credibility. First, desirability occurs when the cost of reform to political leaders does not exceed its benefits. This takes place when there is a critical mass among the various constituencies in the electorate that favors change. An extreme example is an economic crisis that realigns interest groups. Second, political feasibility occurs when leadership has support from government agencies like the legislature, bureaucracy, and local government, and has the ability to withstand opposition from the negatively affected interest groups like the state-owned enterprise employees. Third, political credibility is essential for investor confidence. This entails the ability to resist policy reversals in the wake of unforeseen opposition and can be assessed through private investor risk ratings and historical precedents.

Furthermore, Gomez-Ibanez (2006) identifies four reasons why corporatization and privatization are complements, not substitutes. First, the resistance to privatization that resulted from the trade-offs between efficiency considerations (commercial goals) over equity considerations (social goals), remains equally applicable

to corporatization. Second, the institutional constraints—judiciary, domestic capital markets, independent regulation—that derailed privatization remain a challenge for corporatization as well. Third, while privatization targeted the more viable state-owned enterprises, most state-owned enterprises left for corporatization, or more generally for reform, are the "most politically sensitive and commercially weak" (Gomez-Ibanez, 2006, p.5). Fourth, if economic gains are the goal, corporatization is an indirect method. What is even more surprising is that Shirley's analysis found "that privatization and corporatization have generally similar political costs and that, when countries are politically ready to reform, these reforms can complement each other" (Shirley, 1999, p.115). Yet this critique has been marginalized by policymakers and their advisors (PPIAF, 2008, p.6, and Baietti 2006).

Thus, there is little reason to believe that corporatization will succeed where privatization failed, or that if corporatization succeeds it will yield significant improvements. Empirical evidence from previous efforts in developed economies remains weak. Yet, while there is a lively debate between scholars and practitioners on the theoretical and practical implications of corporatization, empirical evidence of the impacts of these reforms on state-owned utility performance and their benefits to the marginalized is scant (Estache and Fay, 2007).

In sum, about 80% of all infrastructure services world-wide are provided by incumbent state-owned enterprises (Estache and Fay, 2007). Much of the capital stock

remains under public ownership and management, thus privatization or corporatization is likely to remain only a minor part of the solution; indeed private investment to date is limited to marginal investments in the residual 20% of infrastructure. Supply-side restructuring focuses on how state-owned infrastructure enterprises can respond to the looming challenge posed by a large and ever-expanding infrastructure deficit, a short-fall in capital stock, poor management and service provision, and capital constraints for much needed additional infrastructure. While there are doubts expressed by scholars (Shirley, 1999 and Gomez-Ibanez 2006), practitioners in lead international development organizations like the World Bank and reform-minded bureaucrats in developing countries are strongly in favor of corporatization of state-owned enterprises and ignore the critique offered by scholars on the associated political risks and resultant limitations. A classic example was the advice provided by the Rakesh Mohan committee, Government of India, to corporatize, and then privatize the Indian Railways in 2001.

Thus emerges the ***research question***: When privatization or corporatization of utilities is not politically feasible (or desirable—and unnecessary as my research will demonstrate) under what conditions do state-owned enterprises improve infrastructure services in developing countries? This question is policy relevant because infrastructure provision in the developing world remains dominated by state-owned enterprises, yet despite limited progress with privatization in the 1990s, most research

has remained focused on the role of the private sector, associated management strategies, and investments. In sum, in a pareto optimal world, the state substitutes for the market in the provision of public goods to achieve a socially optimal level of service.. Thus, the issue is not whether state provision is better than private provision; instead in many geographies and sectors, it is about mediocre state provision versus (more) efficient state provision, because the private option is not politically feasible, desirable, or even necessary.

Chapter 3: Research Design

Introduction

The detailed research methodology along with considerations of epistemology is presented in this Chapter on Research Design. My dissertation uses the case study method to examine the Indian Railways. I address the question of how this Railways, a state-owned enterprise, improved its profitability, thus making it more efficient, without burdening the poor customers or its 1.4 million employees. As Dreyfus and Dreyfus (1986) conceptualize learning[16], the role of detailed case studies is essential in this process because only complex and selective applications of the basic principals informs action in ways that develops expertise. Flyvbjerg (2001) has further elaborated the value and need of case studies in the social sciences, in what he calls the need for exemplars. In this respect, I join the long tradition in infrastructure economics, policy, planning, and management literature where the use of case studies has been essential to understanding the particularities of infrastructure markets and their failures in various jurisdictions. Three pronounced works that use the case study approach are *Development Projects Observed* (Hirschman, 1968), *The Privatization of Public Service: Lessons from Case Studies* (Sclar, 1997), *The Limits of Market Organization* (Nelson, 2005),

[16] In the Dreyfus model of acquiring skills students evolve through 5 stages of learning from the novice, to the advance beginners, competent, proficient, and finally to the experts.

and *Regulating Infrastructure: Monopoly, Contracts, and Discretion* (Gomez, 2006). Common to these works is the emphasis on deliberative, as opposed to a calculative, rationality with the aim of identifying causal mechanism for policy manipulation. In addition, the case method has long been a distinguishing factor of urban planning programs and the Harvard Business School's pedagogical approach to teaching business administration.

Comparative Case Method and the Treatment of the Counterfactual

As Gee (1950, p. 230) defines it, a "case study method emphasizes the total situation or combination of factors, the description of the process or sequence of events in which behavior occurs, the study of individual behavior in its total setting." Thus, the goal of my case study is to present a "historically interpretive and causally analytic" Regan (1987, p. 35) view of the Indian Railways transformation, from its near bankruptcy in 2001 to its revival in 2008. The advantages of this method are that it provides a continuous account, including historical context, and an intimate knowledge of the situation (Gee, 1950, p. 230).

I draw on an interpretive[17] approach that explores the case of the Indian Railways' transformation over a four year period beginning in 2004. The purpose is to identify causal mechanisms to achieve efficiency (and answer the question: how it works?) through the tools of detailed description in the case analysis. The objective is to seek specific effects, with a sense of faithfulness to "depicting a world, rather than finding information for a specific hypothesis") (Lin, 1998, p.171). I emphasize the need to understand causal mechanisms in this public utility because it is a prerequisite to manipulating them for desirable policy outcomes: Such as faster, heavier, and longer trains. Further, I use Regan's (1987) classification of the distinctive features of case-oriented methods. First, they are designed to uncover patterns of invariance and constant association. This focus on invariance encourages greater specificity in causal arguments. Second, the focus is not on relative frequency, but on the *variety* of meaningful patterns of causes and effects that exist. Three, cases are studied as whole entities as opposed to a collection of variables. Finally, case studies are aimed at stimulating a dialogue between ideas and evidence.

[17] The alternate approach is a positivist one and it seeks to discover causal relations (as opposed to mechanisms) by asking questions like "what it consists of" and uses statistical tools with the objective of finding average effect for representative units of analysis.

Through a case study of the Indian Railways, I explore the transformation of one such state-owned enterprise. The broad focus of the study remains grounded in institutional incentives and organizational strategies. In order to demonstrate that utility reforms can be undertaken, despite a restricted policy space, I undertake a case analysis and the approach is deliberative (as well calibrative). In contrast to the conventional notion of comparison between two similar units of analysis—for example, two utilities with geographical, sectoral, or ownership variations and related degrees of reform success—my research compares the restructuring of a public utility through a Weberian[18] approach to the "ideal-type" policy prescription. The ideal-type is grounded in the experience of British Railway privatization reforms (1993–2001), among other cases. In this manner, I establish not only the limitations of the present policy approach to privatization and corporatization, but it also enables me to critically assess contemporary theory on improving efficiency of public utilities. Additionally, this approach helps develop the theoretical ingredients, in an inductive manner, of a nuanced and pragmatic approach to optimizing public utilities.

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[18] "An ideal type is formed by the one-sided *accentuation* of one or more points of view and by the synthesis of a great many diffuse, discrete, more or less present and occasionally absent *concrete individual* phenomena, which are arranged according to those one-sidedly emphasized viewpoints into a unified *analytical* construct (Gedankenbild)." Weber, M. (1947, p. 90). The Methodology of The Social Sciences. Translated by Edward A.Shils and Henry A.Finch. New York: Free Press.

Nested-Unit of Analysis, Options, and Choice

State-owned enterprises can be studied in several ways. Some well-known approaches in the rich literature on state and market include a focus on explanatory variables such as transaction costs (Coase, 1960), institutions (North, 1987), asymmetric information (Stiglitz, 1989), activist state for capital accumulation (Amsden, 1989), and co-opted state for mopping-up after capitalism (Harvey, 1973). Also, from a historical and economic sociology perspective, the market economy and the nation state are conceptualized as embedded in society and culture (Polanyi, 1944). An alternative approach, often absent in development economics and planning, is the study of the state from the perspective of the society pioneered by the subaltern scholars like Partha Chaterjee (1993) and Gayatree Spivak (1988). These scholars study the state in the post-colonial context from the perspective of the masses (a bottom-up view as opposed to the conventional top-down perspective of the elite). For example, in Spivak's 1988 seminal essay "Can the Subaltern Speak," she deconstructs the notion that the subaltern scholars have given voice to the feminist perspective on sati (widow sacrifice, banned by the state) in the post-colonial identity of brown women. Similarly, this can also be done within the structure of a bureaucracy, for example, in the literature on street-level bureaucracy. For example, Lipsky (1980) and Tendler (1998) point to various aspects that place frontline workers at the center of policy making due to the discretion they enjoy.

However, the appropriate method to study the transformation of the Indian Railways is from an organizational perspective. Through preliminary fieldwork, it emerged that the nature of the transformation of the Railways had been led by creative endeavors of the bureaucracy that focused on asset optimization: faster, heavier, and longer trains. This follows in the long tradition crafted by Weber (1947) with his focus on the rationalization of the state that results in bureaucracies, the routine, and the focus on means and ends (understood here as policy interventions for achieving an organizations' multiple social and commercial goals of equity and efficiency). Thus, my unit of analysis is nested, the organization of the Indian Railways, a public utility, within the context of the transportation market in India. Drawing on Denters & Mossberger (2006) I explore a multi-level analysis of the Indian Railways through a part-whole relationship between the Railways and its constituent departments. I also research the Railways' relationship to consumers and producers of the complement and substitute services, such as alternate modes of transportation. The Railways is studied in the context of the macroeconomic conditions in India that are in turn shaped by global markets, particularly in commodities like steel, cement, coal, and iron ore where the Railways is a dominant service provider. In sum, this organizational analysis focuses on the administrative hierarchy of the Railways and addresses its relationship with the political leadership, its relations with other state-owned enterprises, line ministries, and the economy (including the market—firms, and households—that act as

consumers as well as producers). I create a reference class of state-owned enterprises in several infrastructure sectors to which the Indian Railways belongs (see Figure 5, an updated version of Figure 3) to establish the universal set to which railways are a subset, and the Indian Railways an exemplar.

My ***case selection criteria*** is based on Flyvbjerg's case classification (2006, p. 230). This is a paradigmatic case because it develops a metaphor for improving infrastructure services through state-owned enterprises (see Table 4). It is argued that if the Indian Railways (one of the world's largest state-owned enterprises thereby one of the most complex entities in this regard) can be made efficient without privatization, then so can others. In contrast, the British Railways is a critical case because it establishes that privatization is not a sufficiency condition for achieving efficiency gains in public utilities. Moreover, the case of the Indian Railways addresses a matter of concern, a social concern, (instead of a matter of fact), Latour (2004, p.231) and thus is worthy of a scholastic endeavor.

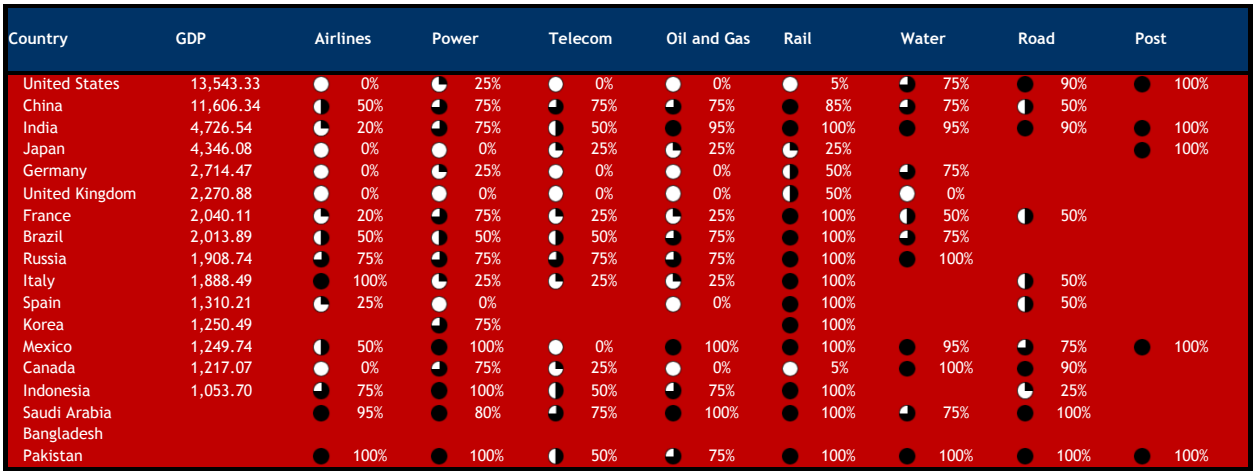
Table 4. **Case selection criteria: Is efficiency a function of private ownership?**

	Ownership (X)	
Efficiency (Y)	State (Public Utilities)	Private (Corporatized or Privatized Utilities)
Inefficient	***Outcome 1: Weak*** *Most Public Utilities:* Weak case to study, because theory and most empirics demonstrate that utility is inefficient if nationalized.	***Outcome 3: Critical case*** *British Railways:* A study of this case reveals why privatization is not a sufficient condition for efficiency.
Efficient	***Outcome 2: Paradigmatic case***	***Outcome 4: Weak***

Railways, India: Strong case to study because this is a counter-intuitive but desirable outcome. This occurs when privatization is not feasible, as is the case with most public utilities.	*Reliance, Bharti Airtel, Idea Cellular, India:* Private efficient utilities are over studied, yet under represent the total population of utilities that remain under state-ownership.

Most scholars as well as practitioners argue that outcomes 1 (inefficient public utility) and 4 (efficient private utility) are expected. Thus, to improve the efficiency of utilities that are state-owned, privatization is a prerequisite. My dissertation argues that privatization is infeasible for as large a proportion as up to 80% of utilities (see Figure 5, also Sclar, 2005; Eustache and Fay, 2007; OECD 2007; World Bank 2010b; and Airoldi, M., Biscarini, L., & Saracino, V., 2010) and thus to improve efficiency there is a need to explore reform recipes that allow translation from outcome 1 (inefficient public utility) to outcome 2 (efficient public utility), as opposed to outcome 4 (efficient private utility). Moreover, a corollary to the above question is: while the study of the Indian Railways establishes that privatization is not a necessary condition for efficient utilities, is privatization a sufficiency condition? The case study of British Railways (outcome 3), a textbook case of privatization, provides insight as to why privatization does not fulfill the sufficiency condition for efficiency as well. However, given the obvious trade-off between depth and breadth of analysis, this dissertation will focus primarily on the Indian Railways, contrasting this with the ideal type privatization attempt of British Railways.

Figure 6. **Extent of state versus private ownership in 2010**



Country	GDP	Airlines	Power	Telecom	Oil and Gas	Rail	Water	Road	Post
United States	13,543.33	0%	25%	0%	0%	5%	75%	90%	100%
China	11,606.34	50%	75%	75%	75%	85%	75%	50%	
India	4,726.54	20%	75%	50%	95%	100%	95%	90%	100%
Japan	4,346.08	0%	0%	25%	25%	25%			100%
Germany	2,714.47	0%	25%	0%	0%	50%	75%		
United Kingdom	2,270.88	0%	0%	0%	0%	50%	0%		
France	2,040.11	20%	75%	25%	25%	100%	50%	50%	
Brazil	2,013.89	50%	50%	50%	75%	100%	75%		
Russia	1,908.74	75%	75%	75%	75%	100%	100%		
Italy	1,888.49	100%	25%	25%	25%	100%		50%	
Spain	1,310.21	25%	0%		0%	100%		50%	
Korea	1,250.49		75%			100%			
Mexico	1,249.74	50%	100%	0%	100%	100%	95%	75%	100%
Canada	1,217.07	0%	75%	25%	0%	5%	100%	90%	
Indonesia	1,053.70	75%	100%	50%	75%	100%		25%	
Saudi Arabia		95%	80%	75%	100%	100%	75%	100%	
Bangladesh									
Pakistan		100%	100%	50%	75%	100%	100%	100%	100%

Note: percentage indicates extent of private ownership

The ***geographical scope*** of my research is predominantly limited to the developing country context with references to related policy trends in North America and Western Europe, particularly British Railways. I focus on the Indian Railways in the context of the economic liberalization of the economy post 1990s to explore the causal recipes that allow for the uneven improvement in the Railways' performance.

Treatment of Time

The treatment of time in research is important. For example, in *The Great Transformation*, Polanyi (1944) explores state-market relations through a historical evolutionary lens. State-owned enterprises can be explored in a similar manner. Further, in the literature on organizational routine, Nelson and Winter (1982) develop an evolutionary lens for organizational change, and explore how decision making about

adoption of technology within a firm is internalized, then replicated, and eventually integrated into the firm's DNA over time. Yet, not much is understood about how public sector enterprises—in particular public utilities—adopt technologies, internalize, and integrate them into their routines. Moreover, time is important because *when* action occurs is as important as the *fact* of its occurrence (Tilly and Aminzade in Griffin, 1992, p. 416). Thus, I use Griffin's (1992, p. 403), three attributes of temporality in my dissertation. First, I examine time retrospectively through historical bracketing of the Indian Railway from its inception 150 years ago to the present. The most critical event during this period was the creation of India as an independent nation in 1947, which was accompanied by the consolidation and nationalization of the Railways. This historical review focuses on four salient institutional and technological developments—financing through bonds, advancement in technology, development of safety standards, and evolution of institutional structure—with the aim to contextualize the unit of analysis, the Indian Railways and the associated reforms. Additionally, I focus on trends over the last 50 years to identify periods of interest; for example, points of inflection, where there was a significant change in the performance of the Railways as well as longer term trends, such as change in (or adoption of) new technology, like the switch from the steam engine to the electrical and diesel engines. These data provide information about the financial performance of the Railways and the composition of its

physical stock, so they can be used only indirectly to deduce changes in institutions. For an insightful example of linear temporal bracketing see Beauregard (2007).

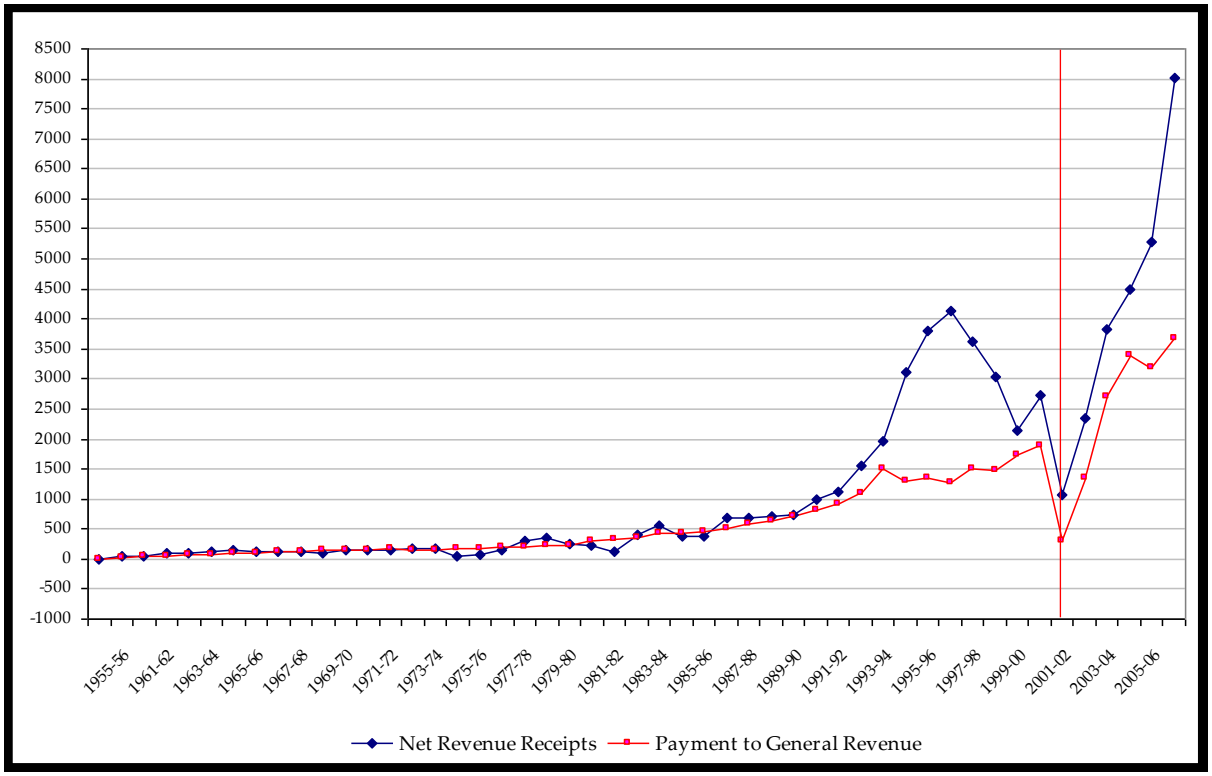
Second is the causal emplottment[19] (White 1973) 2001 onwards (2001–2008). During this period particular attention is given to temporally delimited causal generalizations (Griffin 1992, p. 407) and the conditions that led to a near bankruptcy in 2001 (Figure 6). Additionally, I address the ideal policy prescription that called for reforms aimed at corporatization and eventual privatization of the Indian Railways with the aim of achieving commercial viability. Further, a deliberative analysis of the limitations of these prescriptions is articulated. Finally, a thick description of the four year period starting in 2004 articulates the crafting of an alternate approach to the Railways reforms. Here, there is a focus on the diagnostics of the challenges within the Indian Railways in 2001, the identification of spaces for reform, and the eventual crafting of a management strategy that worked—for instance, by running faster, longer, and heavier trains.

Third, and most important, the temporal attribute regarding causal mechanisms (causal fluctuations) is elaborated through identifying and analyzing transformations in temporally specific causal patterns (Griffin 1992, p. 408). This includes an explanation

[19] Emplottment refers to 'where do you begin'. White (1973). "It is emplottment that gives significance to independent instances, not their chronological or categorical order. . . As a mode of explanation, causal emplottment is an accounting (however fantastic or implicit) of why a narrative has the story line that it does. (Sommers and Gibson, 1994, p. 59)."

of the temporal conditions (when and where) under which conditions certain causal mechanisms come into play[20]. For example, when and where is it more conducive to negotiate on issues where unions resist? Or when is senior management more open to introducing change?

Figure 7. **Revenue and expenditure**



I refer to both ***primary and secondary data***. Over a two-year period, I collected primary data through in-depth (structured and semi-structured) interviews of about 100 key informants, including railway staff at various levels of the bureaucracy (ranging

[20] Abbott provides a full conceptualization of sequence of events: continuous or discontinuous, convergent or divergent; volatile or stable; and when does order matter (Abbott, 1983).

between the top management to the frontline workers), the customers, and independent analysts. I spent half a year based at the Office of the Minister of Railways, Government of India, during which special emphasis was given to the role played by strategists who advised the Minister of Railways. They were interviewed to tease out attributes of the reform strategy that focused on balancing efficiency and equity considerations in a commercially viable and socially desirable manner. Additionally, I observed on-site the various aspects of the Railways functionings including the railway port inter-phase, large passenger terminals, and the utility's senior policy makers and bureaucrats at work (see Annex 1).

I collected secondary data through an archival review of policy documents, including the annual Railway budgets, internal memorandums, policy reports (prepared by the Rakesh Mohan Committee, Government of India, the Ministry of Railways, the World Bank, and the Asian Development Bank), and its analysis by the popular media[21] (Economic Times, Times of India, Business Line, Dainik Bhaskar, Nai

[21] Some illustrative questions are provided. ***Macro issues:*** What was the role of Internal and (or) external factors that led to the transformation of the Railways**.** What specific organizational change resulted in the improved revenues? What macroeconomic conditions did you benefit from: Particularly, a boom in the commodity prices accompanied with high oil prices?
Micro issues: What role did institutional incentives play? What are the salient issues in the political economy of institutional change? What operations and decision making processes in the railways were changed, related benefits, and what remains the same? Particularly addressing the three strategic actions taken in regards to freight (increased wagon carrying capacity-CC+8+2, wagon turnaround time, freight reclassification and its commercial pricing) and demand responsive passenger services (increasing occupancy rates, volume of upper class seats and leasing of parcel capacity).

Duniya, among others). Further, I collected statistical data on the last 50 years of the Railways performance to analyze the role of long term trends in the recent transformations. These data were prepared by the Ministry of Railways and are available for the period following Indian independence. Indicators to measure the performance of the Railways include the organizational capacity (labor and capital stock variables), as well as performance measures like operating ratio, revenue and expenditure, average passenger fares, freight volumes measured in Net Ton Kilometers, and so forth. I also located the case of the Indian Railways in a reference class created from the global railways database (a World Bank data base of 100 railways) as well as state-owned enterprises in general (an updated version of the McCraw-Economist 1978 matrix, see Figure 5). In sum, the data collection techniques that I relied on are two-fold. First, I used a set of in-depth semi-structured interviews along with participant observations to gather primary data. Second, I collected archival data including

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In particular, I am interested in understanding explanations to how, and why now, the transformation occurred? How the vision of the Rail Minister regarding these actions was translated to the Board and eventually through the complex structure of the organization to the zones down to the street level bureaucrats at the weighing bridge and the like. If the decision making process was not top down then how did it occur? And how, and how much, did ideas and feedback trickle back upwards to the policy makers. How interest group conflicts were managed (particularly groups outside the railways that may have little to gain)? Was this made easier because of the rapid growth in commodity prices and other macroeconomic conditions? What were the partial and general equilibrium considerations, ex-ante for the above specific actions that lead to a radical increase in revenue in a remarkably short time?

internal policy documents and statistical data to complement as well as triangulate or contextualize the primary data.

Data Analysis Procedures

Weiss (1966) notes that a complex situation is one in which several interrelated phenomena are studied concurrently. The analysis of such subjects call for a holistic approach, and the case study of the Indian Railways lent itself to this holistic aim of understanding organizations through a density of empirical detail (Weiss, 1966, p.202). Further, there was a focus on causal *recipes* because the interesting aspects of the Railways case are various combinations of causes that contributed to how the reform happened (Regan,2006, p.639). Additionally, a fuzzy set approach was adopted. There was an emphasis on the degree of membership of a causal variable or strategy, in order to identify the extent to which a variable contributed to the cause, in this study, various attributes of the reform strategy that led to efficiency gains (Regan 2006, p.640). The thinking was in terms of set theory (and fuzzy sets) and subset of relations. For example, a necessary condition (but not a sufficient one) is a subset of the solutions (Regan 2006, p.642-3). There was an emphasis on within case analysis (Gerring, 2006, p.724) through the comparison between better and worse performing services within the Railways and addressing the temporal variability of causes. Finally, the grounds of generalization were based on Weiss' (1966, p.203) criterion. First, that there is a

"necessity of a particular kind of organization given certain conditions." In other words, "If the values of essential elements of the system are given, then the system as a whole must result." Second, "the elements or the organization of the case to the molding forces in social context."

In sum, the case study of the Indian Railways' transformation from bankruptcy to billions was conceived as configurations, and through an outcome-oriented investigation, causal inference was drawn through causal conjectures that are a heterogeneous combination of variables and embody temporal variance that resulted in efficiency gains while adopting an unconventional strategy.

Additional Theoretical and Practical Considerations and Limitations

While ***general equilibrium considerations***, that is economy wide impacts, are important, they are not the primary focus of this research. Further, for this research it is ***assumed*** that one type of economic model (mono-economics), at all times, is not applicable for developed and developing countries alike. This is because the latter has several distinguishing conditions, including a spectrum of unique market failures (particularly in capital markets, knowledge production), efficacy of institutions, and large-scale unemployment that violates the full employment assumption of many economic models. The ***external validity of the research*** remains to be tested, given the unique

conditions of railroads in India. Findings, lessons, new theoretical insights, and recommendations are cautiously drawn.

While the glossary defines several technical terms that are specific to infrastructure sectors, particularly those used in the context of the Indian Railways, two key concepts, namely infrastructure and infrastructure economics, are defined here. ***Infrastructure***, broadly refers to transport, energy, and water utilities, what Hirschman (1958, p.83-84) defined as social overhead capital (SOC):

> "SOC is usually defined as comprising those basic services without which primary, secondary, and tertiary productive activities cannot function. In its wider sense, it includes all public services from law and order through education and public health to transportation, communications, power and water supply, as well as such agricultural overheads capital as irrigation and drainage systems. The *hard core of the concept can probably be restricted to transport and power*"(p. 83-84, emphasis added).

Hirschman identifies three necessary, but not sufficient, conditions for categorizing an activity as social overhead capital: first, services that enable a wide range of economic activity; second, service provision is predominantly by 'public agencies or private agencies subject to public control' (1958, p.83) at subsidized prices; third, services are non-tradable. Further, a service is considered *strictly* social overhead capital, or infrastructure, if the investments to provide such services are 'characterized by "lumpiness"(technical indivisibilities) as well as by a high capital-output ratio'(p. 84). Railroads, like other network infrastructure such as water, power utilities, and road transport networks are a classic example of such services, as large scale investments are

required upfront. And ***infrastructure economics*** is public and development economics applied to infrastructure sectors.

Chapter 4: Bankruptcy to Billions!

Introduction

Here is an overview of how the Indian Railways was transformed in four years (2004 to 2008), counter-intuitively, under a populist leader, the Minister of Railways of during this period. What makes this surprising is that while retaining state-ownership, the railway graduated from near bankruptcy in 2001 to US $6 billion[22] annual cash surplus in 2008.

Soon after the railway had earned a cash surplus of 15,000 crore rupees (US $3.5 billion) in 2006, the Minister was keen that this financial gain translate into rewards for the Railway employees and tangible benefits to poor travelers that rely on the Railway for transportation. Of his propositions, the most striking was his insistence on reducing second class passenger fares by a rupee per passenger. The Railway Board members were perplexed, **"**Why reduce just one rupee? In most transactions nowadays, a rupee (2½ cents) has no value. This fare reduction will cost the railway 250 crore rupees (US $58 million) and the passengers will hardly benefit." The Minister responded with a reference to his constituents, "*Hathua ki gwalan apna dudh Dilli me nahi balki Siwan me bechati hai. Aur Hathua se Siwan ka kiraya maatr saat rupaih hai* (a milk vendor from

[22] One US dollar is 43 rupees at 2008 average market exchange rates.

Hathua—the Minister's political base in Bihar eastern India—sells her milk not in Delhi, but in Siwan. And the train fare for Hathua to Siwan is just seven rupees). *Lagta hai ki air-conditioned office me rahne walon ko yeh ehsaas nahi hota ki ek garib gwalan ke liye ek rupaih ke kya kimat hoti hai* (It seems that those who reside in air-conditioned offices do not realize what a rupee means to a poor milkmaid)." Further, the Minister elaborated that it is likely that all her relatives live within a 70 mile radius, and thus most of her work and life related train trips are within this microcosm. At the end of this exchange, the Railway Board agreed to a one rupee fare reduction.

This anecdote is grounded in a larger reality. An analysis of passenger trips revealed that 88 percent of railway travelers—namely, all suburban and ordinary passenger train users—have an average fare of about ten rupees. As the Minister got the second class passenger fares reduced by three rupees over four years, the minimum passenger fare reduced from seven rupees in 2004 to four rupees in 2008; a 42 percent reduction in the minimum fare. As a result, a rupee reduction in the fare is not just symbolic, but it has a substantive effect on the total fare for these travelers. During this period, the annual bonus for Railway employees was increased from 59 to 73 days of their respective wages. However, what is critical is that because the poor consumers, as well as railway employees, directly benefited from the Railways' financial gains—annual cash surplus grew to 25,000 crore rupees in 2008 (US $6 billion), the railway was not accused of profiteering. Further, this proved to be a popular initiative to the extent

that it was central to the Minsiter's public meetings, even with his constituency, as is evident in the following conversation.

> The Minister asks a gathering of people from his constituency, "*Tum ko malum hai ki railway ne pichle char saal mein 70,000 crore rupaiyah munafa kamaya*" (Do you know, in the last four years the railway earned 70,000 crore rupees in profits?)
> A voice from the crowd responds, "*Na Saheb."* (No sir.)
> The Minister asks, "*Char saal pehle Hathua se Siwan ka yatri kiraya kitna tha*?" (Four years ago what was the passenger fare from Hathua to Siwan?)
> The people respond, "*Jee saat rupaiyah."* (Sir, 7 rupees.)
> The Minister, "*Abhi kitna hai?*" (Now, how much is the fare?)
> The audience responds, "*Chaar rupaiyah.*" (Sir, 4 rupees.)
> The Minister "*Pahle kisi rail mantri ne yaatri kiraya kam kiya tha"* (Did any Railway Minister ever reduce passenger fares in the past.)
> The audience responds, "*Na Saheb*."(No, sir.)
> The Minister "*Hamne har saal yaatri kiraya kam kiya, phir bhi 70,000 crore kamaye. Kaisa laga?"*(Every year, I reduced the passenger fares, yet the railway made a profit of Rs.70,000 crore rupees over the last four years. What do you think?)
> The excited audience screams back, "*Wah Wah sarkar! Yeh toh kamal ho gaya.*" (Congratulations sir, this is great.)

The above exchange between the Minister and his constituency draws attention to the need to balance commercial objectives with social concerns such that the market metric is balanced with the societal one. Not only is there a compelling moral imperative but also a political and economic rationale to address the needs of the marginal, if the overarching commercial goals are to be achieved and sustained.

Despite the Odds—Financial Crisis to Super Solvency

Financial Crisis

The railway is as critical for the poor as it is for the economy. On one hand, it is one of the only affordable means of transport for millions of commuters as well as aspiring

migrants who travel to realize their dreams in the city. On the other hand, freight trains haul critical commodities that crank the wheels of the economy—taking raw materials to power, steel, and cement plants as well as food grains to ration shops and fertilizer for farmers. This institution, and one of the largest employers with 1.4 million employees and 1.1 million pensioners, faced a severe financial crisis in 2001 when its cash balance shrank to a paltry 359 crore rupees (US $83 million[23]), the operating ratio[24] deteriorated to 98 percent, and it defaulted on the payment of a dividend to the Government of India. The severity of this financial crisis is aptly captured in the Mohan committee report (2001b).

> To put it bluntly, the Business As Usual Low Growth will rapidly drive IR to fatal bankruptcy, and in fifteen years GoI (Government of India) will be saddled with an additional financial liability of over Rs. 61,000 crore (US $14.2 billion, p.180). . . .On a pure operating level IR is in a terminal debt trap and can only be preserved by continuing and ever increasing subsidies, year-on-year, from the central government. As is well known such subsidies are not available (p. 181).

During the 1990s, the core profit making freight segment grew at the 'business as usual low growth' rate of 2 to 3 percent, and wages grew at a faster pace than the growth in labor productivity (Mohan, 2001b, p.178). As a result, in the five years that led up to the 2001 crisis, Railways' expenses grew at over 13 percent per annum, while its revenues

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[23]One US$ = 43 Indian rupees

[24]The operating ratio is calculated by dividing operating expenditure with operating revenue. The operating expenditure is all cash and non-cash expenses including depreciation and appropriation to pension fund, but excluding the dividend payable to Government of India. The operating revenue is gross traffic receipts. Therefore, the lower the operating ratio, more efficient is the enterprise. The Railways was spending 98 cents to earn a dollar.

lagged at 8 percent. This was unsustainable as the railway was unable to generate sufficient cash to cover the cost of replacement and renewal of its aging assets. The World Bank (2006) noted that had the railway made adequate provision for depreciation it would have been bankrupt.

> It is to be noted that IR's (Indian Railways') operating ratio of 0.96 is substantially understated, as the provision of depreciation is well below actual requirements. If IR were to make adequate provision for annual asset renewal, a fortiori if it were to make adequate provision for the large backlog of overdue equipment and track renewals, as well as pension accruals, in normal commercial accounting terms, it is very likely that IR would be a heavily-loss-making entity—in fact one well along the path toward bankruptcy, if it were not state owned (p.5).

This under-provisioning for depreciation endangered operations and led to stacking-up of replacement arrears year after year. To liquidate these arrears the Government of India had to establish a special railway safety fund worth 17,000 crore rupees (US $4 billion) two-thirds of which it gave as a dividend free grant, while the rest was financed through a safety surcharge on passenger fares.

Super-Solvency in Four Years

While improvements were made up to 2004, the Railways' financial condition remained precarious. However, in the next four years a populist political mandate did not allow conventional policy prescriptions; in the words of the Railway Minister, "no privatization, no retrenchment, and no fare hike". Yet counter-intuitively, the finances of the Indian Railways have been transformed.

> The cash surplus of the Railways rose steadily from Rs. 9,000 cr. in 2005 to Rs. 14,000 cr. in 2006 to Rs. 20,000 cr. in 2007. The august House would be happy to know that in 2007–08, we will create history once again by turning in a cash surplus before dividend of Rs. 25,000 cr. (US $6 billion). Our operating ratio has also improved to 76%. Indian Railways is a government department. However, we take pride in the fact that our achievement, on the benchmark of net surplus before

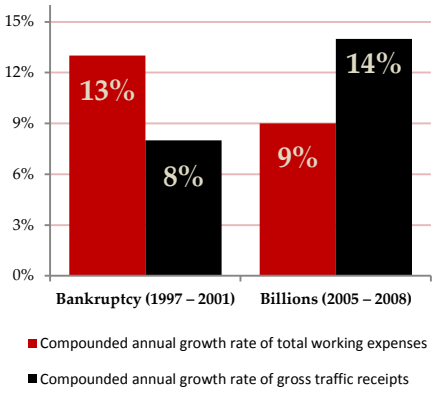
> dividend, makes us better than most of the Fortune 500 companies in the world (Budget Speech, Minister of Railways, 2008, February 26, p.1).

There was a complete reversal from a projected terminal debt trap to a cash-rich organization with a bank balance of over 22,000 crore rupees (US $5.1 billion). In 2008, the railway internally generated six times more cash than its annual debt repayment obligation of about 4,000 crore rupees (US $0.93 billion), making it a significantly under-leveraged organization. This was acknowledged by investors in the United States, whose subscription to Indian Railway Finance Corporation's bonds in a matter of hours amounted to over four times what was available; at 5.94% in 2007, this coupon rate was better than that was offered to the best private firms in India. The Railways' operating ratio, at 76 percent, is better than the operating ratio of the Chinese Rail, as well as the class-one American railroads; its 21 percent return on net-worth is better than that of some of the contemporary blue-chip Sensex companies in India. Earlier, the investible surplus was insufficient to finance the replacement of aging assets, but in 2008 the same Railways generated an investible surplus of 20,000 crore rupees and its capital expenditure tripled compared to 2001 (see Table 5).

***Table 5.* Financial indicators**

	2001	2008
Cash surplus before dividend	4,790	25,006
Investible surplus (after payment of dividend)	4,204	19,972
Capital expenditure	9,395	28,680
Fund Balance (bank balance)	359	22,279
Operating Ratio	98.3%	75.9%
Ratio of net revenue to capital-at-charge and investment from capital fund (return on net worth)	2.5%	20.7%
Debt service cash coverage ratio	1.74	6.53

Source: Statistics and Economics Directorate, Ministry of Railways

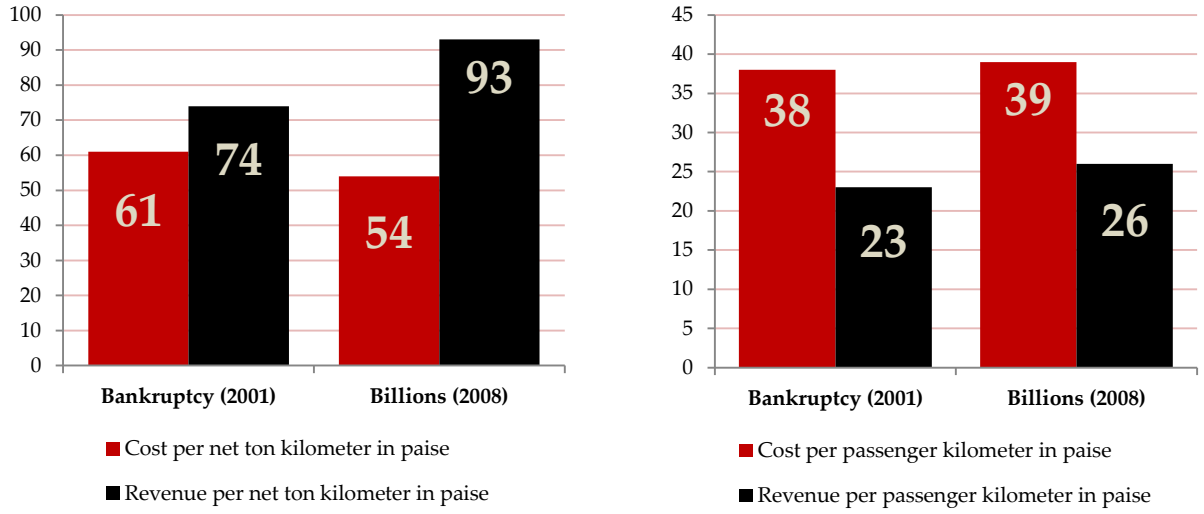


Freight and passenger volumes clocked a compound annual growth rate of nine percent between 2004 and 2008. During this period asset and labor productivity grew at twice the rate of the 1990s. Earlier the Railway was heading towards bankruptcy because expenses were growing five percent faster than revenue, but this trend was reversed, with subsequent revenues growing over five percent faster than expenses (see Figure in Table 5).

Freight business profits have boomed because of growing volumes, declining unit costs (from 61 to 54 paise), and increasing unit revenue due to selective fare-hikes (from 74 to 93 paise, see Figure in Table 5). Despite the reduction in passenger fares of most travel classes, losses in the passenger business have been curtailed by virtue of stable unit costs (38 to 39 paise) and an increase in unit revenue due to a change in the product-mix in favor of high-value and high-margin air-conditioned, and long-distance travel segments (23 to 26 paise, see Figure 7). Further, the growth rate of 'other

coaching' as well as 'sundry earnings' have doubled from around 10 percent in 1991–2004 to over 22 percent in 2005–2008. This has been achieved by enhancing non-passenger fare income through leveraging eyeballs and footfalls of travelers[25] and by tapping unutilized parcel capacity.

Figure 8. **Freight and passenger unit revenue and cost**



Source: Statistics and Economics Directorate, Ministry of Railway, 2008.

Apart from the financial transformation, customers have benefited from faster, safer, and better services. Additionally, the identity of the organization and the morale of the employees received a boost as did the stature of the Minister.

Management Strategy

[25] For example by providing subsidiary services for travelers through private sector participation in restaurants, shops, and advertizing on railway stations.

What makes this financial transformation unique is its distinct approach and swift accomplishment. The financial health of the railway was restored without burdening millions of poor Indian travelers, or railway employees. As hypothesized by skeptics, this transformation is not merely the result of commodity cycles or a booming economy, but structural change resulting in significant gains in operational efficiency. Nor is it the result of creative accounting or unsafe over-loading of wagons; rather it is largely due to labor and asset productivity gains. The core supply-side strategy can be summarized in three words, each worth over a billion dollars in surplus: *faster, longer,* and *heavier* trains. The demand-side can be summarized in another three concepts: *dynamic, differential,* and *market-driven*. To execute these demand-and-supply strategies, the management created cross-functional teams, leveraged existing resources and synergized operational interventions.

Yet, these management strategies along with operating faster, heavier, and longer trains are not new, and in fact date back to the very inception of the Railways. In this regard, the Minister is often asked by skeptics, "If it is so simple, why it wasn't done earlier?" his response is straightforward, "The Indian Railway has a *huge* potential, it's like a Jersey cow; if you don't milk it, the cow falls sick. Therefore, we are milking the cow fully and taking good care of it." However, what remained unanswered was why this metaphorical 'cow [was] not milked' earlier. There may have been several other factors at play but a conceptual constraint was the conflict between a

populist political mandate that was at loggerheads with the policy prescriptions of the experts. As captured in the Mohan committee report (2001a), it was this conflict that had debilitated the Railway.

> On the one hand, IR (Indian Railways) is seen by the government, and by itself as a commercial organization. It should therefore be financially self-sufficient. On the other hand, as a department of government it is seen as a social organization which must be subservient to fulfilling social needs as deemed fit by the government. It is now essential for these roles to be clarified (p. 5).

Over a 150 year history, the railway has confronted several formidable challenges. At its inception, the railway was built under the difficult conditions prevalent in the mid-nineteenth century, followed by the post-independence challenge of nationalization and modernization, after which came the critical operational crisis in the 1980s. On each of these occasions, the Railways' technically sound staff rallied around shared objectives and strategies, and it demonstrated its ability for adaptive resilience. This is because of two core institutional strengths of the Railways—namely, its people and systems. It has some of the most qualified bureaucrats and technocrats recruited through extremely competitive civil service exams. It has an equally strong organizational structure with its robust field-units as well as articulated procedures and processes. Yet, this institution was unable to cope with the financial crisis of 2001. This was primarily due to a structural shift triggered by the liberalization of the Indian economy in the 1990s. On the one hand, the Railways' profitable freight and air-conditioned passenger segments became vulnerable to stiff competition from alternative modes of transport. On the other hand, the shrinking fiscal space resulted in declining support from the

federal coffers. To compound the crisis, the railway continued to be burdened with social obligations like low passenger fares. Consequently, the rising cost of operations was often offset by increasing tariffs of the lucrative freight and air-conditioned passenger travel segments, further eroding the Railways' market share in these segments.

To revive the financial health of the Railway, experts recommended restructuring—passenger fare-hikes, retrenchment, corporatization, and independent regulation (Mohan, 2001b). However, there was no political space to implement these recommendations as it entailed sacrificing the interests of the Railways' employees as well as poor travelers. This inherent contradiction between the policy prescriptions and the political mandate led to a deep rooted cynicism within the staff (Tandon, 1994).

> The feeling has built up at all levels that the solutions lie above their level: a "They" complex; only "They can decide." . . .The whole attitude builds a sense of helplessness and there is growing evidence of lack of commitment and involvement, a rigidity and drift (p.7).

To break free of the widespread cynicism within the railway, the staff needed to be reassured that the commercial objectives and social considerations were compatible, and indeed could be reconciled. The essence of this challenge is captured in the words of the Indian Prime Minister Manmohan Singh.

> The challenge before the political leadership in India today is to meet the aspirations of an energetic new India, and, at the same time, take care of the concerns of the less endowed, less privileged sections of our society, who are no less energetic (Economic Times, October 9, 2006, p.19).

Translating the mission of inclusive reforms—defined here as meeting commercial objectives without compromising the needs and aspirations of the poor—into action, required a deep understanding of the political economy of the Indian Railways. Moreover, it required a re-conceptualization of what reforms actually meant.

> Reform is, in the final analysis, about changing mindsets. We must have the courage to think out-of-the-box. We must have the courage to think anew. To question old beliefs. To seek new pathways. As an old Chinese saying goes—a road is made by walking. We must learn to walk in new directions and create new roads to progress (Economic Times, October 9, 2006, p.19).

Despite having the will to think anew, how were market considerations harmonized with societal obligations? The 'split-personality', as the Mohan committee experts described the conflict between commercial and social objectives, implied that there were only two possible outcomes of any policy initiative—either a loss on the political objectives while gaining on the commercial front or vice-versa. Initiatives like increasing lower-class passenger fares or sanctioning non-remunerative new-lines fall into these categories. But, increasing axle-load to carry more freight or adding coaches to a popular passenger train enhances earnings per train, and is welcomed by consumers as well as benefiting the Railways. Thus, policy outcomes fall into four categories, not two (see Table 6).

Table 6. **Feasible set of reform outcomes**

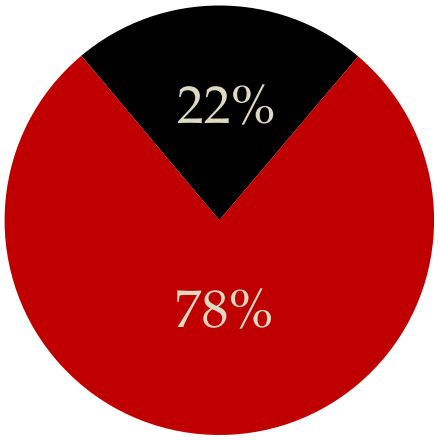
	Commercially viable	**Commercially unviable**
Politically desirable	***Outcome 1: Win-Win*** Reform efforts that fall in this category create win-for-all outcomes and face no resistance. For example, increasing the length of a popular passenger train enhances earnings per train and is welcomed by consumers because it helps clear long waiting lists.	***Outcome 3: Exclusively social returns*** Reforms of this nature are extremely contentious because there is tremendous political will, yet these are commercially unviable. For example, maintaining loss making branch railway routes (or opening new ones) for marginal communities in remote areas.
Politically undesirable	***Outcome 2: Exclusively commercial returns*** Reforms that are socially sub-optimal and commercially viable are contentious because they lack political will, typical of the 'split personality' scenario of the Railways. For example, increasing passenger fares in second-class ordinary passenger trains.	***Outcome 4: Lose-Lose*** These outcomes are neither politically desirable, nor commercially feasible. For example, new railway projects sanctioned on constricted departmental considerations compromise the institutional objectives.

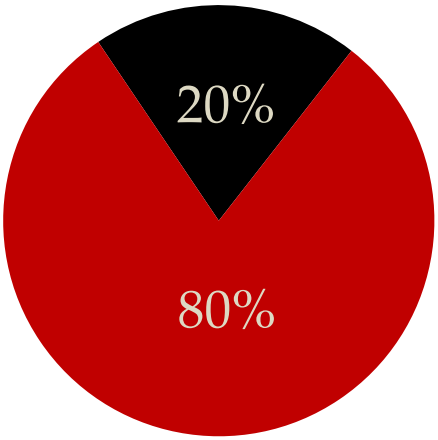
Each policy initiative was examined to determine the type of outcome. The strategy was to look beyond the obvious, to reconcile perception with reality, and to find out if the conflict between the political mandate and commercial objectives was the principal reason for the deteriorating condition of the Railways. For example, the total cost function of the Railways is largely inflexible because the railway does not have the political space to retrench at will, to shutdown, or even sell loss making branch lines and business units. On the other hand, if the total cost is distributed over greater volumes then unit cost declines. This volume driven strategy has no political implications, and benefits customers and the Railways alike. Similarly, while an increase in passengers fares is extremely politically sensitive, increasing yield per train

by adding additional coaches to popular trains benefits both waitlisted customers and the Railways. Assessing the hidden opportunities behind the veil of political economy led to some striking discoveries. Through a rigorous analysis, it was demonstrated that about 80 percent of the Railways' revenue stream as well as investments are not politically sensitive and can be market driven (see Figure 8).

As illustrated in Figure 9, the entire freight, parcel, and air-conditioned passenger segments are apolitical and can be market driven. The Mohan committee attributed the declining market share, even in bulk commodities, to freight fares cross-subsidizing passenger services. As these cross-subsidies affected all commodities, then why was there a dichotomous response in the transportation of finished products versus raw materials? For instance, while the Railways' market share of finished products like steel and cement declined sharply in 1990s, the share of iron ore, coal, and other minerals remained stable during the same period. Both iron ore and steel are heavy commodities; however, there is a key distinction. In the case of iron ore, the Railways provides a door-to-door service—from the mine-pithead to the factory.

Figure 9. **Traffic and investment in fiscal year 2008**





Social Commercial

Social Commercial

Note: Total revenue for fiscal year 2008 was 71,720 crore rupees (US $17 billion). The social components include all earnings from passenger trains with the exception of air-conditioned and first-class. Essentially, income from poor passengers are included and from non-poor excluded.

Source: Computed with data from Ministry of Railways (2008a).

Note: Total invetment for fiscal year 2008 was 28,680 crore rupees (US $7 billion). The social components include all expenditure in new railway lines, urban transportation projects, and gauge conversion. Essentially, expenditure for projects considered to be pro-poor are included, and the rest is excluded. By and large these proportions have been consistent over the last few years.

Thus, the rail freight is equal to the total 'door-to-door' logistics cost borne by the customers—implying that incidental costs of rail transportation are negligible. On the other hand, in the case of steel, the Railways provides a 'station to station' service. Nevertheless, steel is neither produced nor consumed at railway stations. As a result, in addition to the rail freight, the customer incurs incremental costs due to multiple transfers, bridging, warehousing, inventory, and so forth. In essence, rail freight is only a small component of the total door to door logistics cost to the customer. Truckers, on the other hand, provide door to door service for transportation of steel, and the incidental costs of road transportation are negligible. Thus, the railway has a strong

competitive edge in transportation of iron ore, while it is very vulnerable in case of steel. To compound the problem, the Railways determined freight rates based on the value of the commodity rather than elasticity of demand. Hence, relatively low-cost raw materials like iron ore were charged less, with expensive finished products like steel being charged more. On the contrary, based on the competitive strength of Railways in the market place, the pricing policy for these two types of commodities should have been the reverse higher charges for transportation of iron ore and less for steel. As a result, the Railways was losing market share in steel, while retaining the same share in iron ore. In sum, the differential loss in market share was not on account of cross-subsidies, but due to misconceptions about the competitiveness of the Railways in the market place as well as a monopoly mindset. Likewise, while successive Ministers were reluctant to increase non-air-conditioned class passenger fares, this prevented the Railways from decreasing air-conditioned class-one and two fares to face the competition from low-cost airlines. Thus, the Railways' core profit making business segments were under threat largely due to an aversion to profit, a monopoly mind-set despite shrinking market share, poor commercial orientation, and lack of customer focus.

In the same vein, barring construction of new railway lines, urban transportation, and some gauge conversion projects that are sanctioned based on political considerations, the remaining 80 percent of investment decisions have no political

implications. Essentially, the bulk of investments made were not yielding results due to narrow departmentalism that routinely compromised institutional goals for departmental gains (Tandon, 1994). For instance, investments made in the 1980s and 1990s of 30,000 crore rupees (US $7 billion) for strengthening the railway track structure did not yield commensurate results- not because of political interference, but on account of lack of cross-functional coordination and risk aversion to increasing axle-load.

Such analysis was done policy by policy, business by business, and activity by activity. It revealed that the space for reforms was extensive. For instance, there are no significant political implications with regard to operation, maintenance, train examination policies, and other day to day operations. Conflicts between the social and commercial obligations of the railway were not the primary constraint. Therefore, the focus of the reforms graduated from no privatization, no retrenchment, and no fare hikes to identifying, and expanding win-win outcomes and leveraging them to maximize financial returns without social costs. As an immediate step, care was taken to minimize lose-lose outcomes by inducing synergies between departments, establishing cross-functional teams, and encouraging project focused co-ordination with well defined targets under the close-eye of senior management.

While the above understanding was a prerequisite, it was not sufficient. The whole organization could only be galvanized by the transformational mission of

inclusive reforms if the top leadership demonstrated fairness. Achieving this was a herculean task for the Minister because of the image associated with his rule in Bihar. Initial incidents like the Minister's in-laws forcing, at the last minute, a change of platform for a Rajdhani Express train in Patna or party workers found travelling in a higher-class than assigned on the ticket, seemed to confirm people's apprehensions. However, on each occasion the Minster stood firm and directed the railway staff to enforce rules in an impartial manner. Moreover, senior railway officers were worried that transfers and postings decisions would be colored by caste-considerations—favoring some social sub-groups. But the Minister maintained a hands-off approach, allowing the Railway Board autonomy in making merit based decisions regarding transfers, postings, and the awarding of contracts. This gradually fostered mutual trust and understanding between the bureaucracy and the political leadership.

It is not uncommon for the bureaucracy and politicians to hold each other in contempt as they confuse the democratic mandate of 'no privatization, no fare-hike, no retrenchment' with political interference, namely meddling with the Railways' everyday management. While the bureaucracy learned to respect the political mandate, the political leadership reciprocated by not interfering with the routine operations of the Railways. The above constructive politico-bureaucratic engagement allowed for translating the mission of inclusive reforms into concrete outcomes. Further, a deep

commitment to reform was fostered. As members of the core reform team often summarized, "we eat, drink, sleep, and dream Railways."

Breaking the Myths

Once this critical hurdle of establishing trust with the staff was overcome, it unleashed the Railways' core strengths—its qualified staff, and robust systems—to initiate change. In the spirit of 'questioning beliefs' and 'seeking new pathways', assumptions about the nature of business and its purpose were revisited: including variables like the very nature of the Railways business and its rationale, the cost structures, revenue streams, competitive strengths, and relative elasticity of price and non-price factors, cost variability and sensitivity to load and length of train, as well as its manipulation.

The first assumption was the notion that the railway is a monopoly service provider that required tariff regulation. However, this was inconsistent with declining market shares. In practice, the railway was facing a competitiveness problem characterized by poor growth rates, falling market shares, and low or negative margins. The Railways was losing out to alternative modes of transport—pipelines, airlines, roadways, shipping lines, and so forth. Thus, a grounded view of the Railways was that of a transporter operating in a competitive market place where it enjoyed an edge in some profitable segments and not in others. The erosion of competitiveness was unlikely to be solved by regulation; instead, it required offering superior and

compelling value to the customers. Thus, the focus shifted from tariff regulation to reducing unit costs, improving yields, margins, market shares, productivity, product-mix, and quality of service with a customer focus.

Second, in the past, profit was not the primary focus. Instead, the Railways' operations and technology-based considerations dominated decision-making. This lack of profit orientation is not confined to public utilities like the Railways but, as observed by the CEO of Nissan Motors, is also seen among large private corporations.

> ". . .Nissan wasn't really engaged in the pursuit of profit. . . . They were selling cars without knowing if they were taking losses or making profits. . . . Sure, executives discussed profitability, but the company wasn't managed to that end. And when profit is not a motivating element, it won't simply materialize as a result of good luck. You have to place profit at the center of your concerns. No magic is going to bring it about." (Ghosn and Ries, 2005, p. 98).

Yet, the new found profit orientation of the Railways differs from private corporations, because its focus is to earn profits while serving the interests of the common people. This required a new perspective as well as business savvy: spotting, seizing, and encashing business opportunities were of essence. A striking example that demonstrates this savvy is a fivefold growth in freight earnings from transporting iron-ore for export—from 900 in 2004 to 4,400 crore rupees in 2008 (US $209 million to over a billion). The international prices for iron ore soared while the cost of mining remained relatively stable, thus the iron ore mining corporations were reaping wind-fall profits. The Railways has a formidable competitive edge in transporting this commodity due to geographic conditions, bulk quantities, and long distances from the mine to ports. In addition, the Railways recognized that its services were underpriced; this was reflected

in a long waitlist of over 10,000 indents—requests for rakes to transport iron ore for exports. Through consecutive freight rate hikes in iron ore for export, the freight rates were increased by nearly 400 percent and the Railways encashed this opportunity offered by the global commodity boom, yielding an additional 9,000 crore rupees (US $2 billion) in profits over the four years period (2004–2008). Such opportunities are short-lived and therefore timely action is of the essence.

Third, business assumptions regarding variability of costs were revisited. The Railways' finance code prescribes the long-term variable costs of the railway as being 78.5 percent. An analysis of the variability of costs from 1983 to 2004 revealed that while operating expenses had increased ten times at nominal (current) prices, real (constant) prices had decreased marginally. Meanwhile, the Railways' throughput, measured in gross ton kilometers, had more than doubled. This illustrates, that the increase in unit costs was predominantly a result of inflationary pressures and not on account of growth in throughput. Thus, the variability of costs for the Railways was substantially less than prescribed in the code even in the long-term, and was negligible in the short-term. This relative insensitivity of unit cost to output is due to economies of scale, slack in the system, improvements in operating strategy, and technology. For instance, with half the number of wagons and locomotives, the Railways now carries twice the amount of load due to gains from technological improvements. Likewise, as the operating strategy changes to run heavier and longer trains, unit costs decline. This

is because the cost of operation is relatively insensitive to load and train length as the same crew, engine, tracks, and so forth is required. This analysis was central to the scale driven strategy to increase freight volumes, reduce unit cost, gain market share and margins, and make billions of dollars in profits.

Fourth, was revisiting the pricing policy based on affordability. Poor passengers and low-value commodities like iron-ore and minerals were charged much less while wealthier passengers and expensive commodities, usually finished products, were charged higher fares. However, Ministers are not concerned whether steel freight is more costly than iron-ore or the other way around. While politicians are hyper-sensitive to pricing for poor passengers, they also welcome fare reductions in air-conditioned segments. With this new insight, the pricing policy was creatively modified. Now, the pricing for the freight, parcel, and air-conditioned passenger business segments is market driven and customer centric, while the affordability based pricing continues for low-end passenger segments. The past policy of across-the-board increase in prices to compensate for rising costs was replaced with a policy of selective price increases based on the relative competitive strength of the Railways. Freight charges were increased where the Railways had a competitive edge, and decreased where it was lacking. Further, uniform pricing across seasons, routes, and to and fro traffic flow succeeded in the planned economy of the statist-era, but had little relevance in a liberal economy. This has been substituted with a differential and dynamic pricing

policy. On the one hand, substantial discounts are offered during the lean season as well as in empty returning trains. On the other hand, surcharges are levied during the busy season and on congested routes.

Fifth, the past fixation with price per passenger or per ton has conceded ground to yield per train, unit costs, margins, product-mix, and so forth. The profitability of a train is a function of several variables including price, and non-price variables like occupancy rates, carrying capacity, load and length per train, and other aspects that determine asset utilization. In turn, each of these variables is further a function of other variables, for instance carrying capacity depends on axle-load, design of the wagons and coaches, tare weight, volumetric capacity, density of the commodity, and so forth. Thus, the focus has shifted from pricing per passenger or per ton to maximizing profits through yield and margins per train.

Sixth, the emphasis on construction and procurement of new assets has been replaced with a focus on asset maintenance, enhancing productivity, and better utilization—namely by operating faster, longer, and heavier trains. Reducing the seven day turnaround[26] time to five days enabled the Railways to run an additional 230 trains each day on average. All else being constant, incremental revenue from just these trains alone amounted to 10,000 crore rupees (US $2.3 billion). Furthermore, by adding an

[26]Turnaround is the time lapsed between two successive loadings.

extra six tons of load per wagon, the railway transported 90 million tons of incremental load each year or achieved 6,000 crore rupees (US $1.4 billion) in incremental revenue. Finally, by attaching additional coaches in popular mail and express trains with long waitlists, the incremental revenue from 3,000 such coaches translated into 3,000 crore rupees (US $0.7 billion) of additional revenue.

Finally, traditionally the Railways has been an insular organization driven by its processes and products. But now the focus is on value creation and customer satisfaction and a tech-savvy approach. This requires an agile and outward oriented management strategy. Information technology and strategic alliances have been leveraged to create value and improve the quality of service so as to provide cheaper, safer, and more reliable travel. For instance, e-payments, value added services such as half train load as opposed to a full train load of 2,500 tons, multiple location unloading facilities, and faster delivery of cargo have benefited the freight customers as well as the Railways. Likewise, travelers have benefited from systemic changes in services like e-ticketing, nation-wide train enquiry call centers, as well as better catering, cleanliness, and improved ambience of stations and trains. The management was confronted with the task of translating this insight to improved profits.

Crafting the Coalition of the Willing

Post 2001, under the uncertainty of corporatization plans proposed by experts, the Railways' staff had low morale. There were concerns about job losses and panic over pensions was on the rise. To instill confidence within the bureaucracy and provide a sense of mission to the staff, the Minister's stance and phraseology were critical. Thus, the political mandate of no privatization, no retrenchment, no fare hikes was encouraging for the Railways' staff. The Minister constantly referred to the Railways as a *sone ki chidia*, a golden bird with great potential, and this transition from critique to complements was a first step in reinstating confidence among the railway employees. In essence, the political mandate not only reflected the needs of the electorate but also provided security and restored confidence within the bureaucracy.

Second, to empower the Railways' staff, the Minister adopted a hands-off approach to day-to-day management of the Railways—including finalizing of tenders, evaluation of bids, award of contracts, and staff transfers and postings. Instead, he focused on finding qualified and talented officers for the job. This was in the same spirit as the routine corporate practice. Jack Welch, ex-CEO of General Electric, is known to have said, "I have no idea how to produce a good [television] program and just as little about how to build an engine. . . But I do know who the boss of NBC is. It is my job to choose the best people and to provide them with dollars (Slater, 2003, p.17)". Welch goes on to say that he gets rid of staff if they do not deliver (Pandya and Shell,

2005, p. xvii). In contrast, the approach adopted by the Railways' leadership was to stand by employees even if they failed to deliver despite their sincere efforts. This was not just a constraint of the bureaucracy—where retrenchment is not a viable proposition—but was also a matter of principle. Gradually, as the coalition of reformers was expanded across the organization, authority for decision making was decentralized, for example, the discretion to grant discounts on incremental freight was placed with staff at field units. Customers that approached the Railway Board with their grievances in the past, now resolve most concerns at the zonal level. Thus, devolution of powers not only empowered the staff but also motivated the organization to act.

Third, working by consensus was adopted. While such deliberative decision making was frustrating and a cause of delays, it was still worthwhile because it developed a deep ownership for change. For instance, increasing axle-load or improving train examination practices required inputs from various experts with allegiances in different departments—mechanical, financial, traffic, electric, civil—and the participatory decision making required resolving these conflicting views, yielding robust solutions. Occasionally, consensus required accommodations and compromises to balance conflicting views. For instance, when the reformers proposed to introduce free upgrading of passengers to fill vacant seats from lower to upper classes, the finance department was resistant, insisting that it would result in losses. After a lot of debate

and delays, finally a compromise solution was arrived at where the upgrading scheme would be tried on a few trains for only a few days. Once the pilot was a success the scheme was scaled-up nationwide, and the new Finance Commissioner championed it. Finally, once consensus-based decisions were arrived at, skepticism in implementation was not tolerated. In essence, decision making was consultative because it not only yielded better solutions, but also instilled a deep rooted ownership within management, resulting in quick implementation.

Fourth, incentivizing performance within the bureaucracy. Unlike the private sector where degrees of performance are rewarded with differential pay, perks and career trajectories, in the Railways, quite like other public sector enterprises, promotions are seniority based and salaries and perks are uniform across comparable grades, irrespective of individual performance. Further, the organizational culture of the railway was one of a large family where quality of work and sharing of benefits were valued more highly than performance based discrimination. Thus, it is not uncommon to find several generations of Railways employees from the one family—in some cases up to five consecutive generations have worked exclusively for the Indian Railways. In response to this organizational culture, the railway reformers adopted a strategy of leveraging the deep rooted commitment and loyalty that the Railways' staff has towards the organization. To motivate this 1.4 million strong bureaucracy, a combination of normative incentives were adopted, differentiated across various staff

grades—from the frontline workers to the senior management. For instance, on a field visit the Minister met some frontline workers, namely gang-men and key-men, whose working conditions were dire—barehanded and poorly clad in severe winter weather, they were working with rather basic tools. In appreciation of the critical role of 200,000 such frontline workers the management allocated uniforms, hand gloves, and better tools. Likewise, to terminate the practice of the train crew carrying dry meals to cook enroute, the Railways now provides subsidized meals in railway canteens to drivers and the rest of the train crew on duty. Similarly, for senior officers the perks were revised to include a house-help, laptop computers, mobile phones, personal cars, and possibilities for short-term training abroad. Such incentives are common in the Indian corporate sector that has traditionally paid less than its multinational counterpart. While these are small gestures and were required more for improving the working conditions of the staff than for motivating them, it clearly demonstrated that the institution cares about the employees and was critical in motivating them. Further, to reward performance when the railway achieved its mission—600 million tons of freight loading and a cash surplus of 10,000 crore rupees (US $2.3 billion)—the senior management approved group-cash awards for the teams that contributed to the success. In essence, through a combination of normative and economic incentives, the reformers motivated the railway employees to seek ownership of the change and improve their productivity, while non-performers were not penalized.

From Ideas to Action

While re-conceptualizing the Railways' business to reflect realities on the ground and motivating a team committed to reform were essential steps of the management strategy, the next step was implementation. Swift execution was central to action. Operating longer and heavier trains had been debated for decades within the Railways, but the management could not make the decisions that would result in implementation. The Railways' narrow departmentalism, a monopoly mindset, and cynicism towards the political mandate had been critical obstacles in the past. However, with a new mindset, a business perspective was translated into action through five critical management interventions. The Indian Railways deployed a combination of management strategies: setting stretched targets, leveraging resources to optimize existing assets, working through cross-functional teams, fostering alliances, investing strategically, adopting a deliberative and calibrated approach, and chasing projects to swift completion to reap high returns. These management strategies are outlined below.

First, thinking beyond the resource constraint required leveraging resources such that aspirations exceeded the resource endowment of the Railways. Here innovation and asset optimization—as opposed to asset accumulation—were central. The strategy was to fully utilize assets by running faster, longer, and heavier trains.

Second, was coordination and cooperation requiring functional and spatial synergy as well as complementarities among various kinds of policy interventions, such that the sum of the parts was greater than the whole. This was achieved through establishing cross-functional taskforces that were assigned specific decision-making tasks to be delivered in a time-bound manner. Third, strategic investments were made for a systems-based approach to improve the utilization of existing assets—low hanging fruits. Low-cost, short-gestation, high-return, and rapid-payback were the criteria for these investments. Such investments included lengthening platforms to accommodate longer trains, and investing in ameliorating network bottlenecks like small segments of weak railway tracks on high density networks. These interventions were given top priority and authority was devolved to allow swift implementation. Fourth, strategic alliances were forged to meet soaring demand, co-opt competition in areas where the Railways' lacked competitiveness, and forge long-term alliances with the existing customers so as to offer better service. Fifth, was a deliberative and calibrated approach where projects were first piloted to learn, revise, and scale-up in a phased manner. A classic example of this incremental approach was the gradual increase of axle-load in small increments of two tons on selected routes and gradually expanding this across the high density network. However, presiding over these themes was the organizational mission to champion inclusive reforms—the political mandate of transforming the

financial condition of the Indian Railways without burdening the poor travelers and railway employees.

To implement the strategy the management had to aggressively chase targets. The senior management identified new policy targets, chased, and grabbed them. The chase has several elements. First, among these was setting stretched targets. Second, the set of strategic inputs was pursued simultaneously. Third, timing, because in this context, when to act is of essence. Fourth, change was induced by demand. Finally, in contrast to the past tedious process of decision making, where the Railways had deliberated over critical issues like increasing axle-load or introducing more efficient train examination practices, implementation was surprisingly swift, because the Railways has both the technical prowess, procedures, capacities, and the discipline to implement large and small changes[27].

[27]This resonates with the experience of transforming Nissan (Ghosn and Ries, 2005). ". . . as long as management gives clear directions that everyone understands, as long as you've got a clear, thoroughly explained strategy, you don't need to worry too much about how well and how fast it's carried out. Don't get me wrong, you still have to expend a lot of time and energy, but it's remarkable how execution falls into place (p. 210)."

Outcomes, Sustainability, and Replication

The outcome has been a win-win for the Railways with over US $6 billion in annual profits of 2008, customers have better service, and the Minister has gained a positive reputation. Some skeptics are critical of the long term implications. Four concerns dominate in this regard—on one hand those who claim that the Railways' performance is a result of accounting trickery or at the cost of safety, while on the other hand are those who state that this successful transformation of the Railways is a result of plucking low-hanging fruits or due to an upswing in commodity cycles.

These concerns for sustainability are substantially misplaced. While the Railways' freight business benefits from surging demand in a booming economy, encashing this required structural improvements in the functioning of the Railways. As for its accounts and financial statements - these are verifiable as for any other public enterprise. Further, during the 1990s, the Railways was unable to afford replacement of over-aged assets. In contrast, for the fiscal year 2009, assets, internal generation, and non-budgetary resources contributed 78 percent of an annual plan outlay of 37,500 crore rupees (US $8.72 billion). Likewise, all operational changes in the Railways are closely scrutinized by the Railways' Research, Designs and Standards Organization—better known by its acronym RDSO—as well as an independent Commission of Railways Safety, administered by the Ministry of Civil Aviation, Government of India. Additionally, the number of train accidents has declined from 473 in 2001 to 194 in 2008,

and the allocations for replacement of over-aged assets has increased from 2,300 to 7,000 crore rupees over the same period; the Railways' profits have also soared, implying that safety, productivity, and profitability are complexly interdependent.

As for the low hanging fruits argument, there is little substantiation for this. The scope to optimize utilization of the Railways' existing assets—through 'innovations in systems, processes, policies, and technology'—along with augmenting its capacity to respond to future demand, provide a strong base for perpetuating the present success of the Railways. This is partially demonstrated in the Railways' ability to have sustained significant growth in traffic earnings for four successive years. Moreover, for a glimpse into the underutilization of the Railways' existing assets, consider the following comparisons with Chinese and American railroads. While the state-owned Chinese railroad has a comparable network and about the same number of passenger kilometers, the Chinese railroad carries four times more freight than its Indian counterpart. Likewise, the freight only, class-one American railroads have about one tenth the labor force of the Indian railway but carry three times the amount of freight. Thus, the scope to continue improvements in the utilization of existing assets in Indian railway is immense.

For the short-term, the Indian railway is investing much more than before in building as well as acquiring additional assets. Over the last seven years the annual budget of the Railways has tripled from 11,000 in 2003 to 38,000 crore rupees in 2009.

Likewise, in the same period, the production of engines has increased from 180 to 500, wagons from 6,000 to 20,000, and construction of new broad-gauge routes from 1,000 to 3,500 kilometers. These investments will yield greater productivity gains because the capacity of new wagons is between 22 to 78 percent more than the old ones. Likewise, the capacity of new passenger coaches is enhanced by between 5 to 20 percent. To augment the capacity of the existing rolling stock, they are being retrofitted and the production of lower capacity coaches and wagons is being phased out.

For the long-term, along with the introduction of capacity and efficiency enhancing technology, systems, and procedures, the Railways plans to invest about US $53 billion (230,000 crore rupees) during the next five years (2009–2013) for enhancing capacity. All this investment is being strategically channeled to projects that have a commercial orientation. For instance, through route-wise planning the entire high-density network's capacity will be augmented on a priority basis over the next five years at a cost of 75,000 crore rupees (US $17.4 billion). Likewise, priority is being given to strengthening iron ore and coal routes so as to carry 25 ton axle-load. Finally, to enhance capacity in the long-term, dedicated freight corridors are being developed along the length and breadth of the country to match the national highway building program, better known as the golden quadrilateral and its diagonals. To meet a surge in demand, factories are being built to manufacture engines, wagons, coaches, and their

parts, as well as multi-modal logistics parks are being developed. In essence, Indian Railways is investing to sustain its growth trajectory.

Sustaining the management impetus after the Minister and his team leave office is less of a concern as the policy reforms have been embedded in the institutional DNA by mainstreaming systemic and procedural reforms. These have become part of the organizational routine, manuals, and to some extent norms. This can largely be attributed to leading change while respecting and strengthening the organizational identity and morale of employees. Through a consensus based approach the reforms have developed deep roots within the institution.

However, what remains a real threat for the future of the Railways are three critical, yet little discussed factors. First, is the importance of macroeconomic stability which is characterized by low inflation and interest rates. This is critical to reduce unit costs at current prices—a lynchpin of the Railways' recent financial transformation. In the 1990s, a combination of low growth in the freight business segment, at an annualized rate of two percent, combined with high inflation, averaging 11 percent per annum, resulted in costs increasing faster than revenues, leading to a financial crisis. However, between 2005 and 2008, the combination of macroeconomic stability characterized by annualized inflation rates of five percent, a booming economy, and an upswing in the commodity cycles provided a fantastic opportunity for the Railways. The Railways seized this opportunity by growing freight volumes at nine percent per

annum for four consecutive years. This was four percent higher than the average rate of inflation. Consequently, nominal (current) costs declined by two percent each year, and the Railways' freight unit cost declined from 61 paise in 2001 to 54 paise in 2008, resulting in a doubling of profit margins, despite no across-the-board increase in fares. Further, passenger losses reduced because costs remained stable while the product mix was changed in favor of high-value high-margin business segments. However, high inflation and high interest rates may reverse this virtuous cycle of declining unit cost, improving profit margins, and growing market shares.

Second, unlike the past when the Indian Railways was the preferred employer for the talented youth, including the elite IIT and IIM graduates, now there is a gradual disinterest in working with the Railways largely due to the competition from private employers. Third, the Indian Railways is sustaining an internal drive to constantly innovate so as to create value for the customers such that the railway is the preferred mode of transportation in various freight and travel business segments.

This successful transformation of the Indian Railways consists of a number of transferable lessons that can be replicated in other public utilities as well as large corporations that are increasingly organized like large bureaucracies. The conventional prescription of corporatization, privatization, retrenchment, fare hikes, and independent regulation often works wonders in sectors where user fees are not politically contentious as in the case of telecom and aviation. A classic case of such

efforts is the telecom industry in India. However, there is a need to rethink this text-book approach to reforms in sectors like, energy, water supply, irrigation, and railways where these are politically infeasible. Three striking lessons are outlined. First, counter-intuitively, the experience of the Railways transformation demonstrates that the commercial objectives and social obligations can be reconciled. This can be achieved by dissecting business segments into political and apolitical ones, and then further disaggregating into nano-constituents so as to identify apolitical variables that can be manipulated to improve profitability without compromising the interests of the political constituencies—in the case of the Railways it was the poor consumers and the Railways' employees. In essence, an in-depth business and political analysis is a prerequisite for crafting an effective strategy. Such analysis reveals that there is immense scope for expanding desirable win-win outcomes where the social and commercial objectives are met simultaneously. For instance, across sectors there is much room to improve efficiency by optimizing an underutilized system, fixing loopholes, and reducing revenue losses. To translate this insight into action requires working across departmental silos, introducing a commercial orientation to the organization, and breaking free of a monopoly-mindset. And above all, this requires a productive politico-bureaucracy interface such that the bureaucracy respects the political mandate, and in return the political leadership refrains from interfering with the routine functioning of the bureaucracy.

Second, thinking anew. In a fast changing external environment it is critical for public utilities to question past assumptions about the nature of the business, its cost structures, pricing, and respond appropriately. For instance, the widespread obsession with construction, procurement, and expenditure should to give way to effective and efficient utilization of existing assets for enhancing productivity.

Third, there are the *big five* approaches to implementation: namely, setting stretched goals, cross functional and spatial coordination, strategic investments, fostering alliances, deploying a deliberative and calibrated approach, and aggressively chase for results. And finally, but most importantly, there is no substitute for business savvy.

In conclusion, the Railways transformation is an exemplar for how state-owned enterprises can improve services despite all the odds of balancing commercial and social objectives to deliver inclusive reforms. The following chapters will unpack the various attributes of the transformation strategy in substantial depth.

Chapter 5: Political Economy of Reform

Introduction

To conceptualize the functioning of the Railways, this chapter begins with a brief introduction, an outline of the organizational structure, followed by an account of the institutional and technological evolution of the Indian Railways post-independence. Three key events are discussed illustrating how the Railways faced the challenge of integration and modernization post nationalization, a resultant operational crisis in the 1980s, and most recently a financial crisis. Then, I explore the complexities associated with the political economy of reforms and present some surprising facts with respect to the expert recommendations and their mismatch with the realism of a populist Minister. Next, I discuss the challenge of establishing trust between the political leadership and the Railways' bureaucracy. Finally, the process of crafting space for reforms within the political economy of the Railways is presented along with a few pragmatic steps taken to initiate change.

Indian Railways' Organizational Structure and Functioning

Due to its size, ownership structure, and 150 year history, the Indian Railways is a unique state-owned enterprise. These attributes, among others, make it a complex and intriguing subject. The Indian Railways is one of the world's largest infrastructure-

providing state-owned enterprises. The Railways is a Ministry within the Government of India with 1.4 million employees and 1.1 million pensioners (see Table 7).

Table 7. **Staff strength**

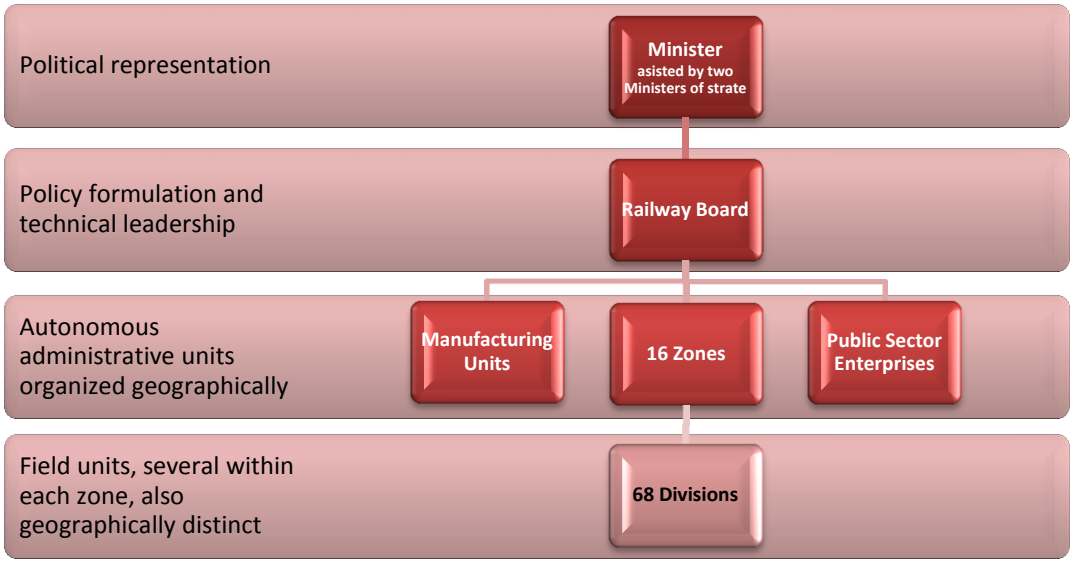
Type of unit	Number of staff (2008)	Staff grade	Number of staff (2007)
Railway Board	1,842	Group A and B	16,000
Manufacturing Units & Public Sector Enterprises	50,426 (44,426 + 6,000)	Group C	907,000
16 Zonal Railways (including 68 divisions)	1,326,663	Group D	484,000
Total	1,378,931	Total	1,407,000

Source: Statistics and Economics Directorate, Ministry of Railways, Government of India.

It has one of the world's largest railway networks—over 63,300 kilometers of routes—and runs approximately 13,000 trains each day, including 9,000 passenger trains. Indian Railways carries over two million tons of freight and some 17 million passengers between 7,000 railway stations each day. This is achieved with a fleet of 200,000 wagons, 40,000 coaches, and 8,000 locomotives. To fathom the scale, consider the fact that Indian trains, each day, travel four times the distance from the earth to the moon and back. The Railways is vertically integrated and horizontally differentiated into functional silos. Under this single umbrella organization, the Indian Railways finances, builds, owns, and manages most of its assets. This includes the locomotives, wagons, coaches, rail tracks, stations, and enormous stretches of land as well as hotels, schools, hospitals, and staff housing. Additionally, through a range of subsidiaries, it manufactures and maintains most of these assets in-house (see Figure 9). This

monolithic structure of the Railways has been a contentious issue among senior policy makers in the Government of India as well as international organizations who have argued for unbundling and privatization.

Figure 10. **Organogram of the Indian Railways**



Source: Author, based on information from the Ministry of Railways, Government of India.

The apex body in the railway is the office of the Minister, which brings with it a political mandate and associated leadership. This is followed by the three-level bureaucracy of the Indian Railways—railway board, zones, and divisions (see Figure 9). The bureaucrats are organized in a matrix of functional and geographic specialties. At the top is the Railway Board. It is composed of one member from each of the functional specializations of the Railways—electrical, engineering, finance, mechanical, staff, and traffic. The board is led by the Chairman—better known as CRB or Chairman of the

Railway Board. All members of the Railway Board rise through the ranks of the institution, and thus have enormous experience and insight but short tenures—it is generally a year or two before they retire from these positions. Thirty five directorates assist the board in fulfilling its functions.

Zones are the apex bodies in the field, and they also act at an intermediate policy level. These are relatively autonomous units that govern the functioning of the Railways and are organized into 16 geographic areas. Each zone is led by a general manager who leads the administrative activities of the concerned zone. Members of the Railway Board provide oversight over the technical functions in the zone. Furthermore, each zone is parsed into several divisions, each led by a Divisional Railway Manager. The division is the lowest administrative level where the zone departmental heads provide a similar oversight role as the Board provides to the zones. Finally, there are several public sector enterprises and manufacturing units, workshops, and other training institutions that report directly to the Board.

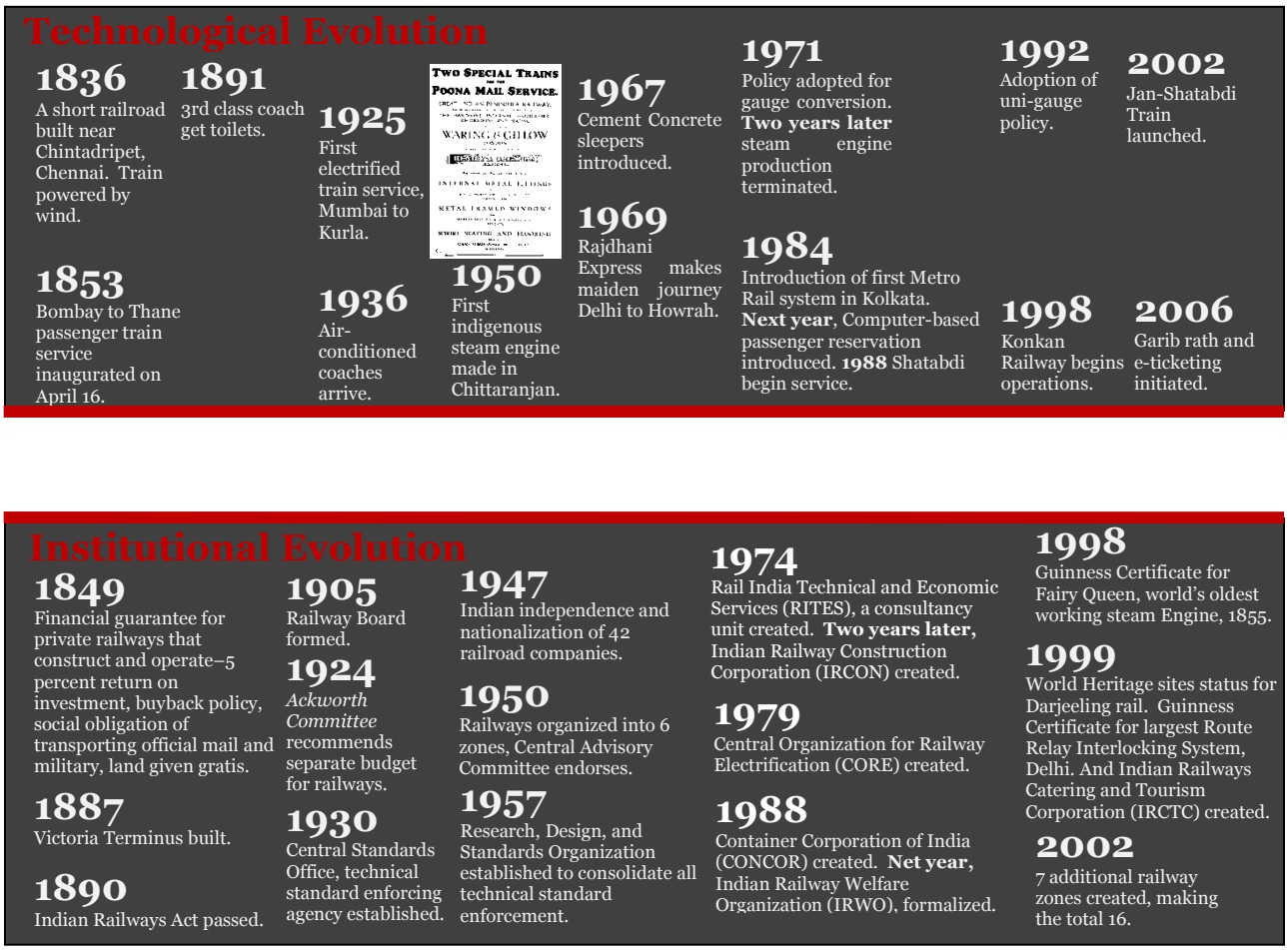
Evolution of the Indian Railroads (1800s to 2000)

The inception of the railroads in India is often associated with the maiden journey of a fourteen carriage train carrying 400 passengers at 20 miles per hour between Mumbai and Thane on April 16, 1853. But this was not the first railroad in India. From 1836 to 1837, about 17 years earlier, linked to a stone quarry, a three and a half mile long

railway track was laid in Chennai—then known as Madras Presidency. On this ran the first freight train in India. Yet another surprising fact is that it was powered by wind sails and consequently was called the *Wind Carriage Railway as* reported on December 30, 1837 in the Madras Herald (Bhandari, 2006, p.2). With the looming concerns of climate change that threaten the modern economic models based on consumption of fossil fuels, in hindsight, the use of a renewable source of energy like wind was astonishingly progressive.

Much of the initial railroad construction was led by private firms including the East India Company. This construction was financed through investments from capital markets in England backed by British government guarantees. The princely states of Bikaner, Gwalior, Jodhpur, among others financed their own railroads as well. Eventually, the crown realized that the incentive structure for the private contractors did not encourage parsimony. This was primarily because all risk was borne by the state, which guaranteed a five percent return on investment. Furthermore, the contracts had provisions to buy back the infrastructure if it was unprofitable for the private firms that built it. Additionally, the state provided land gratis and required its mail to be carried free of charge.

Figure 11. **Evolution of the Indian Railways**



Source: Adapted from Bhandari (2006)

As a result, in some cases private contractors spent lavish amounts to construct railroads. Such public-private collaboration in the nineteenth century resembles the contemporary cost-plus models with assured rates of return. To counter the private disincentives, and respond to security concerns due to the revolt of 1857, the British government decided to take on the task of railway construction and management. Fast-forwarding to Indian independence in 1947, there were about forty-two Railways that

were all nationalized and consolidated into one state-owned enterprise. The timeline below illustrates the pivotal events in the evolution of the rail industry in India (see Figure 10).

Indian Railways has an affinity for technological development and possesses the in-house engineering prowess to keep pace with the progress in the global rail industry. At the risk of over simplification, assume a railway consists of only four important components that constitute its capital stock; the railway tracks, the carriages that roll on them, the engine that pulls these carriages, and the signaling systems that tell the engine driver when to start and stop. After 1947, during the post-independence nationalization and resultant consolidation of the Indian Railways, several types of rail technology were inherited from the numerous independent regional railway enterprises. Enormous efforts were put into standardizing this uneven capital stock.

Operational Crisis of the Nineteen Eighties

In the period following nationalization of the Railways there were some critical technological improvements. The old stock consisted of less efficient and high maintenance technology. The brake system was vacuum based, and most engines were steam powered. Wagons had unreliable plain bearings and four wheels—implying shorter wagon length as well as lower load carrying capacity. Further, screw coupling,

the device that linked wagons to form a train, was manually operated and had limited strength, so forming longer and heavier trains was difficult.

The new stock consisted of better technology. The new diesel and electric engines were more effective because they could pull heavier loads, used less energy, provided greater operational flexibility, and were less polluting[28]. Wagons had lower-friction roller bearings and eight wheels—namely, covered and open BOX and BCX respectively, with greater volume and load carrying capacity. The centre buffer coupling[29] device was also better. In essence, through a combination of such technological improvements, the Railways had better rolling stock. However, as the lifespan of rolling stock is between 35 to 40 years, old stock continued to operate along with the new stock.

Further, goods were accepted in both wagon and train loads. This created operational inefficiencies. Piecemeal freight required frequent en route marshalling, examination, and formation of wagons between trains. At an interval of every 400 kilometers the Railways maintained goods yards for this purpose. This was complimented with a logistical network to repack small parcels en-route at repacking

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[28] So every time a passenger peeped out of a moving train they did not have their face covered with black soot, but as a train left the station the travelers missed out on the dramatic start of a puffing steam engine.

[29]These are also know as the CBC type of coupling and make the train safer and faster. Incase of an accident this coupling ensures that coaches remain firmly connected together in the vertical plane. This arrangement prevents one coach from stacking up on another.

sheds before they were finally sent to their destinations. To further complicate the matter, the old and new stocks of wagons were mixed and forming a train required linking incompatible types of couplings via a bridging device—know as a 'baby coupling' which was perpetually in short supply as it was frequently stolen and resold. The repeated reconfiguration of rakes—a set of wagons that form a train—needed issuance of new brake power certificates that required frequent inspections, leading to delays. Additionally, the steam engine required repeated halts for operational needs like coal and water refills and crew changes.

The old and new stock of wagons with different types of couplings and bearings were jumbled to form freight trains. Frequent shunting was required because of piecemeal movement of wagons. This was a critical obstacle in the very functioning of the railway system. As a result the entire railway system was reduced to operating on the strength of its weakest link. Railway sidings (auxiliary tracks), were cluttered with (under repair) wagons, and yards had become bottlenecks, mainly due to wagons waiting to be remarshalled and transferred to other trains. Furthermore, there was a union of engine drivers which was also making tough bargains. In sum, these and other operational and management practices caused uncertainties and long delays in the entire freight operations—power plants awaited coal supplies and transportation of essential commodities such as food grains and petroleum products was severely constrained.

On November 17, 1980, through an extraordinary executive order by the then Prime Minister, Indira Gandhi, the entire Railway Board was replaced. She identified M S Gujral to be appointed as Chairman of the Board, the first General Manager of the Railways to be directly appointed to this post. Gujral took bold steps on arrival. He had a twofold strategy. First, he segregated the old and new types of wagons—specifically, four wheeler from eight wheeler, screw coupling from center buffer coupling, and roller bearing from plain bearing.

The steam engines were mostly utilized on short routes, like operating trains between yards and shunting; for long haul journeys' higher horsepower engines were deployed. As a corollary to the separation of stock, Gujral improved the maintenance practices at the start of each train journey so as to abolish the practice of en route examination of trains called 'safe to run' at every 400 kilometers (and 'intensive' at every 800 kilometers for intensive routes). This was replaced by end-to-end examination. Second, to further improve the operational efficiency, he terminated the practice of accepting freight consignments that were less than full train load and introduced the concept of 'block and point-to-point trains', thus eliminating the need for trains to halt en route. He revised the unit of transportation from a wagon load to a train load. Earlier, for every change of steam engine, new brake power certification was required through a safe-to-run examination. Further, train examinations were required when trains were re-marshaled, because the unit of transport was a wagon load.

However, following reform, trains did not require renewal of brake power certification for a change of locomotive at short distances. He further ordered the elimination of several redundant yards. As a result of these two actions the time spent on shunting wagons at yards, or the need to halt at every yard, was reduced.

Gujral introduced long-term measures, including improved brake, bearing, and coupler technology in all wagons as the standard practice. Second, the production of higher capacity and better-designed air brake BOXN and BCN wagons was initiated, high power diesel locomotive production was ramped up, and high capacity diesel powered breakdown cranes were acquired. Third, he prioritized the electrification of railway routes, improved utilization of diesel and electric locomotives, and ordered the complete phasing out of steam engines.

In sum, the Gujral reforms resulted in a quantum leap in the Railways' operational performance. Trains ran faster and an increased amount of freight was transported. For example, there was a fourfold increase in freight carried in the decade following the reforms compared to the preceding decade. Gujral had also explored the need to increase the axle load—essentially carrying greater amounts of load in a freight wagon—on his rather abrupt departure. The risks associated with the decision took precedence, resulting in no further follow-up for the following two decades. The Railways' present transformation leveraged the new rolling stock that Gujral had introduced through his long-term plans.

Financial Crisis in 2001

In 2001, Indian Railways faced a severe financial crisis. It defaulted on dividend payments to the Government of India, its cash balance shrank to a paltry 359 crores rupees, (US $83 million) and the Railways did not earn enough to replace over-ageing assets resulting in large replacement arrears. The profitable freight business was recording a poor growth rate of 3 percent and its expenses were growing faster than revenues. The Railways financial condition was unsustainable and it was on the verge of bankruptcy. There were a range of internal and external factors that led to the Railways deteriorating operational and financial condition. In response to the currency crisis in 1991, the Government of India initiated liberalization of the command and control economy—this marked the retreat of the *license raj* (Fabian regulatory regime). These reforms reduced barriers to trade—revoking quotas, licenses, permits, as well as reducing tariffs on imports of intermediate and finished goods. Additionally, with deregulation of the internal markets, restrictions on large and small firms were gradually repealed. As a cumulative effect of these liberal reforms, firms began feeling the competitive pressures from domestic and international firms because in a liberal trade regime, domestic prices of tradable goods and services converge with global ones. Moreover, the cost of international freight transportation has been declining. In response to stiff competition from domestic and international firms, producers began

reviewing their cost structures, including total logistics costs—namely, cost of transportation, inventories, multiple modal transfers, delays, damages, and so forth.

In the pre-reform era, under the freight equalization scheme, the cost of transportation of crucial bulk commodities like steel and fertilizers was neutral to the distance these goods were transported, as the difference was paid by the public exchequer through a subsidy. Steel made in Jamshedpur cost about the same in Ranchi and Gujarat, owing to the freight equalization policy for steel. Further, oil pool accounts for petroleum products and the retention pricing scheme for fertilizers played a similar role. In essence, the producers of these commodities were not concerned about the costs associated with transportation because they could pass on these costs to the state. Liberalization began dismantling this arrangement. Hence, firms became cost conscious and began seeking cheaper transport services. Since transportation of bulk commodities lay at the heart of the Railways' post-Gujral phase, liberalization was putting pressure on the freight business model as customers migrated to other modes of transport.

Moreover, a fiercely competitive private road transportation sector was increasingly acquiring the Railways' market share. There were other competitors on the horizon as well: international logistics firms, shipping industry, and oil pipelines. Further, the Railways experienced another external shock from the reformed macroeconomic environment. There was a sharp decline in the ability and willingness

of the central government to provide budget support through fiscal transfers for capital investment needs or recurring expenses like the increase in wages due to the recommendations of the Fifth Pay Commission that determines the wage structure of all Government of India employees, including those of the Railways. The former enhanced competition from the demand responsive private road transport market, and the latter eroded hopes of bailouts through fiscal transfers.

Finally, over the 1990s, seven billion dollars (30,000 crore rupees) was invested in improving the quality of tracks[30]. The new tracks were stronger and could endure heavier loads. Additionally, by the turn of the century, billions of dollars were invested in acquiring race horse like engines—relatively expensive high horse power diesel and electrical locomotives. Yet, the modernization efforts and the inherent strength of the bureaucracy were not translated into benefits, despite surging demand for freight services because of a lack of synergy among the Railways' departments and a missing commercial focus, among other things. These constraints will be discussed in subsequent chapters. In sum, while there were significant technological and institutional improvements over the past two decades, it did not lead to tangible

[30]Earlier, railway tracks consisted of 90 pounds (44.65 kilogram per meter), rails resting on cast iron or wooden sleepers manually laid on a bed of 200 millimeter size gravel, also known as ballast cushion. In 1980's and 1990's most of the track structure on the high density network was upgraded to either 52 kilogram or 60 kilogram rail with 72 or 90 pound ultimate tensile strength, pre-stressed concrete sleepers 1540 to 1660 numbers per kilometer density and mechanically laid ballast cushion of 250-300 millimeter size gravel.

improvements in productivity of the Railways. As the Minister describes the condition: The Railways had acquired a Jersey Cow, but did not milk it adequately, resulting in a sick cow.

Beyond Bankruptcy

The financial condition of the Railways was so precarious that the Government of India convened some of the brightest policy makers and private sector experts to diagnose and advise on corrective measures. Rakesh Mohan, the Deputy Governor of the Reserve Bank of India was the chairman of this *expert group*. The combined intellect of the Government of India's expert group on railway reforms as well as the global experts, attributed this near bankruptcy scenario to the 'split personality' of the Indian Railways. The conflicts in achieving multiple organizational goals—welfare and commercial—were to be blamed. In the expert view, there were five essential contradictions that the Railways needed to resolve. First, was the political mandate that led to conflicting priorities between the politician and the bureaucracy—the Minister and the Railway Board, Railways' top management. The experts argued that the Indian Railways was heading to bankruptcy because Ministers meddled with financial allocations, resulting in poor choices of investment in politically motivated un-remunerative projects. Further, the planned economy mindset saddled the railroads with social obligations like cross-subsidization of passenger fares through frequent

increases in freight tariffs which eroded the market share of this profitable segment of business. This cross-subsidy is reflected in the fare to freight ratio[31] in Indian Railways, as it is one of the lowest in the world. For the intuition behind this ratio consider the following: If the ratio tends to one, there is little or no cross subsidy, but as the ratio gets closer to zero, the subsidy from the cargo segment to the passengers becomes greater. Furthermore, there was concern that even within the passenger segment, the potentially lucrative premium class passenger segments like the air-conditioned coach travelers were taxed—because they paid higher prices—in order to subsidize the ordinary sleeper classes. And as these premium class fares were on the rise, the Railways was losing these customers to budget airlines.

Second, since the policy making, oversight functions, railway ownership, and management are all organized in a monolithic organization, there is a lack of accountability.

Third, the Railways indulged in a variety of non-core activities that ranged from in-house manufacturing and maintenance of engines, carriages, and even catering (for example, *Rail-neer)*[32]. Additionally, it was burdened with social obligations like running

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[31] This is an indicator of the extent to which the cargo customer cross-subsidizes the passenger fare. This indicator is arrived at by dividing the average passenger fare per kilometer by the average freight rate per ton per kilometer.

[32] Rail-neer, drinking water bottles produced and sold by Indian Railways, was introduced in 2002.

hospitals and schools, *yatri niwas* hotels, training institutions, and employee housing. These distracted Railway employees from focusing on the core business of running trains. Operating such non-core businesses belonged to a bygone era, out of sync with contemporary practices.

Fourth, was a fiscal crunch due to declining budgetary support[33] through central government transfers. Budgetary support has declined three fold from 75 percent in the fifth plan (1975–80) to 25 percent in the ninth plan (1997–2002). To make-up the gap in investment needs, the Railways borrowed from the markets.

Finally, there was an army of rail employees and their ever increasing salaries and pension liabilities. To compound the burden of employees, staff costs accounted for about half of total costs; the implementation of the 5th pay commission would act as the final nail in the fiscal coffin.

In sum, a combination of political interference, conflicting commercial and social objectives, fiscal crunch, lack of market incentives, and unproductive employees had hindered investment in track renewals and other safety measures, while the Railways was losing market share.

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[33] The Indian Railways pays a 7 percent return on this fiscal transfer to the public exchequer. This is a loan in perpetuity.

In response, the Mohan committee and the international experts recommended institutional restructuring, stating that "At present, IR (Indian Railways) faces two possibilities: significant change through reform, or a financial and operational collapse."(Sondhi, 2002, p.37). Based on the above analysis, the experts had carefully crafted a reform package: (1) Unbundle the institution into separate roles—policy making, regulation, management—by corporatizing the Railways, and establishing an independent regulator, especially for tariff setting; (2) Privatize non-core activities like healthcare, education, production and maintenance of trains; (3) Reduce the 1.6 million staff by 25 percent; (4) Reduce cross-subsidies, hike fares for second class passengers by 8–10 percent every year—for five years; (5) And separate social and commercial obligations.

These reform recommendations received an emotionally and intellectually charged response. Labor unions held a *dharna* (sit in protest) and raised the red-flag in Kolkata (Frontline, 2001). Among the top management of the Railways there was unease about the organizational restructuring. As a reaction to the Mohan reform proposals, the Railways' management responded with a status paper that recognized the need for change. The status paper tabled the following five central measures of action to the parliament for consideration. It proposed to corporatize non-core activities citing the past success with its consultancy, container, construction, catering, and telecommunication business subsidiaries. Set clear targets to reduce staff numbers to

the 'right-size' for the organization, from 1.545 million to 1.18 million by 2010 through natural attrition. Rationalization of freight and passenger fares was considered. Regarding cross-subsidies, a case for interest free transfers from the central government was made. Finally, to address the fiscal gap it was proposed to consider loans from multilateral banks—World Bank and Asian Development Bank—as well as co-financing with state and local governments, and cautious leveraging of private equity.

The status paper was mute on restructuring the vertically integrated monopoly structure of the Railways. Instead it favored the devolution of more discretionary power to the zonal level for approval of capital investment projects. Thus, general managers could make larger decisions about the priorities in their zones, but were not unbundled into autonomous competing units, as was envisaged by the Mohan report. Many of these efforts were implemented—tariff rationalization (simplification of the tariff structure), reduction in staff strength (by not filling two-thirds of job vacancies), and borrowing from the World Bank and Asian Development Bank.. While these efforts brought some respite from fiscal crisis, the condition of the Railways remained precarious.

A Contradiction—Privatization under Populism

The international experts (Thompson, 2003 and Sondhi, 2002) and Mohan committee (2001) recommendations[34] applied conventional wisdom, but many of them presented the anti-thesis of the populism for which the Minister stands. Arriving at Rail Bhavan, headquarters of the Ministry of Railways, the Minister did not disappoint his supporters, or critics, by taking a populist stand. His position on several policy issues was the converse of the recommendations proposed by the Mohan committee as well as other international expert groups. This contrast is captured in the following significant steps taken by the Railways since he became the Minister of Railways.

While the experts had recommended retrenchment, the Minister planned to use the Railways as a vehicle to generate employment, both within and outside the Ministry. As a first step, he banned the use of plastic cups on railway stations and trains, replacing them with *kulhads*, clay pots. Similarly, synthetic upholstery and linen for offices, trains, stations, and *yatri niwas* were to be replaced with *khādī*, which is a handspun yarn and hand-woven cotton cloth. The purpose was to increase employment for the rural artisans and *khādī* handloom weavers through the use of

[34]While there is a debate on how infrastructure service providing state-owned enterprises reform should proceed, privatization and its variant, corporatization are a significant component of this reform program. The success of these methods is uneven and varies by geographies as well as by sectors as seen Chapter 2.

handmade cups and cloth. Finally, he hired 20,000 *Coolies* as railway staff for the post of gangmen—class four employees and frontline workers for railway track maintenance.

The experts had recommended a fare hike in the loss-making passenger segments, and the establishment of a tariff regulator. In contrast, the Railways did the opposite and reduced fares in each budget and in every travel class—from air-conditioned coaches to unreserved passenger coaches—and at least by three rupees (7 cents) for poor passengers.

Further, the Minister was of the opinion that as an elected representative of the people, if he was in-charge of the Ministry of Railways and answerable to the people via the Parliament, then he could not devolve the role of determining tariffs to an autonomous entity—an independent tariff regulator. Thus, he opposed independent regulation.

The Mohan committee and the international experts had recommended corporatization and divesture from non-core businesses. But the Minister had planned on building new production units to manufacture diesel and electric engines, wheels, and passenger coaches. Three factories were to be built in his constituencies: the rail wheel factory in Chhapra, a diesel locomotive factory in Maruhara and an electric locomotive factory in Madhepura, Bihar, northeast India. Fourth, a factory to manufacture rail coaches was to be built in Rae Bareli, the constituency of Sonia Gandhi, the chairperson of the United Progressive Alliance, the political party in power.

Moreover, the Railways acquired bankrupt freight wagon factories like the Mokama and Muzaffarpur units of the Bharat Wagon and Engineering Company in Bihar from the Ministry of Heavy Industries of the Government of India. Additionally, the Railways acquired land and scrap material of the Dalmia-nagar industrial complex in Rohtas, Bihar to build factories for manufacturing essential components of wagons. While the expert group deemed such investments a distraction to the core business of transportation (Mohan, 2001, p. 9), the Minister saw them as a political necessity.

The Mohan committee had criticized investments in unremunerative projects like the construction of new railway lines, urban rail transportation and the uni-gauge policy[35]. However, the Railways announced that the entire 13,000 kilometers of track utilizing meter gauge would be converted to broad gauge and be completed by 2012. Between 2005–2008 twice the number of new railway lines were sanctioned as the preceding four years—41 new project approved at an expense of 10,500 crore rupees (US $2.4 billion). Additionally, the experts expressed concerns about the Railways giving priority to loss-making passenger trains, as opposed to securing track space for profit-making freight trains. However, fifteen hundred additional passenger train services were announced between 2005–2008, a ten percent increase over the previous

[35] Gauge refers to the spacing between railway tracks and the Indian Railways inherited three track widths—narrow, meter, and broad. Through a gigantic effort, the Railways is upgrading the narrower tracks to the broad gauge.

four years. Finally, while the experts had recommended that the Railways should isolate its total social burden and seek central government subsidies for the same, the Railways had substantially added to its social obligations, even though the government lacked the fiscal space and willingness to offer subsidies.

In conclusion, the expert group recommendations were text-book solutions for restructuring the Indian Railways, quite like the British Railways reform—unbundle and separate social and commercial functions, retrenchment, independent regulation, corporatization, and fare hikes. Much of the costs of proposed reforms would be a burden to the common people and Railway staff, at least in the short-term; but this did not resonate with the Minister, a populist politician concerned about the masses—the 300 million people in India that live on less than 18 rupees a day[36]. Yet, the Minister announced that he wanted to make the Indian Railways the 'world's best'.

Not surprisingly, the Minister's announcement was met with contempt. Opinions expressed in the media, and within the Railways' bureaucratic inner circle,

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[36]Despite enormous progress in poverty reduction in India, there are millions of extremely poor people. Based on the 61st National Sample Survey the Planning Commission, Government of India, estimates the national poverty ratio of 27.5 percent for 2004. These are substantially lower than the 36 percent in 1994. But in absolute numbers about 300 million people live below the national poverty line. About 73 percent of the poor are in rural areas and the rural poverty line is defined as people living below rupees 356.30 for a 30 day month (measured by monthly per capita consumption). These rural poor on average have 12 rupees or less to spend each day. The urban equivalent is rupees 538.60 for a 30 day month, or 18 rupees per day. In sum, the economic benefits of a growing economy are unevenly distributed across a range of social sub-groups in India (Planning Commission, 2007).

were rife with skepticism about the Minister's credentials, as well as his intentions. The Minister was ridiculed because of his past performance in Bihar where he and his wife had been voted out of power after leading the state for a decade and a half. In the first few months of the Minister's arrival, these apprehensions seemed to crystallize in two incidents at Rail Bhavan, the Railways headquarters in Delhi.

Soon after his arrival at Rail Bhavan, the Minister was visited by a Member of Parliament[37] from the state of Uttar Pradesh in north India. During the meeting the Minister called the Chairman of the Railway Board, the senior most bureaucrat in the Railways, and requested that he consider the petitions of this visitor. Soon after the meeting was over the Minister left for the Parliament. The visitor decided to pay a visit to the Chairman whose office was next door. The visitor and the chairman had an unpleasant exchange. The visitor accused the Chairman of being a political puppet of the previous government and ridiculed him. Understandably, the Chairman was furious and wanted to proceed on leave immediately. In the Railway bureaucracy, leave of this nature implies an intent to resign.

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[37] While this visitor was not from Lalu's political party they belonged to the same social sub-group, the *yadavs*. They share the same caste.

Next, another Member of Parliament requested a car. Even though he was not entitled to this, the Ministry of Railways sent an air-conditioned white Ambassador[38]. But, this influential politician was offended by the car he received. He expressed his displeasure and stated that the use of such an old fashioned car was below his stature. He requested the vehicle to be replaced with a more elegant and comfortable Honda City. The railway administration in-charge of cars complied.

In sum, such events seemed to confirm the public fears of Rail Bhavan morphing into 'Bihar Bhavan' and *jungle raj* (jungle rule) displacing *rail raj* (rail rules). It was a turbulent time in the railway headquarters, with rumors filling the corridors of power. The media followed suit and newspapers and news channels were generous in their daily reporting of pessimistic accounts of the Minister, his family or his political party—as is well documented in the Railways media records.

Earning Trust, a Challenge for a Tainted Minister

Little did the Railways' staff or the media realize that in his new assignment the Minister was going to dispel the image associated with his leadership in Bihar. When

[38] The curvatious car is manufactured by Hindustan Motors and is based on the Morris Oxford model of the 1950s. It is a symbol of indigenously produced automobiles of the post-independence import substitution and industrialization policies. This car is also know as the Amby and retains its popularity in the corridors of power.

the Minister learned of the developments with the chairman, he left the Parliamentary session and rushed back to Rail Bhavan. In the meeting that followed, the Minister clarified his personal stance, declaring zero tolerance for political interference with Railways' daily operations. He encouraged the Chairman to take decisions based solely on the Railways' rules and regulations and further assured the Chairman that he had complete confidence in him and assured him of his wholehearted support. At this moment, the Chairman became the first and the most formidable ally that would champion the future rail reforms.

Regarding the second incident, the Minister was briefed about the car request and to everyone's surprise he was upset. He inquired why such requests were entertained and took institutional action by issuing a memorandum. In the memo, senior railway managers were instructed not to dole out favors to individuals who claim to seek these under the Minister's patronage. Additionally, any notes or telecommunications claiming to be Ministerial instructions must be clarified with the Railway Board, and instructions sought in writing. These instructions were reiterated every few months for a period of two years because old habits die hard. Thus, a zero tolerance towards rule breaking was enforced. In the interim, many misdemeanors were registered against the Minister's family members, party workers, and other political allies. These violations ranged from travelling in a higher-class coach with an incorrect ticket, to requests to change the platform on which a train was scheduled to

arrive. Despite stiff resistance from persuasive quarters, the Minister consistently backed the Railway staff, allowing railway personnel the room to implement the rules and regulations, charge fines, and take corrective action.

By setting aside personal agendas the Minister earned the respect and trust of peers and colleagues. For the Minister, this notion of self discipline was extended to include his family, party workers, and political allies.

Further, the Minister demonstrated a nonpartisan ethic in his daily engagement with the Railway Board. There are two types of responses from the Minister that are worth noting. First, senior bureaucrats in the Railways were concerned that the Minister would favor candidates based on their social sub-groups (castes) as opposed to meritocracy. But to their surprise, he adopted a hands-off approach, allowing the management to select their own teams based on merit.

The second, involved transparency in the approval of competitive tender bids. The Minister upheld and promptly approved the recommendations of the Board on the award of tenders for construction works and procurement contracts that ranged from few hundred to thousands of crore rupees.

In this context, understanding of the distinct and complementary roles of the political leadership and the permanent civil service is essential to the functioning of a

Ministry. These roles are well articulated in the Indian Constitution[39]. The politician comes with a mandate from the people—such as no privatization, no retrenchment, and no fare hike— which sets the broad policy agenda. The bureaucracy, within the limits of law, is the implementation agency. However, in practice these roles tend to clash. Some politicians interfere with implementation, especially in transfers, posting, and new staff appointments, issuance of contracts, and other operational matters, where preferential treatment result in political gains. And bureaucrats deploy their discretionary powers to stall the political mandate by avoiding or slowing down execution. This mutual discontent between the political leadership and the civil service reinforces unproductive behavior. Conversely, a politico-bureaucratic arrangement is productive when the politician does not meddle in the functioning of the executive, and in turn the bureaucracy accepts the political mandate. In the Railway reforms, a prerequisite for this arrangement was making a distinction between the 'political mandate' from petty 'political interference' in routine administrative activities, and then developing complementary roles.

Through routine engagement between the bureaucracy and the politician a sense of trust, respect for differences, and understanding emerged. There were mutual

[39] See Constitution of India, Article 74 and 75 on accountability to parliament and Article 309–312 on role of civil service (Government of India, 2003).

differences, and these persisted; but the bureaucracy learned to respect the political mandate, and in return the political leadership maintained a hands-off approach to Railways' operations. While the integrity of the leadership is a bed-rock for the transformation of the Railways, it is not a sufficient explanation. To formulate and execute the reform strategy a core team of reformers was required, who had a deep sense of purpose, a sharp understanding of the political economy, and business acumen. These were convened form within and outside the Railways through a Ministerial intervention.

Analyzing the Political Economy

The Minister challenged his staff with rustic references. In the early days, he often asked the management to explain that if a cow herder like him can produce a profitable herd of five hundred from a few cows, then why would the Railways with its 200,000 wagons, 40,000 coaches, and 8,000 engines run at a loss? The contexts and constraints different in a number of respects; the Minister neither sells the cow's milk at a loss nor does he over staff the barns. The veterinary services for the cows, education, and health care for his staff are not provided in-house. Besides, the milk produced is sold at competitive prices to a premier five star hotel in Patna. The Minister acknowledged that the Railways' challenge was a greater one because unlike his farm, the Railways has several social obligations.

Before proceeding with an analysis of these conflicting objectives and its implications for reform, what makes a profitable commercial organization is briefly reviewed here. Consider a simple example of a firm that sells goods or services. A firm is profitable if its costs are less than the selling price because the profit is the difference between the price and the costs (profit = price – cost)[40]. But, if the costs are greater than the price then the firm makes a loss.

To transform a loss making business into a profitable one, private firms respond in one of three ways. Jack Welch, the Chairman and CEO of General Electric (1981–2001), aptly summarized this strategy as the 'fix, sell, or close' options (Welch and Byrne, 2001, p. 111). To 'fix' a loss making business, either the price of goods sold needs to be increased or the costs decreased[41]. But, if the business cannot be fixed through these measures, then one should 'sell' those aspects of the business that are loss making.

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[40]Price is what consumers will pay for the goods or service, and cost is the sum of the expenses associated with production stages up to the final sale. Among other things, accounting rules about depreciation, amortization, taxes, subsidies, cost of capital, and risks, make the reality of a business more complex, but these simple principles remain relevant.

[41]Increasing price, or the numerator approach is preferred when demand is inelastic—the decrease in demand for normal goods is much lesser than the increase in price, thus increasing total revenue and eventually profitability. The cost-cutting measures, or reducing the denominator, by reducing costs of inputs, labor, capital and associated overheads. This approach is preferred for elastic demand—where the consumption of normal goods is very sensitive to prices, especially when substitute goods are available (Hamel and Prahalad, 1994, p. 9). Often a combination is deployed in mixed proportions.

Third, if fixing or selling is infeasible, the next step is to 'close' a business and sell the residual as scrap.

In the private sector, this strategy works well—at it did for General Electric, IBM, and a host of others. But, in the thick socio-political reality of the Railways, such a strategy is at best economically desirable but politically infeasible. This infeasibility is deep-rooted because expense cutting is accompanied by high social costs associated with restructuring—retrenchment and disinvestment. Thus, the challenge confronting the policymakers was to deliver inclusive reforms—cater to all the unremunerative social obligations and yet transform the Railways into a commercially viable organization of global repute. Transforming the Railways through inclusive reforms became the mission around which the Railways' core strengths were garnered (Ministry of Railways, 2006, p. 1). This called for a creative response. Past assumptions and practices were to be reviewed. Therefore, the core team of reformers began with analyzing the reform context.

Crafting the Space for Reform

The core team discovered that to diagnose the political economy and identify space for reforms within the Railways, all policy initiatives must be screened at two levels. First, a market test, where considerations focus on commercial viability. Second, a societal value test, where the evaluation of the issue is based on its political desirability and

feasibility. Reforms that pass the first test but fail the second are commercially desirable but politically infeasible. Reformers accepted the social considerations as integral to the political mandate and considered a step by step approach. Each variable that affected the Railways functioning was split into its apolitical and political components, across scales and dimensions—from the macro to the micro and across facets. The core team was adamant about looking beyond the obvious. Their approach to traversing the complex political economy of the Railways involved a lot of learning by doing - an incremental approach that can best be described as muddling through. But, the five step analysis presented here captures the essence of the strategy. The primary objective of this experiment is to assess the true extent of the Railways 'split personality'—conflicting commercial and social goals and seek to verify if these conflicts were the principal obstacles leading to the deteriorating condition of the Railways. In the process, the space for reform was crafted.

A macro analysis to separate the political aspects from apolitical ones is the first step. In each facet of the Railways' functioning—pricing, commercial operations, investment policy, and labor management—every policy initiative was subjected to the twin test along commercial and social equations. This has to do with discovering the proportion of investments and revenue that are considered politically sensitive due to their social implications on the poor (macro-level) from those with exclusively commercial implications.

As seen earlier in Chapter 4, only 20 percent of the total capital investment has political implications—the socially determined investments and the rest of the 80 percent of investments had little in the way of political repercussions. Instantaneously, an enormous apolitical space for leveraging investments was created. These allocations can be market oriented and based on operational and commercial requirements, such as route-wise planning of congested high-density networks where demand far exceeds supply. However, route-wise planning requires all departments to channel their efforts into getting all of the technical and operational details right—from tracks, stations, and signaling to scheduling and running trains. Despite several discussions about this matter, the Railways was unable to act, not because of political interference, but because of widespread rifts between functional silos that are organized into departments.

Further, total traffic earnings were disaggregated in a similar manner. A quick glance suggests that 22 percent of the revenue is from market segments that are politically sensitive—largely second-class passenger trips in reserved and unreserved coaches used predominantly by poor people—an outcome again with exclusively social return. The rest of the 78 percent of the revenue is earned from an apolitical segment of the customers— freight, parcel, high-end passenger segments, and other sundry earnings. This business segment can (and should) be managed on commercial principles, but the Railways lacked a business orientation in the past. As these variables are analyzed further, the space for reform continues to grow.

The social cost of retrenchment, divesting, and other cost cutting measures are high, they are politically infeasible. Therefore, the railway management lacks control of many operating expenses. However, there is no political constraint in distributing the same operating expenses over larger volumes to reduce unit costs. For example, the number of employees cannot be reduced (except by natural attrition), but if trains carry more goods or more trains are run with the same number of employees, unit costs decline. Similarly, while at macro-level passenger fares are politically sensitive, the yield per train is apolitical. While, increasing revenues through passenger fare hikes and reducing unit costs through retrenchment were thought to be outcomes with exclusively economic returns, this analysis demonstrates how they have been converted to being commercially viable and socially desirable (win-win) outcomes.

As a second step efforts were made to identify apolitical sub-components within the politically sensitive business segments. Reformers had not given-up on the potential of the remaining 20 percent of investment spending and 22 percent in revenues that were assumed to be political at the macro-level. This 20 percent of investments consists of 8.75 percent for new railway lines, 1.59 percent for urban transport, and 9.05 percent for gauge conversions for the fiscal year 2008. Consider gauge conversion. The experts branded these as unrenumerative investments; perhaps they were right. However, despite being done in a piecemeal manner, more than half of the gauge conversion could be leveraged for remunerative activities. While different

gauge conversion projects were at varying stages of completion, the reformers focused on projects that enhanced the capacity for the lucrative freight business. Alternative routes for congested railway lines were discovered through route-wise planning of these gauge conversion works. Nearly half of the gauge conversion works were helpful in capturing additional freight business and therefore were commercially viable. Examples of such alternative routes are links to ports, connectivity to cement plants, marble and granite quarries, and so forth. Essentially, through such analysis, the initial 80 percent of apolitical investment expanded to 85 percent because some components of the gauge conversion were included.

Similarly, consider the 22 percent of revenues from passenger segment that was set aside as political. While passenger fares for suburban rail service or second-class passenger, trains are politically sensitive, non-passenger revenue is apolitical. Consider the Victoria Terminus and the slew of stations along the suburban railway network in Mumbai. With seven million dedicated customers each day, the Railway's stations have access to the gaze, the foot-fall, and refreshment needs of these hard working *Mumbaikars*. Quite like the fabulous advertisements and sponsorship revenues that account for crore of rupees (millions of dollars) in the Indian Premier League cricket games or at Times Square in New York, Railways stations can leverage their strategic position to earn revenues without raising passenger fares. Such strategies allow the Mumbai suburban service of the Western Railway zone to remain profitable despite

passengers being charged fares that are below cost. As they segregated these apolitical aspects from political variables the space for reform was further expanded.

Third, this space for reforms further widens when perceptions are reconciled with reality. The Railways had a uniform policy to subsidize all customer segments, based on the principle of a customer's perceived ability to pay—low value commodities were charged cheaper rates. Emphasis is laid on the perception of affordability because in practice, there was no explanation for why the customers who transported low-value bulk commodities like iron and manganese ores were charged less in comparison to cement and steel customers. Surprisingly, this was the practice at a time when commodity prices were booming and there was no pressing political rationale for keeping freight charges low. Additionally, there was a firm belief among the Railways' bureaucracy that the transportation of food grains and fertilizers needed to be under priced. They assumed an increase in the freight costs would be politically undesirable because it would result in price increases for poor consumers like small farmers. In reality, the price for the food grain and fertilizer is fixed by the Government of India, and the differential between the "cost" and the "fair price" is borne by the Government. When the Minister was briefed that increases in freight charges would not result in increased food or fertilizer prices for the consumer, he quickly agreed to revise the freight charges for these commodities. This is an example of what was thought to be an exclusively social outcome turning out to be a win-win outcome as the Railways

increased its revenue while poor consumers were not affected. In sum, such gaps between perception and reality were demolished, and were crucial in further crafting the space for reform.

Table 8. **Disaggregating variables into political and not so political**

Policy	Political	Apolitical
Pricing	*Passenger fares* for non-air conditioned classes—reserved and unreserved second class.	Passenger fares for air-conditioned classes.
	Freight charges for salt.	All commodities other than salt which is 99 percent of freight business.
	Parcel charges for fruits—banana, orange, mangoes.	All commodities other than fruits which is 90 percent of parcel business
Commercial	Affordability and honor-based concessional fares—for senior citizens, students, farmers, freedom fighters, army, and the like.	Over 90 percent of non-passenger income from catering, parcel, land lease, and advertisement revenue.
Operational	Priority to less remunerative trains. For example profitable freight trains give way to passenger trains.	All other operational decisions.

Source: Author's compilation.

Fourth, each policy initiative—pricing, commercial, and operational—were broken-down into its nano constituents and reconfigured into the four outcomes. Table 8 illustrates how political variables for each policy issue in every business area are separated from apolitical ones.

In conclusion, the spirit behind the analysis was to accept political engagement not as interference but as the democratic mandate, and work towards an inclusive transformation. In return for the bureaucracy's acceptance of the political mandate, the political leadership had to earn trust, as it did through self discipline.

Another crucial challenge that inhibited action was organizational constraints. As observed by the Tandon (1994) expert group, the organizational structure of functional silos routinely compromised institutional goals for departmental gains.

> Departmentalism, its all-pervading culture, is regarded a "bane and a curse" of the system in which each discipline or area becomes an "Island unto itself, no part of the main". Consequently, a hierarchicalised caste system prevails in which some departments are considered superior to others. It weakens the organization, notably because in the absence of a team spirit, owing to departmental loyalties, the interests of the organization are subordinated to a department's own narrow considerations. In consequence the organization suffers while the "whole becomes less than the sum of the parts." This is particularly so when projects are perceived and pushed in the interest of a department even at the cost of the organization. (p. 8)

Therefore, the focus of the reforms graduated from no privatization, no retrenchment, and no fare hike to identifying, expanding, and multiplying mutually beneficial outcomes, and leveraging them to maximize financial returns without adding social costs. How this was achieved is the subject of the following chapters that unpack the market response disaggregated into demand and supply side strategies (Chapters 6 and 7 respectively) as well as a public sector management approaches. As an immediate step, care was taken to minimize unproductive outcomes by inducing synergies between departments, establishing cross-functional teams, encouraging project focused co-ordination with well defined targets under the close-eye of the senior management.

Political Economy Strategy

Having identified the space for reforms, the core team needed to act by setting ground rules for engaging in the political economy. In politics, perception often counts for

more than reality, the pace of reform (or the lack of it) matters, and form may precede substance. Thus, the strategy had three elements—political stance and phraseology, incrementalism, and tact.

In order to inspire confidence among interest groups—media, parliamentarians, bureaucracy, and labor unions, among others—the Minister had announced, "no privatization, no retrenchment, and no fare hike". It was a bold statement. Here the choice of words was important. Such a statist stand appealed across party lines, and received thumping applause in the Parliament. The bureaucracy felt at ease with the *no* 'sell-out, fix, or fire' stance. As a next step, the Minister qualified his statement. He was against privatization of core railway functions, but he was not against (meaning reluctantly in favor of) public-private-partnerships in non-core functions of the Railways. This resonated with the Planning Commission, which had been recommending the introduction of private operators to run container trains for several years. On the other hand, the left-front did not oppose this stance because of the Minister's broader political image of being a staunch supporter of the public sector and the poor. The Minister further qualified his stance on private participation. The core operations of track maintenance, hauling, and coordinating movement of trains would remain in-house. Private players were to participate in booking, aggregating, and delivering freight. The private partners would act as a city cargo booking office. Without any pushback from labor unions, private players were introduced. Similarly,

the Minister observed that the "core-business of the Railways is to run trains, not fry *bhajiyas*". Trivializing non-core activities and inviting private participants required a careful placing of ideas in carefully selected words. Now, private firms are being engaged in a range of activities—from modernization of stations, setting hubs for logistics, and connectivity to ports.

Further, the Railways experience revealed that introducing private firms for new manufacturing units received no opposition, but divesting existing factories infringed on interest groups that are difficult to manage—the employees, management, and the supply chains. In the case of the Kapurthala coach factory in Punjab, corporatization was met with stiff resistance. But, five new rolling-stock factories built as joint ventures experienced no resistance. In this regard, having a 'joint venture' is crucial because it takes the sting out of the term *privatization*. In practice, it is reassuring to the existing employees that the broader intent of the state is to stay responsible and engaged, even though in day to day management a 26 percent stake in the corporation makes them relatively autonomous private firms. Such inclusive development efforts require striking a delicate balance between competing political and private interests and regional development needs. In sum, the Minister's left of center political position and his choice of words were a part of the strategy.

In introducing change, the choice of when to act, is of the essence. Here, for example, in the budget speech, it was a mistake to announce corporatization of the

Kapurthala rail coach factory just before the assembly elections, because the political climate was not conducive for change. Likewise, increasing freight charges for a seemingly benign commodity like iron ore turned out to be a political hot potato. The timing was wrong. Due to the inflationary pressures the government was facing political flak. The government lobbied steel producers to curtail soaring steel prices. In response, the steel producers sought a price rollback for steel freight. As a result, at the behest of the government, the Railways had to roll back the increase in freight rates. In essence, what matters is 'when' actions associated with a reform strategy are implemented.

Another aspect of the strategy was to concede battles to win the war. In both the above examples, interventions were ill-timed. Despite anticipated resistance, in the democratic spirit, room for consultation and negotiation with key stakeholders was built in. But such a consultative process also provided ample room for an early exit. Since the unions were not confident of the benefits from corporatization of a particular factory, without escalating the differences, the decisions were reversed to avoid additional trouble. Further, in the face of resistance from the affected workers, the decision to outsource toilet management at a major railway station was reversed. Finally, in the democratic context of India, an evolutionary approach to change was considered conducive. The core team argued that change creates uncertainty and raises fears among the affected. The pace at which change is introduced should be

manageable. Because immediate concerns dominate political discourse, an incremental approach to change was preferable. Accommodating such a range of interests amounts to funambulism, the balancing acts of a slack rope walker. The implementation of an increase in axle load is an illustration of this approach. Since increasing the load carried by each wagon has safety implications, and safety is a high priority in the Railways, a gradual approach was adopted. First the load increase was tested on a non-passenger route, with an increase of just 2 tons per wagon. Gradually, the load and the travel routes were increased. Eventually on some non-passenger routes, an incremental load of 8 tons per wagon was introduced. Similarly, freight and passenger tariffs were rationalized over a four year period. And when loading and unloading increased from 8 hour shifts to 24 hour, the change was introduced incrementally, starting in locations where unions, unorganized labor, or traders were more willing to negotiate. The objective was to introduce change where resistance encountered was limited.

Thus, the political economy considerations had tempered the pace and methods of introducing change. The political leadership and the management strategists had to consider political positioning, choice of words, timing, and gradualism while implementing a mega-transformation.

Can good economics be good politics? In the experience of the Railways the political space for populism increased with the commercial success. A nearly bankrupt Railways could not have financed the five rolling-stock factories that the Minister

announced. But, with the successful transformation of the Railways, demand for locomotives has more than doubled, from 200 in 2004 to 500 in 2009. Therefore, building the factories was necessary, and it allowed for some political space to allocate them in constituencies of the Minister and other coalition partners. Similarly, the issue of employing *coolies* or decreasing passenger fares would be absurd for a bankrupt Railways, but with a 25,000 crore rupees (US $6 billion) cash surplus in 2009, such a populist intervention received no criticism. With the commercial success of the Railways the space to benefit the electoral constituency increased as did the stature and influence of the political leadership. Yet, this success needed to be communicated to the electorate.

Initially, the media was rife with skepticism because without a track record of performance of the Minister there was no positive news coverage. In the initial year the strategy was to remain relatively inactive. At the end of the first year in 2005, when the budget was presented, there had been substantive improvements—including a historic change in the tariff schedule, and incremental revenue of 5,000 crore rupees (over a billion dollars). Despite this reasonable performance, India Today's 2005 ranking (2006) of the performance of federal Ministers had ranked the Railway Minister at 33, nearly at the bottom of the list. National newsapers like the Business Standard (Phadnis, 2005) had ascribed key attributes of the railway budget for fiscal year 2006 to the Prime Ministers Office (also known as the PMO). Adding that the Railway Minister was busy

campaigning in Bihar. Other newspapers were skeptical as well. Therefore, after the first year's performance, engaging with media required a proactive strategy. First, ground rule was to consistently promise less and deliver more. In each budget 5,000 crore less was committed than what was eventually delivered at the end of the fiscal year. Similarly, the other measures of efficiency were stated with moderation and the results were about 5 percentage points better.

Second was to strategically select high impact events. At the top of the rung was the railway budget around which the Railways gets the undivided attention of the media—newspapers and news channels devote their prime space to discuss the popular elements of the budget. Similarly, the core team seized high impact events. Finally, the third bit of the strategy involved fact-based information sharing with all willing news sources without preference for any particular media outlet. In all, the media perception regarding the Minister and the Railways has been productive. In a reversal of the past ranking, India Today (2006) ranked the Minister of Railways the second best Minister of the year in 2006.

Conclusion

Having established the political mandate and made the distinction between mandate and interference, identified the space for reform, the reformers designed ground rules for engagement in the political economy, which included a media strategy. In the next

few chapters I move on to analyze the comparative advantage of the Railways in the context of the market (Chapter 6). In particular, I explore the supply and demand -side constraints (Chapters 7 and 8 respectively) and entrepreneurial responses to win back market share and margins in a fiercely competitive environment.

Chapter 6: The Market

Introduction

Cell phone service providers in India are an example of how the telecom industry leveraged economies of scale to make cellular phone calls affordable for the common people of India. From 15 million customers in 1997 the telecom market has grown exponentially to 234 million customers in December 2007, to 791million customers in February 2011, with 20 million customers being added in the months of January and February 2011 (TRAI, 2011, p. 1, and TRAI, 2008, p. 19). During the same period (1997–2007) the call charges per minute dropped from 17 rupees (40 cents) to a rupee (2 cents) and costs continues to decline (p. 2, TRAI, 2007). Meanwhile, private telecom firms have made billions of dollars in profits.

Despite reducing passenger fares, when the railway generated a cash surplus of 25,000 crore rupees (US $6 billion), why were people surprised? If the railway network was to be rebuilt today, it would need a trillion dollar investment. Once the network is laid, spreading the fixed costs over larger volumes substantially reduces the unit costs because variable costs are relatively small[42]. Identifying the aspects of the business that

[42] The railways total operational costs consist of fixed and variable costs. Variable costs change with the amount of output produced. Fixed cost do not vary when the amount of output changes.

are politically sensitive, distinguishing where market opportunities exist, leveraging the scope for economies of scale, deploying cutting edge technology, and finally seizing the opportunity offered by a booming economy were essential ingredients for this success.

Prior to further discussions about how the railway transformed, there is a need to examine the nature of the business. The railroads in India were considered to be a monopoly rail service provider (Mohan, 2001b, p. 69 and World Bank, 2002). Yet, the same studies showed a rapidly declining market share in the cargo business (Mohan, 2001b, p. 63). Reconciling these facts requires an understanding of the business of railroads in India. Here, an analysis of the business is presented along with its revenue streams, a diagnosis of its competitive strengths, and the demand elasticity of price and non-price factors. Finally, the cost structure, its variability and sensitivity to load and length of train, as well as its manipulation are discussed. In essence, the attributes that make the railway a competitive service provider are explored in depth.

Puzzle, Monopoly Loosing Market Share

What is the nature of the business of Indian Railways? If the Railways is considered to be a provider of rail services, it is a monopoly supplier by definition because it is the only provider of rail services in the Indian market. However, the Railways' market

share[43] in `land based transportation of goods' eroded from about 89 percent in 1951 (RITES, 1994, p. 1.1) to less than 40 percent in 2004 and from 69 percent to 20 percent in the passenger segment, over the same period (Agarwal, 2004, p. 175). A look at the Indian transportation market reveals to whom the market share was lost. The transportation of petroleum products migrated to pipelines. Steel and cement transportation moved to trucks and, in coastal areas, to shipping lines. Similarly, luxury travelers preferred air-conditioned buses and budget airlines to the Railways' express trains. The monopoly assumption hindered a competitive analysis grounded in empirics, and experts continued to define the Indian Railways as a monopoly, arguing for a tariff regulator (Mohan, 2001b, p. 69). If the Railways is re-conceptualized as a transporter among many alternative modes—trucks, ships, pipelines, airlines, and luxury buses—it operates in a highly competitive market place for transportation services.

For the Indian Railways this was the first step and a paradigmatic shift from thinking of itself as a monopoly, to recognizing the ground realities of being a transporter that faces stiff competition from alternative modes. The Railways faced the classic competitiveness problem characterized by low growth, declining market share,

[43] During this period 95 percent of total traffic in India was carried by either rail or road transport (Agarwal, 2004, p. 175).

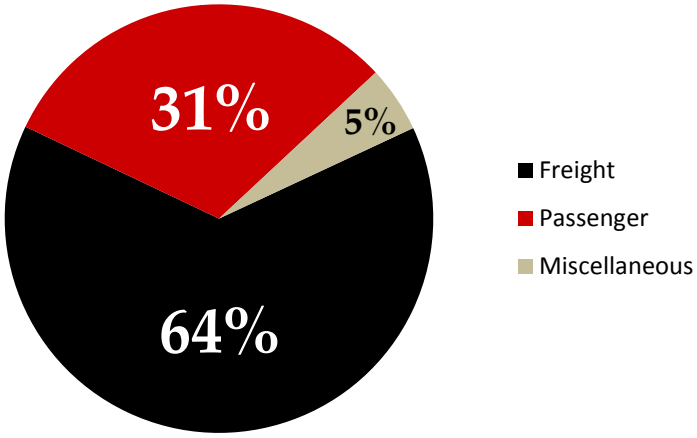
low productivity, poor service, and eroding margins. Solving this problem required offering customers superior and compelling value, not mere tariff regulation. To win back the Railways' competitive edge in the market required a dispassionate analysis of competitiveness blended with insight and pragmatism. Here critical assumptions about the Railways' business model, variability and sensitivity of cost structures, and elasticity of demand with respect to price and non-price factors, needed a rigorous analysis.

Business Portfolio

Overall Composition

Freight transportation is central to the profitability of the Indian Railways. Freight contributes to 64 percent of the Railways' traffic earnings; passenger traffic contributes 31 percent of earnings. The remaining five percent is contributed by 'other coaching and sundry earnings'. Figure 11 unpacks the Railways traffic earnings by source for the fiscal year 2004, when total earnings were 42,842 crore rupees (US $10 billion).

Figure 12. **Where the rupee comes from**



Source: Statistics and Economics Directorate, Ministry of Railways, Government of India, 2004.

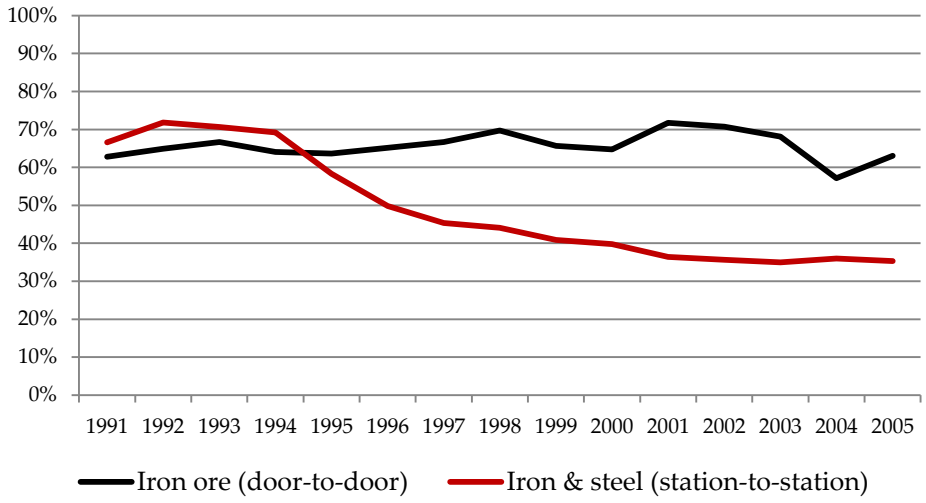
While each day, only one-third of the 13,000 trains operated by the Railways carry freight, they account for two-thirds of total earnings. The remainder is from passenger trains, the majority of which run at a loss. Railroads have a competitive edge in freight due to their ability to efficiently carry large loads over long distances. Further, much of the freight business is apolitical in nature and can be managed on commercial principles. Thus, the lynch-pin of Railways' reform strategy was to optimize the freight business, reduce losses in the passenger segment, and deploy creative methods to improve the share of earnings from miscellaneous sources. But, in keeping with the nuanced approach to analysis, the reformers refrained from making generalizations at this level and further disaggregated each market segment into its nano-constituents.

Freight

In the early 1980s, because of the Gujral era decision to stop accepting piece-meal freight and focusing on hauling bulk commodities, the Railways' share in piece-meal freight rapidly declined to minimal levels—except through containerized traffic and the parcel business segment. As a corollary, 90 percent of goods carried by the railway consisted of eight bulk commodities—coal, iron ore, other minerals, food grains, petroleum products, fertilizers, iron and steel, and cement.

The expert committee attributed the declining market share, even in bulk commodities, to cross-subsidization of passenger services by freight, poor quality of services, and the national highways expansion—the golden quadrilateral and its diagonals that made the road sector more competitive (Mohan, 2001a, p. 2). But these factors affected all commodities equally, then why was there a dichotomous response in the transportation of finished products versus raw materials. For instance, while the market share of finished products like steel and cement has been declining since the 1990s, during the same period, the share of iron ore, coal, and other minerals remained stable (see Figure 12 and Table 9).

Figure 13. **Market share of steel and iron ore freight (1991–2004)**



Source: Statistics and Economics Directorate, Ministry of Railways, Government of India, 2008.

Both iron ore and steel are heavy commodities. But there is a distinction as well. To transport iron ore for a firm, like Tata Steel in Jamshedpur, the railway provides a door-to-door service—from the mine-pithead to the factory. The Railways picks the iron ore from Tata's mine-pithead and empties it directly into the Tata Steel factory at Jamshedpur. Thus for Tata Steel, the total logistics cost is equal to the rail freight charges as other incidental costs of rail transportation are negligible. Furthermore, rail freight charges are substantially lower than truck transport charges.

Therefore, the Railways has a competitive edge in transporting iron ore, even over distances as short as 100 kilometers. As the distance increases, the Railways service becomes more competitive. Moreover, Tata Steel produces five million tons of steel annually; for this production it requires eight to ten million tons of iron ore each year or 22,000 tons every day. It would require over two thousand trucks to transport

this amount of iron ore. Transportation by road is unviable because of the number of trucks required, poor road conditions, and the hilly terrain.

On the other hand, for the transportation of steel, the railway provides station-to-station service to Essar Steel, a private steel company. This steel plant has no rail sidings at the factory or at the consumption centers. Further, it does not maintain any warehouses. If its factory in Hazira, Gujarat, needs to transport steel to a construction site near Mumbai, Essar has to transport the steel from the factory to the nearest railway station, and the railway hauls it to a railway station near the destination. But no steel is consumed at railway stations. Therefore, for the last leg of the freight—station to the consumer—the firm once again has to organize an alternate transporter. As a result, in addition to the rail freight, incremental costs are incurred due to multiple transfers, bridging, warehouse fees, inventory, and so forth. These additional costs add up to be a significant component of the total logistics cost and can exceed the cost of rail freight itself. On the other hand, road transporters provide a door-to-door service. Trucks collect the steel at the factory and take it directly to the consumption site. Further, trucks can carry small quantities of freight, while the Railways does not accept anything less than a train load of 2,000 tons per consignment. The incremental costs of bridge transportation at both ends outweigh the cost advantage of cheaper rail freight charges. Consequently, despite steel being a heavy commodity and rail freight charge being lower than those for trucks, the Railways is an uncompetitive transport service provider

for distances less than 750 kilometers; even for longer distances its competitiveness is limited.

To compound the problem the Railways charged freight fares on an `affordability principle[44]'. Cheaper commodities like iron ore were charged less, while higher value products like steel were charged more. Such affordability based price discrimination was benign in the Fabian era, but post-liberalization the Railways rapidly lost market share in the transportation of steel, especially after the Government revoked the `freight equalization' scheme for steel[45]. Based on market principles, the freight charges should have been the converse, charging more for iron ore which

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[44] This refers to the railways past practice of price discrimination in freight charges based on the value of the commodity. This practice was also applied in the passenger segments. Such affordability based price discrimination was benign in the Fabian era because the cost of transportation was borne by the government under freight equalization policies. But, post-liberalization the cost for freight was no longer pass onto the government, and producers sought to minimize costs of freight, further affecting the Railways that was already loosing market share in steel freight.

[45] However, this loss in market share in the steel freight was uneven. For Steel Authority of India the Railways did not lose much of its share of freight transport, while with Tata Steel the loss in the freight market share was moderate. In contrast, the recent steel plants of Essar Steel in Gujarat and Ispat Industries in Maharashtra, both in western India, chose to skip the railway services altogether. This differential loss in market share was because of the duality in the type of transportation service the Railways provide. To deal with the constraints associated with station-to-station freight services of the Railways, the old integrated steel plants of Tata Steel and Steel Authority India had developed rail sidings for loading at the factory and unloading at their warehouses in distribution centers. And the Railways continued to provide them with a door-to-door service. On the other hand, Steel plants like Essar Steel and Ispat Industries directly dispatch steel in trucks to distributors who redirect material to customers. For these new generation steel plants the Railways is not competitive in the short or long distance traffic for three reasons. First, the factories dispatch steel in small quantities (less than 2,000 tons). Second, these steel producers predominantly serve regional markets (implying short distances, less than 500 kilometers). Third, these steel producers do not have warehouses to receive large quantities, and the points of consumption are dispersed.

received a convenient door-to-door service and less for steel which received an inconvenient station-to-station service; requiring further non-rail transport to get to its final destination. These flawed pricing decisions were not a result of political choices or broader societal (equity) considerations, but reflected a lack of understanding about the relative competitive strength of the Railways in transportation of the two commodities.

Thus, the cross-subsidy and poor service argument proposed by the Mohan committee and other experts failed to explain why rail remained the preferred mode of transport for iron ore but not for steel. The door-to-door concept helps clarify this differential preference of consumers.

In conclusion, the Railways has a competitive advantage and pricing power in freight with the following four characteristics. First, where transportation is door-to-door (production-to-consumption) as opposed to station-to-station. Second, when freight is in bulk quantities (greater than 2,000 tons) and not piece-meal. Third, transportation is of heavy goods like iron ore as opposed to low-density goods like tea. Fourth, freight is transported over long-distances. If the first three conditions are met, the Railway is competitive, even for distances less than 500 kilometers. However, if the first condition is not met and the Railway is a station-to-station transporter, it is uncompetitive for short and medium distances—even for long haul trips its competitive edge is not guaranteed (see Table 9).

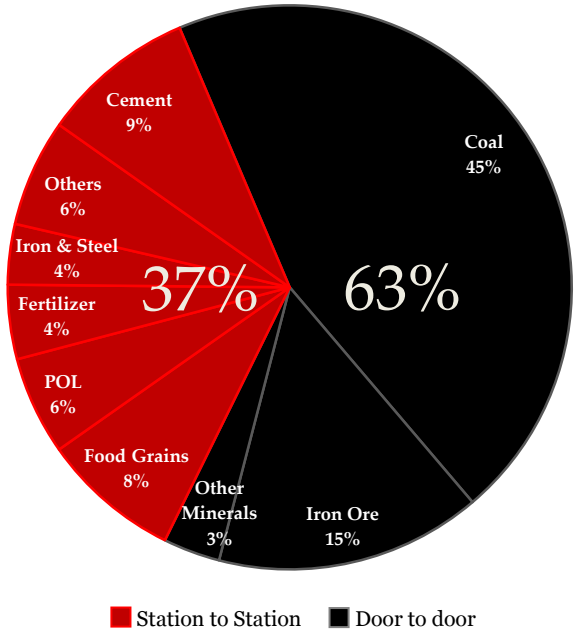
Table 9. **Attributes of freight competitiveness**

	Iron ore	Steel	Tea
Service	Door-to-door	Station-to-station	Station-to-station
Weight	Heavy (high density)	Heavy (high density)	Light (low density)
Quantity	More than 2,000 tons	1,000–2,000 tons	Piece-meal
Distance	More than 100 kilometers	More than 750 kilometers	More than 1,000 kilometers
Overall competitiveness	High	Moderate	Negligible

Source: Authors' subjective assessment and Statistics and Economics Directorate, Ministry of Railways, Government of India.

The commodities for which the Railways provides a door-to-door service are raw material, ores and minerals like coal, iron ore, gypsum, and manganese, while the station-to-station service—or door-to-station—is predominantly for finished products like steel and cement. Over 63 percent of the Railways' freight customers are provided a door-to-door service and the remaining 37 percent are provided a station-to-station service—or door-to-station, essentially involving additional logistical costs. This distinction between door-to-door service versus station-to-station is summed up in Figure 13.

Figure 14. **Composition of freight transported in 2004**



Source: Statistics and Economics Directorate, Ministry of Railways, Government of India.

Several underpriced door-to-door commodities like iron ore offered ample space for fare hikes without decreasing the Railways' competitiveness in the freight market. In contrast, overpriced station-to-station commodities like steel and cement had no room for fare hikes—instead, either the fares had to be maintained (with value-added services), or reduced. On a note of caution, there is no standardized policy for pricing Railways' freight services, except that there is a need to have a commodity and client specific strategy that responds to seasonal as well as spatial variations in demand. For

example, wheat and fertilizer are provided a station-to-station service, yet freight charges for these

commodities could be raised, as these services were underpriced in the past due to a misconception that freight charges for these commodities were politically sensitive.

Passenger business

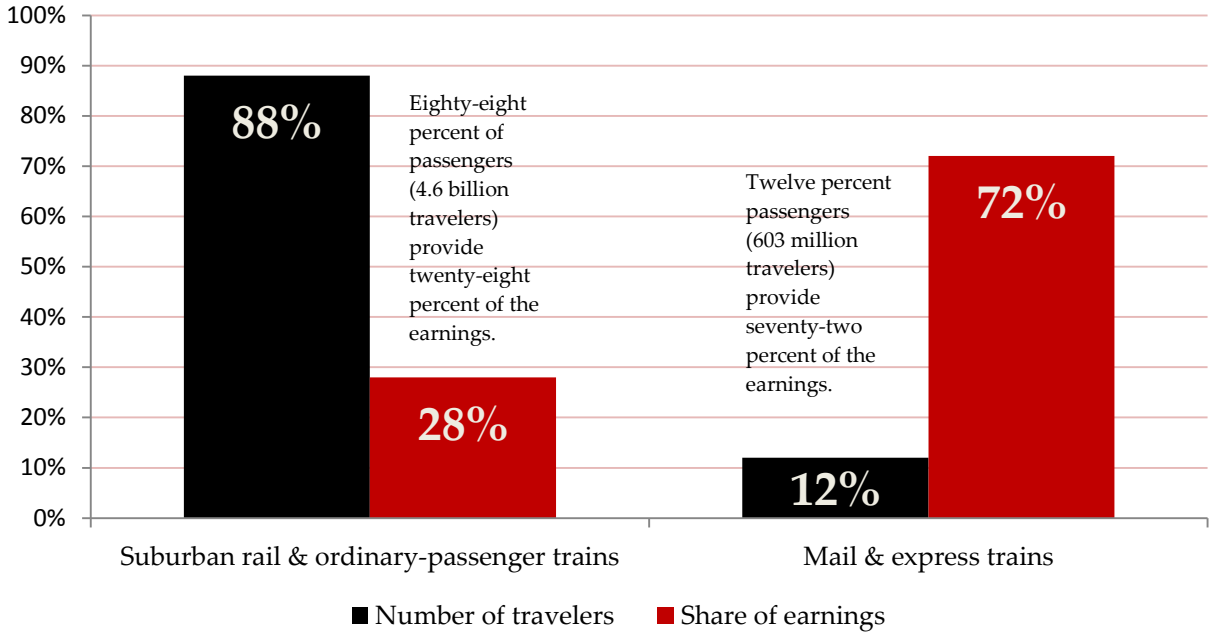
The passenger business is central to the political aspects of the transport business of the Railways. There are few business segments that offer both political and commercial flexibility. In Figure 14, one observes that the suburban and ordinary passenger segments constitute 88 percent of the total number of 5.2 billion rail trips each year. Yet, they contribute only 28 percent of the passenger earnings.

This business segment that constitutes 88 percent can be split into two. First suburban rail transport, essential for daily commuters in big cities. Second, the slow and frequently halting ordinary passenger trains[46] often used by migrant labor, rural poor, vendors, farmers, and office personnel to commute between surrounding districts. The Railways remains competitive in both these low-price segments, but there is a lack of political will to endorse a fare hike.

[46] These also include commuter trains known by their acronyms DEMU and MEMU (Diesel-Electric Multiple Units trains and Mainline-Electric Multiple Units). These are engineless trains that can move in both directions.

Passengers in mail and express trains constitute 12 percent of the 5.2 billion annual train trips[47], but contribute 72 percent of the total passenger earnings. Of the 603

Figure 15. **Number of passengers and share of earnings**



Source: Statistics and Economics Directorate, Ministry of Railways, Government of India.

million mail and express train trips in 2004, 411 million were in unreserved-class, 155 million in non-air-conditioned sleeper-class, and 38 million in air-conditioned classes. Unreserved-class and sleeper-class travelers constitute over 93 percent of the 603

[47] The reason for the vast difference in the proportion of revenues from this relatively small number of mail and express travelers is largely because they travel long distances while the suburban and ordinary passenger travelers travel short distances. This difference is captured in the passenger kilometers—pkm. In 2004, the 607 million mail and express train passengers accounted for 292 billion passenger kilometers, while the 4.4 billion suburban and ordinary-passenger train travelers account for 250 billion passenger kilometers. (2005–2006 Explanatory Memorandum: Railway Budget, Ministry of Railways, p. 6). And passenger fares of even unreserved class of mail and express trains are substantially higher than ordinary passenger trains.

million mail and express trips. These segments also offer commercial opportunities because alternate modes are dearer, but politicians are reluctant to increase fares due to the associated political fall-outs.

The 38 million air-conditioned class passenger trips constitute less than one percent of the total number of travelers but contribute 20 percent of the total passenger earnings. This is the apolitical segment of the high-end travel-classes. However, in the past, the Railways' affordability based differential pricing strategy taxed these air-conditioned class passengers by increasing their fares. As a result, with the competition from budget airlines, the long distance passengers opted to fly, while the short distance travelers took to luxury buses and taxis. But, the Railways staff were in a state of denial. They argued that while airlines carry 37 million passengers each year, the Rail traffic was many folders higher at 14 million passenger trips each day. But the competition with budget airlines was in the small first and second-class air-conditioned segment of rail travel and the Railways was rapidly losing this market share. In sum, there was a sea of data, but either the policy makers did not draw the right inferences or did not act based on it.

As of 2004, the Railways was incurring a total loss of 5,780 crore rupees (US $1.3 billion) in its passenger and other coaching business segments on an income of 14,221

crore rupees (US $3.1 billion)[48]. This posed an enormous challenge for the reformers because the loss was over 40 percent of revenues. Of this loss, 20 percent, about 1,200 crore rupees (US $280 million) was in parcel, luggage, and catering services[49].

Overall, 99 percent of the passenger business is politically sensitive. However, the passenger segment offers several opportunities to increase earnings and reduce losses. For instance, the yield per train depends not just on the passenger fare, but also on a host of other non-fare variable likes the number of coaches in a train, the combination of coaches that form a train, occupancy rates of a coach, and the number of seats in a coach(which in turn depends on the coach layout). Results presented below in this regard (see Table 10) question the conventional wisdom that higher passenger fares invariably result in higher earnings.

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[48] These values include all passenger (13,298 crore rupees) and other coaching earnings (923 crore rupees), but exclude negligible sundry earnings.

[49] Data for catering and parcel losses in fiscal year 2003 has been used here because equivalent data for 2004 was not available. In 2004 these figures were likely to have increased.

Table 10. **Composition of earnings per coach kilometer by travel class for 2003**

Travel class	Relative fare	Earning/coach km	Cost/coach km
Suburban[50]	1	22 rupees	34 rupees
Unreserved ordinary	1	22 rupees	41 rupees
Mail and express unreserved	1.82	20 rupees	26 rupees
Mail and express reserved-sleeper second-class	2.91	16 rupees	24 rupees
Air-conditioned three-tier	8.19	40 rupees	29 rupees
Air-conditioned two-tier	13.1	37rupees	28 rupees
Air-conditioned first-class	25.5	37 rupees	26 rupees

Source: Statistics and Economics Directorate, Ministry of Railways, Government of India, 2008.

In Table 10 it is worth noting that despite air-conditioned first-class fares being 25.5 times higher than suburban fares, earning per coach kilometer from the first-class air-conditioned coach (37 rupees) is less than double of the suburban coach (22 rupees). This is because the suburban rail carries 300 passengers in a coach, while the air-conditioned first-class has room for only 18 passengers. Moreover, counter-intuitively, higher fares can, at times, result in lower earnings per coach kilometer. Consider the mail and express reserved-sleeper second-class fare, which is about three times the unreserved ordinary fare (see Table 10). Yet, the earnings per coach kilometer from the mail and express reserved-sleeper second-class is 16 rupees, which is 36 percent less than the unreserved ordinary coach, which earns 22 rupees. The yield per unreserved

[50] For the purpose of this calculation it has been assumed that all passengers travel on tickets bought for a single trip. In practice many of the suburban rail passengers use discounted monthly season tickets or quarterly season tickets.

coach is greater because it has seating capacity for 90 passengers (and in practice accommodates more travelers) as opposed to 72 in the reserved-sleeper second-class coach. Once again the difference is due to the number of passengers occupying a coach. In sum, the earning per coach kilometer is not only a function of fare per passenger but also the number of passengers travelling in a coach.

The popular conception of the perpetual and excessive demand for trains is derived from stereotypical images of thousands of passengers riding on the roof-tops of trains in India, clinging to every ledge, bar, bolt, and crevice on the engine, and between carriages. But in practice, many trains are not so popular. The occupancy rate for trains not only varies by type of train and among class of travel, but also by season. Occupancy rates matter because an empty seat is a lost opportunity in passenger-fare revenue. For every one percent increase in occupancy rates, the Indian Railways earns an additional 100 crore rupees (US $23 million). Trains heading towards hill stations (high altitude holiday destinations) are popular during the summer. But various trains that head towards the desert regions of India have very low occupancy in this period; instead it is hard to find vacant seats on these trains during the winter—the tourist season in Rajasthan[51]. Thus, demand modeling to maximize occupancy rates on all

[51]Located in the Thar Desert in India and popular tourist destination, particularly during the winter season.

trains across travel classes and seasons holds immense potential to enhance the Railways' earnings from the passenger business. Likewise, if an air-conditioned first-class coach with a 20 percent occupancy rate on an unpopular train is added to a popular one with a wait-list, the occupancy rate will increase.

The combination of coaches that constitute a train is yet another variable affecting the yield per train. Consider a typical coach composition of a Rajdhani Express train. Of the 17 coaches, one coach provides no fare revenues while another two offer little revenue; these are the one pantry car and two power-cars cum brake-vans. The remaining 14 coaches include seven three-tier, five two-tier, and two first-class coaches. These three air-conditioned travel-classes have varying degrees of profitability—three-tier being the most profitable in practice. Thus, the profitability of a train can be improved by manipulating the combination in which these coaches are added and subtracted.

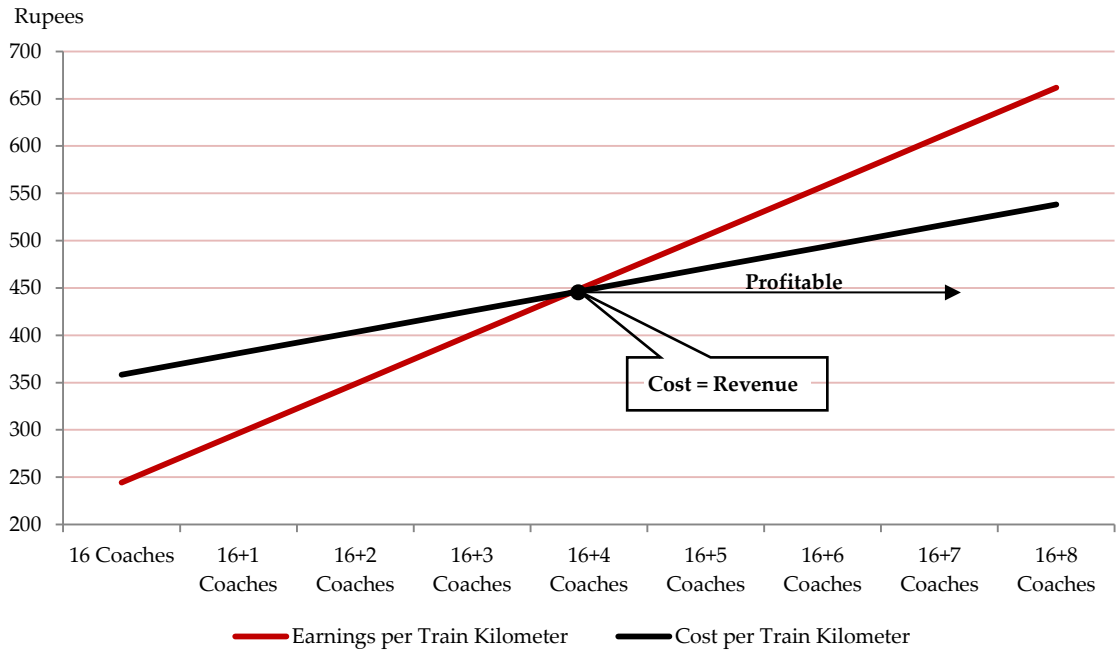
Further, the layout of coaches affects the yield per coach because an arrangement that accommodates more passengers increases per coach kilometer earnings. If the profitable air-conditioned three-tier coach layout is reorganized to accommodate 78 seats instead of 64, its profitability improves[52]. Moreover, Indian Railways

[52]Here it is assumed that these coaches have full occupancy. Therefore, layout of the coach also determines the yield per train.

predominantly has broad gauge tracks, which offer opportunities to increase the seating capacity by leveraging the maximum moving dimensions.

Another variable affecting profitability is the number of coaches in a train—the length of the train. Consider Figure 15 where all other variables are kept constant—fare, coach class, occupancy rates, distance travelled—and coaches are added. These calculations are for a mail and express type of train that travels a distance of 1,385 kilometers[53].

Figure 16. Train lengths and its affect on profitability



[53] For the purpose of this comparison it is assumed that all coaches accommodate passengers and have full occupancy. The above unit cost per train kilometer is based on the methods adopted by the Indian railway—where most cost components are treated as variable, although many of these costs are fixed in nature. Therefore, the cost per train kilometer function increases in a linear manner (for a detailed breakup of fixed and variable costs see Annex 2).

The train with 16 coaches runs at a loss. As coaches are added to the train, it breaks even at 20 coaches (Figure 15). Without increasing passenger fares, this train becomes profitable as the length of the train is increased to 24 coaches. Earnings increase in proportion to the addition of coaches, provided there is full occupancy. Yet, costs associated with additional coaches are much lower. Irrespective of the number of coaches in a train, several costs remain the same—rail-track, locomotive, guard, driver, platform space, and so forth. Moreover, demand for several passenger trains far exceeds supply as reflected in long waiting lists and packed compartments. Keeping all other factors constant, adding coaches to a train offers opportunities to increase the yield per train, as opposed to the politically infeasible task of increasing passenger fares. This offered a win-win solution.

It would thus be seen that the passenger fare is only one among many variables affecting the profitability of trains. Except for the passenger fare, all variables are apolitical and have a huge potential, especially if they are manipulated together to maximize profitability.

One such untapped potential for the Railways is the air-conditioned travel segment of popular trains. Many of the 155 million non-air-conditioned sleeper-class passengers that travel in mail and express trains aspire to travel in air-conditioned coaches. In this regard, the Minister often narrated the experience of his friends who would try to stand near the door of the air-conditioned compartments at railway

stations. This was to enjoy the little cool air that would waft out while they peeked a glimpse of what the coach looked like inside (because all air-conditioned coaches had tinted window glasses); the police would chase these curious farmers away. Here was a distinct indication of an unmet demand that presented a significant opportunity to expand the air-conditioned travel segment six fold, from a paltry 38 million to include these 155 million sleeper-class passengers, with the caveat that fares needed to be affordable. This approach is quite like Tata's Nano[54], the one-lakh car, priced at about US $2,326, or mobile phones that are cheap enough for the common people—from vegetable vendors, carpenters, to small farmers.

Miscellany

The footfalls and eyeballs of 14 million passengers who travel on trains each day, offer great opportunities for increasing non-passenger fare income in 'sundry earnings' and through brake-vans and parcel-vans for improving 'other coaching earnings'. Sundry earnings include license fees for renting of advertisement space, parking, catering, land lease and so forth. And coaching services include parcel and luggage transportation

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[54] Ratan Tata, the group chairman of Tata Motors, was inspired by the sight of a family of five that are seen riding on two-wheelers in India. All five ride together, with the father on the front wheel, mother on the pillion, and with the children hanging off their parents, like a bunch of grapes. This sparked the reinvention of the people's car (Economist, January 10, 2008).

services, special trains for the use by the armed-forces, and pilgrimages. But why had the share of miscellaneous earnings declined from eight percent of total passenger earnings in 1951 to four percent in 2004? The Airport Authority of India has less than 100 airports but earns a few hundred crore rupees through revenue from advertisements. In contrast, the Railways had a paltry income of 39 crore rupees from its 7,000 Railways stations across India, with 9,000 passenger train services each day in 2004. Even the metro rail transport in Singapore, a city state, had more advertisement revenue than all of Indian Railways. Cineplex chains in India have mastered the art of accruing non-fare revenues through catering, parking fees, auxiliary entertainment, and so forth. On the contrary, the Railways' land leases yielded a paltry 116 crore rupees in 2004, and the total annual catering earning of the Railways was 29 crore rupees[55]. Likewise, the Railways had a host of untapped opportunities in this business segment. Moreover, twenty percent[56] of passenger losses were from parcel and catering services despite the fact that the Railways did not sell subsidized meals, nor did it carry parcels at a discount. Why were the Railways' catering and parcel earnings so low at 620 crore rupees (US $144 million) and losses so high?

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[55]Based on data from the Accounts Directorate, Ministry of Railways.

[56] This amounts to a loss of 1200 crore rupees (US $279 million).

The primary reason is that Indian Railways' had acquired an institutional disinterest in commercial policies and non-passenger fare earnings. This was not on account of political interference or compulsions, but due to a lack of commercial orientation and profit motive. Moreover, the entire emphasis of management was on operating trains. This was reflected in the preference for posting of senior officers that managed both the commercial and operational activities of the Railways. The most coveted jobs for these officers were in operations. Issues such as catering, advertisements, parking, and licenses for other commercial activities on platforms received little attention, if at all. This is evident in the fact that for years on end, license fees had not been revised and arrears were not collected. Additionally, there was little effort towards price discovery through competitive bidding for licenses and so forth.

Furthermore, the commercial policy focused on retailing rather than wholesale outsourcing of non-core functions like catering, parcel, and luggage services. Each signage and parcel contract was individually contracted. This led to significant underutilization of assets. For example, every train has two brake-vans[57]; each has the capacity to carry eight tons of cargo. An empty van is forgone revenue, yet less than 30 percent of the total parcel capacity was being utilized by the Railways. Additionally,

[57] These vans are a safety requirement because Indian Railways does not have anti-collision devices and thus needs these vans as a buffer in the front and the rear of the train.

underutilization was due to a uniform pricing policy. To compete effectively in the parcel and courier market, time-bound delivery is of essence[58]. But, the Railways' uniform pricing did not reflect the demand variations for the service. Parcel services were priced the same for both peak and lean seasons. While the parcel rates differed between fast and slow trains[59], the quality of service varies among the mail and express trains—some are more punctual and quicker than others. While the quality of service provided by the *Toofan* express and *Purva* express vary significantly, they both are fast trains and usually tend to have the same parcel charges. Further, the pricing policy charged the same rates for transportation, from production to consumption centers, like Delhi to Guwahati, and back. Delhi to Guwahati is in the loaded-flow direction for

[58] Long distance mail and express trains provide opportunities for earnings through parcel and courier services. If a parcel is dispatched from Delhi and delivered in Mumbai in less than 24 hours (door-to-door) the market rate for a kilogram is between eight and twelve rupees. But if the courier time is between 24 and 48 hours, then the rates drop to a half. For a courier time of 72 hours and more the rate is as little as 2 rupees a kilogram. Since, mail and express trains are punctual and each train has four brake-vans—two in front, two at the rear end, and there is flexibility to add a few more vans—these trains offer an opportunity to capture some of the high value courier service. The Rajdhani express, depart at 5 pm in Delhi and reach Mumbai at 10 am (station-to-station), so a parcel couriered via these trains can be delivered in less than 24 hours (door-to-door). Here the rail is more competitive than the roads because buses and trucks (that provide a similar service) take much longer to travel, and have the same additional costs (station-to-door, in their case booking office to customer). On the other hand, for distances less than 500 kilometers the Railways is not competitive for parcel courier because of the station-to-station issues discussed earlier. Further, the Railways is not competitive on routes where trains are not punctual, because in the couriers market the value is of speed as well as reliability.

[59] The Railways parcel service had a three-tiered tariff structure in the increasing order for ordinary passenger trains, mail and express trains and for the `super-fast' Rajdhani and Shatabdi trains.

which there is much greater demand, the return trip in the empty-flow direction has little demand.

Finally, the Railways did not leverage its brand value in catering, parcel, courier, advertisement, or on its iconic trains like *Rajdhani* and *Shatabdi*. Branding offers the win-win proposition of increasing revenue several fold while enhancing customer service and reinventing the rail travel experience.

Cost Structures

Many costs for the Indian Railways are beyond control of the management, being determined exogenously. Employee salary and benefits are determined by the federal government's pay commission, diesel prices by a combination of international crude prices and government subsidies, and general inflation by the market conditions. Moreover, as seen in earlier chapters, reducing the number of employees or selling or closing loss-making business segments is politically infeasible. Thus, unlike private firms, the Railways is constrained in cutting total costs and determining the pace of the cost increases. Under such constraints, the potential to transform the Railways' finances appears grim, but in practice how formidable was this challenge?

The unit cost[60] of freight has been continuously declining at real (constant) prices since 1991 due to gains in productivity and operational efficiency. The unit costs had declined by more than half from 10 to 4.3 paise in 2004[61]. This happened due to a combination of leveraging technology and scale. With such long-term trends in the Railways, why was it heading towards bankruptcy in 2001? While the Railways' unit cost was declining in real terms, operational expenses were incurred at nominal (current) prices. As the unit cost was increasing at nominal (current) prices and since a corresponding increase in tariffs was politically infeasible, the Railways' financial condition was deteriorating[62]. In this regard the Mohan committee had emphasized that the 'rate of growth in revenues has been outstripped by the rate of increase in costs' (2001a, p. 4). But this relationship between wage-hikes and productivity, expenses and revenue, could be reversed, requiring the increase in annual labor productivity to exceed the annual wage-hike.

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[60] (Unit cost = total cost / total output (GTKM) = (fixed cost + variable cost) / total output. As total output (↑), fixed costs (↔) and variable costs (↑), therefore unit cost (↓↓).

[61] In 1991 the unit cost per net ton kilometer of the Indian Railways was 10 paise which has reduced to 4.3 paise in 2004 at constant prices (base year 1982). While in 1981, the railway had 11,000 engines by 2004 the railway had a fleet of 7,800 engines—predominantly diesel and electric powered. Likewise, the 227,000 wagons that are part of the Railways' rolling stock are half of the past quantities. But, the engines and the wagons are superior in technology and have substantially increased the railways productivity. In addition, from 1981 to 2004, the number of employees had declined from 15.5 million to 14.4 million.

[62] In nominal terms the Railways' costs were increasing faster than their revenues, implying an inevitable financial crisis.

Railroads are network infrastructure that require lumpy initial investment with returns in the long-term. Bigger is better because with an increase in the amount of load transported, the average cost of each ton transported falls as the fixed costs can be spread over a greater tonnage. Therefore, marginal costs are substantially lower than average cost of operations. Railroads embody strong economies of scale.

Figure 17. **Operating expenses and gross ton kilometers**

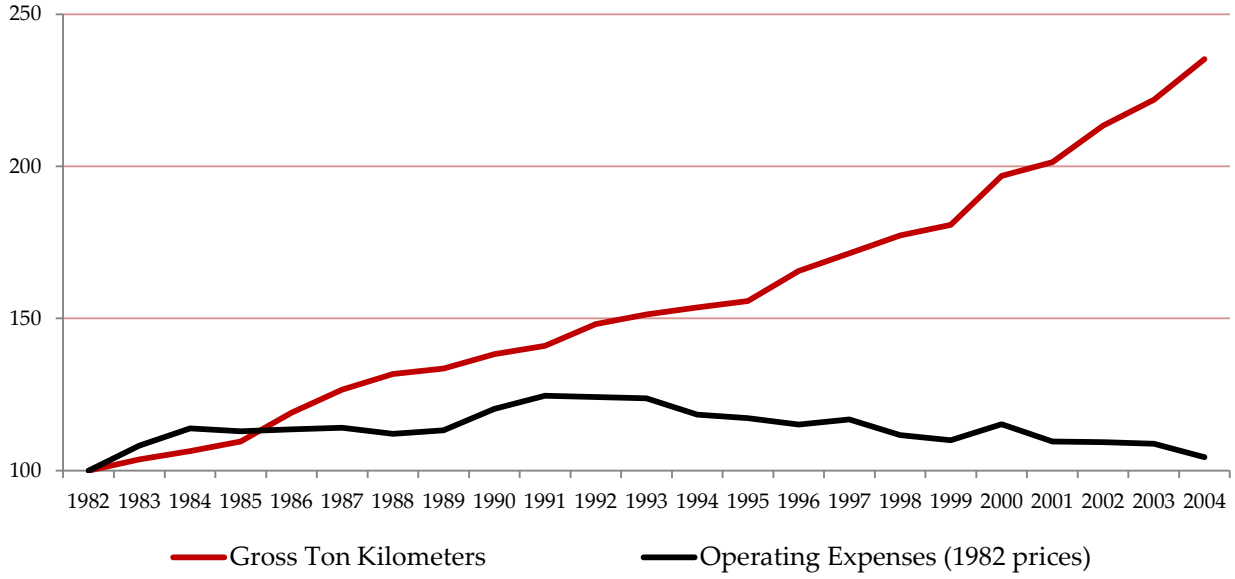


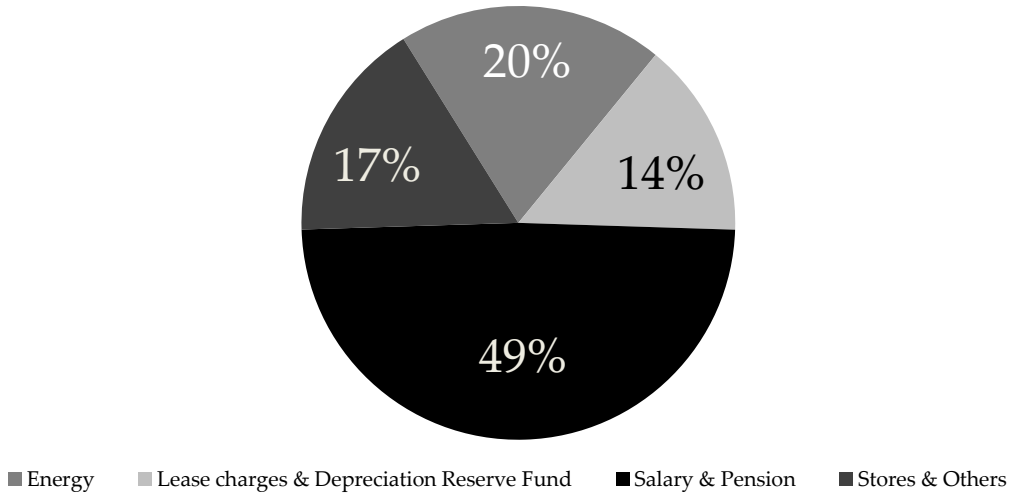
Table 11. **Operating expenses and gross ton kilometers**

	1983	**2004**
Gross Ton Kilometer (Billion)	518	1,176
Operating expenses at nominal prices (Crore Rupees)	3,900	39,482
Operating expenses at real prices (Crore Rupees)	3,400	3,323

Source: Statistics and Economics Directorate, Ministry of Railways, Government of India.

As observed in Table 11, between 1983 and 2004 the gross ton kilometer[63], increased over two times—from 518 billion gross ton kilometers in 1983 to 1,176 in 2004. During the same period, at nominal (current) prices, operating expenses increased 10 times, but in real terms—adjusted for inflation[64] to the base year 1983— expenses marginally decreased (Figure 17). To understand why the total costs do not vary much even with the substantial increase in the Railway's throughput[65], consider Figure 17 that provides the composition of operating expenses.

Figure 18. **Composition of operating expenses**



[63] Also known as GTKM is a combine measure that captures the distance and weight of total traffic carried on the Railways.

[64]Divided by a weighted input cost index for the Railways. Weighted Index of Inputs for Railways (WIIR) is prepared annually in order to measure change (increase or decrease) of Railways' input costs over the time. The purpose of this index is to compute a single index from price indices of the inputs relevant to the Railways, taking into consideration their relative weights in order to produce a composite metric, (for details see Annex 3)

[65] Amount of traffic transported in a given time.

Salary and pension expenses (49 percent) and financial and amortization charges (14 percent) for lease charges and depreciation are fixed. It seems intuitive that more trains imply more engines, drivers, guards, wagons, among others. However, over the years the number of trains has grown, but the number of staff, engines, and wagons, all declined. This is because the Indian Railways is a mega-enterprise with enormous slack in the system. By leveraging scale, technology and operating strategy the same assets provided more output.

What is more astounding is that despite an increase in throughput and the increase in the number of trains, energy and storage expenses do not vary much. It is intuitive to assume that more trains imply a proportional increase in diesel consumption. But in the case of the Railways this assumption falls apart. Consider the consumption of diesel over the eight year period—2000 to 2007. While the diesel gross ton kilometer[66] increased by 37 percent, the consumption of diesel increased by a third, that is just 12 percent[67]. Thus, costs do not vary as much with the increase in throughput. Operating costs were on the rise, not because of an increase in the number of trains but because of an increase in the price of diesel, employee bonuses, and salaries. In essence, the Railways has low variable costs and fixed costs dominate. This

[66]A measure of the amount of load transported by diesel engines.

[67]Statistics and Economics Directorate, Ministry of Railway, Government of India.

is also referred to as a high operating leverage, implying that profits are elastic with respect to output or sales[68]. To put it simply, given the rigidity in the cost structure, as output increases, operating profits increase at a rate much faster than the growth in volumes; thus the more freight transported, the more profitable the Railways is, and vice-versa. If the Indian Railways system, with its 4,000 freight trains, completes the to-and-fro journey faster and decreases the time between successive loadings, the Railways' output can increase exponentially. The turnaround time of freight trains was seven days in 2004. If this time could be reduced to five days, then the Railways could load an additional 230 trains each day. Given the high operating leverage, the increase in associated costs would be nominal and this offers a multi-billion dollar opportunity.

Further, another crucial attribute of the Railways' costs is its insensitivity to the length of the train. As the length of a train is increased—by adding more coaches—the passenger capacity increases but, the incremental cost is proportionately smaller. Therefore, the unit cost per passenger declines. Table 12 shows the difference in unit cost of a typical Rajdhani train with 17 coaches and a longer Rajdhani train as the well as the case study—modeled on the *Garib Rath*, a low cost air-conditioned passenger train service introduced by the Railways.

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[68] Operating leverage is the elasticity of profit with respect to output.

Table 12. **Cost per passenger kilometer, 2008**

Train		17 Coaches	20 Coaches	24 Coaches[69]
Rajdhani	Cost per train kilometer	649.20 rupees	749.03 rupees	882.55 rupees (+36%)
	Revenue per train kilometer	993.44 rupees	1226.60 rupees	1537.93 rupees (+55%)
	Cost per passenger kilometer	80 paise	73 paise	68 paise (-15%)
	Number of passengers per train	816 people	1032	1302 people (+60%)
Case Study	Cost per train kilometer	465.48 rupees	533.25 rupees	623.92 rupees (+34%)
	Revenue per train kilometer	567.29 rupees	686.26 rupees	851.02 rupees (+50%)
	Cost per passenger kilometer	38 paise	35 paise	32 paise (-16%)
	Number of passengers per train	1233 people	1512	1920 people (+56%)

In the Rajdhani, as the number of coaches increases from 17 to 24, the cost of a passenger kilometer decreases by 15 percent—from 80 to 68 paise. This is because cost per train kilometer increases by 36 percent, but the carrying capacity of the train increases at a greater rate of 60 percent. Therefore, the unit cost per passenger falls by 15 percent[70]. This is because a longer train continues to use the same engine, tracks, driver, and crew. In essence, longer trains have a lower unit cost per traveler.

Another mechanism is the insensitivity of cost to the load hauled by a train. While freight trains carry five times the load of a passenger train, costs are not five times higher; instead they are less than double the cost of the passenger train because

[69] In parenthesis is the percentage change in values with respect to the values under 17 coaches.

[70] Here the assumption is that additional coaches have full occupancy and the engines can haul these longer trains. In response to such needs the Indian Railways had acquired high horsepower locomotives but could not increase the length of the trains because the platforms at railway stations where not long enough to accommodate longer trains.

both the trains use the same driver, tracks, signaling system, and so forth. Additionally, energy efficiency in terms of fuel consumption per thousand gross ton kilometer of an engine hauling a heavier train is superior compared to hauling a lighter train. Therefore, per ton kilometer costs of a freight train is 51 paise while that of a passenger train is almost 14 times more at seven rupees[71]. Table 13 summarizes some of these attributes.

Table 13. **Insensitivity of costs to load, 2004**

	Gross train load	Cost per Train kilometer	Cost per coach/wagon kilometer (in Rupees)	Cost per net ton kilometer
Passenger	1,000 ton	412 rupees	36 rupees	697 paise
Freight	4,000 ton	714 rupees	17 rupees	51 paise

The passenger train is not comparable with the freight train on account of several factors. But Table 13 demonstrates the relative insensitivity of cost to pay load. Additionally, this is borne out by an analysis of two freight trains, carrying different loads. The unit cost of a train with a heavier payload of 5,600 tons is 10 percent lower than the unit cost of a relatively lighter train with a payload of 4,000 tons. Moreover, (see Table 13) a relatively lighter Rajdhani with 17 coaches carrying 816 passengers has

[71] The cost per passenger kilometer is 41 paise and the average weight of a passenger is assumed to be 60 kilograms. 17 passengers x 60 kilograms = one ton. Therefore, 17 traveler x 41 paise = 697 paise per ton kilometer).

a unit cost of 80 paise, while a heavier and longer case study train[72] with 1,920 passengers has a much lower unit cost of 32 paise. In essence, heavier and longer trains have lower unit costs and thus are more profitable. Given the insensitivity of cost to load and length, increasing the load and length of freight trains or the number of travelers per coach and number of coaches in a passenger train offers a significant opportunity. While speaking to the Federal Open Market Committee, Alan Greenspan, the now retired chairman of the Federal Reserve Bank of America, argued that a 'combination of rising capital efficiency and falling nominal unit labor costs' has been fueling world economic growth in an era of uniquely low global inflation and interest rates (2007, p. 379). What can the Railways learn from this observation? At a macro level, given the rigidity in the cost structures, if the rate of growth in productivity outpaces the rate of inflation, then the unit cost of operations at nominal (current) prices is likely to fall. During the period 1991–2004, the Railways' input costs grew at 11 percent while its volumes and asset productivity grew at five percent. During the same period, its freight unit cost increased at six percent per annum at nominal (current) prices. Although it would be inappropriate to assume a simple mathematical relation between the rates (11 – 5 = 6 percent), it is plausible to hypothesize that costs for the

[72] This case study train accommodates more passengers in each coach (consider a chair-car coach instead of a sleeper-coach). While the Rajdhani's coach carries 47 travelers, each coach in the case study train carries about 80 passengers.

Railways are rising predominantly on account of inflationary pressures. In this context, the macroeconomic stability of the 2000s, characterized by a benign inflation rate of four to five percent, provided a golden opportunity: If volume growth was to exceed inflation rates, the unit cost was likely to decline at current prices, making the Railways profitable.

Conclusion

The narrow definition of the railroad as a monopoly missed out on the fact that the Railways operates in the fiercely competitive business of transportation. A monopolistic mindset was doing much harm because it called on increasing prices in the segments that were apolitical but had no commercial space for price rises, further eroding the Railways' competitiveness. Rapid sustained economic growth in India and the upswing in the commodity cycle offered mega-opportunities in the transportation business. Aversion to profitability and a lack of commercial orientation are incompatible with achieving institutional sustainability, and this frame of mind needed to change so as to face the threat from severe competition in the market place. To deliver superior and compelling value, the Railways needed to manage both supply and demand side constraints and reorient its operations to be more market driven and address customer needs.

An important finding from this analysis is that the profitability of railroads is not simply a function of how much cross-subsidy the freight segment provides to the passengers, or air-conditioned class passengers provided in cross-subsidy to unreserved passenger segments. Rather, profitability is a function of several variables over which the Railways functioning can be optimized.

Profit $(\pi) \neq f\ (fares)$; instead **Profit** $(\boldsymbol{\pi}) =$

$f(fares + \ length\ of\ train + occupation\ rate\ in\ coaches + speed\ of\ train +$

$weight\ transported\ per\ wagon + composition\ of\ rakes + \ \varepsilon\ (several\ other\ factors)$.

Railway expert groups and consultant reports attributed Indian Railways' high fares to cross-subsidies between the Railways' commercial and social obligations. In contrast, the reformers discovered that the Railways' fares, in the absence of cross-subsidies and in comparison to other comparable Railways around the world, were very high. This is because, in purchasing power parity terms, the Indian Railways unit costs were three times that of the Brazilian or Chinese Railways. Thus, the fundamental problem was the high costs of operations and not cross-subsidies. The analysis of cost structures reveal that given the rigidity in the cost structures, the Railways could increase its profitability if it carried larger volumes. To carry larger volumes the trains need to run faster, longer, and heavier. And to achieve operational synergy the Railways requires a systematic approach. Such a coordinated approach is at the core of

the supply-side constraints, if unmet demands are to be addressed. How these insights were translated into billions of dollars will be discussed in the following chapters.

Chapter 7: Milking the Cow: Supply-side Strategy

Introduction: Expanding Supply by Optimizing Asset Utilization

The Minister was discussing the freight loading target for the forthcoming budget for the fiscal year 2005. In 2004, the Railways had achieved a freight loading of 557 million tons. The Railway Board was of the opinion that even a modest increase with a meager growth rate of 2.3 percent from the previous year to a target of 570 million tons would pose a challenge. But, such a conservative proposal was not unusual because the compound annual growth rate of freight from 1992 to 1999 was 1.86 percent (Mohan, 2001b, p. 16). The Board members articulated their concern, "The railway assets are over utilized. On some routes trains are running at 140 percent of capacity."

Since the Board could not reach a consensus on the target for freight loading for the fiscal year in 2005, the Minister called for the concerned `file'. The budgetary freight loading target for 2005 was set at 580 million tons, and an internal `mission 600 million tons' was launched. The Minister personally wrote to all General Managers in zonal Railways encouraging them to make every effort to honor the target. With the very same people, network, and rolling stock, the Indian Railways not only achieved its stretched target but exceeded it by loading 602 million tons in 2005. In Indian Railways' 150 year history, this 45 million ton of incremental loading was the highest ever in one fiscal year. Since 2004, the Indian Railways has graduated from 557 million tons to 795

million tons in 2008. This increment of 238 million tons in four years is significantly greater than the 155 million tons the Railways clocked over the entire 1990s. Based on the present trend, the Railways is expected to record an additional loading of 300 million[73] tons during the five year period (2005–2009). In comparison, this is more than the 280 million tons of incremental loading than that recorded over the previous two decades (1981–2001).

What was it that enabled the Indian Railways to make this quantum leap from 10 million tons to 60 million tons a year and from two to eight percent annual growth? Simply put, this is the result of a scale driven strategy of growth. To generate larger volumes of throughput the Railways needed to manage both supply and demand-side constraints. And the entire supply-side management can be attributed to three interventions—*faster*, *longer*, and *heavier* trains. Each of these three elements is worth a billion dollars in profit. Faster, longer, and heavier trains are economical. They use the same resources—locomotives and crew, routes, wagons, and systems—and transport more freight. Marginal costs are negligible, resulting in lower unit costs, but revenues increase substantially. Efficiency is generally equated with heavy haul trains, led by the Rio Tinto in Western Australia. A typical Rio Tinto Pilbara train has a loaded weight of

[73] The budgeted target for the fiscal year 2009 is 850 million tons and the internal target is of 870 million tons. On achieving the budgetary target this year, the incremental loading over the five years (2005–2009) will be 293 million tons.

30,000 tons and length of over two kilometers (Railway Gazette, June 19, 2008). In contrast, the Railways' axle load[74] was 20.32 tons, and a train with 58 wagons hauled a payload of over 3,364 tons[75].

The strategy was to improve yield per train because costs are sensitive to kilometers[76] rather than passenger kilometers or ton kilometers. This strategy amounted to refocusing the Railways' comparative advantage to its basics. These attributes—namely, guiding (allowing faster speed), coupling (facilitates demand responsive lengths), and bearing (allowing heavy axle load)—were the motivations for inventing railroads in the mid-nineteenth century (Van der Meulen and Möller, 2006, p. 1).

First, faster trains. Here, faster does not refer to actual train speed but to quicker turnaround—reduction in the time lapse between two successive loadings. Indian Railways had 4,000 freight rakes in 2004. With a seven day turnaround the Railways loaded 570 trains each day. Reducing this turnaround

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[74] The design load bearing capacity of each of the four axles of a wagon

[75]For several reasons Indian Railways' freight trains are not comparable, yet there was a lot of scope for improvement. Australia and Brazil were the front runners, carrying 44,000 tons and 30,000 tons respectively. Chinese Railways were hauling trainloads of 20,0000 tons and railways in Russia, South Africa, and the United States, ran trainloads of 15,000 tons each (UIC, 2007).

[76] Train Kilometer is a 'unit of measurement representing the movement' of a train 'over one kilometer', adapted from United Nations Economic Commission for Europe, Transport Division Database, *www.unece.org*.

time to five days enabled the Railways to run 800 trains a day, that is to say an additional 230 trains each day. All else being constant, incremental revenue from these these trains alone amount to 10,000 crore rupees (US $2.3 billion).

Second, run heavier trains. In 2004, the railway was loading 30,000 wagons each day, which increased to 40,000 in 2008. Adding an extra ton of load to each wagon translated to 40,000 additional tons or 15 million tons a year. However, rather than just one ton, six tons were added to each wagon, which translated to 90 million tons of incremental load each year or 6,000 crore rupees (US $1.4 billion) in incremental revenue.

Third, increasing the length of trains by attaching additional coaches in popular mail and express trains with long waitlists. Each additional coach provided a crore in incremental revenue and 3,000 such coaches would translate into 3,000 crore rupees (US $0.7 billion) of additional revenue. Similarly, extra wagons were added to covered and open freight trains—40 to 41 in the former and 58 to 59 in the latter.

Three-fourths of the supply-side transformation of the Railways is explained by these three interventions. If these interventions were so simple and intuitive, why were they not encashed earlier? While all the strategic solutions emerged from within the bureaucracy of the Railways, and are in fact as old as the inception of railroads, they did not translate into action because of the lack of a system-wide approach and cross-functional and spatial coordination. Indian Railways is a mega-system, with several

sub-systems within systems. Quite like a *matryoshka*, the Russian nested doll. These systems are structured around various departments within the Railways and are interwoven and interdependent in complex ways. Each technological intervention required collaboration across departments, zones, and divisions; and to expand the capacity of the system there was a need to work on several variables simultaneously so as to synergize policy initiatives. To capture the complexity and the interrelationships between departments and with policies for each of the interventions consider the following.

Faster Trains

The turnaround time of a wagon is a function of several variables. For reducing the turnaround time, either the speed of the trains had to be increased, or the non-travel time reduced, or both. In 2004, the turnaround time was 7 days. Of the seven days, two days were spent on travel[77], and the remaining five days were spent on non-travel activities. Among the three non-travel activities, handling—loading and unloading of goods—at terminals took two and a half days, train examination took another half day; and the residual two days were spent on miscellaneous tasks including maintenance,

[77] Average distance travelled by a train—known as lead in rail parlance—was 660 kilometers in 2004. As most trains returned empty and the average speed of a freight train was 24 kilometers per hour, of the seven days only 2.3 days, or 55 hours, were spent on the move.

asset failure, and so forth. It was discovered that train speed had remained almost unchanged over the previous 30 years[78]. After little success with increasing the speed of trains, an aggressive multi-pronged strategy was launched to reduce non-travel time spent on handling, train examination, and miscellaneous tasks.

First, detention time was longer because of shorter platforms and restricted working hours at many terminals. While the Railways ran trains day-and-night, at many goods sheds the handling was restricted to business hours—12 to 16 hours a day. The time allotted to customers for handling was nine hours, beyond which a penalty was charged. Consider a typical terminal that operated between 6am and 6pm. A train that arrived after 9am took nearly 24 hours to load, yet no penalty was applicable because the loading time could be computed only within working hours. This problem was compounded by short loading lines and platforms—a legacy of the pre-Gujral practice of piecemeal loading. Since several platforms were less than 685 meters long, trains had to be loaded in more than one installment, and each installment took up to 24 hours.

Therefore, it was decided to convert all goods terminals that handled more than ten rakes a month into round-the-clock working terminals with full-train-length

[78] This is because increasing the speed of trains requires complex interventions, many of which could be achieved with massive investment in new tracks and signaling technology, that too in the long-term.

platforms. Adequate funds were made available to carry out these works[79]. The implementation was time bound and projects were to be completed within six

These initiatives were coordinated with several operating and commercial interventions. The preferential traffic schedule[80] was modified to grant allotment of rakes to efficient customers—having full-length terminals, mechanized handling facilities, and round-the-clock working. Demurrage and wharfage charges were increased, and with a few exceptions, the discretionary powers to waive these charges were revoked. For efficient freight handling, incentives such as the engine-on-load scheme were introduced. Unlike before, the engine would now wait if loading was completed quickly—3 to 6 hours. In essence, efficiency was rewarded, and delays penalized.

Second, a critical cause of delay was the examination of freight trains. In a quest to reduce operational delays, Gujral had eliminated all en-route train examination. Since then, most trains were examined prior to loading and the

[79] The final decision was left to the zonal railways so as to consider local constraints. Authority was devolved to general managers at zonal railways to make adjustments as per local conditions. In some cases, land for extending platforms was not available, while in others, workers' unions were resistant. Further, the extension of platforms was accompanied with improved illumination, construction of access roads, provision of electricity back-up generators, and provision of other infrastructure.

[80] This policy instrument sets the priority in which trains will be received at a terminal for loading and unloading or determines the right of way. Customers are ranked into five categories in the following order—defense receives the first right of way, followed by relief and emergency freight services, programmed traffic for feeding power plants and steel factories, followed by cement and other customers.

validity of examination expired at the end of every trip—thus known as end-to-end examination. Nonetheless, this examination was independent of the distance travelled by the train, be it 500 or 5,000 kilometers. This contradiction in examination practices was pointed out by the Minister in his rustic humor. In a meeting with the Railway Board he quipped, "*Tumhari gadi ko toh steshan ka naam padhna aata hai. Kyonki yeh toh station ka naam padh kar bimar padti hai*" (your trains are literate; they seem to fall sick after reading the name of stations). In contrast, for some trains, operating on a closed-circuit with a home base, the validity expired after a specific number of kilometers were travelled. These trains were examined after a couple of trips[81]. Under this dualism nearly two thirds of trains were examined after every trip, while a third were under the efficient system based on distance travelled. As a result, of the 600 trains loaded each day, over 300 of these were examined each day. Conducting an examination along with delays in organizing locomotives absorbed about 15 hours. Therefore, each day 4,500 train hours or 188 train days—were spent examining and organizing trains.

As part of the faster turnaround strategy, the train examination frequency was revised to reflect mileage and time lapse. Examinations are conducted after every 4,500 kilometers of travel or every 15 days, whichever is earlier. This eliminated the need to examine trains at the end of every trip. Further, the validity of the brake power

[81] The examination was valid for 4,500 kilometers and the average round-trip was 1320 kilometers.

certificate—a service guarantee on braking efficiency for a specific braking distance of the train—for closed-circuit rakes has been increased from 4,500 to 7,500 kilometers, or 35 days whichever is earlier.

For the third category of non-travel time spent on miscellaneous activities—maintenance, locomotive breakdowns, traction change points, and so forth—constraints were mitigated. For example, there were several traction change points. As early as the 1960s the links from Delhi to Kolkata had been upgraded to electric traction. However, the feeder branch lines—the first and the last mile on the same route—were not electrified. This resulted in 10 to 15 hour delays at the traction change points in organizing a diesel locomotive, crew, and other operational requirements. In the past, the Railways neither had incentives for the customers to migrate to electric traction nor did the Railways electrify the last mile. The transformation strategy identified this as a high priority intervention and the Railways electrified the last mile at its own expense, making large savings due to a reduction in delays. The interval between two consecutive repair and maintenance activities was increased and delays were curtailed. These efficiency gains were made by reducing the delays in queuing for repairs, repairing sick (damaged) wagons, their release, and redeployment. This further enhanced the supply of wagons and coaches. Finally, information technology was deployed. Through a freight operation information system, real-time rake

movements were monitored, resulting in efficient management of wagons. Through a combination of these initiatives,[82] deployed simultaneously, the wagon turnaround time reduced from seven to five days. Similar efforts were made to reduce the turnaround time of coaches. And rationalization of locomotive and crew linkages improved the availability of locomotives for freight trains. The reformers induced a sense of urgency, focus, aggressive chase (persistent follow-up), and swift execution of such high priority system improvements. The entire intervention cost a few hundred crore rupees (about US $100 million), but it led to three billion dollars in incremental revenue.

Longer Trains

To run longer trains, of up to 24 coaches, during the 1990s the Railways procured higher horse-power locomotives at three times the cost of older and slower ones. But, longer passenger trains required longer platforms. However, the length of platforms was not increased to accommodate longer trains. Thus, the Railways continued to run passenger trains with an average length of 14 coaches. In a pithy statement, the Minister observed, "Indian Railways purchased a Jersey cow, but forgot to milk it."

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[82] Many train examination points located at private terminals have been closed, validity of closed circuit brake power certificates (BPC) have been increased to 35 days and a new concept of premium end to end train examination with BPC validity of 15 days have been introduced. Out turn from shops and sick lines have shown improvement on account of close and regular monitoring against specified target.

Therefore, platforms were lengthened on a priority basis, but here, demand followed supply. Trains were lengthened first, followed by the decision and allocation of funds to extend all platforms along the route of the train, which were located in multiple zones requiring inter-zonal coordination. As a result, while passengers did face inconvenience for a time, this induced imbalance created a sense of urgency for constructing the platform.

Longer trains required more coaches; however, in the short-run producing more coaches to replace the existing stock was impossible. Instead, more effective and efficient utilization of existing coaches seemed more promising. This asset optimization was tackled through a three pronged strategy. First, by reorganizing the allocation of coaches—detaching coaches from trains with less demand and adding them to trains with long waiting lists. Second, like in the case of freight wagons discussed earlier, rationalization of examination and maintenance practices resulted in an enhanced availability of coaches—brake power certificates were issued for longer distances and intervals for routine maintenance were increased. Third, the same rake composition was run more often. While the former required responding to passenger demand on a seasonal basis, the latter required a standardization of coach compositions, so that the same train could be utilized for multiple trips within a day. For example, consider an express train that arrives in Delhi at 9am and departs at 6pm; either this train is renamed and sets off as another express train or makes a short-distance interim trip.

Such changes required a standardization of the composition of coaches among a set of interchangeable trains.

Once the coaches were available, their deployment was prioritized based on the potential yields. A passenger profiling management system was developed that provided detailed demand information for each class of travel on each train. All chief commercial managers in each zonal railway started compiling a daily status report of this demand model. Profitable coaches, like the air-conditioned three-tier coaches and in-demand parcel vans on long distance trains, were given priority. Similarly, the length of covered (BCN) and open (BOX-N) freight trains was increased from 40 to 41 and from 58 to 59 wagons respectively. This was achieved within the permissible moving dimension—namely, constraints imposed by the length of loop lines.

Heavier Train Loads

The Minister had been receiving complaints regarding overloading. On September 27, 2004, the Minister arrived at Muri where the entire train could be weighed on an in-motion electronic-weighing bridge. At the traffic control room in Rail Bhavan, the senior management coordinated a nation-wide weighing of trains. Within four days (September 27–30, 2004) 101 freight trains had been weighed, and in most trains massive over loading—ranging between 2 to 15 tons per wagon—was discovered. This revealed that the Railways was hauling the additional load anyway but was not getting

paid for it. This practice was prevalent for years, but evidence of substantive damage to the tracks or rolling stock had hardly ever been reported.

Apart from disciplinary action, the reformers sought to fix the problem in-charge. By increasing the axle load—that is to say load per wagon—they significantly reduced the room for overloading. In the face of substantial skepticism, and some criticism, the Minister took a strong stand regarding the increase in axle load. In the Minister's words, "My mother has taught me to take the bull by the horns; catching it by the tail lands you with a kick in the face." Since safety issues are 'political hot potatoes' in the Railways, and increasing axle load raised the safety alarm, its implementation required a thorough assessment of risk and its mitigation. This ability to take a calculated risk stemmed from the field inspection where the Minister had discovered the illegal overloading and the subsequent revelations of the extent of such practices across the Railways. Moreover, over the 1990s, the Indian Railways invested six billion dollars in strengthening its track structure[83]. During this period the Railways commissioned three independent assessments—CANAC Incorporated, a Savage

[83]The light-weight-weaker rails—90R 72 ultimate tensile strength —were replaced with heavier and stronger rails—60 kilograms with 90 ultimate tensile strength. Further, the Railways had upgraded wooden and cast iron sleepers with higher quality pre-stressed concrete sleepers. But upgrading of tracks was done in a piecemeal manner, requiring entire routes to operate on the basis of older track strength. As recent as 2004, the high density Delhi-Mumbai and Delhi-Kolkata routes had its track segments built of the weaker and older rail, reconciling the trains on these routes to function once again on the lowest-common-denominator.

Company, experts from the Asian Development Bank, and an empirical assessment by the International Heavy Haul Association. With some improvement[84], these agencies certified the tracks fit for hauling 25 ton axle loads. Yet, the Railways continued running trains based on an axle load of 20.30 tons. What makes this intriguing is that as early as 1922, in some zonal Railways, on the older and weaker 90 pound rails, steam engines[85] operated on axle loads of 22.5 and 23 tons. The actual axle load was greater because of a hammer blow effect—emerging from a lack of wheel alignment (imbalances) that created greater stress on the tracks. If weaker tracks could carry heavier loads why were the new and stronger tracks carrying only 20.3 ton axle loads[86]? Moreover, until the 1990s electrical locomotives of class WAG4 and WCG2, with 21.9 and 22.5 ton axle loads respectively, were in operation.

To operationalize the increased carrying capacity of wagons required an addition of four springs in each wagon; upgrading of tracks required improving the weaker segments that were built with the old rail and a revision of the stress calculations with

[84]As criteria for replacement of old tracks were based on the age of assets, several intermittent segments were waiting their time-out, however, due to this bottleneck; the entire new investment did not yield improved productivity.

[85] XE and XG class engines

[86]This condition was compounded by the fact that the track modulus—the physics equations to calculate the permissible load on tracks—had not been revised despite significant improvements in the quality of tracks.

the track modulus[87] to reflect the tensile strength of the new tracks. Further, electronic weigh bridges and wagon impact load detectors (WILDs) were installed to monitor and prevent the over loading of trains. Furthermore, higher horse power locomotives were assigned to haul heavier trains and specific commodities were identified and reclassified to allow heavier loading of wagons. There were a host of complementary interventions. Finally, a visit to the Safety Commissioner for approval was made.

The Big Five—Supply-Side Management Strategy

Five strategic themes emerge from the preceding discussion and constitute elements of ***radical incrementalism***. First, thinking beyond the resource constraint required leveraging resources such that the staff's aspirations exceeded the resource endowment of the Railways. Here innovation and asset optimization—as opposed to asset accumulation—were central. The strategy was to fully utilize assets by running faster, longer, and heavier trains. Secondly, coordination and cooperation required functional and spatial synergy as well as complementarities among various kinds of policy interventions, such that the sum of the parts was greater than the whole. Third, filling operational gaps with strategic investments—low hanging fruits. Low-cost, short-

[87] Track modulus, the physics equations used to calculate stress bearing capacity of tracks, had not been revised for decades.

gestation, high-return, and rapid-payback were the criteria for these investments. Fourth, aggressive chase and follow-up mechanisms built on monitoring systems, evaluation, and system feedback, facilitating swift implementation. Fifth, a deliberative and calibrated approach where projects were first piloted to learn, revise, and then scale-up in a phased manner. However, encompassing these themes was the organizational mission to champion inclusive reforms—the political mandate to transform the financial condition of the Indian Railways without burdening poor travelers and the Railways' employees.

Leveraging to Optimize

Simply put, earlier, the Railways' modest aspirations were dwarfed by its resources. Assets were underutilized and the system was slack, lumbering along like an old elephant. The extent of slack in the Indian Railways is illustrated by a quick benchmarking with comparable Railways around the world. All Class One freight railroads in the United States[88] have about one-tenth the number of employees, but produce seven times the equivalent output of the Indian Railways (measured in ton-kilometers). Similarly, the Chinese Railways has the same length of network and only a

[88] Association of American Railroads definition: U.S. Class I Railroads are line haul freight railroads with 2006 operating revenue in excess of US $346.8 million.
http://www.aar.org/~/media/AAR/Industry%20Info/Statistics.ashx

marginally larger proportion of double track compared to that of Indian Railway. With twice the number of locomotives and wagons and the same passenger transportation output (measured in passenger kilometers), the Chinese Railways had five times the freight throughput of the Indian Railways (UIC, 2006). While these Railways are not strictly comparable, the comparisons illustrate the extent of slack in the Indian Railways' system. Moreover, the annual ritual of setting an output target was relaxed, if not sluggish, at two percent year-on-year growth. This neither inspired action nor required significant efforts to achieve. While the Railways consistently met targets, it simultaneously faced a financial crisis.

In 2005, when the annual targets were stretched from 2 percent to an ambitious yet realistic 8 percent, the options were limited. Given the temporal and fiscal constraints, adding tracks and rolling-stock within the same year was practically impossible. Thus, the central emphasis of the strategy gravitated towards getting more milk from the same cow, as opposed to buying more cows. This approach to achieving stretched goals through resource leveraging is articulated by Hamel and Prahalad (1994, p. 172). They characterize organizations based on the combination of ability to set stretched goals and leverage resources[89].

[89] Some illustrative 'aspects of resource leveraging' are summarized as converging, focusing, targeting, learning, borrowing, blending, balancing, recycling, co-opting, protecting, and expediting (p. 191).

Table 14. **Leverage and goals**

	Lack ability to leverage (unstrategic)	**Leverage resources** (strategic)
Slack goals (unambitious)	***Looser:*** Firm with neither ambition nor ability to leverage resources.	***Sleeper:*** Firm that has 'nascent capacity' to leverage resources but lacks ambition.
Stretched goals (ambitious)	***Dreamer:*** Firm that thinks big but does not leverage its resources.	***Winner:*** Firm that stretches goals and achieves them through resource leveraging.

In sum, the Indian Railway graduated from a low operational productivity to high productivity by deploying a combination of stretched targets, resource leverage to optimize existing assets, cross-functional team efforts, investing strategically, fostering strategic alliances, adopting a deliberative and calibrated approach, and finally chasing projects to swift completion to reap high returns.

Functional and Spatial Coordination

A prerequisite to operate faster, longer, and heavier trains was to adopt a systemic approach towards asset optimization. As seen earlier, enhancing the effectiveness and efficiency of the Railways required a complex multipronged approach because of the interdependent and interwoven structure of the Railways' functioning. For instance, consider decreasing the wagon turnaround time. The single target of reducing wagon turnaround time from seven to five days required coordination among decisions

regarding investment, commercial, and operating policies as well as train maintenance, and examination practices.

Mechanical and traffic departments had to collaborate for making train examination practices more efficient and less frequent. Mechanical, electrical, and traffic departments had to collaborate to improve the availability of locomotives and crew by link rationalization, decreasing outage—that is the time spent on queuing, refurbishing in workshops, and release; and finally redeployment. Civil and finance departments had to coordinate in order to determine cost effective investments for improving poor infrastructure, illumination, paving of access roads, equipment, and tools at the examination depots. Finally, the traffic department had to modify the preferential traffic schedule and commercial policies concerning demurrage and wharfage charges. In essence, mechanical, electrical, civil, finance, and traffic departments were required to work together as a cohesive team to reduce the turnaround time. Further, spatial coordination and cooperation was required; beyond this various zonal Railways as well as divisions within zones had to cooperate and collaborate across spatial jurisdictions.

The complexity and interdependence for a single initiative and the inherent tensions and conflicting departmental interests are captured in the case study of the taskforce on train examination, constituted on November 29, 2004. This 'Multi-disciplinary Taskforce on Freight Train Examination Practices and Procedures' was

composed of the directors of the mechanical and traffic departments, with the mechanical director as the convener. The primary objective of the team was to 'reduce overall terminal detention for train examination' without compromising safety. After making field visits to some zonal Railways and seeking inputs from all zones, the taskforce submitted its report; however, the Railway Board got stuck in a stalemate. Each department was concerned with its own perspective: while the traffic department wanted train examination practices revised so as to increase availability of rakes, the mechanical department's primary concern was safety. Some key requirements and concerns of the traffic and mechanical departments are summarized in Table 15.

Table 15. **Requirements of the traffic department**

1. Increase operational flexibility and enhance availability of wagons.
2. Replace the criteria for examination from trip based to mileage based.
3. Increase validity of brake power certificates for close-circuit rakes from 4,500 to 6,000 kilometers.
4. Scrap the practice of post-tippling and loading train examination.

Concerns of the mechanical department

1. Safety of trains is paramount.
2. Lack of infrastructure and diagnostic facilities at examination and maintenance depots.
3. Lack of operating discipline—close-circuit rakes get jumbled-up and trains run despite expired brake power certificates.
4. Greater delays due to placement and release detentions (10 hours) rather than train examination per se (5 hours).

Source: Taskforce on Train Examination Practices, Railway Board, Ministry of Railways, Government of India, 2008.

Yet, there was significant progress and both departments agreed on some central issues. First, wagons are the bread earning rolling-stock of the Railways, and therefore needed to be well maintained and optimally utilized. Second, terminal detentions, both for train examination as well as loading and unloading, needed reduction. Third, infrastructure facilities needed to be upgraded at maintenance and examination depots, plus goods sheds.

In order to break the gridlock and reconcile the differences the Minister issued the following memorandum to the Chairman Railway Board on March 18, 2005.

> "On account of difference of opinion between Traffic and Mechanical Directorates, the report of the Task Force on Train Examination has not yet been put up. CRB (Chairman Railway Board) should try to resolve the differences keeping in view the following:
>
> (i) Train examination practices should aim at achieving the twin objectives of **operational flexibility and enhanced availability of rakes** without compromising **safety of trains.**
>
> (ii) The opportunity cost of these kinds of **excessive detentions** runs into hundreds of crore of rupees.
>
> (iii) The time spent on placement and release is two times more than the time spent on train examination per se. **This needs to be brought down by *at least 50%.***
>
> (iv) The validity of **BPC** (brake power certificate) **in end to end rakes is decided not by quality** of examination **but by the distance travelled** between two successive loadings. **This appears** not only to be **incongruous** but also **leads to examination** of rakes **after traveling very short distances** in number of cases. **This** needs **to be** examined and **suitably addressed**.
>
> (v) We should try to reap full benefits of massive investments made in procuring superior technology rolling stock. We should also ***bench mark our train examination practices with the best in the world*** and make suitable investments in upgrading infrastructural facilities.
>
> We have achieved Mission 600 MT with excellent team effort and we should commit ourselves, rising above departmental considerations, to **achieve Mission 700 MT** with the same team sprit. This should be put up at the earliest and in any case **not later than 11.04.2005**."

Source: Ministry of Railways, Government of India, 2008.

Even after the above Memorandum, it took over two months to resolve differences between the departments. Meanwhile, there was relentless follow-up, providing a sense of urgency. In May 2005 the Railway Board decided to introduce a comprehensive premium end-to-end service wherein rakes were examined, not at the end of each trip but at a 12 day interval. Decisions emerged through patient deliberation, diligent follow-up, and respect for mutual views in a democratic frame of mind, with the spirit of accommodation, as well as calibration leading to consensus, and eventually to action. Funds were allocated for upgrading infrastructure facilities and the authority to procure spare parts was devolved to the field units.

Similar taskforces were constituted for increasing axle load, passenger amenities, leveraging information technology for productivity gains, tariff rationalization, freight incentive schemes, redesigning wagons and coaches, route-wise planning for high density networks, public-private partnership, and so on. And in practice several initiatives were pursued at once, making the whole engagement a very intricate process.

The cross functional teams were constituted with members drawn from relevant departments. Each team had a convener appointed from a lead department whose expertise was directly aligned to the team's objectives. For example, the team on axle loads was convened by a civil engineering officer, tariff rationalization by a traffic officer, and train examination practices by a mechanical officer. These task forces were

not new to the Railways. However, the reformers upgraded these teams from merely deliberating on issues to decision making bodies. The advisory reports produced by these teams were placed at the center of decision making and results were sought in a time-bound manner. The teams pushed the Railways to question entrenched practices and initiate deep-rooted change. The experience of the Railways with cross-functional teams as a critical vehicle for leading change is not unique. Similar experiences are shared by corporations as well.

> The cross-functional teams lie at the heart of what people call my method. They were the key to the success of the Nissan Revival Plan, because they necessarily engaged those who would be charged with carrying out the plan.
>
> I knew that if I tried to impose change from the top down, I'd fail. That's why I decided to place a battery of cross-functional teams, or CFTs, at the center of the recovery effort. I'd used CFTS on the other occasions when I was working to turn a company around, and I'd come to the conclusion that they were an extremely powerful tool for inducing executives to look beyond the functional and spatial boundaries of their direct responsibilities. The idea was to tear down the walls, whether visible or invisible, that reduce a collective enterprise to a congregation of groups and tribes, each with their own language, their own values, their own interests (Ghosn and Ries, 2005, p. 102–103).

However, the distinction lies in the fact that while the Railways is a gigantic-governmental organization, essentially a Ministry in the Government of India; while corporations like Nissan provide their management with the flexibility and autonomy associated with private corporations.

Strategic Investments

Various cross-functional teams on rolling stock identified and prioritized investments that were vital for ensuring effective utilization of rolling stock. The recommended

inputs included increasing the length of the platform and goods terminals, upgrading and strengthening infrastructure at examination and maintenance depots, and deploying information technology for strengthening the freight and passenger operating information systems.

All such investments are strategic in nature—short gestation (less than a year), low cost (few million dollars), rapid pay back (within a quarter), and high return (10 to 100 times initial investment). By investing a few hundred crore rupees (a few million dollars) for increasing the length of the goods sheds and passenger platforms, illuminating and improving the access roads to goods sheds for round-the-clock operations, and upgrading and strengthening maintenance and examination depots, the Railways raked in manifold returns in the form of incremental income—a billion dollars in 2006 to three billion dollars in 2008.

Likewise, the taskforce on throughput enhancement suggested the elimination of critical bottlenecks on high-density networks and congested junctions to augment network capacity. All of this was achieved through route-wise planning simulations, deploying information technology for optimization of the system. The focus was to increase the overall capacity of critical routes by enhancing throughput per train, or augmenting the number of trains on a particular route, or both. Consider the following four illustrations. First, as

recently as 2004, the high density Delhi to Mumbai and Delhi to Kolkata routes—each stretching over 1,400 kilometers—had less than 100 kilometers of track built of the weaker-older track, requiring the trains on these routes to function once again on the lowest-common-denominator[90] of 20.3 ton axle load. However, due to this bottleneck, the overall investment could not yield results as axle load could not be increased due to these weak track segments. When prioritized investments were made to upgrade these few miles of tracks it yielded enormous returns, because they unlocked billions of dollars in prior investment on track improvements. Second, low-cost traffic facility works were pursued, namely improved signaling systems and so forth. For instance, on all high density routes intermediate block signal systems are being installed at a cost of 250 crore rupees. As a result the route capacity will improve by about ten percent. Third, time bound completion of ongoing doubling[91] projects, and other throughput enhancing last mile projects were initiated on high-density networks. Fourth, steps for decongesting busy junctions, by constructing bypasses, underpasses, flyovers, and

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[90]Railway had upgraded cast-iron sleepers with higher quality pre-stressed concrete sleepers. Further, the light-weight-weaker rails—90R 72 ultimate tensile strength—were replaced with heavier and stronger rails—60 kilograms with 90 ultimate tensile strength. But upgrading of tracks was not done for the entire route. Some segments were waiting their time-out because replacements were made based on the age of assets. This required entre routes to operate on the basis of older tracks.

[91]Doubling refers to laying a second railway track along an existing route. Likewise, a third track is referred to as tripling and so on.

crossovers, ameliorating constraints at goods sheds and coaching terminals were initiated.

In essence, the strategy made a clean departure from the past routine. Earlier, the emphasis was on acquiring new rolling stock and building tracks as opposed to maintaining the existing half a trillion dollars worth of capital stock[92], and utilizing it effectively. This obsession with allocation, expenditure, procurement, and construction, is not solely a public sector malady. Hamel and Prahalad (1994) articulate this concern in the context of private corporations—IBM, General Motors, and Phillips—as well:

> [T]he resource allocation task of top management has received too much attention when compared to the task of resource leverage. . . . [T]here has been relatively little emphasis put on top management's role in accumulating and orchestrating a firm's resources. . . .[W]hatever the efficiency of resource allocation, sooner or later, in every industry, the battle revolves around the capacity to leverage resources rather than the capacity to outspend rivals (p. 174).

In contrast, the primary focus of this investment strategy has been to get more from the existing assets by effective and efficient utilization. This has been achieved through decongesting the network, reducing transit time, and enhancing the utilization of rolling stock to increase the throughput of traffic (Budget Speech, 2008, p. 3). Previously, there was an overall liquidity constraint, and the abovementioned works

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[92] The Railways' total rolling stock is worth US $25 billion and the capital invested in wagons is a whopping 30,000 crore rupees (US $7 billion), locomotives worth 50,000 crore (US $12 billion) and coaches worth another 40,000 crore (US $9 billion). But, in the past investment focused on acquiring new assets: it spent 11,000 crore rupees acquiring new assets in 2005. While in the same year, Indian Railway spent a paltry 14 crore rupees (US $3.3 million) on capital works for upgrading infrastructure for maintaining these wagons.

were not granted adequate priority and resources. The reformers ensured that there were no liquidity constraints for investments with the above characteristics, which were accorded high-priority. Initially, priority was granted to low-cost projects and, as the Railways surplus increased, liquidity constraints were relaxed for all throughput enhancement projects. Additionally, instead of an annual ritual, such projects are sanctioned throughout the year, further facilitating timely improvements. To facilitate swift action, the authority to sanction small works, award contracts, and finalize estimates was devolved to the front-line—Divisional Railway Managers and General Managers do not need to seek approval from the Railway Board.

Fostering Strategic Alliances

To meet soaring wagon demands, strategic alliances were forged. Customers were invited to lend a helping hand. Through the opening up of container trains to private players—other than the Railway-owned container corporation (CONCOR)—investment worth another 1,000 crore rupees (quarter of a billion dollars) poured in. From February 2006 to mid-2008, when these concession agreements were signed, 15 new private firms entered the market and added 70 new container trains—this alone constitutes half of all the container trains added over the last 20 years by CONCOR. Moreover, several inland container depots that act as dry docks are under construction, of which two have been built and are in operation and another five were scheduled to resume operation in 2009, while a dozen are in various stages of completion.

Through a wagon investment scheme that guaranteed availability of rakes to wagon owners, 3,000 crore rupees (three-forth of a billion dollars) worth of rolling stock was leveraged from the market. Not only did these augment supply, they also unleashed innovation where the private sector is experimenting with the production of more efficient models of wagons. The role of the Railways' research design and standard's organization (RDSO) has evolved from the sole designer and certifier of standards to that of assessing and monitoring quality and safety. Additional schemes, like a matching grant from the Railways for construction of private railway sidings and public-private partnerships for port connectivity—in some cases build-operate-and transfer arrangements—were contracted.

Through strategic alliances with ancillary units the Railways ramped up production from 100 to 250 locomotives a year, for both diesel and electric engines. In-house production focused on core strengths—that is only those production aspects that could not be procured from sub-contractors in ancillary units. This outsourcing was popular among the management and the labor unions alike because it was done only after maximizing the number of shifts for in-house production, as well as freeing up overtime rules to allow maximum employment for and complete participation of existing labor. Further, production cost per unit declined as the same staff and overheads were distributed over more output. In essence, the focus of strategic

arrangements was to fostering win-win alliances where in-house capabilities were insufficient to meet supply side constraints.

Deliberative and Calibrated Approach

A first step towards reducing train examination time was reducing the frequency of examination. Progress on this initiative was calibrated and deliberative as seen in Table 16.

Table 16. **Calibrated approach to reducing train examination time**

Timeline	*Incremental change in examination practice*
October 2004	Validity of 6,000 kilometers or 20 days close-circuit rakes introduced at 'A' category closed-circuit bases.
May 2005	Premium end-to-end rakes with 10+2 days validity introduced for BCN wagons.
February 2006	7,500 kilometers or 30 days close-circuit rakes introduced at select 7 close-circuit bases.
April 2006	Premium end-to-end rakes with validity of 12+3 days introduced at selected 40 examination points. Premium pattern introduced for other wagons also like BOXN, BOST, BTPN, BOBRN, and the like.
January 2007	Validity of 7,500 kilometers or 30 days close-circuit rakes extended to 35 days. 7,500 kilometers or 35 days close-circuit rakes extended to 10 close-circuit bases. Premium pattern permitted for all air-brake-stock except BRN, BTPGLN, BLC, BFN, and departmental stock.
April 2007	Premium pattern extended to total 90 examination points. Since then, further progress has been made.

Source: Taskforce on Train Examination Practices, Railway Board, Ministry of Railways, Government of India, 2008.

Similarly, the reformers adopted a calibrated and incremental approach towards increasing axle load. Initially, heavier trains were run on non-passenger routes, with considerations given to safety, track structure, commodity hauled, and potential to scale-up the operations for a sub-set of high demand commodities like iron-ore and coal. A more complex example of this approach is presented in Annex 5; the 45 rate circulars issued over four years are testament to the gradual increase in the axle load on selected routes for some bulk commodities.

This deliberative and calibrated approach focused on piloting initiatives to learn, revise, and finally scale-up. This approach was adopted for several reasons. First, making changes in small increments faced less resistance in a cautious and at times risk-averse organization. Second, early successes, as in the case of an improvement in train examination practice, gave the staff confidence allowing for a gradual scaling-up. Third, mistakes, when they occurred, like in the case when subcontracting the cleaning of a railway stations met with the disapproval of unions, had small fall-outs. Incrementalism allowed for hedging risks and taking immediate corrective measures, especially in politically contentious and institutionally critical issues like safety and labor. Further, risk to return tradeoffs were considered. Initiatives with low-risk and high-returns were accorded priority. For instance, over a four year period only one-third of the total route kilometers were gradually approved for CC+8 heavy axle load freight trains, but these routes carry two-third of the traffic. Finally, incremental change needed small amounts of investment up-front, making it affordable for a fiscally constrained railway. In sum, a calibrated and deliberative approach allowed for consistent change, ensuring broad based support because risks were minimized, reward were quick, and boosted staff confidence.

Chase—Persistent Follow-up for Implementation

Chase, the mentality of a hungry tiger on the hunt is an essential ingredient of the supply side reforms. Analogous to the tiger, the senior management identify new policy targets, chase, and grab them[93]. The chase has several elements. First, among these was setting stretched targets. Once targets were set, the staff articulated the

[93]New policy initiatives—increasing axle load, rationalizing train examination practices, round-the-clock working at freight terminals, route-wise planning, traction change points, incremental revenue, and so forth—require a chase tool-kit. In the case of axle load increase, first a stretched target was set—mission 600 million ton, internal target for 2006. However, the issue of enhancing axle load began with the Minister's surprise inspection at Danapur where overloading was identified. As a follow-up of that visit and the related fall-out, the Minister issued a memorandum. This first note was personally signed by the 'MR' as the Minister for Railways is known. In the note, not only were priority issues identified, but the Board was also instructed to respond within a specific time period of 2 weeks. Further, to chase the issue, as the Minister's office sought past research on axle load and these were forwarded to the Railway Board, and each supplementary note acted as a reminder. For instance, the office of the Minister forwarded, supplementary notes on the 22 and 23 ton axle load steam locomotives that operated in 1922 on weaker tracks. This was followed with the CANAC Incorporated, Asian Development Bank, and International Heavy Haul Association's assessments on clearance of the railway tracks for 29 and 30 ton axle load. Still the file on axle load was not returned to the Minister. Therefore, a follow-up meeting with the Minister was convened, where the agenda required an update on the progress made on increasing axle load.

Each individual member of the taskforce on increasing axle load was contacted for routine updates on the progress. Feedback from multiple members provided a sense of the debate and reasons for the delay. Irrespective of the hierarchy staff inputs were solicited. In many instances junior staff were most receptive to provide feedback on the obstacles and departmental concerns. Keeping in mind the delicate relationships within the departmental hierarchy, this feedback was diploid to *nag* the departmental heads—an approach of management by nagging. If the axle load issues were resolved by the time the meeting with the Minister was schedule, then the meeting would be cancelled. However, in this case the meeting was necessary. On the day of the meeting the Minister was provided a comprehensive multi-departmental view on the obstacles to increasing axle load. And the meeting with the Minister broke the gridlock and the first decision on increasing axle load by two tons on one route on one train was taken. While the initial policy note had 34 routes under consideration, the approval of two routes was a success. As soon as these two routes were approved, the next file chased the remaining 32 routes. After relentless pursuit, and 45 circulars on axle load, most routes carrying heavy bulk commodities allow freight trains to carrying capacity plus six tons per wagon.

needed inputs to achieve the target. Here stretch and leverage are complementary and the latter is inspired by the former.

Second, pursue the set of strategic inputs simultaneously. Increasing axle load load required collaborative inputs from several departments. Here the principle driving chase was the spirit behind Robert Bruce and the spider, "Try, try, try again, till again, till you succeed." This management by nagging toolkit consisted of the following. Memos with clear objectives were issued and directed to all relevant departmental heads, seeking a response in a pre-specified and realistic timeframe. timeframe. Critical decision memos were stamped with "top priority" in red ink, adding to the sense of urgency. Meanwhile, there was relentless follow-up over the the phone, chasing the file from one desk to another—from the Director, to his Joint Joint Secretary, further up to the Additional Secretary, then finally to the Board member. While the file moves five levels down in the Railway Board, it then finds its finds its way up the same order, making it a ten-step and tedious process. Further, this Further, this was done across the concerned departments of mechanical, electrical, civil, electrical, civil, traffic, and finance. For each revision on axle load the files go through a through a similar process. There were over 45 rate circulars issued on the matter, the the files on increasing axle load moved through ten desks in each of the five departments, thereby ultimately requiring inputs and approvals at 2,250 desks. Moreover, in many cases inputs were sought from all the 16 zonal Railways, and at

times this involved field visits. Just one input of the axle load required chasing over 2,000 desks in four years, in addition to chasing all of the zonal Railways, which in turn chased hundreds of field units. Likewise, to reduce wagon turnaround time, a gigantic coordination and follow-up effort was mounted so that over 20 inputs from several departments could be simultaneously solicited. On several occasions departments had differences and this resulted in gridlock. In response, the reformers organized meetings to facilitate exchange of views, meanwhile persistently following up with memos and supplementary information. Then at a more personal level, the view points of all factions were heard, files where chased on the phone, attempts were made to solve issues informally over tea, or at the level of the Board, and finally if nothing worked, feedback and decisions were sought to meet the annual budget deadline. The complexity associated in running faster, longer, and heavier trains with hundreds of cross-functional and spatial inputs across the bureaucratic web was enormous. This was one of the primary constraints that had inhibited action in the past.

Third, timing, because in this context *when* to act is of essence. The most critical period among these is the annual railway budget that is recognized in the Railway as a rigid deadline. There are also two or three supplementary budget deadlines, as well as general manager's conferences, and monthly board

meetings. Each such deadline was deployed to focus the attention of the senior management in order to resolve differences and make critical decisions. Further, senior officers were the most receptive to new ideas and other inputs prior to their promotions and during the early days of their appointment. Put simply, high priority events, entirely based on the institutional culture and psyche of the organization, were leveraged to meet deadlines for deliverables. Thus, choosing when to raise the next generation of policy reforms was as important as identifying and prioritizing initiatives.

Fourth, change was induced by demand. By implementing decisions and following up with requisite inputs, a sense of urgency was created. For example, first the train length was extended, then platforms were lengthened. The interim imbalance created by the extra length of the train that did not have access to a platform encouraged divisional managers to act swiftly to extend the platforms. Similarly, axle load was increased before the weaker segments of tracks were replaced. In the interim the trains were operated with speed restrictions on the weaker track segment. Not only did these demand responsive approaches create a sense of urgency and induce the system to play catch-up, they also allowed for incremental earnings to precede incremental investment.

Finally, in contrast to the tedious process of decision making, implementation was surprisingly swift. For certain decisions that translate directly into policy directives, not much follow-up was required. Examples of such directives are the rate

circular on tariff changes, change in axle load, or the circular on revised train examination practices, which by default became effective from the date specified in the notification—as soon as the decision was communicated to the zonal Railways, it resulted in an instantaneous implementation of the new practices.

Other decisions that required actual construction, like overcoming terminal constraints and removing network bottlenecks, were done in a timely manner, partially because funds were allocated, decision making authority devolved, and demand induced. But more importantly speedy implementation resulted from the Railways' strong execution capabilities that rest on the shoulders of its technological prowess and follow-up mechanisms. Further, to leverage this sophisticated monitoring and evaluation system, the reformers integrated critical budgetary missions and reform targets into the existing system. In this context, the reforms borrowed lessons from the experience of reforming Nissan, where the CEO, Carlos Ghosn observed that,

> . . . as long as management gives clear directions that everyone understands, as long as you've got a clear, thoroughly explained strategy, you don't need to worry too much about how well and how fast it's carried out. Don't get me wrong, you still have to expend a lot of time and energy, but it's remarkable how execution falls into place (Ghosn and Ries, 2005, p. 210).

Parsing Supply—Long-Term and the Interim

The essence of the supply strategy's temporal sequencing is captured in the Railway budget speech for fiscal year 2008 (Indian Railways, 2007).

> The growing demand for transportation can only be met through a harmonious blend of short-term and long-term policies. Our short-term policy of investing in low-cost high-return projects has

> been successful in eliminating network bottlenecks and in ensuring effective utilization of rolling stock. Alongside a twin mid-term and long-term investment strategy will be adopted to enhance productivity through, modernization and technological upgradation on the one hand and enhancement of capacity of the network and rolling stock on the other (p. 12).

As seen above, the emphasis of this strategy is to augment capacity by a combination of expanding the railway network and increasing productivity by deploying technology. Additionally, with the improved financial condition of the Railways, capital investment had increased from 11,000 crore rupees in 2004 to 28,000 in 2008, implying a compound annual growth rate of 30 percent. In particular, the annual production of rolling stock has been ramped up from 6,300 to 14,000 wagons a year in 2008. Equally, diesel as well as electric locomotive production had more than doubled from 116 to 222 and 86 to 200 a year respectively.

Increase in allocations and quantities were also accompanied by improvements in quality. The new rolling stock is technologically superior and has been redesigned to enhance the capacity of each new wagon, locomotive, and coach. The production of old low horse-power diesel and electric locomotives is being phased out over a five year period ending in 2011—this drawn-out phasing is not due to liquidity constraints but due to the need to test and develop a reliable and cost-effective supply-chain of vendors for the new technology. Meanwhile, annual production of the new generation diesel locomotives has been ramped-up from 24 to 59 and electric engines from 16 to 55. Similarly, coaches have been redesigned to accommodate additional seats and better amenities for passengers; meanwhile the existing stock has been retrofitted to

incorporate these improvements, particularly in the air-conditioned classes. The improved capacity of redesigned wagons is captured in the 2008–2009 railway budget speech (Ministry of Railways, 2008, February 26).

> With the objective of increasing the carrying capacity, from 2008–09 onwards manufacture of 20.3 ton axle load BCN and BOXN wagons will be stopped and only 22.9 ton axle load stainless steel wagons will be manufactured. The newly designed stainless steel BCN wagon has a lower tare weight. Due to the shorter length of these wagons, instead of 40 wagons, the BCN wagon train will now accommodate 58 wagons, like BOXN wagons trains. Thus, the payload of the BCN trains will increase by 78% from 2,300 tons to 4,100 tons. Similarly, the payload of open wagon trains will increase by 22% to 4,100 tons. We have achieved this by reducing the tare weight and increasing the width and height of the wagon (p. 18).

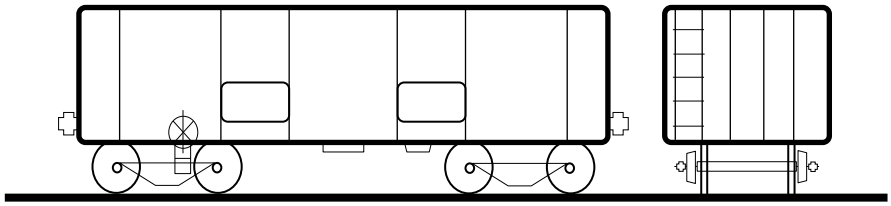
See Table 17 and Figure 18 for a comparison between the old and new wagons and their payload capacities[94].

Table 17. **Carrying capacity of old and new covered wagons (BCN)**

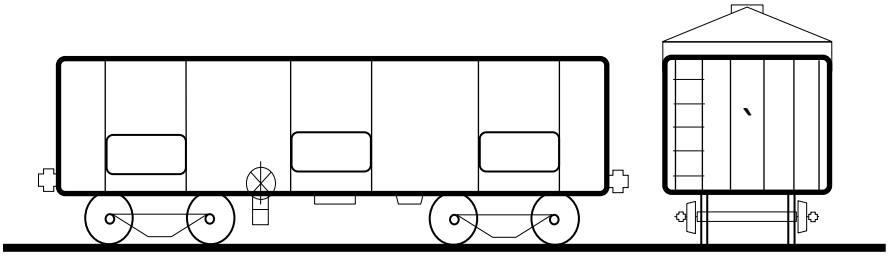
	Old Wagon	New wagon	Old Rake	New Rake
Tare weight perwagon	24.55 tons	20.8 (↓) tons		
Pay load per wagon	58.6 tons	70.6 (↑) tons	2360 tons	4095 tons
Volumetric capacity per wagon	103.4	92.5 (↓)m3	4550 m3	5365 m3

[94]Net result, the improved BCN and Box-N rakes will carry a payload of 4,100 tons, an increase of 78 percent from the previous 2,300 tons. Some cases, the train length has been extended from 40 to 58 wagons, axle load has been increased from 20.3 tons to 22.9 tons and tare weight reduced by four tons. For BOX-N wagons the capacity had been enhanced by 22 percent to 4,100 tons.

Figure 19. **Old and new wagons**



Old Wagon



New Wagon with higher carrying capacity

Further details of redesigned wagons are provided in Annex 6. Likewise in the passenger segment, the capacity of air-conditioned three-tier coaches has been increased from 64 to 72, air-conditioned-chair-car from 66 to 102, air-conditioned first-class from 18 to 22, air-conditioned two-tier from 46 to 52, and for the second-class sleeper coach from 72 to 84. Additionally, there is an effort to enhance throughput by route-wise planning and development of the track network, which were articulated in the railway budget 2008–2009 (Ministry of Railway, 2008, February 26).

> Sir, more than 75% of Railways' goods traffic moves on about 20,000 kilometer of the Railways' high density network, (namely) coal and iron ore routes, and port connectivity railway lines. Many of these routes are fully saturated and capacity utilization is in excess of 100%. . . . An investment of about rupees 75,000 crore (US $17.4 billion) will be made over the next seven years to augment line capacity on these routes. Route-wise works will be undertaken in a phased manner including 124 works of doubling, third and fourth-lines, bypasses, flyover, crossing stations, intermediate block signaling, automatic signaling works, and yard remodeling. . . . 104 throughput enhancement works in progress would be completed over the next two years. This entire network will be provided with IBS (intermediate block signaling) by March 2009 (p. 12–13).

Finally, through dedicated-freight corridors, multi-modal logistics parks, 'world-class' railway stations, and five rolling-stock factories, the long-term strategy is to anticipate and provide for future growth needs. The process for enhancement of throughput has been simplified—both approval and execution of these projects will require less time than other projects.

Conclusion

Through this supply-side management, the Indian Railways has grown consistently at eight percent annually. This growth is due less to an increase in the rolling-stock or railway network and more to productivity gains from higher efficiency and effective utilization. Meanwhile, most of this period 2004–2008, has been characterized by macroeconomic stability with inflation hovering between 4 to 6 percent and relatively low interest rates[95]. At real (constant) prices the Railways' unit cost has been declining since Indian independence in 1947. But in a historic first, even at nominal (current) prices the Railways' unit cost declined due to productivity growth rates outpacing the rate of inflation. Therefore the freight unit cost declined 12 percent from 61 paise a ton in 2001 to 54 paise at current prices in 2008. The unit revenue from the freight business

[95]The recent spike in inflation and interest rates is a new trend and is affecting the unit costs this fiscal year. This issue is discussed in substantial detail in chapter 7 where alleged and real threats to sustainability are addressed.

segment was 74 paise in 2001, and the profit margins were around 21 percent. With a seven paise decline in unit costs the profit margin has nearly doubled from 21 percent in 2001 to 37 percent in 2008. In the same period, the unit cost per passenger kilometer remained almost constant, increasing marginally from 38 paise to 39 paise. This significant improvement resulted from a supply strategy to increase volumes to reduce unit cost. As will be articulated in the following chapter, this provided substantial room for demand responsive pricing to increase market share and expand profit margins. The discussion of the supply-side preceded demand-side analysis because several analysts have argued that a large proportion of the freight traffic has been lost, not because of lack of demand, but due to capacity constraints. In this regard, the RITES Report (1998, p. 2.24) argues that *matching capacity to requirements is critical*, "In fact, wagons and locomotives are in short supply, most of the major routes are working to near saturation level of capacity and demand for rail movement is ahead of supply (p. 2.24)." However, once supply-side management increased the availability of wagons and coaches and reduced other supply constraints, a dynamic and differential pricing policy, along with a market driven and customer centric response was required. The details of this demand-side strategy are the concerns of the next chapter.

Chapter 8: Service with a Smile: Demand-Side Strategy

Introduction

The essence of the demand-side strategy is best captured in Mahatma Gandhi's observation on his visit to the Indian Merchant Chamber, Mumbai sometime in the early part of the 20th century.

> A customer is the most important visitor on our premises. He is not dependent on us. We are dependent on him. He is not an interruption of our work. He is the purpose of it. He is not an outsider to our business. He is part of it. We are not doing him a favour by serving him. He is doing us a favour by giving us the opportunity to do so.

Like many things in the Mahatma's life, this too is hard to emulate, but the Railways has made a sincere attempt to reinvent itself as a customer centered organization. This chapter provides insight into the Indian Railways' struggle to transform from a statist and monopolistic approach to customers to that of a demand responsive—dynamic, differential, and market-driven—customer-focused organization.

Looking in the Wrong Place—Assessing Demand-Side Constraints

In order to respond to customers' needs, the Railways began simplification and rationalization of its pricing policy. In steel, where the Railways had been losing market share, freight charges were reduced by about 22 percent from class 230 to 180. Following this, the Railways introduced other incentives. Incremental freight traffic earnings, in comparison to the previous year, received a 15 percent discount and authority to approve these discounts was devolved to the field-units. Customers were offered loyalty discounts. Loyalty towards the Railways was

measured by the rail coefficient—namely, Railways' share of the total cargo of a given commodity with a particular customer. Additionally, major customers were also rewarded with quantity based discounts. On the pricing front, all conventional approaches had been exhausted. Despite these efforts, the rail coefficient for steel kept declining from 67 percent in 1991 to 35 percent in 2005. Steel fright market share was lost mainly to trucks. Counter-intuitively, this decline occurred despite far lower rail fares in comparison to truckers. With the objective of initiating dialogue, seeking customer feedback, and becoming demand responsive, the Minister constituted a committee of the major freight customers under his chairmanship. In one such meeting the Minister expressed his frustration: "*Hum kiraya aur kitna ghatayen? Free kar den kya*?" (By how much more should we reduce the fare? Should we make it free-of-charge?)

The CEO of a mega-steel corporation retorted: "You are looking in the wrong place." He continued, "The Railways provides a station-to-station service for transportation of steel and the incidental costs associated with rail transport are very high due to multiple handling costs, truck transport costs at both ends, warehousing, increased inventory, and so forth. And these costs outweigh the savings accruing from cheaper rail charges because rail freight is a fraction of the total door-to-door logistics costs for my steel company. Therefore, for customers like me, to opt for Railways' services will require you to offer small batch consignments."

The Railway Board leapt in defense, "The Indian Railway cannot return to being a transporter of piecemeal traffic, carrying ten tons of cargo per customer like the truckers do." The representatives of the steel industry were quick to reply, "No, we just need half-train loads instead of full train loads (that is 2,000 tons)". The Minister intervened in the affirmative, "We grant you that, now will you shift your freight to the Railways?" "Not really", came the reply,

"we also need to unload at multiple locations on the way." "Granted", responded the Minister. And other CEOs of the steel and cement companies chimed in, "How much will you charge for these services?" The Minister replied, "Gratis, this is my gift to you." Once the Railways started accepting half train loads and providing the option to unload in a combination of stations en route[96], the Railways succeeded in arresting and then reversing a 60 year old trend of a declining rail coefficient for steel. Between 2005 and 2008, the rail coefficient for steel traffic increased from 35 to 45 percent and for cement from 41 to 45 percent. This reversal was due to a combination of customer focused and market driven policies tailored to the customers' requirements.

Quintessentially, through such client engagements, the Railways had learned a basic principle of the market: Market share is to be fought and won in the market place. To win this battle consistently, the customer should be offered superior and compelling value on a continuing basis. The ultimate measure of value for the Railways' services was customer satisfaction. To create this value, the Railways has transformed from an introspective organization where the emphasis was on process and procedure, to one that is externally oriented with emphasis on the market and the customer. But succeeding once does not mean that the customer can be taken for granted. The Railways learned this lesson the hard way. In the fiscal year 2007, the Railways was over confident after gaining market share in steel and

[96] Both these services have certain temporal, spatial and other conditions that circumscribe the benefits of these new products to the customers that the Railways needs to offer added value in order to retain or regain.

cement. In this exuberance they introduced a five percent peak-season surcharge for the above-mentioned new services. In response, the customers for steel and cement voted with their feet and the Railways recorded negative growth in the freight for these commodities[97] in April 2007.

However, the Railway Board was resistant to any hasty revision: "How can we change policies announced in the Budget without waiting for its approval". "There has to be some stability, uniformity, and consistency in our pricing policies." Their concerns were noted by the reformers who recognized that the Railway's pricing policies cannot be as volatile as the marketplace; however, a degree of dynamism was essential.

Soon after the budget was approved by the parliament on May 9, 2007, the Minister invited the customers for a meeting at the Railway museum, where the customers complained about the surcharge imposed on the mini-rakes and 'two-point' rakes as well as the incremental freight discount policy, "With respect to incremental freight, how can we provide a quantum increase year-on-year? Why don't you assess the incremental freight discount from the base year of 2006?"

In response[98], the Minister announced the revocation of the surcharge and revised the incremental freight discount policy with a fixed base year of 2006. However, damage had been done. The Railways lost traffic in May and then again in June, leading to poor freight loading in the first quarter. This was followed by the lean-season. There was a lag due to existing freight

[97]Since the Railways monitors the daily loading of cement and steel the decline was even more obvious.

[98]The reformers had deliberated on these issues earlier, and the Railway Board had approved modifications in the policy. Working with consensus was essential to functioning in a mega-bureaucracy.

agreements between customers and alternative service providers. But with the introduction of a lean-season discount and a revision of the incentive policies the customers began trickling back.

It would be misleading to draw the conclusion that all customer demands were addressed. Accommodations were made only where demand was relatively elastic and the threat of losing the customer to alternate modes was real. Thus, the Railways' reformers were selective in their response. For instance, in the above customer meeting, the corporate representatives complained about two things. First, about fare-hikes, namely the 50 percent increase in freight rates for iron ore as well as other minerals, and 33 percent increase in food grains and fertilizer freight charges. Second, termination of the minimum-weight condition. Now they had to pay for loads that they did not transport. While wagons could carry only 60 tons of urea, the customers were being charged the full carrying capacity of the wagon, which is 64 tons. But, these concerns were not addressed because despite hefty increases in freight charges and the problem of dead weight in urea, these customers had not opted out. As seen in Chapter 6, the Railways is a door-to-door transporter in most of these market segments—like iron ore and coke—with negligible incidental costs. And rail freight costs over 50 percent less than the comparable road freight. Likewise, the customers demanded discounts on total load all year round, as opposed to the discounts being limited to incremental freight in the lean-season. But, these demands were also not met. In the same vein, food grains and fertilizer corporations demanded mini-rakes and two point unloading facilities of gratis, but these demands were only partially addressed by offering these facilities at an additional surcharge of five to ten percent. Thus, the reformers conscientiously leveraged the Railways' relative

competitive strength in these door-to-door freight segments. There was no political backlash in the case of food grains and fertilizers. As seen earlier, this was a case of perceived political sensitivity, but it was not a real concern because the cost of freight was borne by the public exchequer and not the end consumer.

In essence, the demand strategy had four critical elements: differential, dynamic, market driven, and customer centric policies and pricing. The critical instrument was to respond with a combination of price and non-price initiatives where the Railways faced a real competitive threat and thus offer superior value at competitive prices. As a first step the tariff structure was rationalized.

Demand-Side Reforms: Rationalization of Tariffs

Until 2005 the Railways had an encyclopedic and multi-volume tariff schedule; this ran to over 500 pages containing over 4,000 entries across different commodities. These entries included traditional Indian sweets like *rasgoolla, balusahi, jalebi, laddoo*; types of hair like camel and human; musical instruments and players like the tape recorder, gramophone records, gramophone needle cakes, pianos, and so forth. The earlier tariff schedule not only specified the name of the commodity but further sub-classified them. For instance, the tariff schedule had 261 sub-categories of cotton. And the rate classification for these 261 subcategories of

cotton ranged from class 130 to 240, with 13 different classes in all[99]. To further complicate matters, earlier freight was charged on the basis of the minimum weight condition—referred to as 'W' commodities in the schedule—or based on the actual carrying capacity of the wagon—referred to as 'CC' commodities. The various attributes regarding the nature of commodities—processed or raw, hard or soft, powdered or granular, compact or loose, were relevant to determine the loadability of each commodity in different types of wagons. For instance, coking coal is low in density and therefore was classified as 'W' which means it was charged based on the minimum weight condition, while ordinary coal is dense and therefore was classified as 'CC'. Further, for coal there were 24 entries with seven types of differing 'W' weight conditions. The rate classification ranged between 130 to 165, with four different classes in all. In sum, the permutation and combination of these categories created a rate matrix that was difficult to fathom. These classifications were a cause of confusion, leading to mistakes in billing to customers as well as collusion to misclassify freight to benefit from lower rates for similar commodity types. The Railways' staff were not able to distinguish between the various categories, nor were the customers able to convince the Railways' field staff of the precise sub-category of the commodity prior to each loading. This ambiguity created a cesspool of corruption.

[99]Further, commodities in class 200 had three different weight conditions and class 140 had four varying weight conditions.

All of these were inheritances of a past era when the Railways was in the business of transporting piecemeal traffic—referred to as smalls and wagon loads[100]. In 1981 the Railways decided to end piecemeal traffic and accept mostly train loads[101]. As a result, thousands of these categories became redundant, but the tariff schedule was not revised. For the first time since 1958, a comprehensive revision of tariff was undertaken in fiscal year 2005. An ABC analysis[102] revealed that eight major commodities accounted for more than 85 percent of freight traffic; further, 71 commodities accounted for over 97 percent of the freight traffic. Hence, all obsolete entries of the bygone era of small and piecemeal booking were deleted.

Second, all commodities were categorized into 24 generic group heads, for instance all kinds of alloys and metals or all types of chemicals and fertilizers were classified under one head[103]. While earlier, different alloys and metals could have varying freight rates, the revised

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[100] Post-independence, the Indian Railways carried most long-distance freight because the Indain road sector was in its nascent stage.

[101] In 1995, acceptance of smalls was formally terminated and almost all freight migrated to train loads.

[102] ABC analysis prioritizes items in a rank order based on their contribution to the total net-ton-kilometer. The results were grouped into three bands—namely A, B, and C—where category A consisted of 8 commodities that contributed to over 85 percent of total freight volumes, category B included an additional 63 commodities such that A and B categories combined accounted for 97 percent of total freight volumes, and category C accounted for the remaining three percent.

[103] Any other alloy and metal that has not been listed will be charged the same class freight rate as the generic class—metals and alloys. In addition to the 24 group heads, four heads have been created for light-weight commodities and account for a negligible proportion of the total freight, but since they are in use they have been accommodated. Because the objective of this tariff rationalization was to simplify the cumbersome routine, and not to increase revenue, four additional block classes below class 90, were introduced so as to have a minimize the increase in effective freight charges for these commodities.

tariff schedule provides uniform rates for all commodities within a major group heading, unless specified otherwise.

Third, in the revised tariff schedule the minimum weight condition was scrapped. The Railways decided to charge by load —the carrying capacity of a wagon—as opposed to the load that is actually being carried. This method of charging for carrying capacity has been the norm in the freight industry. For instance, cabs charge for the distance and duration of the trip, irrespective of the number of passengers travelling. This rationalization of the tariff structure reduced the cumbersome red-tape, systemic corruption, and suboptimal use of the wagons. The hegemony of the goods-clerk over the customer due to the 'plethora of imponderables', that allowed enormous discretionary powers, was eliminated with the revised tariff schedule. With increased transparency and it's easy to use and enforce format, the new tariff schedule has reduced the harassment of the customer on one hand and tariff evasion on the other.

Rate Rationalization

While the goods tariff specifies the applicable rate class for the commodity to be transported, the rate table provides the applicable charge identified in the goods tariff for a specific distance. In the past, the freight rate table[104] had a class range of 40 to 300, and the ratio between the minimum and the maximum rate class was 1 is to 8. Post-rationalization and simplification, the ratio between the minimum and maximum

[104] The rate table provides a matrix that varies prices by rate class and for a range of distances.

freight rates has been narrowed down to two, with the minimum class set at 100 (that is the breakeven price) and the maximum at 200 (which is twice the breakeven price). Further, the number of classes has been reduced from 27 to 11, and they now have a uniform increment in multiples of ten. In the pre-rationalization rate table, the class interval between 40 and 190 was in increments of five and beyond 190 was in increments of ten and the taper varied by classes. Additionally, the taper for deriving the telescopic rates—decreasing block tariff—is now uniform across all classes; earlier it varied among classes.

In the passenger business, while the Mohan committee (2001b, p. 72) had recommended decreasing the ratio between the highest and lowest passenger classes from 14 down to 10, largely by increasing the fares of the non-air-conditioned classes, the rail reformers achieved the same objective by decreasing the fares of the highest classes. This was both commercially prudent and socially optimal, because the Railways gained market share in its high-end, high-margin segment while the poor customers were not burdened. Such, a win-win solution faced no political resistance.

Finally, essential services like defense and postal tariffs, which had traditionally been subsidized by the Railways, were revised upwards so as to cover costs of operations and obtain a reasonable profit. Likewise, the fares for special trains operating for marriages and political rallies have been raised to reflect the cost of service.

Differential Pricing Policy

In the socialist era, all pricing was affordability based—low-value commodities and poor passengers were charged less, while higher value commodities and travel segments were charged higher fares. Despite liberalization of the Indian economy in 1991, this pricing policy remained unchanged because fares were considered to be politically sensitive. Since Ministers resisted fare hikes in politically sensitive segments—suburban, ordinary passenger, and second-class mail and express trains—the brunt of rising costs, more often than not, was borne by high value finished goods and air-conditioned travel classes. This eroded the Railways' competitiveness. In particular, steel and cement customers migrated to trucks, while air-conditioned class travelers used budget-airlines. Yet, fares for these segments kept increasing, and the Railways was consistently pricing itself out of the market.

There was a clean break from an affordability based pricing policy[105] and a monopolistic approach to the market. The policy of announcing across the board price-hikes to make up for the budget deficits, irrespective of the Railways' competitiveness, was scrapped. The current pricing strategy is differential and customer centered. The

[105] In essence, dynamics of pricing are embedded in the micro-conditions and depend on the origin and the destination, seasons, fuel prices, the number of service providers, condition of the roads, and a host of other variables that affect demand and supply. However, the Indian Railways was detached from this market dynamics.

pricing policy based on the socialist principle of affordability has been creatively modified. While affordability based pricing continues to guide the politically sensitive second class travel segment, the pricing policy for the entire freight, parcel, and air-conditioned business segments is now market driven. Currently, in these segments fares are increased or decreased depending on the Railways' competitive edge. For instance, in order to regain competitiveness in the passenger business, air-conditioned first-class and two tier fares have been reduced by 28 and 20 percent respectively. As seen in Chapter 6 the Railways lacks a competitive edge in station-to-station freight segments while it has a formidable edge in the door-to-door segment. But in the affordability based pricing regime, station-to-station services—largely high value finished goods like steel and cement—were charged more while the door-to-door service—low value commodities like iron ore and other minerals—were charged less. This has now been revised. Freight charges for low value door-to-door commodities like iron ore have been increased by 50 percent. On the other hand, with a view to solidify a competitive edge, station-to-station freight transportation rates have been reduced or kept constant. For instance, over the last few years freight rates for petroleum products and steel have been decreased by 33 and 22 percent respectively. And several non-price incentives are being offered to improve the quality of service—namely, mini-rake loading, multiple location unloading, and so forth. In sum, the effort has been to strengthen the total value offered to the customer. As a result, the Railways has been

gaining market share in freight for both door-to-door as well as station-to-station services.

Yet, another example of differential pricing policy is the *empty flow direction scheme.* In the past pricing policy did not make a distinction between loaded and empty flow directions, and freight charges were the same for both directions. Since a large proportion of the Railways' trains return empty, the 'empty flow direction freight discount scheme' was outlined in the Railways budget (Budget Speech, 2007, February 26) to capture some traffic in the empty returning freight trains.

> Sir, the truck rate for Delhi to Guwahati is considerably higher than the rate for the return trip where as the Railways charge the same rate in both directions. It is seen that 40 out of 100 freight trains return empty. The additional expenditure in loading freight in the empty flow direction trains is quite low. Hence, I announce a heavy discount on incremental freight in the empty flow direction. For distances beyond 700 kilometers, the discount will be 30 percent during non-peak season and 20 percent in the peak season. The scheme will be applicable for all items loaded in covered wagons. In the case of open wagons, the discount will be applicable for all commodities except coal, coke, and iron-ore for export. In peak season, this discount will be applicable for open wagons for distances over 1000 kilometers only (p. 32).

In the subsequent budgets, empty flow rebates were increased to 30 percent and made applicable all year round. Authority was devolved to the General Managers of the zonal Railways to increase the discount up to 50 percent. Incremental freight traffic requirements have also been relaxed for loading at goods sheds—but not from private sidings. Now field-units offer discounts on total freight traffic, as opposed to incremental loading, in the empty-flow direction from loadings at goods sheds. Likewise, for the loading of food grains, fertilizer, and cement in open wagons (these commodities are usually transported in closed wagons), double discounts were

provided in the empty flow direction. The customers were offered the usual empty flow discount as well as a compensatory discount to make-up for the decreased loading capacity of open wagons; the floor[106] to this combined discount was set at class-70.

Finally, the new *tatkal seva*, is a fee based service where passengers can buy tickets at the last minute. In several trains, as soon as advance reservation services become available (that is 90 days prior to the travel date), all tickets get sold. In the past, passengers had to approach touts to buy tickets at a premium. Now the *tatkal* service, has been extended to 30 percent of the total seats on a train and is offered over a period of 5 days prior to the travel date. The service has differential prices for higher and lower travel classes, and the prices differ between lean and peak seasons and popular and less-popular trains. Not only has the *tatkal seva* stymied the role of touts and served the needs of last minute travelers, but it also takes in 300 crore rupees (US $70 million) a year for the Railways, another classic case of a win-win outcome.

Dynamic Pricing

After the initial success of the Railways' reforms with rationalization of the tariff structure, the reformers turned towards market oriented freight rates and passenger

[106] The floor price was set because loading and unloading take a day each and there is an incremental cost to hauling loaded trains as they travel slower and consumer more energy and these costs need to be recovered.

fares. Dynamic aspects of the pricing policy are illustrated through a variability introduced by the reformers between peak and lean season. This is summarized in the budget for the fiscal year 2006 (Budget Speech, 2006, February 24).

> Railways' passenger fares and freight rates remain unvarying for all seasons and for all routes, whereas tariffs in the airline and road sectors vary depending upon the demand and the season. In order to be able to effectively face the challenges posed by stiff competition, in the current year we had started a discount scheme for non-peak season and empty flow direction for freight rate, which has been successful. As an extension of this policy, I propose to introduce a Dynamic Pricing Policy for freight as well as passenger, for peak and non-peak seasons, premium and non-premium services, and for busy and non-busy routes. As per this policy the rates for non-peak season, non-premium service and empty flow directions will be less than the general rates and the rates for peak season and premium services could be higher than normal. For the freight the non-peak season would be 1st July to 31st October. For the passenger segment this period would be 15th January to 15th April and 15th July to 15th September (p. 31).

In the lean season demand declines and truckers lower their freight charges. The Railways also responded with a decrease in prices, particularly in the station-to-station segments[107] during the lean season. The Railway Budget (Budget Speech, 2005, February 24) outlines the modalities of 'the non-peak season incremental freight discount scheme.'

> The demand for freight transportation dips from 1st July to 31st October on account of monsoon. Hence, during this period, under non-peak season incremental freight discount scheme, freight rebate of 15 percent will be offered for incremental freight revenues of over rupees five crore in a month and ten percent if the incremental earning is less than rupees five crore. This rebate will be applicable for all commodities except coal, minerals, and items with classification below 120 (p. 32).

[107] While in the monsoon season, which is the lean season, freight trains are stranded as tracks and mines get flooded, less coal is consumed by power plants because hydroelectric power plants come online, and drop in construction activity, dampens demand for steel and cement.

Conversely, in the peak season, when demand exceeds supply, 5 to 7 percent 'busy season' surcharges were levied. Likewise, in the passenger segment, pricing for the air-conditioned segment became dynamic—reduced during the lean season and in unpopular trains. Since there was no political space to increase passenger fares in the peak season or for popular trains, even in the air-conditioned classes, dynamic pricing was achieved by lowering fares in the lean season and for unpopular trains.

In the past, in classes where occupancy rates were low, seats were left vacant and the Railways lost revenue. In an effort to have customer centric and market driven passenger services, an automatic upgrading scheme was introduced and now travelers in lower classes are upgraded to the next higher-class—an empty seat in air-conditioned first-class is filled by a air-conditioned two tier passenger and so on. The Railways' staff do not have discretionary powers to choose whom to upgrade; four hours before the departure of the train upgrading is done by software that randomly selects travelers. As a result the Railways not only has higher occupancy per train, but also gets revenue for an otherwise lost seat. On the other hand, customers are delighted at the possibility of an upgrade in their travel class. Here too, there are some exceptions. For instance, on Shatabdi trains most sales are last minute and over the counter prior to the departure of the train. Thus, these trains do not have an upgrading scheme. In essence, the reformers focused on macro responses to demand like seasonal variations or to and fro variations. Some micro-management related issues like time of day convenience pricing

and auctioning of vacant seats and births in passenger trains, as well as empty returning freight trains, were in the process of being implemented through a commercial portal in 2009. Auctioning will be done at scheduled prices or lower because the objective is to increase utilization and occupancy rates and not profit from scarcity.

Price Discovery

Each passenger train, with the exception of short distance commuter services, has two brake-vans—one van in the front and one at the end—with a total parcel-luggage carrying capacity of 16 tons per train. Further, the Railways has about 800 parcel vans which are attached to passenger trains as per demand. For all this parcel service, the Railways' rates are set in three brackets—highest for Rajdhani and Shatabdi, followed by Mail and Express, and then ordinary passenger trains. These are denoted by R, P, and S classes, in that order.

However, in the parcel business the Railways is a station-to-station transporter. Therefore, in the short-lead (that is over short distances) the Railways is uncompetitive. There is hardly any demand for parcel booking in the frequently-stopping, short-distance, ordinary passenger trains, and over 50 percent of mail and express trains that travel a distance less than 750 kilometers. Overall, the Railways' competitive edge increases with distance and service reliability—punctuality, time of service, and so

forth. Further, brake-and-parcel-vans going from production to consumption centers were in demand, but on the return trip these vans were empty. As a result, only 20 percent of the total parcel capacity was being utilized.

Despite two years of trial and error, the reformers were unsuccessful in improving the parcel business. Through a process of learning by doing the reformers discovered that in the parcel segment, speed and reliability, not price, are critical. Parcel charges per kilogram of cargo between Delhi and Mumbai vary between two and 12 rupees, depending on how consistent and quick the service is. The business improved as soon as the Railways aligned its price with the industry norms of speed and reliability. A critical element of the parcel business revival strategy was initiating a wholesale leasing of the brake-and-parcel-vans through open competitive bidding. However, the parcel operations of the Railways had deep rooted vested interests that were resistant to wholesale leasing, citing concerns around redundancy of porters and parcel clerks. Thus, initially, outsourcing was introduced in one brake-van per train. Gradually, these price discovery mechanisms were extended to include a second brake-van. The rest of the parcel segment continued the past practice of routine piece by piece booking of parcels.

Once the freight forwarders' willingness to pay was assessed through competitive bidding, all attributes affecting demand—time, speed, reliability, directional flow, and so forth—were built into the price. Several long distance trains

were leased at rates substantially higher than the scheduled parcel rates, but piecemeal booking continued at much lower scheduled rates for the remaining brake-vans. In response, the pricing policy was revised such that if brake-vans of a passenger train were leased out at more than the scheduled rates, piecemeal booking by the Railways should be done at the immediately higher class, provided leasing operators honor the lease agreement for at least a period of one year. For example, if a train is leased at higher than P, the intermediate rate, after a year piecemeal booking will be done at R, the highest rate band. With this decision, earnings from piecemeal booking increased significantly—in some cases earnings doubled and the hold of vested interests weakened.

On the other hand, there was no response to scheduled parcel rates for several trains. In such cases, field units were authorized to progressively reduce the reserve price from 100 to 75, 50, and even 25 percent of scheduled parcel rates, subject to a minimum of the previous year's earnings. This process led to an increase in capacity utilization of the brake-and-parcel-vans. As a result, the Railways' parcel and luggage earnings more than doubled between 2004 and 2008 from 476 to 1,008 crore rupees (US $110 million to US $ 234 million).

Alliances for Value Creation

As in the case of the parcel business, other alliances for value creation were also sought where the sum of the parts was greater than the whole. In this regard there were three underlying principles that guided the partnerships. First, co-option of competition was sought in sectors where the Railways was a minority or declining transporter. Second, alliances were sought to align the long-term interests of existing customers with that of the Railways. Third, alliances were also forged to improve the quality of service and enhance the overall value proposition for clients. For instance, to co-opt competition, fifteen container train licenses have been issued to firms from the logistics industry—shipping, road transport, as well as warehousing. These players have added over 70 additional trains to the existing 140 container trains operated by Container Corporation of Indian—known as CONCOR and a public sector undertaking of the Indian Railways. While CONCOR built this fleet of trains over two decades, the private players have added half as large a fleet in two years. The container business is now growing at twice the earlier rate at 24 percent annually. These new players have been incentivized to focus on adding new customers rather than diverting the existing freight customers of the Railways, thus creating an expanding pie scenario. The concessions are for 22 years and thus foster long-term partnerships.

To foster additional long-term alliances the Railways initiated investment schemes for wagons, rail sidings, and incentivized engine-on-load. Under these

schemes the initial investments are made by customers—to build sidings or produce wagons—and a portion of the cost is reimbursed by the Railways through discounts in total freight billing over a ten to fifteen year period. Under the wagon investment scheme, clients were invited to invest in their own wagons. Depending on the type of wagon, discounts in freight charges are granted—these range between 10 to 15 percent for a period of 10 to 15 years. This is to reimburse the customer investment in wagons along with interest. As a result, not only is the customer committed to using the Railways freight service for the long-term, but the Railways also gets additional investments in wagons (Budget Speech, 2008, February 26).

Further, with the objective of tying in the customers for the long-term and providing railway connectivity within the customers' premises, the Railways revised its policy for construction of sidings. Unlike the past, where all capital costs were borne by the customer, now half the cost is borne by the Railways and reimbursed to the customers via a discount in the freight over a period of ten years or more. Further, salaries of Railways' staff posted at the sidings were previously borne by the customers. Now, except for one commercial staff member per shift, all other costs are borne by the Railways (Budget Speech, 2006, February 24). As a result, the Railways provide customers with a door-to-station service instead of a station-to-station service.

Under the engine-on-load schemes, to enable quicker release of wagons, the engine stands by during loading and unloading operations. In the past, the engine

would place the rake and return after the loading was over. While loading and unloading took up to a day or more, the engine also lost time commuting back and forth. Under this new scheme, the permissible time for free-of-charge loading and unloading has been reduced to four hours for open wagons and six hours for covered wagons, as opposed to nine hours in the past. The reduction in time spent on loading and unloading requires investment in modernization and mechanization of handling equipment and infrastructure which is being reimbursed to the customer. This scheme is outlined in the Railway Budget for fiscal year 2007 (2006, February 24).

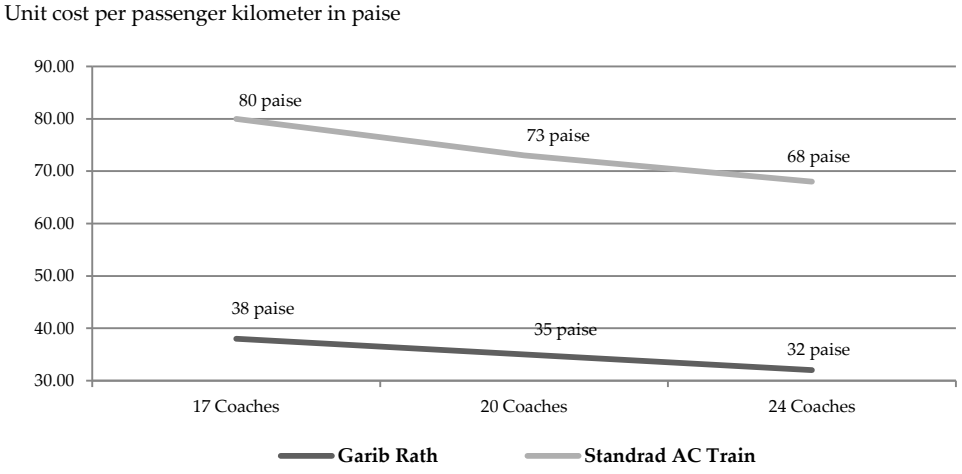
> Customers who fulfill the conditions laid down in the scheme and invest in their terminals so as to bring down the loading and unloading time, and complete loading or unloading in lesser time, will qualify for five percent rebate in the first year. Over the next ten years the rebate will be given at a diminishing rate and would be one percent from the fifth year onwards (p. 33).

Innovation

To complement the above tariff rationalization, reformulation of the product mix, and improvements in the quality of service, the Railways introduced several innovative products and services. As seen earlier, mini-rakes, two-point unloading, *tatkal seva*, and automatic upgrading of passengers are some examples of recent innovations. However, by far, the most popular novel product is the *Garib Rath*, the poor people's chariot. This is the *Nano* of Indian Railways. Quite like the Nano car launched by Tata Motors, the *Garib Rath* has four integrated attributes: Affordability, scale, aspiration, and efficiency. The *Garib Rath* provides air-conditioned travel at affordable prices—about half the

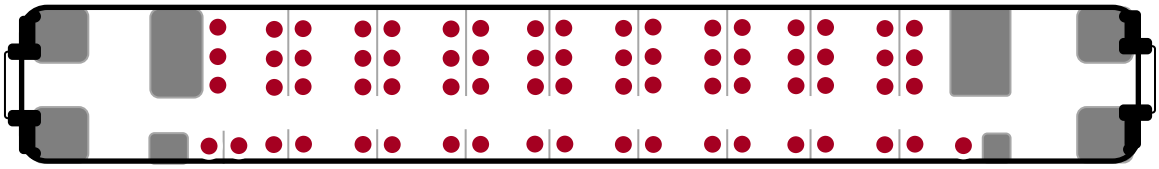
passenger fare of a Delhi-Mumbai three tier air-conditioned class travel. The following illustrations (see Figures 19 and 20) captures the essence of a strategy to decrease the unit costs by increasing the number of coaches per train, as well as efficiently using space within each coach to accommodate more passengers in the *Garib Rath* as opposed to the normal Rajdhani train. As against 17 coaches in a normal train, the *Garib Rath* has 24 coaches. Further, unlike the air-conditioned three tier coach in a normal *Rajdhani* train that accommodates 64 passengers per coach, the *Garib Rath* accommodates 75 passengers per coach. Likewise, the chair-car of a *Rajdhani* has space for 70 passengers; its equivalent in the *Garib Rath* has space for 102 passengers (Figure 20).

Figure 20. **Affect of train length and coach layout on unit cost**

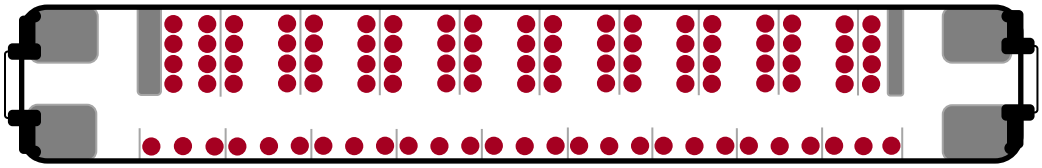


Source: Statistics and Economics Directorate, Ministry of Railways, Government of India.

Figure 21. **Affect of coach layout on seating capacity**



Rajdhani chair-car coach has seating capacity to accommodate 70 passengers.



Garib Rath chair-car coach has seating capacity to accomodate 102 passengers.

Note: Each circle represents a passenger in the above coach layout plan.

Source: Author's illustration based on data from Ministry of Railways, Government of India.

Table 18. **Economics of a *Garib Rath* train compared with a normal Rajdhani**

	Normal Rajdhani Train	Garib Rath
Seating capacity three-tier	64	75
Chair-car	70	102
17 coach train	816	1,233
24 coach train	1,302	1,920
Cost per passenger kilometer	80 paise (17 coaches long)	32 paise (24 coaches long)

Source: Statistics and Economics Directorate, Ministry of Railways.

Therefore, while a standard train carries 816 passengers, the *Garib Rath* accommodates more than twice the number of passengers with a capacity of 1,920. Further, as most costs are fixed, and thus insensitive to the number of passengers, the unit cost per travelers decreases substantially from 80 paise in a *Rajdhani* Express train to 32 paise in the *Garib Rath* as summarized in Table 18. Through a combination of the above attributes and removal of various paraphernalia—non-paying coaches like the pantry cars—the *Garib Rath* tickets are priced at about half of the air-conditioned three tier fare.

Further, there are no concessional tickets and no discounts, even for rail pass holders. Thus, it meets the aspirations of the common people of India who until now travelled in much higher densities and congested coaches and could not afford air-conditioned travel. These mutually reinforcing attributes make the *Garib Rath* not only affordable to the poor, but they also hold the potential to revolutionize the generally loss making segments of the passenger business and thus is an exemplar of the win-win outcome that was discussed in Chapter 5 on the political economy of reforms.

Profit Margins and Product Mix

Profit margins in the freight business have improved from 20 percent in 2001 to 80 percent in 2008. A simplistic assumption would imply the misuse of monopoly power to price gouge. However, this is not the case. Freight rates of coal and cement, which account for nearly half of freight earnings, have increased marginally, while those of steel and petroleum products, accounting for another 15 percent of freight earnings, have been reduced. Thus, 65 percent of commodity freight prices, barring busy season and the development surcharge, have been reduced or remain constant. The radical improvement in profit margins is attributed to the triple combination of a reduction in unit costs, selective fare hikes, and transformation of low margin business segments into very high margin ones.

First, declining unit costs. In 2001, the Railways' unit freight cost was 61 paise per net-ton-kilometer with a unit realization of 74 paise. Thus, even during the worst of times the Railways enjoyed a profit margin[108] of 21 percent in the freight business. During the seven year period between 2001 and 2008, even after absorbing inflationary pressures, the unit cost fell by over 11 percent from 61 to 54 paise at current prices. Even at the past level of unit revenue, profit margins would have expanded from 21 to 37 percent solely by virtue of declining unit costs. Conversely, if costs had continued to increase as per the past trend growth rate of 8 percent (the compound annual growth rate between 1991 and 2001), the unit costs would have increased to 103 paise in 2008. The Railways would have had to increase freight rates by 40 percent to breakeven and by 70 percent to retain the 20 percent profit margin. This illustrates the importance of declining unit costs in fueling significant growth in profit margins. The decline in unit cost is a function of macro economic stability characterized by low inflation—hovering between 4 and 6 percent as opposed to 10 and 12 percent over the 1990s—as well as double the growth rate of eight percent in freight loading.

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[108] Profit margin is the difference between unit price and unit cost. In the context of the railway price as well as costs differ by product segments—based on quality and quantity of service provided and the demand in the market. To increase margins either price needs to increased, or cost needs to be decreased, or both.

Second, between 2001 and 2008 unit revenue increased from 74 to 93 paise. This was partly due to selective increases in freight rates of door-to-door commodities—namely, iron-ore and minerals by about 50 percent, where the Railways has a formidable competitive edge, and of low rated commodities like food grains and fertilizers by 33 percent, which had been underpriced in the past. Moreover, levying the development and busy season surcharges at the rate of 2 and 5–7 percent respectively, led to further increases in revenues.

Third, transforming low value, low margin iron ore for the export business segment, to a high value high margin one. Success in business is about spotting an opportunity, seizing, and encashing it. Booming prices of iron ore from US $20 per ton in 2004 to over US $100 in 2008 in global markets offered such an opportunity for the Railways. Iron ore is mined in the central plateau regions of India where trucks are unviable—the road conditions are poor, the slopes are steep, and the commodity is bulky in nature—and therefore price elasticity of demand is low. Taking this into consideration freight rates for iron ore for export have been quadrupled[109]. Even at four

[109] Another paradox is that while freight earnings from seven main commodities other than iron-ore increased by 9 percent the over all earnings in freight increased by 23 percent. While the freight volume, transported as measured in net-ton-kilometers, iron-ore for export is six percent of the total freight volume in the fiscal year 2008, but it accounted for nine percent of the total freight revenue. In the current fiscal year, that is 2009, while the iron-ore for export retains its share of total freight volume at six percent its share of total revenue is 20 percent. While last year's margin was 100 percent this years

times previous prices there is little dearth of demand—over 10,000 indents are pending in South Eastern Railways—and transport volumes have increased from 36 to 53 million tons. These fare hikes have neither societal implications because the commodity is for export and prices are determined by global demand, nor are the customers opting out because of the high profit margins they enjoy resulting from the sudden increase in global iron ore prices. This is a classic example of revamping a low-margin and low-value business into a very high margin and high-value one. As a result, freight earnings from iron ore for export are estimated to have increased from 900 in 2004 to 9,000 crore rupees in 2009, and its contribution to overall freight earnings is expected to increase from three to 13 percent in this period (see Table 19).

Table 19. **Contribution of iron ore for export in total freight traffic.**

	2004	2008	2009[110]
Iron ore for export's share of total freight earnings	3 percent	9 percent	13 percent
Growth in earnings of iron ore for export	52 percent	63 percent	115 percent
Revenue from iron ore for export	900 crore	4,400 crore	9,000 crore
Growth in freight earnings without iron ore for export	3 percent	10 percent	13 percent
Growth in freight earnings with iron ore for export	4 percent	14 percent	21 percent

Source: Statistics and Economics Directorate, Ministry of Railways.

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margin has leaped to a whopping 250 percent. This year iron ore accounts for 13 percent growth in the first four months.

[110]Based on data up to July.

In fiscal year 2009, freight rates of all commodities other than iron ore for export were not increased. Yet, growth in freight earnings substantially exceeded growth in volumes in the first five months of 2009. This is because 115 percent growth in earnings from the freight of this one commodity alone increased the overall growth in earnings by eight percent—from 13 to 21 percent.

Further, the passenger business offers yet another illustration of leveraging the varying growth rates in different business sub-segments to accelerate growth of earnings at a pace that exceeds the growth in volumes. Over the last four years, the passenger volume recorded a compound annual growth rate (CAGR) of more than six percent while earnings had a much higher compound annual growth rate of 12 percent. This was achieved despite a reduction in passenger fares for most classes. A simplistic explanation offered by skeptics is that there has been a clandestine increase in fares. But the counter-intuitive differential growth rates of revenue and volumes are explained by the differential growth in high-margin and high-value services versus low-margin and low-value service segments (see Table 20).

Table 20. **Contribution of types of passenger services to revenue.**

	Distribution of Travelers	CAGR (2004–08) of	Revenue per passenger	Share of Total Revenue
Air-conditioned service	1 %	10.5 %	638 rupees	20 %
Mail and Express sleeper	3 %	9.6 %	215 rupees	26 %
Suburban service	57 %	5.4 %	4 rupees	8 %
Total	100 %	6.4 %	28 rupees	100 %

Source: Statistics and Economics Directorate, Ministry of Railways.
Note: all figures are for fiscal year 2007, unless mentioned otherwise.

As seen in Chapter 6, suburban services account for 57 percent of the total number of passengers but contribute only eight percent of total passenger earnings. On the other hand, air-conditioned plus mail and express non-air-conditioned sleeper segments account for four percent of the total number of passengers, but account for 46 percent of total revenue. This paradox of differential growth in volumes and earnings is explained by a 10 percent growth in the volume of high-value segments with a five percent growth in the low-value segments. For the former, namely air-conditioned and mail and express sleeper, each passenger on average pays 638 rupees (US $14.8) and 215 rupees (US $5.0) respectively while for the latter, namely the suburban segment, each passenger on average pays four rupees (US 9 cents). In essence, price is only one variable, among many, that affects growth in earnings; product mix is another critical variable.

Improving Quality of Service

To improve the quality of customer service, several complementary efforts—namely, improving operation efficiency through investments in new technological and human resources, investments in amenities, systemic changes through deployment of information technology, and strategic partnerships—were made.

Reliability, punctuality, safety, productivity, operational efficiency, and profitability are organically interdependent. These are complements not substitutes.

Improvement in reliability and safety not only reduces the damage to assets but limits the disruption of the Railways' operations, thus increasing punctuality, which in turn improves productivity and profitability. For instance, the recent reduction in the turnaround time, a key gain in productivity, is a result of significant improvements in reliability, punctuality, and safety. With this faster turnaround of wagons, not only are customers demands met more quickly—as seen in shorter-wait-lists for indents[111]—but the Railways' assets are being better utilized and thus profitability has increased. Therefore, quality of service and productivity are inherently interdependent, and the following five vectors were central to the strategy. Furthermore, to address client grievances, regular meetings are conducted at various levels of the system.

First, the Railways is making massive investments to upgrade its technology and modernize the rolling stock, signaling and telecommunication, tracks, and other assets for improving reliability, safety, and operating efficiency. For example, the Railways has more than tripled its allocations for the depreciation reserve fund from 2,300 to 7,000 crore rupees between 2001 and 2008. These investments have been complemented by investing in human resource development and leveraging information technology. As a result, the number of accidents have declined to less than a half—from 320 in 2004

[111]Unlike the past, where up to 40,000 indents would stack up waiting for the rakes because demand far exceeded supply, through supply-side management, demand for rakes is met year round except during the peak season where a congestion charge has been introduced in the from of a peak season surcharge.

to 194 in 2008, and asset productivity and a operating efficiency have made significant gains. The freight customer benefits from the reduction in inventory during transit, timely delivery, improve reliability of the service, and reduced damage and pilferage. This is a win-win outcome with customer satisfaction rising as well as achieving improved utilization of the Railways' assets. However, there is much more that can be done and to this end the Railways is investing in initiatives that will bear fruit in the near future.

Second, the Railways has made significant improvements in passenger conveniences through investments in amenities. The height of most platforms has been modified to match the height of trains. Covered shelters have been provided in hundreds of small stations and there are no constraints on funding improvements in passenger amenities—namely, better illumination, drinking water facilities, the general ambiance of stations, among others. Likewise, major goods sheds are being renovated and access roads and other facilities are being improved.

Third, the customer interface is being improved through systemic changes. For instance, through a revision of the tariff schedule and scrapping of the minimum weight condition, the procedure for freight transportation as well as its documentation has been simplified. Likewise, information technology has been deployed. In the past customers had to either deposit cash or demand drafts. This led to a lot of last minute stress at the customers' end. Now, sitting in the 'comfort of their office', freight

customers can avail of the e-payment facility. And the Railways is in the process of installing its online freight operating information system for all major customers so that they can track their trains in real time.

To improve the customer interface in the passenger segment—across the value chain from ticketing to travel—internet ticketing services have been developed by the Railways' own Indian Railways Catering and Tourism Corporation. Twenty percent of all reserved ticketing is done by these portals and online bookings have doubled since the last year (as of 2009), albeit from a small base. Further, e-tickets are available at over 40,000 outlets across the country from petrol pumps to ATMs, bank counters, and several chain stores and small shops. This not only reduced the queues at ticket counters, but also improved the customer's experience in buying the tickets.

In the past, customers were either unable to reach the train enquiry service, or when their call was answered, their experience was often unsatisfactory. Now, customers dial 139 for the *Rail Sampark* service, a year old nationwide Railway enquiry system. The service is provided in eleven languages by a joint venture between a business process outsourcing firm and a telecom firm. From anywhere in India, telephone enquiries can be made for the cost of a local call. Among other things, this service provider responds to queries pertaining to arrival and departure of trains, reservation status, fares, and passenger name record (PNR). The service is provided through four call centers and has recorded exponential growth, with over half a million

calls being answered each day. Further, the world over, call centers are cost centers; but in this innovative and perhaps unique arrangement, the call center operator is not only paying for the capital and operational expenses but also pays a small annual fee to the Railways. The operator recovers the capital and return on investment by sharing revenue with the telecom operator as well as earnings from the provision of several value added services like SMS alerts, hotel and cab reservation and so forth.

Fourth, in an effort to further deepen improvements in the quality of service the Railways sought external partnerships from private as well as public enterprises. Introduction of catering kiosks and food plazas managed by national and multinational corporations including Haldiram's and Mc Donald's, to improve the quality of food served at stations, is an example. Further, to improve transit accommodation at major railway stations, the Railways' *Yatri Niwas*, previous loss-making outfits, have been contracted out to The Taj Group's Ginger hotel chain and other such private firms. Train toilets have an improved ambience because private firms like Airtel, a telecom service provider, have been given advertisement rights along with the responsibility of improving ambience and maintenance of the coaches. The cleaning of toilets on trains has been contracted to Eureka Forbes, a private firm. This was done without displacing the existing cleaning staff who now play the role of cleaning inspectors and thus are happy with the introduction of the new service. On stations, the Railways has been leveraging 'eyeballs and footfalls' to enhance non-fare passenger incomes as well as

improve the quality of the transit experience. Through these alliances, the Railways' sundry earnings have more than doubled from 1,000 to 2,600 crore rupees in the last four years. This is another example of a win-win outcome because on the one hand the Railways has enhanced its profitability, and on the other customers receive an improved service.

Conclusion

In conclusion, the entire inclusive reform strategy and efforts to transform the Railways were tested in the market place as customer satisfaction was the final measure of the total value of the Railway's service. To strengthen the total value offered to the customer, the reformers have deployed a combination of price and non-price policy initiatives that are dynamic, differential, market driven, and customer centric. As a result, a 60 year trend of declining market share has been reversed because the value provided to the customer has been enhanced. As long as the Railways continue to innovate and add value that results in customer satisfaction, this transformation will sustain. However, there are several threats to sustainability as well as lessons to be learned for replication that are examined in the next chapter.

Chapter 9: Towards a New Theory for Infrastructure Economics: Outcomes, Sustainability, and Replication

Introduction

In this chapter a number of aspects of the Railways' achievements are summarized. These outcomes relate not just to improvements in the Railways' finances, but tangible gains in capital and labor productivity, an increase in market share and profit margins, better quality of services, as well as an enhanced stature of the Minister. Further, a critical assessment of the perceived and real concerns to sustain this transformation is presented. While most critics have raised concerns of passenger safety, short-term gains at the cost of long-term ones, and cashing in on a booming economy, the critical threats to sustainability appear to lie elsewhere. Next, some potentially transferable attributes of the Railways' approach are summarized and for illustrative purposes these are applied to the electricity sector in brief. Finally, based on the lessons of the Railways' reform a new framework for inclusive infrastructure reforms is presented and areas for future research are outlined.

Outcomes of Indian Railways Reforms

The scale of the financial transformation of the Indian Railways is best captured in the following. In 2008, the Railways had a cash surplus before dividend of 25,006 crore rupees (US $6 billion), an operating ratio of 75.9 percent, and a fund balance (or bank

balance) of 22,279 crore rupees (US $5.2 billion). Moreover, the ratio of net revenue to capital-at-charge (return on net worth) had improved from 2.5 percent in 2001 to 20.7 percent in 2008, a relatively high return on equity for a capital intensive infrastructure industry like the Railways. The Railways has improved its debt-service-cash-coverage ratio over three times from 1.74 in 2001 to 6.53 in 2008. In the financial sector, after the American sub-prime, crisis there is a global credit squeeze and lenders are risk averse, especially when it comes to lending to emerging markets like India. Despite these developments, in November 2008, based on a much improved balance sheet, the Indian Railway Finance Corporation placed dollar denominated bonds with the Bank of Tokyo, Mitsubishi for US $100 million at 4.01 percent (LIBOR (2.56) + 1.45 percent), an interest rate which is lower than the cheapest rate offered to many Fortune 500 firms. Table 21 contrasts the Railways' performance on several financial indicators summarizing the scale of change (see Annex 4, 7, 8, and 9 for detailed financial results).

Table 21. **Financial indicators**

	2001	2008	Change
Cash surplus before dividend	4,790	25,006	5 fold increase
Investible surplus	4,204	19,972	Over 4 fold increase
Capital expenditure	9,395	28,680	3 fold increase
Fund Balance (bank balance)	359	22,279	62 fold increase
Operating Ratio	98.3%	75.9%	22 % improvement
Ratio of net revenue to capital-at-charge and investment from capital fund (return on net worth)	2.5%	20.7%	18 % improvement
Debt-service-cash-coverage ratio	1.74	6.53	Over 3 fold increase

Source: Finance (Budget) Directorate, Ministry of Railways

During the 1990s the Railways' expenses grew one percent faster than its earnings, leading it towards bankruptcy. However, between 2001 and 2008, the Railways became 'super-solvent' by inverting this relationship—in this period earnings grew four percent faster than expenses (see Table 22). This resulted from a combination of factors. Earnings have grown on account of the growth in freight volumes, selective fare-hikes in previously underpriced freight business segments, as well as the change in product mix in favor of high-value high-margin segments. Meanwhile, working expenses grew at a lower rate primarily on account of low inflation and the Railways' relatively inelastic cost structure with respect to volumes transported. While such gains in freight have been the backbone of this transformation, the outcome for the Railways as a whole is similar. Table 22 compares the growth in earnings and expenses over 1990s that led to the financial crisis in 2001 and the transformation thereafter.

Table 22. **Compounded annual growth rate of expenses and earnings**

	1991 Crore rupees	2001 Crore rupees	2008 *(2004)* Crore rupees	1991–2001 CAGR %	2001–2008 CAGR %
Total Working Expenses	11,154	34,667	54,462	12.01	6.67
Gross Traffic Receipts	12,096	34,880	71,720	11.17	10.85
Passenger Earnings	3,148	10,515	19,844	12.82	9.50
Goods Earnings	8,408	23,305	47,434	10.73	10.69
Other Coaching Earnings	336	764	1,800	8.56	13.02
Sundry Earnings	242	703	2,565 *(1,004)*	11.25	20.31

Source: Statistics and Economics Directorate, Ministry of Railways

Moreover, the growth in earnings has doubled during the last four years—from seven percent in 2001–2004 to 14 percent in 2005–2008. And on average, the gap between the

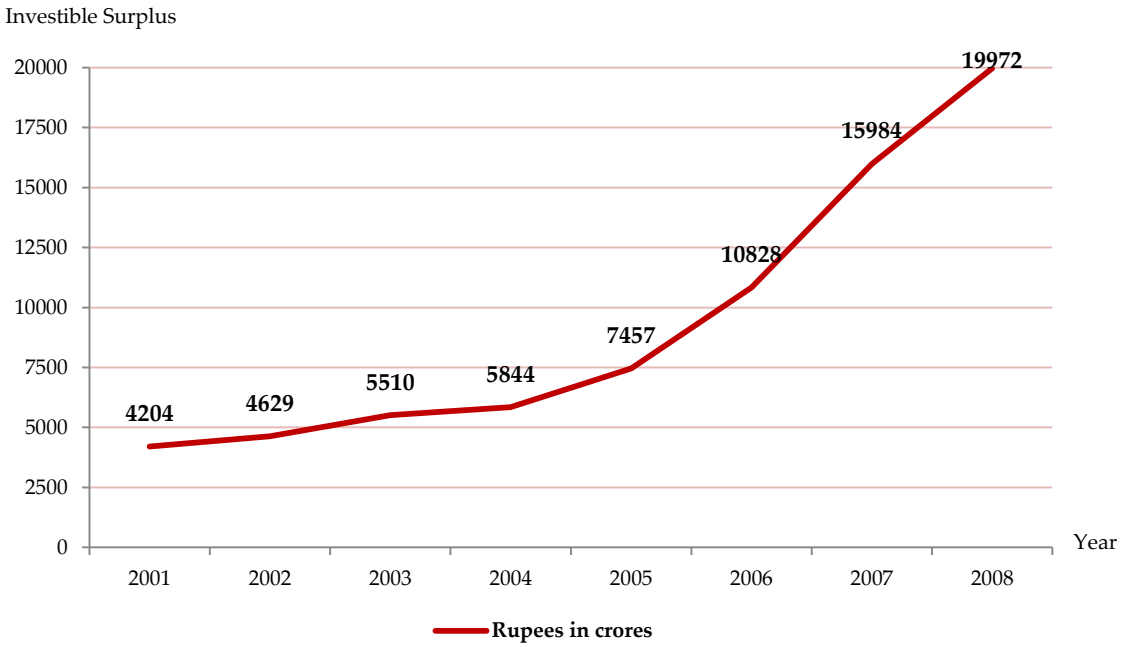
growth rates of earnings and expenses doubled—this was two and a half percent between 2001 and 2004 while it increased to five percent in the following four years (see Figure 21).

Figure 22. **Growth in traffic earnings verses working expenses**

In the same vein, the gains in the recent four years (2005–2008) exceeded the gains in the four years that preceded them. Between 2001 and 2004, traffic earnings recorded seven percent growth, while working expenses grew at four percent, and as a result the investible surplus grew by about 40 percent from 4,200 to 5,800 crore rupees (US $1.4 billion). However, between 2005 and 2008 these gains multiplied three times to 20,000 crore rupees (US $4.7 billion). In sum, a few years after a predicted financial crisis, the Indian Railways became one of India's most profitable enterprises with US $4.7 billion

in profits—namely, investible surplus (see Figure 22). While the Railways' profitability is not directly comparable with privately owned corporations, the scale of its achievement is significant.

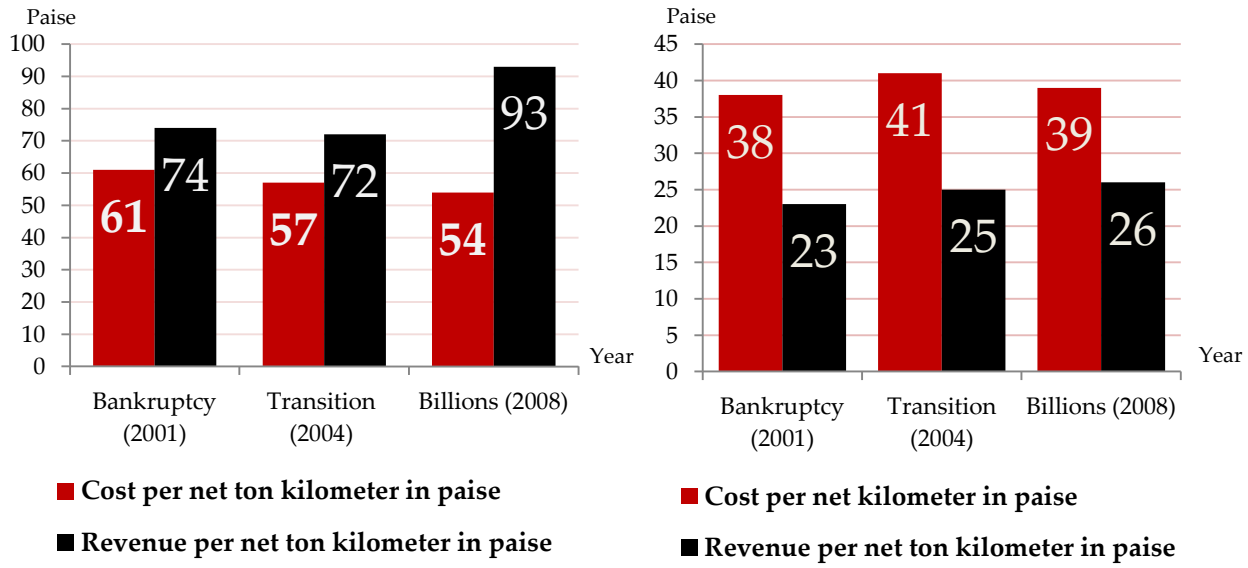
Figure 23. **Growth in investible surplus**



There were modest gains in the investible surplus between 2001 and 2004 as freight unit revenue fell from 74 paise in 2001 to 72 paise in 2004 (see Figure 23). This was largely on account of a reduction in freight rates for petroleum products and steel to curtail the Railways' declining market share in these commodities. However, the reformers discovered that this was insufficient to regain market share because these commodities, as seen in earlier Chapters, are more sensitive to non-price factors such as quality of service—like options to transport less than train loads through mini-rakes as well as unloading en route at more than one location. Further, the Railways was hesitant to

introduce selective fare hikes in underpriced commodities like iron ore, food grains, and fertilizers because of the misplaced conception that these were politically sensitive. Hence, despite a reduction in unit costs from 61 paise in 2001 to 57 in 2004, the Railways' freight operating margins made moderate gains. Likewise, gains in passenger earnings lagged in 2001–2004, compared to 2005–2008 because passenger unit costs increased from 38 paise to 41 paise and business strategies such as reconfiguring the product mix in favor of high-value high-margin air-conditioned and long distance passenger segments were yet to be explored (see Figure 23).

Figure 24. Freight and passenger unit revenue and cost



Investible surplus during 2005–2008 has grown exponentially because of growth in freight volumes, declining unit costs (from 57 to 54 paise), and increasing unit revenue due to selective fare-hikes (from 72 to 93 paise, see Figure 23). Despite a reduction in passenger fares for most travel classes, losses in the passenger business have been

curtailed by virtue of two factors. First, the marginal fall in unit costs (41 to 39 piase). Second, an increase in unit revenue due to a change in product-mix in favor of high-value and high-margin air-conditioned, and long distance travel segments (25 to 26 paise, see Figure 23). Further, the growth rate of 'other coaching' as well as 'sundry earnings' have increased from around 10 percent on average from 1991 to 2001 to about 15 percent on average from 2001 to 2008. This results from enhancing non-passenger fare income through leveraging 'eyeballs and footfalls' of travelers in addition to a reduction in unutilized parcel capacity.

In the same vein, the growth rate of freight and passenger traffic volumes nearly doubled during the period from 2001 to 2008 as compared to the 1990s. (1991–2001) Likewise, from 2001 to 2008 the number of passenger trips grew at over twice the rate of increase of the 1990s. And the freight transported, as measured in net ton kilometers, grew at 2.6 times the rate of the preceding period (Table 23).

Table 23. **Compounded annual growth rate of output**

	1991 Millions	2001 Millions	2008 Millions	1991–2001 CAGR %	2001–2008 CAGR %
Passenger trips	3,858	4,833	6,558	2.28	4.46
Passenger kilometers	295,644	457,022	767,519	4.45	7.69
Freight loaded in tons	318.4	473.5	794.21 *(557.4)*	4.05	7.67
Freight transported in net ton	235,785	312,371	511,801	2.85	7.31

This substantial growth in traffic volumes has been achieved with the same network, rolling stock, and employees—implying a significant gain in capital and labor productivity as summarized in Table 24.

Table 24. **Gains in productivity**

Indicators	1991	2001	2008	1991–2001 CAGR %	2001–2008 CAGR %
Wagon Utilization (NTKM/wagon/day)	1,407	2042	3,566	3.79	8.29
Track Utilization (NTKM/route kilometers in million)	3.78	5.01	8.09	2.86	7.09
Track Utilization (PKM/route kilometers in million)	4.74	7.25	10.99	4.34	6.12
Labor Productivity (NTKM/employee in millions)	0.15	0.22	0.37	3.90	7.71
Labor Productivity (PKM/employee in millions)	0.19	0.32	0.55	5.35	8.04

What is surprising is that this financial transformation did not resort to textbook solutions of shrinking the denominator—that is cost cutting through retrenchment and privatization. Instead, the focus was on growing the numerator—namely increasing revenue by expanding volumes and earnings. As a result, while the proportion of staff costs to expenses remained stable, their share as a percentage of revenue declined sharply. Staff costs were 54 percent of operating expenses in 2001 and 52 percent in 2008. However, the share of staff costs to gross traffic receipts declined from 51 percent

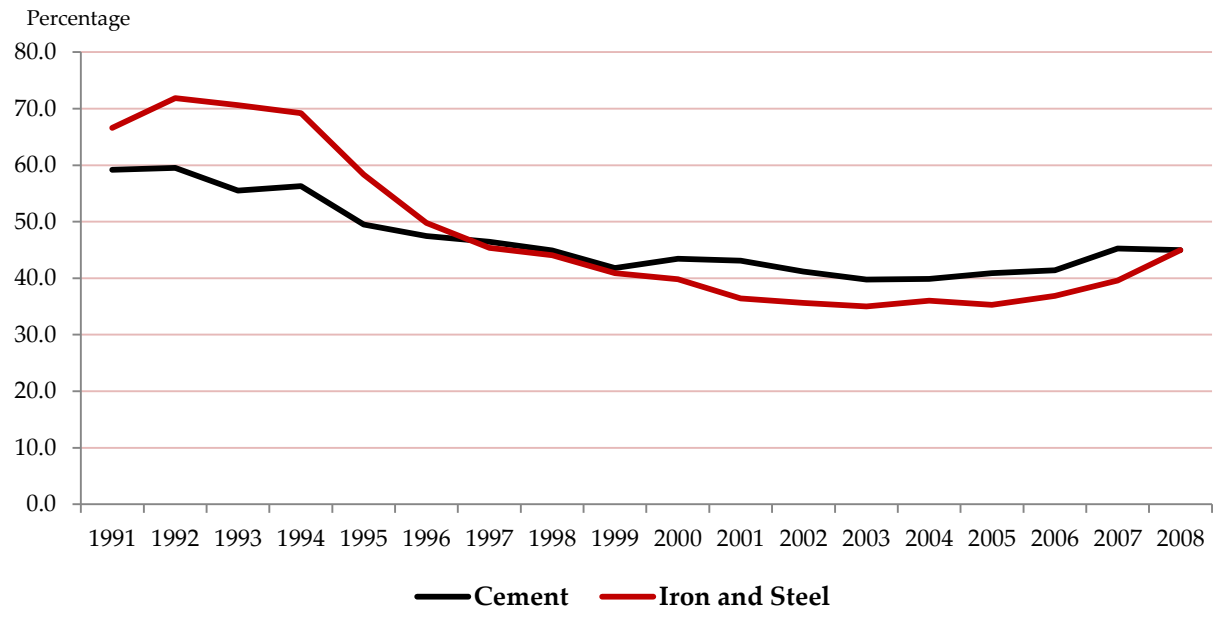
in 2001 to about 36 percent in 2008 (see Table 25). This is primarily on account of rapidly rising volumes and earnings, and the associated reduction in unit costs.

Table 25. **Break-up of Ordinary Working Expenses (Gross)**

All amounts in crore rupees	**2001**	**2008**
Gross Traffic Receipts	34,880	71,720
(staff cost as percentage of GTR)	*(51.21%)*	*(36.33%)*
Ordinary Working Expenses	33,161	49,924
(staff cost as percentage of OWE)	*(53.86%)*	*(52.20%)*
Staff Cost	17,861	26,059

Further, the Railways' market share in the freight transport of finished goods like steel and cement has expanded—the Railways measured this through the rail coefficient, a measure that monitors the Railways' freight market share in each of the eight major commodities it transports. This is an important outcome because the Railways had been losing its market share in these segments for a decade and a half—market share for steel and cement in 1991 was 67 and 59 percent respectively, while in 2004 it had declined to 36 and 40 percent respectively. In a historic reversal, the Railways increased its market share in the freight of both of these commodities (see Figure 24). While the steel and cement industries grew by 8–10 percent in 2007–2008, rail freight grew by 25 percent, resulting in an increase in the market share from two to five percent.

Figure 25. **Railways' market share in steel and cement**



Another critical outcome is improvements in customer orientation as measured by reductions in price, improvements in safety, and quality of service. Along with the reduction of passenger fares in several travel classes, freight fares for several station-to-station commodities like petroleum products were lower in 2008 when compared to 2001 price levels. Additionally, safety has improved as captured in the halving of the total number of accidents—from 473 in 2001 to 194 in 2008. Moreover, this occurred when the total number of train kilometers had increased. Thus accidents per million train kilometers declined by two-thirds—from 0.65 in 2001 to 0.22 in 2008. The quality of service for passengers and freight customers has improved as a result of systemic changes such as e-ticketing, complementary upgrading of passengers if seats are vacant in upper class coaches, contracting out cleaning services on trains, improving the

ambience of railway stations through private participation, e-billing for freight customers, and a host of other service improvement initiatives discussed in earlier chapters. Finally, the transit time for travelers and freight customers has declined, and field units of the Railways have greater autonomy to resolve customer grievances and respond to meet rising expectations.

Despite all these positive outcomes what did the Minister and the Railways' staff gain? Based on a performance ranking of all the federal Ministers, by a leading news magazine in 2005 the Minister was at the bottom of the list, at number 33 (India Today, 2006). In 2006 the same publication ranked him as the second best performing Minister of the coalition government. Over his tenure as the Minister of the Railways, he has been able to transform his image as well. In sum, the Minister has enhanced his stature. Likewise, breaking away from the fear of retrenchment and uncertainty associated with the financial crisis, the success of the Railways' transformation has given a boost to the morale of the Railways' staff. In 2007, NDTV, a leading national news media service provider, ranked public sector organizations in India; the Railways stood second, just below the Indian Army. This is a significant achievement for an organization that was close to bankruptcy in 2001. In essence, the outcomes of the Railways' transformation have been multifaceted—improvement in the functioning of the Railways by gains in productivity, generating a substantial cash surplus, benefiting customers, and strengthening the political leadership as well as boosting staff morale, without

burdening the common people of India. However, this is not to say that the Railways has surpassed its own potential or that the expectations of policy makers and customers have been met. There is a lot more scope for further improvements, making the sustainability of this transformation a central concern going forward.

Sustainability—Perceived and Real Longer-term Challenges to Indian Railway Reforms

Policymakers and academics have raised five major concerns regarding the future of this transformation; these are discussed in turn. First, the Railways' improved performance is a result of creative accounting. Second, financial gains are at the cost of safety. Third, growth in revenues is the result of a rapidly growing economy. Fourth, transformation of the Railways is a result of plucking the low hanging fruit, as in easy fixes that will soon be exhausted and thus short lived, particularly, when the Railways face severe capacity constraints—saturated high-density networks, terminal constraints, an energy shortage, and lack of wagons and coaches. Fifth, the fate of the transformation, after the present political leadership departs, is bleak.

These concerns are substantially misplaced. Concerns about creative accounting stem from mainly two factors. First, the pace and scale of the financial gains the Railways has made—from bankruptcy to a annual cash surplus of over US $5 billion in a few years. Second, concerns regarding changes in the Railways' accounting practices

introduced between 2005 and 2008. Regarding the first concern, the Railways' accounts and financial statements are verifiable like any other public enterprise and open to public scrutiny. The Railways' cash surplus is deposited with the Reserve Bank of India and is open to verification. The second concern is about modification in accounting practices with respect to the allocation of leasing charges, interest on fund balances, and reimbursement of losses by the public exchequer stemming from operation and maintenance of strategic railway lines. Earlier, all leasing charges were recorded in accounts as revenue expenditure. But in the revised procedure, the interest component of the leasing charges is recorded in operating expenses (2,153 crore rupees) while the principal component (1,677 crore rupees) is recorded as capital expenditure. This accounting change amounts to a difference of 1,677 crore rupees or US $390 million in 2008. Likewise, earlier reimbursement of losses on account of strategic lines (637 crore rupees or US $148 million) was recorded in accounts as a reduction in the dividend liability. Now it is included in sundry earnings. In the same vein, interest on fund balances (1,175 crore rupees or US $273 million), which was not recorded as earnings earlier, is now included in total earnings for calculation of cash surplus before dividend. These changes are in sync with corporate accounting practices and are based on the recommendations made by the external experts on the Railways' accounting reforms. As a result of these accounting changes, the Railways' cash surplus records an incremental 3,489 crore rupees (US $810 million) in 2008. However, to eliminate

ambiguity, all past and present cash and investible surplus data used in this research are computed based on the current accounting practices and are thus comparable. Hence, modifications in accounting practice do not account for the financial transformation.

Regarding the safety-profitability trade-offs, in contrast to popular perception, safety, productivity, and profitability are complexly interdependent and are arguably complements not substitutes. Thus, it should not be a surprise that the number of train accidents has declined from 473 in 2001 to 194 in 2008, while the Railways' profitability has soared. Further, during the run up to the financial crisis in 2001, the Railways had a cash crunch and was unable to afford replacement of particularly aged assets. In contrast, for the fiscal year 2009, assets, internal generation, and non-budgetary resources are contributing 78 percent of an annual plan outlay of 37,500 crore rupees (US $8.7 billion) that not only covers the cost of replacing aging assets but also investment needs to meet future demand. Moreover, all major operational changes having safety implications in the Railways are strictly scrutinized by the Railways' Research, Designs, and Standards Organization (RDSO) as well as an independent Commissioner of Railway Safety, administered by the Ministry of Civil Aviation, Government of India.

Third, while the Railways' freight business benefits from surging demand in a rapidly growing economy, it is not sufficient to yield higher earnings and profits.

Between 1987 and 2001 the Indian economy grew by over six percent, but rail freight grew at about two percent. In contrast, between 2005 and 2008 the Indian economy grew at eight percent, and the Railways, through a series of interventions discussed earlier, encashed this surging demand by expanding its freight business at nine percent per annum. To recapitulate, encashing this demand required structural improvements in the functioning of the Railways to alleviate supply-side constraints so that the Railways could respond. Further, between 2001 and 2008, both local and global macroeconomic stability, characterized by low inflation and interest rates, greatly enhanced the Railways' ability to reduce its unit costs at current prices. A combination of high inflation and high interest rates could disrupt this virtuous cycle of growing volumes and falling unit costs. Moreover, commodity cycle upturns have benefited the Railways. While the spike in petroleum prices (particularly in 2008) imposed an additional burden of about a billion dollars on the Railways, surging demand for commodities like steel, cement, and iron ore provided manifold benefits to the Railways' freight business segment. As discussed earlier, high international prices of iron ore contributed a few billion dollars of additional earnings to the Railways through increase in freight charges on exports. However, the volatility of the commodity market and its impact on the Railways' freight business is seen in potential outcomes of the recent global financial crisis and credit crunch. As the commodity cycle unwinds, the

Railways' freight volumes may decline and freight earnings from iron ore for export alone may wipe out a billion dollars in expected earnings.

Fourth, the quick fix argument, or gains from low hanging fruit, does not stand to scrutiny either. A back-of-the-envelope calculation to benchmark the Indian Railways with Chinese and American railroads provides a glimpse into how underutilized the Railways' existing assets are. An equally large state-owned Chinese Railways undertakes the same number of passenger kilometers but transports four times more freight than its Indian counterpart. Likewise, the freight only, class-one American Railroads have one-tenth the number of employees when compared to the Indian Railways, while transporting three times the amount of freight. In essence, the scope to improve productivity in the Indian Railways remains significant.

Moreover, to meet future demand, targets are set for the Eleventh Five Year Plan (2008–2012), namely a 50 percent growth in passenger and freight volumes. This will require an increase in investments to extend the network and expand the rolling stock, adopt new technology, plus improve the quality of rolling stock, signaling, and other systems (see Table 26).

Table 26. **Comparison of traffic volumes in past and present Five Year Plan**

	10th Plan 2003–2007	11th Plan 2008–2012 (projected)	Percent increase
Freight Traffic (million tons at origin)	728	1,100	51
Net Ton Kilometers (billion)	481	702	46
Passenger Trips(billion at origin)	6.3	8.4	33
Passenger Kilometers (billion)	696	942	35

Source: Planning Commission, Government of India, 2008

Table 27 provides a comparison of past as well as planned investments for capital expenditure based on the five year plans. There is a concerted effort to increase reliance on internal generation, market borrowings (extra-budgetary resources) as well as public-private partnerships (not listed in the table but expected to raise four billion dollars) as opposed to relying largely on budgetary support from the public exchequer.

Table 27. **Comparison of investment sources in Five Year Plans**

Source of investment funds	10th Plan 2003–2007	11th Plan 2008–2012 (projected)	Percent increase
Gross Budget Support *(% of total)*	37,516 *(45%)*	63,635 *(27%)*	70
Internal Generation	29,567 *(35%)*	90,000 *(39%)*	204
Extra-Budgetary Resources	16,981*(20%)*	79,654 *(34%)*	369
Total	84,064 *(100%)*	233,289 *(100%)*	178

Source: Planning Commission, Government of India, 2008
Note: in the 11th plan additional investments through public-private partnerships are anticipated.

In an effort to increase the effectiveness and efficiency of investments, the construction works, as well as the acquisition of rolling stock, have been conceptualized with a commercial orientation to meet the demand of the logistics market. The investment

strategy has been temporally parsed. Short and medium term reforms have been discussed in the preceding chapters. For instance, the Railways strategically invested in short-gestation high-return projects, like increasing axle load on one hand, and lengthening platforms to accommodate longer trains on the other. Further, several operational and procedural constraints were alleviated by the modernization of loading practices and conditions on goods sheds as well as fixing network bottlenecks. Likewise, in the medium-term, a three to five year period, several transit junctions were decongested by constructing flyovers and bypasses, goods sheds were provided with additional loading and unloading lines, gauge conversion on some congested routes to serve as alternate paths, and so forth. Yet, these measures are not sufficient to meet the anticipated demand for traffic. For the long haul, along with the introduction of capacity and efficiency enhancing technology, systems, and procedures, the Railways will be investing tens of billions of dollars during the next five years to enhance capacity. The Railway Budget has allocated resources for eliminating network bottlenecks, developing multi-modal logistic parks, and improving railway stations. These investments are being financed through a combination of internal generation, borrowings from the market, and public-private partnerships, including outsourcing though long-term contracts (see Table 27). All of this investment is being strategically channeled to projects that have a commercial orientation. For instance, through route-wise planning the entire high-density network's capacity will be augmented on a

priority basis over the next five years at a cost of 75,000 crore rupees (US $17.4 billion). Likewise, priority is being given to strengthening iron ore and coal routes so as to carry 25 ton axle-load. Finally, to enhance capacity in the long-term, dedicated freight corridors are being developed along the length and breadth of the country to match the golden quadrilateral and its diagonals, a national highway building program. To meet the surge in demand, factories are being built to manufacture engines, wagons, coaches, and their parts. Simultaneously, through public-private partnerships, billions of dollars will be invested in information technology. The central objectives of the information technology projects are to better inform senior management as they plan for the long-term for effective and efficient utilization of human and physical capital, reducing operating cost, increasing passenger and freight earnings, enhancing customer satisfaction and further building brand value. In essence, the Indian Railways is investing through a multi-pronged strategy to sustain its growth trajectory (see Annex 10).

Finally, sustaining the management impetus after the Minister and his team leave office is less of a concern as the policy reforms have been embedded in the institutional DNA by instating systemic and procedural reforms. These have become part of the organizational routine, manuals, and to some extent norms. This can largely be attributed to change management approach that respects and strengthens the

organizational identity and morale of employees. Through a consensus based approach the reforms have induced change with deep roots within the institution.

However, several challenges lie ahead on the organizational front. Chief among these are attracting and retaining talented staff, creating a culture of cross-functional collaboration, increasing accountability throughout the hierarchy of the organization, and spurring innovation. First, in a reversal of past trends, when the Indian Railways was a sought after employer for highly qualified young professionals including IIT and IIM graduates, with a rapid expansion of the economy the Railways is increasingly facing competition from private employers.

In an ever evolving business environment, recent efforts by the Railways to train officers in institutions outside the Railways, both in premier universities in India and around the world, is a first step in strengthening the capacity of existing staff. But it is not sufficient to meet the Railways' future needs and such capacity enhancing collaborations should be further developed. There have been efforts to decentralize decision making in the Railways' zones and within zones to divisions so as to increase the level of accountability at the field units but there is a lot more that could be accomplished on this front as well. In this vein, other institutional changes, like reorganizing the Railway Board based on the Railways' business segments, as opposed to the present functional silos, hold the potential to help break departmental divisions and bring a cohesive business orientation to the organization as a whole. Additional

efforts towards increased accountability throughout the hierarchy of the organization as well as enhancing the quality of work for the staff are goals that need further work. Finally, to sustain these financial gains the Railways needs to continue to foster innovation in commercial, operational, and pricing policies. Further, there is a need to promote synergy across zones and system optimization through cross-functional cooperation and spatial coordination. To encourage creative and nimble responses to an ever shifting market dynamic, an innovation promotion group has been constituted in the Railway Board, but this is still in its infancy and needs further strengthening.

On the business front, it is essential to continue the focus on market and business segmentation, respond to firms' supply chains as well as distribution networks and client needs through tailor made strategies. For example, a steel plant on the one hand needs to transport raw materials from the mines to the factory and on the other hand transport finished products to the consumers. These are two distinct transportation needs of firms, and the Railways needs to align its freight business in order to directly respond to these diverse business needs within the supply chain of firms and tailored to specific commodities like steel, cement, fertilizer, and so forth. For instance, to achieve the Mission 200 million tons for the cement industry, a goal set in the Railway Budget (2008), the management needs to focus on articulating specific responses to the logistical needs of the specific supply chain. This includes, but is not limited to, developing tailor made wagons for fly-ash, clinker, and bulk cement, and to

expand as well as strengthen the rail network and terminals in new cement producing geographies. This industry specific response is increasingly becoming the modus operandi and needs further development. Moreover, there is a need to anticipate capacity expansion by firms, especially as several commodity producers, like steel and cement plants, plan on doubling capacity over the next few years.

> Production of cement is expected to increase from 170 MT to 280 MT by the end of the 11th Plan. Railways receive more than 100 MT traffic every year from the cement industry and we are targeting a loading of 200 MT from cement industry in 2011–12. There are more than 10 big clusters of cement production in the country. Work is in progress on Nandyal-Yerraguntla, Jaggayyapet-Mallacheruvu and Vishnupuram-Janpahad new lines and these will be completed in a time bound manner. The work of Bhanupali- Bilaspur-Beri new line in Himachal Pradesh has been proposed in the budget. The work of Daund-Gulbarga doubling and electrification of Pune-Guntakal line is proposed to be taken up to meet the demand of cement manufacturers in Wadi cluster. Gauge conversion and extension of Bhuj-Nalia line will be taken up after obtaining necessary approvals. More than 50 big terminals are being upgraded to increase their capacity, prominent among which are Mumbai, Pune, Chandigarh, Ghaziabad etc (Budget speech, 2008, p. 47).

To respond to the rapidly expanding steel industry the Railways in its most recent budget articulated its own response to this anticipated demand.

> Steel production is expected to increase from 55 MT (million tons) to 110 MT by the end of the 11th Plan. The Railways receives 120 MT traffic from the steel industry every year and we have targeted traffic of 200 MT from the steel industry by 2011–12. Most of the new dedicated iron ore routes will be constructed or upgraded for 25-ton axle load and some routes will be made suitable for running 30-ton axle load trains (Budget speech, 2008, p. 46).

In essence, the Railways not only needs to improve services to the existing commodity freight market by expanding its market share, but it needs to preempt the needs of future customers and lock in business through contractual arrangements that create long term relationships, for example as has been initiated through schemes like the wagon-investment scheme and engine-on-load scheme, as well as incentives for building new sidings and rewards for incremental freight. Dynamic, differential, and

customer oriented policies by their very nature need constant revision and refinement to match the market dynamics. For example, recently the Railways has introduced distance based, also known as lead based, differential pricing for cement and iron ore. Such strategies need to be adopted for other business sub-segments as well. Distance based pricing responds to the Railways relative competitiveness. For instance, long lead traffic of iron ore for export, that is involving a distance of greater than 400 kilometers, is presently offered a discount of up to 50 percent because international commodity prices have plummeted. Conversely, short lead traffic for cement, involving a distance of less than 300 kilometers, is being offered discounts of up to 40 percent because of stiff competition from truckers. Such commodity specific pricing strategies need to be dynamic and differential, but increasingly tailored to specific commodity and geographic regions so as to reflect market conditions—including demand for commodities and credible threats from alternative modes of transport, and the like. Another instance of a critical business segment that requires tailor made responses by the Railways is freight transported to and from the ports, which accounts for a quarter of the Railways' freight business. Thus, there is a need to invest in eliminating bottlenecks along the freight corridors that carry this freight to increase the productivity of these high density networks. This was planned for in the Railways budget for 2009 under mission 300 million tons for port traffic.

> Indian Railways receives about 25% of the total traffic from various ports. India's foreign trade is likely to increase from 650 MT to 1100 MT by 2011–12. Thus, Railways is giving top priority to port

> rail connectivity projects (Budget speech, 2008, p. 43) . . . Under the present scheme, during the concession period of 30 years, the Special Purpose Vehicle is eligible for proportionate net income or a return of 14% on equity whichever is less. The cost of investment in the construction of the project is based on actual expenditure incurred. To prevent time and cost over runs and facilitate real price discovery, it has been decided that on a pilot basis implementation of some projects will be explored on BOT (build-operate-and-transfer) basis through open tenders. The beneficiaries of the new line will give traffic guarantees (Budget speech, 2008, p. 45).

The threats to sustainability stem from macroeconomic volatility more than any other factor because it is beyond the scope of the Railways to adequately hedge for inflation and interest rate fluctuations. On the other hand, the Railways is relatively better geared to tackle issues such as attracting and retaining talented staff and investing to meet future needs as well as innovating to compete effectively in the market for transportation services. However, for an organization as large and complex as the Indian Railways it would to be too simplistic to assume that all issues concerning the future of the Railways have been addressed here or indeed can be anticipated. Thus, like other large organizations the Railways viability will be a function of its ability to learn from its past as well as constantly innovate to meet new challenges posed by a rapidly changing logistics marketplace. For instance, the increasing role of containerization and multi-modal logistics that is seamlessly integrate into global supply chains requires attention. At the same time it must continue to meet the needs of poor commuters.

Towards a New Theory for Infrastructure Reforms in a Market Economy

Inclusive Reform Framework

The traditional approach to infrastructure reforms focuses predominantly on privatization for efficiency gains—unbundling, transfer from public to private ownership, retrenchment, and fare-hikes for cost recovery. In contrast, I propose a new *inclusive reform framework* that discards the assumptions of the traditional approach[112]. In the new framework, it is assumed that privatization is not a prerequisite for efficiency gains and equity and efficiency objectives can be complementary.

Successful transformation of the Indian Railways consists of some transferable lessons that may be considered in the context of reforming other public utilities in market economies. The conventional prescriptions of corporatization, privatization, retrenchment, hikes in user fees, and independent regulation have been effective in sectors where charging and recovering the user fee is not politically contentious, as in the case of ports, telecom, and aviation. The gains from private competition in the telecom industry in India[113] are a classic case. However, there is a need to rethink this

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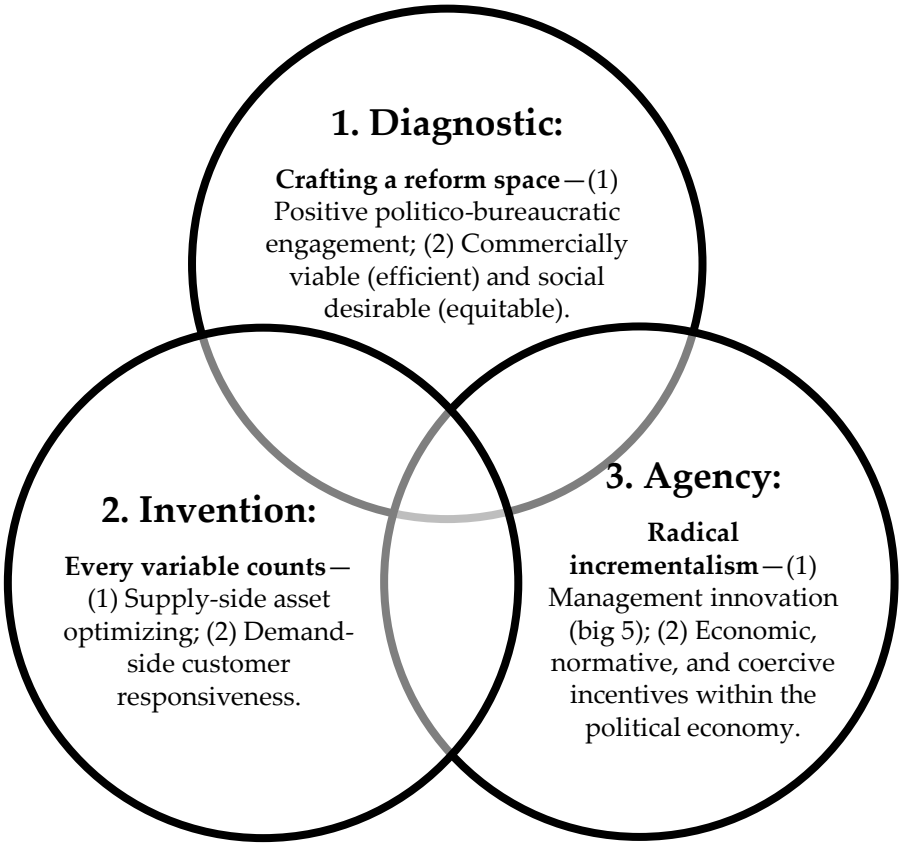
[112] The traditional approach assumes that public utilities are monopolies and inefficient because they lack competition, charge below cost recovery tariffs, and are over staffed. Inefficiency results from political interference aimed at balancing social and commercial objectives. Privatization is a pre-requisite for efficiency gains where equity needs to be compromised for efficiency gains, at least in the short-run.

[113]But similar efforts have been less successful in other contexts, like Mexico for instance. Further, in recent developments, according to an audit report by the Comptroller and Auditor General of India, misallocation of 2G spectrum in 2008 by the Department of Telecommunications resulted in a loss of an estimated US $40 Billion in revenue to the Government of India (Comptroller and Auditor General of India, 2010, p. ix).

text-book approach to reforms in sectors like energy, water supply, irrigation, urban bus transport, and railways where charging and recovery of user fees, such that operation and maintenance costs are recovered, are often politically infeasible. For such sectors, some ingredients for reinventing a reform strategy are identified and a new *inclusive reform framework* is articulated (Figure 25).

The three key ingredients of this inclusive reform framework—diagnosis, invention, and agency—are drawn from the replicable attributes of the Indian Railway's transformation. First, ***diagnosis***, focuses on crafting a space for reform such that reform interventions by policymakers target gains that enhance efficiency as well as equity. This is achieved through unpacking nano-market and nano-political economy conditions to identify constraints and opportunities for reform.

Figure 26. **Inclusive reform framework**



Second, ***invention***, which seeks to depart from the conventional focus on cost cutting through retrenchment and revenue enhancement through fare hikes. Instead the focus is on supply optimization and demand responsiveness. Supply-side mechanism focus on business viability, by optimizing all apolitical variables, particularly leveraging existing underutilized assets of public utilities to jointly maximize social (equity) and commercial (efficiency) goals. This approach requires a shift from a singular focus on asset accumulation and to asset utilization. Demand-side mechanisms require customer centered services with a focus on quality and prices that are dynamic and differential.

Third, ***agency***, which focuses on a spectrum of management initiatives—particularly *radical incrementalism* that combines issues of profit orientation, coordination, strategic investments and partnerships, deliberative and calibrated approaches, with rigorous follow-up. Additionally the focus on economic incentives, such as performance based wage discrimination, that is difficult to implement in public sector, creative alternatives such as including non-economic incentives, like normative and administratively coercive incentives, need consideration.

Replication of Reforms

There is no 'silver bullet' for reforms because they are always context specific, and in order to be effective a detailed analysis pertaining to the sectoral, temporal, and spatial contexts in addition to the usual economic, political, and social contexts is required. These are not meant to be prescriptions; instead, they are offered as possible ingredients of a strategy to tackle efforts to improve public service delivery in other network infrastructure sectors and, to a lesser extent, in non-infrastructure sectors such as health and education, where public service delivery persists. In this regard, key aspects of the inclusive reform framework are outlined.

First, *diagnostic requires crafting space for a productive politico-bureaucratic interface* where the bureaucracy respects the political mandate, and in return the political leadership refrains from interfering with the routine functioning of the bureaucracy. It

is not uncommon for the bureaucracy and politicians to disagree as they confuse the democratic mandate—in the case of the Railways *no privatization, no user fee hike, no retrenchment*—with political interference, namely meddling with day-to-day management of the organization. Mutual contempt, or at best skepticism, needs to be replaced by mutual trust and understanding of roles and responsibilities. This can be achieved by delineating the political domain of crafting the democratic mandate as distinct from the bureaucratic realm. The bureaucrats accept the mandate and channel its functioning to achieve the organization's objectives—providing quality service while having a profit motive—without compromising the political mandate—of meeting the service obligations and needs of the marginal population.

Second, *diagnostics crafts space for commercial objectives and social obligations to be reconciled.* Counter-intuitive as it may be, the experience of the Railways' transformation demonstrates this. The Railways achieved this balance between equity and efficiency by first dissecting business segments into political and apolitical components; followed by further disaggregating it into nano-constituents so as to identify apolitical variables that could be manipulated to improve profitability without compromising the interests of the political constituencies—in the case of the Railways it was the poor consumers and the Railways' employees. In another sector this may differ. For instance, in the electricity sector in India, if consumer segments are disaggregated, it is quite likely that in most states electricity for industries, affluent

neighborhoods, and shops can be market driven, while electricity for rural and urban poor will require social considerations. And the subsidy can be targeted to these poor consumers alone. While the tariff structure attempts to make these distinctions, in practice there is ample scope to seek nano-constituents of the consumer base that can be priced dynamically and differentially without burdening the poor. To translate such insight into action requires working across departmental silos, introducing a commercial orientation to the organization, and breaking free of a monopoly-mindset. For instance, efforts to build cross-subsidies within the tariff, accompanied by increasingly unreliable quality and quantity of electricity supplied, has led to the migration of consumers who then pay their bills to independent power providers (small scale private intermediaries) or install self-generation through captive power plants, both big and small, for industry as well as large residential enclaves. This opting out of the system in favor of alternatives is quite like the Railways customers in that, instead of paying high freight charges or air-conditioned travel fares, they chose alternatives that offered better value. This has not been due to political interference, but due to a lack of commercial orientation and a monopoly mindset within the state electricity boards.

Further, on the investment front, wheeling power to far flung villages is a small fraction of the total capital expenditure of the sector where political considerations dominate. The rest of the power sector investments can and should be commercially managed. For instance, there is vast scope in the electricity sector for improving the

utilization of existing capacity in generation, transmission, and distribution through low cost, short gestation, rapid payback, and high return investments. Bulk metering of electricity along the primary, secondary and tertiary distribution network requires small investments but promises quick and high returns. Separating technical losses in transmission and distribution from theft, and making strategic investments to reduce unaccounted for power which goes to large consumers like urban households and industrial areas, could yield results quite like that of increasing axle load and lengthening platforms as the Indian Railways did. Furthermore, there are exceptions for rural power supply as well: state-of-the-art off-grid pre-paid systems for rural households developed by the Modi Research Group (Modi, 2011). Further, the widespread obsession with construction, procurement, and expenditure needs to give way to effective and efficient utilization of existing assets for enhancing productivity. In essence, an in-depth business and political analysis is a prerequisite for crafting an effective strategy such that apolitical variables are identified and managed on market-principles. This example is only to provoke progressive scholars and policy makers to explore such issues in other sectors and is in no way prescriptive; what such analysis reveals is that there is immense scope for expanding desirable win-win outcomes where social and commercial objectives are met simultaneously.

Third, *invention to improve supply-side efficiency by optimizing an underutilized system.* Across sectors there is enormous room to fix loopholes and reduce revenue

losses. Several components of electricity generation, transmission, most of the distribution, as well as billing and collection, can be market driven, yet publicly managed, assuming that there is a will to override narrow interest groups who benefit from inefficient and inequitable arrangements. As mentioned earlier, state electricity boards in India can substantially reduce aggregate technical and commercial losses that stand at 35 percent, which is three times the global industry average, by improving billing efficiency that stands at 70 percent and collection efficiency of 94 percent.

Fourth, *invention to improve demand-side customer responsive dynamic and differential policies*. While this may sound rather obvious from an enterprise perspective, many public utilities are grounded by inertia. In a fast changing external environment it is critical for public utilities to question past assumptions about the nature of the business, its cost structures, pricing, and respond appropriately. It is reasonable to assume that maximizing profits is not one of the central objectives of a public utility. On the contrary, in the Indian context, there is an aversion to profit. As the experience of the Railways transformation demonstrates, public utilities have to be re-oriented to pursue profits by responding to customer needs and competition from substitute services. This is because a viable and financially sound utility is a prerequisite to meeting social obligations and objectives. This requires not only a new mind set, but business savvy—the ability to spot, seize, and encash business opportunities. Such opportunities abound in the power sector. For example, real time metering, as well as dynamic and

differential power tariffs for bulk consumers, have the potential to improve earnings substantially.

Fifth, *agency through radical incrementalism approaches for implementation*: namely, setting stretched goals, cross functional and spatial coordination, strategic investments, fostering alliances, deploying a deliberative and calibrated approach, and chasing (or aggressively following up) for results.

Sixth, *agency through some ground rules for navigating the political economy*. In the democratic context, perceptions of the electorate matter as much as reality (if not more) and gradualism in reform is essential to mitigate political and social risk, along with economic prudence. A tripartite strategy has elements of replicability. In implementing a mega-transformation, management strategists should carefully consider political positioning, choice of words (phraseology), timing, and a gradual pace for reforms. Incrementalism hedges against risk, as reforms are introduced and modified through negotiations with interest groups. In this democratic spirit some battles will be conceded to win the war. And finally, to garner acceptability and credibility for the reforms, deft media management is required.

In conclusion, the Railways transformation is an exemplar for how state-owned enterprises can improve services despite the odds of balancing commercial and social objectives to achieve inclusive reforms. While the preceding chapters have unpacked the various attributes of the transformation strategy in substantial depth, this

dissertation does not aim to derive prescriptions for reforms. Instead, it aims to provoke the readers by demonstrating that state-owned enterprises that provide infrastructure services can transform quite like private corporations have, and that there may be transferable lessons in the inclusive reform framework, although these may require substantial transformation if applied to alternate sectors, governance structures and economies because one size never fits all.

Research findings and lessons learned

Seven key findings and associated lessons from this research are summarized. First, privatization of inefficient public utilities is not a prerequisite for efficiency again. This discovery is in stark contrast with the prevailing theoretical assumptions and policy prescriptions. Second, efficiency and equity gains can be jointly optimized in infrastructure sectors that are publicly managed because the utilities are well-within the production frontier and thus resources applied for improving services to the poor can simultaneously improve efficiency. This allows for rethinking the conventional wisdom on utility reform that assumed commercial and social objectives to be strict substitutes. Third, profitability of utilities is a function of very many variables. For instance, increasing the volume of a wagon can significantly enhance profits without changing user-fee per ton of freight transported. This lesson is a departure from the traditional approach of focus on cost reduction through retrenchment and revenue enhancement

through increase in user-fees. Fourth, lack of profit orientation and interdepartmental fragmentation (and conflicts) are primary constraints to improve utility performance, not lack of integrity and accountability of frontline workers or lack of talented technical personnel. Thus, institutional systems that prioritize and reward organizational goals should be balanced with performance incentive—normative, coercive, and economic—for individuals. Fifth, favorable macroeconomic conditions—rapid economic growth and associated commodity demand, low interest rates and other costs of accessing capital, as well as low inflation rates—offer opportunities for decreasing the unit cost of utility services through expansion of utility (freight) services that leverage economies of scale. However, leveraging these opportunities requires conceited effort by agents in the business, political, and policy, domains. Sixth, in public utilities, political mandates (distinct from political interference in routine technical choices) can offer desirable outcomes when the preferences of the electorate are expressed through political visions that are implemented through technically qualified bureaucrats. This observation is a departure from the school of thought that prescribes independent regulation as a prerequisite to eliminating political interference. Seventh, each year, at least two trillion dollars are needed to finance infrastructure construction and renewal around the world. Reference classing the forecast of the role of private and public sources of finance suggests the dominant role of public sector financing will persist. For private sector

finance to increase its share of financing infrastructure, in the risk averse capital markets prevalent after the financial crisis of 2008, private innovation will be put to test.

Future Research

Over the next two decades, the OECD estimates that about US $40 trillion will be spent on building infrastructure around the world. Governments will remain significant actors in enabling, regulating, as well as providing these services. This dissertation has aimed to provide insight into alternative mechanisms of improving the performance of infrastructure providing state-owned enterprises, which continue to account for up to 80% of all infrastructure investments and management in developing countries. Building on the theoretical exploration and empirical substantiation of this research, two complementary areas for future research emerge.

Typology of Positive Utility Reform Case Studies

There is a need to analyze additional positive case studies of successful public utility transformations that balanced commercial and social goals through a variety of approaches ranging from public sector innovation to privatization. The case selection should focus on range of infrastructure sectors—water, transport, energy, telecommunications—as well as a variety of socioeconomic conditions in which they exist. The goal of such research is to develop a typology of contextualized possibilities

of improving infrastructure services, to inform the next generation of reforms through grounded theory.

Empirical Analysis of Climate Change on Infrastructure

The next generation of infrastructure investments is being made to replace aging capital stock in developed countries, and build new infrastructure to close the gap in developing countries. There is an urgent need to study impacts of climate change on existing and future infrastructure investment and management. There are few initial efforts in this direction where climate risk, adaptation, mitigation, and policy options for infrastructure sectors are explored. For example, Mehrotra, et al., (2011) assess the state-of-the-knowledge on climate change and urban transport. For a policy oriented application in the context of New York City, the research by the New York Panel on Climate Change is illustrative (Rosenzweig and Solecki, 2010) as are technical assessments by the Transport Research Board (2008). However, a comprehensive assessment of the state-of-the-knowledge on climate change and infrastructure is much needed.

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All details on the Indian Railways are based on Ministry of Railways, Government of India statistics and documents, unless stated otherwise.

Glossary

Hindi Words

Aam admi	common man
Bhajiya	deep fried snacks
Coolie	a porter
Khādī	hand spun and hand woven cotton cloth
Kulhads	clay pots
Mumbaikars	the people of Mumbai
Rail Bhavan	headquarters of the Ministry of Railways, Government of India
Raj	rule
Yatri niwas	hotels

Technical Terms

Zonal Railways	Indian Railways is divided into sixteen zonal Railways. Each zone has a territorial jurisdiction ranging from 2,400 to 6,500 route kilometers. Each zone is led by a General Manager (GM).
Divisions	Each zonal railway is divided into three to six operational units called divisions. There are 68 divisions in Indian Railways each led by a Divisional Railway Manager (DRM).
Production Units	Indian Railways has six production units for manufacture of coaches, locomotives, and the like.
Passenger Earnings	Earnings from all classes ofpassenger traffic.
Other Coaching Earnings	Earnings from luggage, parcel, postal, defense, and other miscellaneous coaching services.
Goods Earnings	Earnings from all kinds of goods traffic.
Sundry Earnings	Earnings from leasing of land, advertising, catering, right of way, dividend from public sector undertakings, reimbursement of operating loss on strategic lines, rents, and tolls, and the like.
Total Earnings	Total earnings from goods, passenger, other coaching, and sundries.
Suspense	Traffic earnings which have accrued but not yet realized.
Gross Traffic Receipts	Earnings realized, namely total earnings +/- suspense.

Miscellaneous Receipts	Receipts from subsidy received from general revenues towards dividend relief, receipts from railway recruitment boards, and the like.
Total Receipts	Sum of gross traffic receipts and miscellaneous receipts.
Ordinary Working Expenses	Expenses incurred for operation of the railway system including general superintendence and services; repairs and maintenance of permanent way and works, motive power and rolling stock, plant and equipments; traffic expenses, fuel, staff welfare, and the like.
Appropriation to Pension Fund	Amount appropriated from total receipts to the pension fund.
Appropriation to Depreciation Reserve Fund	Amount appropriated from total receipts to depreciation reserve fund.
Total Working Expenses	Ordinary working expenses (+) appropriation to pension fund (+) appropriation to depreciation reserve fund.
Open Line Works Revenue	Small works charged to miscellaneous expenditure.
Miscellaneous Expenditure	Expenditure on Railway Board and other offices like RDSO, training institutes, open line works revenue, and the like.
Total Expenditure	Total working expenses (+) miscellaneous expenditure.
Net Revenue	Total receipts (-) total expenditure.
Dividend Payment	It is the amount of dividend paid by the Ministry of Railways to Ministry of Finance for the capital investment made by it in the Railways.
Surplus	Net revenues (-) dividend payment.
Cash Surplus before Dividend	Total receipts (+) interest on railway fund balances (+) appropriation to depreciation reserve fund (+) open line works revenue.
Investible Surplus	Cash surplus before dividend (-) dividend payment (-) interest on pension fund.
Appropriation to Development Fund	Amount appropriated to development fund from surplus.
Appropriation to Capital Fund	Amount appropriated to capital fund from surplus after appropriation to development fund.
Depreciation Reserve Fund	This fund provides for expenditure on replacement and renewal of assets including improvement element.
Pension Fund	This Fund provides for the expenditure on pensionary charges of Railway employees.
Development Fund	This fund provides for expenditure on providing amenities for passengers and other railway users, labor welfare works, un-remunerative operating improvements, and the like.

Capital Fund	Provides for capital expenditure.
Budgetary Support	Funds received from General Exchequer for capital expenditure.
Capital-at-Charge	Book value of railway assets created from budgetary support.
Return on Capital Investment	Rate of return on capital investment made on the Railways. Ratio = (net revenue)/(capital-at-charge (+) investment from capital fund).
Operating Ratio	Ratio of total working expenses excluding suspense to gross traffic earnings.
Traffic Revenue-Earning	Traffic which is paid for by the consignor or the consignee.
Gauge	Indian Railway is a multi-gauge system, comprising of broad gauge(1676 millimeter), meter gauge(1000 millimeter), and narrow gauge (762 or 610 millimeter).
Key-men	Railway employee who inspects their designated stretch of rail network by foot, both track and bridges, once a day.
Private Sidings	Refers to the length of line from the take off point on the main railway system to the siding holder's premises.
Piecemeal or Smalls	Goods consignments whose weight and dimensions do not require the exclusive use of a wagon.
Gross Ton Kilometer	A ton, including payload, tare and weight of engine, carried over one kilometer.
Net Ton Kilometer	Payload of one ton carried over one kilometer.
Wagon Turn-round	Interval of time between two successive loadings of a wagon.
Passenger Kilometer	A passenger transported over one kilometer.
Train Kilometer	Movement of a train over one kilometer.
Lead	Average haul of a passenger or a ton of freight.
Output	The volume of traffic moving between any two points on the railway expressed in terms of passenger kilometers (PKM) or net ton kilometers (NTKM) or train kilometers per running track kilometer.
Sick Line	A portion of the yard where carriage and wagon repairs are undertaken.
Pit Line	A maintenance line for under-frame examination of rolling stock.
Yard	A portion of the railway system where trains are dealt with.

Workshop	A facility for repairs of rolling stock.
Wagon	A freight truck used for carrying goods in Railways.
SandT	Signalling and telecommunication used for controlling the movement of trains.
Free Time	Time limit prescribed for free of charge loading/unloading and removal of consignments from railway premises.
Train Examination	Examination of rolling stock at fixed intervals.
Rake	A formation consisting of a set of coaches/wagons to be hauled as a train.
Close-circuit Rake	To and fro movement of goods trains over a pre-defined route with a base depot for maintenance and examination.
Mileage Based Examination	Maintenance schedule undertaken after movement of a train over a pre-determined distance.
End-to-end Rake	Rakes which are offered for examination and maintenance before every loading.
Passenger profile Management	Mapping of reservation demand against availability of accommodation with a view to optimize the latter.
Rake links	Deployment of passenger trains between originating and destination stations with a view to optimize utilization of rolling stock.
Axle load	The axle load is the maximum weight of an axle permitted on a given track and is a governing parameter for rolling stock and track design. It is calculated by dividing the gross weight of loaded freight wagon/coach/locomotive by number of axles of the rolling stock.
Electronic Weigh Bridge	A device used for weighing each loaded wagon of the train electronically.
Wagon Impact Load Detector (WILD)	Real-time online system to capture, analyze, and report the instantaneous loads exerted by the passing train wheels on the instrumented track section. The system is capable of isolating and identifying wheels exerting excess impact load on the track and send this report immediately to the Divisional Control through an electronic network.
Wharfage	Charges accrued on use of railway premises beyond free time.
Throughput Enhancement	Throughput enhancement refers to any investment or activity that results in an increase in the capacity of a particular section or route to carry additional traffic measured in terms of gross ton kilometers.
Route-wise Planning	Route-wise planning refers to an approach whereby integrated planning is done for the entire route so that bottlenecks are eliminated completely leading to a significant increase in output as against piecemeal/incremental planning which often result in relocating, not fixing, the bottlenecks.

High Density Network (HDN)	This comprises of the rail routes connecting the four metros of Delhi, Kolkata, Chennai, and Mumbai with each other and the Delhi-Guwahati route. HDN carries bulk of the freight and passenger traffic of Indian Railways.
Double Line Track	Two separate unidirectional lines running in parallel.
Block Section	The portion of running line between two stations.
IBS	An arrangement of signaling in which a long block section is split into two block sections for enhancing line capacity.
Multimodal Logistic Park	An inter-model cargo landing and processing facility consisting of container terminals, warehouses, banks, office space, and mechanized facilities for landing, sorting/grading, cold chain aggregation/dis-aggregation, and the like. The objective of this facility is to provide an efficient and integrated logistics hub in or near special economic zones, industrial clusters, or other nodes of cargo convergence.

Annex

Annex 1. Research Summary Matrix

Objective	Source(s) of Information	Method(s) for Selecting Unit(s) of Analysis	Method(s) for Data Collection	Type of Analysis
To provide a reference class for public utilities from world's 15 largest economies (+ other interesting countries) by establishing the extent of state-ownership in infrastructure sectors today.	Various industry reports: Standard and Poors; Reuters; London Economics, and websites of regulators. IMF for GDP.	*Variable:* Gross Domestic Product.	Author's compilation, based on McCraw (1986) matrix on extent of state-ownership in 7 countries.	Descriptive statistics used to compare market share of public with private sector ownership in utility infrastructure in each country expressed in percentages.
To create a reference class for Indian Railways by comparing the Indian Railways with the largest Railways of the world, as measured by freight carried Net Ton Kilometers (NTKM).	World Bank's Railways Performance Database (2007).	*Variable:* Net Ton Kilometers (NTKM). 5 largest Railways of the world (USA, China, Russia, India, Canada) that account for 83% of global rail NTKM.	Public access database downloaded from the World Bank website.	Descriptive statistics used to establish the position of Indian Railways among the world's largest railway systems through a comparison of size, output, and performance variables.
Why study the Indian Railways? (Black swan, a counter intuitive case of how a public utility can improve performance without privatization.)	Books, government documents, media reports, and interviews.	*Variable:* Operating Raito, Revenue, Expenditure. Paradigmatic and critical case (Flyvbjerg, 2006).	Semi-structured and open-ended interviews as well as content analysis.	Comparative case study with a deliberative and interpretivist approach.
To craft a brief history of the Indian Railways including a timeline for modernization.	Books and manuscripts as well as internal Railways' documents like policy. memorandums.	*Variable:* critical events in history: financing through bonds, evolution of technological choices, development of safety standards, and evolution of	Archival research and review of pivotal literature.	Historical analysis through archival research to identify critical events and craft a context for the case study.

Objective	Source(s) of Information	Method(s) for Selecting Unit(s) of Analysis	Method(s) for Data Collection	Type of Analysis
		institutional structure.		
To describe the Railways in India through vital statistics, organizational structure (with organograms), and its importance to the economy and society.	Indian Railways' Statistical Department, government documents and media reports.	*Variable:* Operating Ration, Revenue and Expenditure.	Application requesting the Indian Railways statistical department for the data.	Interrupted time series analysis of key statistics including scale, output, and performance variables over a 50 year period with a particular focus on points of inflection especially around 2001, the near bankruptcy period.
To elucidate the macroeconomic environment in India and its impact on the Railways' performance and finances.	Three[114] Indian transport sector reports (Govt. of India, World Bank, ADB) and interviews with macro economists analyzing the Indian economy.	*Variable: Macro*—GDP growth rates, commodity prices; *Railways*—output and performance measures.	Review of pivotal literature.	Discourse analysis with a focus on liberalization of the Indian economy (including road transport) starting in the late 1980s, changing incentives of Railways' major customers and diminished ability (and willingness) of the Government of India to provide budget support to the Railways.
To explain the build up to the Financial crisis in the Indian	Three Indian transport sector reports.	*Variable:* Operating Ration, Revenue and Expenditure.	Review of pivotal literature.	Discourse analysis with a focus on the inability of the

[114]Government of India. (2001). Rakesh Mohan Committee Report,
World Bank. (2001). Indian's Transportation Sector: The Challenges Ahead
Asian Development Bank. (2001). Railways restructuring study.

Objective	Source(s) of Information	Method(s) for Selecting Unit(s) of Analysis	Method(s) for Data Collection	Type of Analysis
Railways (1997–2001)				Railways to respond to the changing economic environment that led to a financial crisis (non-payment of dividends to the Central Government). And the related *Ideal Type* reform proposed by the Government of India and international analysts.
To craft the reform strategy through seeking answers to: How did the Indian Railways transform in four years? What specific steps led to the Railways revival? What was the role of the freight versus the passenger segments? What were the obstacles to change, how did the Railways over come them? How was corruption tackled?	Interviews with the administrative hierarchy of the Indian Railway bureaucracy[115], critical scholars and journalist, and freight and passenger customer (steel and soya).	*Variables:* Management strategy towards political, market, organizational conditions. Focus on faster, longer, and heavier trains.	Nested unit of analysis: the bureaucracy of the Indian Railways, vertical and horizontal. Interview based on availability.	Analysis of response through a Hirschman approach to non-paradigmatic explanation, clustered into three broad categories of business, political, organizational constraints. Emphasis on the spaces for reform, diagnosis of constraints and organizational strategy of faster, longer, and heavier trains.

[115] The Minister for Railways and his advisors, Railway Board (member traffic and finance) retired senior railway staff; founding director of Container Corporation of India, General managers Central Railways; zonal and divisional level staff and front line workers, critical scholars and journalist, and freight customer (steel and soya) and passenger.

Annex 2. Assumptions for Cost Allocations

Assumptions for cost allocations are as follows. The costs are split into variable and fixed costs based on Railways' cost allocation principles. The variable costs are discussed, followed by fixed costs.

First, unit cost of terminal expenses per passenger originating is applied and as such it is treated as a variable cost, although many of these costs are fixed in nature. Terminal expenses include the expenses relating to ticket booking office, ticket checking, reservation and enquiry, special services such as expenses relating to retiring rooms, waiting rooms, platform inspectors, passenger guide, and traveling ticket checking staff. Additionally, costs for miscellaneous services include expenses incurred on provision and maintenance of platforms, washing, cleaning, and water provision for coaches, train examinations, and shunting activities.

Second, unit cost per coach kilometer (number of coaches multiplied by the kilometers traveled) is applied to compute line haul cost of traction—the unit cost for hauling a train for one kilometer and thus varies with the number of coaches—includes cost of fuel, maintenance cost of overhead electric traction, repairs and maintenance of locomotives, and related depreciation, interest as well as cost of crew, therefore it's a variable cost.

Third, the line haul cost of track maintenance is considered a variable cost. While many of these costs are fixed in nature but are treated as variable because they are computed based on the unit cost per coach kilometer. It includes all the repairs and maintenance cost of tracks, depreciation and interest on tracks.

There are two types of costs that are treated as fixed where addition or removal of coaches does not change costs on unit distance traveled. Therefore, unit cost per train kilometer is a fixed cost. Line haul cost of transportation includes cost of maintenance of structures (other than track), operating staff, train passing staff, and the cost of signaling are computed based on the unit cost per train kilometer of these activities.

To account for overheads, central charges are added as a percentage of total direct costs and therefore they too vary with the number of coaches. Further, repairs and maintenance, depreciation and interest of coaches vary directly in proportion to the number of coaches and are calculated on travel time of the train and are based on the capital cost of coaches.

As a result of the application of the above unit cost adopted by the Indian railway—where most costs components are treated as variable, although many of these costs are fixed in nature—the cost per train kilometer function increases in a linear manner.

Annex 3. Weighted Index of Inputs for Railways

Weighted index of inputs for Railways (WIIR) is prepared annually in order to measure change (increase or decrease) of Railways' input costs over the time. The purpose of this index is to compute a single index from price indices of the inputs relevant to the Railways, taking into consideration their relative weights in order to produce a composite metric.

The wholesale price indices (WPI) consider a general basket of commodities, composed of (a) primary articles—food and agricultural products; (b) fuel, power, light and lubricants; (c) manufactures products. Many of these articles are not relevant for the Railways' operations. Therefore, railway specific inputs constitute the WIIR—diesel, electricity, transport equipment, non-ferrous metals, electrical machinery, lubricants, oil, manufactured products, heavy rails, and ferrous metals. Further, the WPI has indices for these constituents, and are used to derive the WIIR. Therefore, the base years of these constituents correspond to the base years of WPI. For the purpose of computing real prices for the Railways, inflation adjustments are made based on this railway specific WIIR and not the general WPI.

Source: Statistics and Economics Directorate, Ministry of Railways, Government of India, 2008.

Annex 4. Plan Expenditure (2001–2008)

(All amounts in crore rupees)

	Total	General Exchequer	Internal Resources	External Resources
2001	9395	3269	3229	2897
2002	10177	5517	2485	2175
2003	11408	5778	3113	2517
2004	13394	7081	3476	2837
2005	15422	8669	3712	3041
2006	18838	8073	7034	3731
2007	25002	7914	12233	4855
2008	28680	8668	14948	5064

Annex 5. Radical Incrementalism: Gradual Increase in Axle Load (2004–2008)

Rate Circular Number & date	On routes applicable
CC+2	
R C No.22 of 2004 w.e.f 1.9.2004	All loose and bulk commodities
R.C No. 31 of 2004 dated 16.09.2004	Consolidation of all earlier circulars for chargeable weight for cc commodities.
CC+4	
RC No. 48 of 2004 dated 7.11.2004	For all 8 wheeled wagons for loose and bulk commodities
CC+6	
R.C .No. 67 of 2005 dated 21.1.2005	Six routes of CC +6 were introduced
RC. No. 11 of 2006 dated 01.02.2006	Some new routes added in CC+6 routes
RC No 15 of 2006 dated 17.02.2006	New routes added
RC No 27 of 2006 dated 29.03.2006	New routes added
RC No. 41 of 2006	Compilation of CC+6 routes
RC No 82 of 2006 dated 5.10.2006	10 new CC+6 routes are added from different Railways
RC No 96 of 2006 dated 13.11.2006	4 new CC+6 routes are added
RC. No. 103 of 2006 dated 30.11.2006	5 new CC+6 routes are added
RC No. 10 of 2007 dated 07.02.2007	17 new CC+6 routes added
RC.No.16 of 2007 dated 28.02.2007	One new CC+6 routes added
RC. No. 69 of 2007 dated 27.06.2007	Consolidation of all CC+6 circulars issued till date
RC. No 77 of 2007 dated 24.07.2007	11 new CC+6 routes added
Add-II dated 05/07/2007	Two new CC+6 routes added
RC No 76 of 2007 dated 20.07.2007	All route except a few has been notified as universalized CC+6 routes effective from 06.08.2007
CC+8	
R C No. 25 of 2005 dated 10.05.2005effective from 15.05.2005	16 CC+8 routes identified
RC.No. 29 of 2005 dated 2.06.2005	4 more CC+8 routes added
RC.No. 42 of 2005 date 13.07.2005	One more CC+8 route added
RC.No 45 of 2005 of dated 19.07.2005	Tow new CC+8 routes added effective from 22.07.2005
RC No. 73 of 2005 dated 19.12.2005	Two new CC+8 routes added effective from 01.01.2006
RC. No 76 of 2005 dated 29.12.2005	Three new routes in CC+8 are added effective form 15.01.2006
RCNo.10 of 2006 dated 01.02.2006	Three new routes added in CC+8
RC. No 41 of 2006 dated 10.05.2006	Compilation of all CC+8 routes

R.C. No. 51 of 2006 dated 08.06.2006	Sugar, rice, cement in BCNA/BCNHS as 64 tones and 61 tones in BCN on CC+8/CC+6 routes
RC. No 97 of 2006 dated 1.11.2006	When traffic moved comparing on CC+8/CC+6 and normal routes-PCC of wagons
RC. No. 48 of 2007 dated 26.04.2007	One CC+8 route added
RC No 54 of 2007 dated 18.05.2007	One CC+8 route added
RC. No 69 of 2007 dated 27.06.2007	Consolidation of all CC+ 6/CC+8 circulars
Addendum No 3 of RC No 69 dated 10.07.2007	Two CC+8 routes added
Addendum No 4 of RC No 69 dated 10.09.2007	Five CC+8 routes added
Addendum No 5 of RC No 69 dated 21.09.2007	Two CC+8 routes added
Addendum No 6of RC No 69 dated 22.11.2007	Eight CC+8 routes added
Addendum No 7 of RC No 69 dated 30.11.2007	25 new CC+8 routes added
Addendum No 9 of RC No 69 dated04.01.2008	24 new CC+8 routes added
Addendum No 10 of RC No 69 dated 08.04.2008	9 new CC+8 routes added
Addendum No 11 of RC No 69 dated 08.04.2008	One new CC+8 route added
RC No 77 of 2007 dated 24.07.2007	Slag, E&F grade coal permitted to be loaded up to CC+8 i.e. 67 tones in BOXN/BOXNHS on CC+8 routes
RC. No. 102 of 2007 dated 6.11.2007	PCC of BOXNCR and BOXNHA on CC+6/CC+8 routes have been notified
RC. No.28 of 2008 dated 18.06.2008	Compilation of all CC+8 routes circulated
Addendum No 1 of RC No 28 of 2008 dated 20.06.2008	One new route included which was left out while compiling
Addendum No 92 of RC No 28 of 2008 dated 08.07.2008	Two more CC+8 routes added

Annex 6. Incrementalism: Gradual Improvements in Wagons Design (1987– 2004)

Minimum weight condition (MWC) for different commodities till 1987; Introduction of BOXN wagon (1983); MWC of Slack Coal—Marked 55 tones in BOXN wagon (1987); Slack Coal notified to be charged at CC in BOXN wagons (1997); ROM Coal and Iron & Steel are notified to charges at CC+2 in BOXN wagon (1998); On KK Line –Iron Ore in BOXN wagon is being charged at CC+4 (1986); In South Eastern Railway, Local Iron is being charged at CC+2 (1987); In Korba and I B Valley Slack Coal is being charged at CC+2 (1990); In South Eastern Railway Iron Ore Dolomite, Limestone, Manganese Ore, Powerhouse Coal, and Washed Coal are notified to be charged at CC+4 (for 1st February to 31st March 2004).

Annex 7. Statement of Cash and Investible Surplus

The Railways' accounting method was revised between 2005 and 2008. For the data to be comparable all figures presented below (2001–2008) are recomputed based on the prevalent accounting method.

All amounts in crore rupees

	Description	2001	2002	2003	2004	2005	2006	2007	2008
1.	Ordinary Working Expenses	26,449.35	27,586.44	28,407.87	29,311.53	31,718.45	35,029.53	37,432.53	41,033.17
2.	Appropriation to Pension Fund	4,841.85	5,600.00	5,950.00	6,263.09	6,680.00	6,950.00	7,426.00	7,989.00
3.	Miscellaneous Expenditure	227.12	230.44	244.66	275.11	287.44	319.11	407.45	423.59
4.	**Total [1 to 3]**	**31,518.32**	**33,416.88**	**34,602.53**	**35,849.73**	**38,685.89**	**42,298.64**	**45,265.98**	**49,445.76**
	Passenger Earnings	10,515.07	11,196.45	12,575.44	13,298.33	14,112.54	15,126.00	17,224.56	19,844.17
5.	**Gross Traffic Receipts**	**35,154.31**	**38,140.71**	**41,377.23**	**43,143.62**	**47,661.58**	**54,773.29**	**63,040.50**	**71,720.06**
6.	Miscellaneous Receipts	1,130.47	1,520.22	1,673.25	2,005.68	1,676.37	1,824.13	2,054.34	1,556.51
7.	**Total Receipts [5 + 6]**	**36,284.78**	**39,660.93**	**43,050.48**	**45,149.30**	**49,337.95**	**56,597.42**	**65,094.84**	**73,276.57**
8.	Interest on Railway Fund Balances	23.04	42.53	135.30	252.70	392.17	580.35	818.63	1,175.38
9.	**Cash Surplus before Dividend [(7+8) - 4]**	**4,789.50**	**6,286.58**	**8,583.25**	**9,552.27**	**11,044.23**	**14,879.13**	**20,647.49**	**25,006.19**
10.	(a) Dividend Payable to General Revenues[116]	581.47	1,640.30	2,973.84	3,325.76	3,007.38	3,286.83	3,892.81	4,238.93
	(b) Payment of Deferred Dividend	..	..	50.00	300.00	483.30	663.00	663.00	664.00
	Total Dividend Payment	**581.47**	**1,640.30**	**3,023.84**	**3,625.76**	**3,490.68**	**3,949.83**	**4,555.81**	**4,902.93**
11.	**Cash Surplus after Dividend [9 - 10]**	**4,208.03**	**4,646.28**	**5,559.41**	**5,926.51**	**7,553.55**	**10,929.30**	**16,091.68**	**20,103.26**
12.	Appropriation to D.R.F. along with interest	2,305.43	2,024.49	2,482.11	2,742.83	2,893.29	3,843.06	4,445.73	5,703.17
13.	Appropriation to Development Fund along with interest	744.98	449.50	553.85	748.99	1,943.96	2,039.46	2,128.53	2,629.64
14.	Appropriation to Capital Fund along with interest	1,118.30	1,365.95	1,842.81	1,687.46	1,671.43	4,086.32	8,541.14	11,592.83
15.	Appropriation to Railway Safety Fund	..	302.74	..	..	132.46	67.54	..	..
16.	Appropriation to Special Railway Safety Fund	..	455.10	602.51	631.57	779.16	748.60	817.66	..
17.	Open Line Works - Revenue	35.26	31.53	28.32	33.24	37.56	42.80	51.07	46.79
18.	**Net Investible Surplus [12 to 17]**	**4,203.97**	**4,629.31**	**5,509.60**	**5,844.09**	**7,457.86**	**10,827.78**	**15,984.13**	**19,972.43**

[116] Default in the payment of dividend to the Government of India in 2001 and 2002 was 1,823 and 1,000 crore rupees (US $424 million and US $233 million) respectively.

Annex 8. Detailed Financial Results

The data presented here does not reflect the changes in the Railways' accounting method[117] that occurred between 2005 and 2008. Instead for each year, the data reflects the accounting practice prevalent in that year. For comparable data refer Annex 7, *Statement of Cash and Investible Surplus*.

Note: (1) All amounts in crore rupees; (2) * Includes Safety Surcharge Collection.; (3) **Excludes transferred to Deferred Dividend Liability Account.

		2001	2002	2003	2004	2005	2006	2007	2008
1.	**a. Capital-at-Charge**	**32,662**	**36,758**	**40,709**	**45,672**	**48,957**	**53,062**	**58,145**	**63,981**
	b. Investment From Capital Fund	10,390	10,390	10,390	10,390	10,390	12,816	17,886	24,540
	c. Investment in Metropolitan Transport Projects	2,999	3,280	3,593	3,944	4,264	4,476	4,728	5,130
	d. Investment in National Projects	..	..	..	..	1,888	2,888	3,738	4,634
	Total	**46,051**	**50,428**	**54,692**	**60,006**	**65,499**	**73,242**	**84,496**	**98,285**
2.	**Traffic Receipts**								
	a. Passengers	10,515	11,196	12,575	13,298	14,113	15,126	17,225	19,844
	b. Other Coaching	764	872	988	922	990	1,152	1,718	1,800
	c. Goods	23,305	24,845	26,505	27,618	30,778	36,287	41,716	47,435
	d. Sundry Other Earnings	703	945	1,080	1,004	1,157	1,839	1,712	2,565
	e. Total Earnings (a to d)	**35,288**	**37,858**	**41,148**	**42,842**	**47,038**	**54,404**	**62,371**	**71,645**
	f. Suspense	-407	-21	-80	63	332	87	361	75
	g. Gross Traffic Receipts (e+f)	**34,880**	**37,837**	**41,068**	**42,905**	**47,370**	**54,491**	**62,732**	**71,720**
2.	Miscellaneous Receipts	1,130	1,520*	1,673*	2,006*	1,676*	1,824*	2,054*	1,557
3.	**Total Receipts**	**36,010**	**39,357**	**42,741**	**44,911**	**49,046**	**56,315**	**64,786**	**73,277**
4.	Ordinary Working Expenses	27,534	28,703	29,684	30,637	33,389	35,030	37,433	41,033
5.	Appropriation to Depreciation Reserve Fund	2,301	2,000	2,402	2,593	2,700	3,604	4,198	5,450
6.	Appropriation to Pension Fund	4,832	5,590	5,940	6,253	6,670	6,940	7,416	7,979
7.	**Total Working Expenses (4 to 6)**	**34,667**	**36,293**	**38,026**	**39,483**	**42,759**	**45,574**	**49,047**	**54,462**
8.	Miscellaneous Expenditure	272	727	885	950	1,014	2,736	1,286	480
9.	**Total Expenses (7 + 8)**	**34,939**	**37,020**	**38,911**	**40,433**	**43,773**	**48,310**	**50,333**	**54,943**
10.	**NET REVENUE (3 - 9)**	**1,071**	**2,337**	**3,830**	**4,478**	**5,273**	**8,005**	**14,453**	**18,334**
11.	Dividend Payment to General Revenues	308 **	1,337**	2,665	3,087	2,716	3,005	3,584	4,239
12.	Payment of Deferred Dividend	..	..	50	300	483	663	663	664
13.	**Total Dividend payment (11 + 12)**	**308**	**1,337**	**2,715**	**3,387**	**3,199**	**3,668**	**4,247**	**4,903**
14.	**Excess / Shortfall (10 - 13)**	**763**	**1,000**	**1,115**	**1,091**	**2,074**	**4,337**	**10,206**	**13,431**
15.	Appropriation to Development Fund (including interest)	732	449	550	730	1,842	1,853	1,880	2,359
16.	Appropriation to Capital Fund (including interest)	31	248	..	..	..	2417	8326	11072
17.	Appropriation to Railway Safety Fund	..	303	..	..	132	67	..	
18.	Appropriation to Special Railway Safety Fund	..	..	565	361	100	..	..	

[117] For instances, the criteria to allocate lease charges was revised in 2006. Similarly, other accounting changes were introduced in 2007 and 2008.

19.	**OPERATING RATIO (7/2e)**	98.3%	96.0%	92.3%	92.1%	91.0%	83.2%	78.7%	75.9%
20.	Ratio of Net Revenue to Capital-at-Charge and investment from Capital Fund (10/(1a+1b)	2.5%	5.0%	7.5%	8.0%	8.9%	15.4%	19.0%	20.7%

Annex 9. Break-up of Actual Plan Expenditure

Note: All amounts in crore rupees.

Plan heads	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008 provisional**
i) Socio economic projects								
New Lines (Construction)	701	860	1315	1493	1690	1991	2488	2667
Gauge Conversion	454	686	812	1164	1121	1242	2136	3022
Metropolitan Transport Projects	263	281	312	351	317	212	253	401
Total (i)	1418	1827	2438	3008	3128	3444	4878	6090
Percentage of total plan expenditure	15	18	21	22	20	18	20	21
ii)Throughput enhancement and other plan expenditure								
Doubling	524	600	578	532	488	687	1202	1671
Traffic Facilities & Computerization	204	240	234	273	373	484	744	944
Rolling Stock & Leased Assets	3639	3056	3479	3784	4541	6623	8060	9506
Track Renewal, Road Safety Works-LCs, ROBs/RUBs	1781	2024	2660	2948	3645	3486	4156	3568
Signalling and Telecommunication Works	350	369	551	690	818	1043	1179	1343
Electrification Projects & Other Electrical Works	395	367	367	268	272	233	452	709
Passengers Amenities	136	169	175	181	223	256	408	668
Other Plan heads	947	1524	927	1709	1935	2583	3923	4181
Total (ii)	7977	8350	8970	10386	12294	15394	20124	22590
Percentage of total plan expenditure	85	82	79	78	80	82	80	79
Total Plan Expenditure (i) and (ii)	9395	10177	11408	13394	15422	18838	25002	28680

Annex 10. Excerpts on sustainability, Minister's budget speech (2007–2008)

Part 1, February 26, 2008.

Vision 2025

Paragraph 62. The financial turnaround of the Railways has been achieved by thinking beyond the beaten path, taking innovative decisions in commercial, operational and pricing policies and through cross functional cooperation and coordination. For making this magical turnaround durable, we will prepare a Railway Vision 2025 Document within the coming six months which will present new ideas and initiatives in a novel manner. This shall outline our preparedness and strategies for the future. This document will set forth the target for the coming 17 years in the field of operational performance and quality of service. It will also detail an action plan for achieving the stipulated targets and necessary investment plans thereof. This document will also contain details of customer-centric modern passenger services and various freight schemes to sharpen the competitive edge of Railways. This will have a blue print of an organization that encourages trans-departmental decision making to take the Railways to unprecedented heights. Route-wise planning would be done to reduce traffic bottlenecks, expand the network and modernize the Railways. The passenger services will be governed by two words 'comfort and convenience'. The buzz word in freight business will be 'commitment and connectivity'. All these efforts will lay a solid foundation for a resurgent Railway. This document will inspire the Railway management and its employees to do new experiments, and will be like a guiding light for the future generation (p. 21–22).

Innovation Promotion Group

Paragraph 63. During the last four years passion for creativity and risk taking has led to the magical turnaround of the Railways. In the 21st century, the business scenario is changing fast at the speed of light. It is necessary to make coordinated efforts to face the new challenges and to imbibe new technique and thoughts. Therefore, we have decided to set up a multi-departmental innovation promotion group in the Railway Board. All Railway employees and citizens of the country, will be able to send their innovative suggestions to this group. This group will be provided with appropriate facilities and resources for innovation (p. 22) .

Strategic Business Unit

Paragraph 64. The last four years have seen a rise in Railways' share in transportation of steel, cement, coal etc. To maintain this progress, we have decided to set up a strategic business unit in Railway Board for coal, cement, steel and container traffic to facilitate timely settlement of all problems of our clients through a single window system. This unit will be appropriately empowered for taking full advantage of emerging business opportunities and improving Railways' competitiveness in the market (p. 22).

Information Technology Vision 2012

Paragraph 65. In order to make improvements in operational efficiency, bring transparency in working and provide better services to the customers, Railways are trying to bring about radical changes in Railway technology systems and processes. For achieving these objectives, attention is being focused on I.T. applications in three core areas namely freight service management, passenger service management and general management. For getting maximum benefit in the coming years, the mantra for present and future I.T. applications would be seamless integration. The Railways nationwide communication infrastructure will provide the foundation for a common delivery network and platform. Modern

technologies like GIS, GPS and RFID will be applied progressively. A centralized information system will not only be useful for the customers but also for the organization as well. The customers will have accurate, fast and on-line access to information on various subjects. For the customer it would result in superior experience with improvements in overall efficiency, safety of Railway operations, ease of transactions and value added services like infotainment, on-board television and knowledge kiosks with internet facilities. For the organization, planning and deployment of resources would become much easier with a panoramic view of assets and this would have a multiplier effect on productivity, organizational efficiency and staff satisfaction. The Vision for I.T. would be implemented over the next 5 years (p. 23).

Part 1, February 26, 2007.

Railways' New Profile - 11th Five year plan

Paragraph 35. The year 2007–08 is the first year of the 11th Five year plan. Sir:

Ho Izaazat to karun bayan dil apna, Sanjon rakkha hai maine rail ka ek sapna(Sir, if you allow me, I would like to share with you my vision for the Indian Railways, p. 11).

Paragraph 36. The Railways are targeting a freight loading of 1100 million tonnes and passenger traffic of 840 cr by the terminal year of the 11th Five year plan. In order to make this unprecedented growth a reality, it is absolutely essential that in the next few years the Railways' transport capacity be expanded and doubled, unit cost be brought down by playing the volume game and customers be provided world-class services (p. 12).

The quantum jump in Investment

Paragraph 37. During the 11th Five Year Plan, we will invest many times more as compared to earlier plans. There is no readymade investment policy for a vast network like the Indian Railways. The growing demand for transportation can only be met through a harmonious blend of short term and long term policies. Our short term policy of investing in low cost high return projects has been successful in eliminating network bottlenecks and in ensuring effective utilization of rolling stock. Alongside a twin mid-term and long-term investment strategy will be adopted to enhance productivity through, modernization and technological upgradation on the one hand and enhancement of capacity of the network and rolling stock on the other (p. 12).

Paragraph 38. Construction of the Eastern and Western Dedicated Freight Corridors will start in the year 2007–08. These will be completed during the 11th Five Year Plan at a cost of about Rs. 30,000 crores. Even though the Golden Quadrilateral and its diagonals constitute 16% of the rail network, more than 50% of the traffic moves on these routes. As these routes are super-saturated, I have given directions for conducting of pre-feasibility surveys for construction of East-West, East-South, North-South and South-South corridors. My dream is to construct these corridors in a manner that they develop into efficient and economical trunk routes for speedier, longer, heavy-haul trains. After completion of the freight corridors, the problem of passenger and goods trains running on the same network at different speeds will be solved and most of the level crossings would be converted into ROBs. Where possible ordinary passenger trains running on these routes will be replaced by MEMU and DEMU trains. This will facilitate increase in the speed of passenger trains (p. 12).

Gauge Conversion

Paragraph 39. Sir, on account of partial gauge conversion on various routes of the Railway network, the remaining metre and narrow gauges have become like islands. Cut off from the main network, these

lines give the Railways less than 1 per cent freight traffic whereas they still constitute 20 per cent of the total network. As a result Railways are losing thousands of crores of rupees annually. Even freight traffic has become a losing proposition on these lines. Therefore we will make all efforts to convert the majority of the metre gauge lines to broad gauge during the 11th Five Year Plan. Priority will be given to accord approval for execution of projects which will serve as alternate routes on the network; significant among these are Udaipur-Ahmedabad, Lucknow-Sitapur-Pilibhit-Shahjehanpur, Dhasa-Jetalsar, Jaipur-Sikar-Churu-Jhunjhunu, Ratlam-Khandwa-Akola, Chhindwara-Nainpur and Ahmedabad-Botad. Projects where the State Governments contribute 50 per cent of the total cost would also be given priority in sanction and implementation. Gauge conversion will facilitate integrating the remote and far-flung areas of the country with the national main-stream. Integration with the unigauge network and consequent increase in traffic and reduction in unit cost of these lines will reduce losses being incurred on these lines (p. 13).

Construction of High Speed Passenger Corridor

Paragraph 40. Sir, India is today seen as a rising power in the world. The rapid growth of the economy, rising industrialization and urbanization and unprecedented growth in intercity travel, has opened infinite possibilities for developing high speed passenger corridors. Hon'ble Prime Minister while laying the foundation of the Western Dedicated Freight Corridor had expressed the hope that the Indian Railways would also develop world class passenger systems. Therefore, we have decided to conduct pre-feasibility studies for construction of high speed passenger corridors, equipped with state of the art signaling and train control systems, for running high speed trains at speeds of 300 to 350 kms per hour; one each in the Northern, Western, Southern and Eastern regions of the country. These trains will cover distances of up to 600 kms in two to three hours. All alternatives including Private Public Partnership will be considered for implementation of these corridors. Global warming and changing climatic conditions are a world wide concern today. These energy efficient and environment friendly systems would go a long way in alleviating these concerns (p. 13).

Suburban Service

Paragraph 41. Suburban services are the lifeline of our nation's commercial capital Mumbai. To mitigate the overcrowding of Mumbai's trains, enhancement in capacity of these services will have to be undertaken during the 11th Five Year Plan. During this plan period MUTP-Phase I will be completed. The work on Phase II costing Rs.5,000 crore is also proposed to be started. Financing of the Rs.5,000 crore MUTP Phase II project will be done with the participation of Railways, State Governments and multi-lateral funding institutions. All out efforts will be made to complete both these phases within the 11th Five Year Plan so that suburban services and long distance trains are completely segregated. This will enhance their capacity by 56 per cent. Ongoing works on suburban services in Kolkata and Chennai will also be completed on priority basis. During the 11th Five Year Plan efforts will be made to introduce air-conditioned class services in suburban trains in Mumbai, Chennai and Kolkata and escalators at major stations (p. 14).

Rolling Stock Modernization and Capacity Augmentation

Paragraph 42. In view of the demands of growing traffic, along with expansion of network, availability of rolling stock will be increased through effective utilization of available rolling stock, technical upgradation and modernization and by setting up new production units. During the 11th Five Year Plan production of rolling stock will be doubled as compared with the previous Plan. Capacity of existing rail coach and loco production units will be enhanced through expansion of these units. High horse power, energy efficient locomotives with new technology will also be produced. During this plan, production of MEMU, DEMU and EMU coaches will also be stepped up. One new factory each for rail coaches, diesel

locomotives, electric locomotives and wheels will also be established. The locomotives to be manufactured in these units will be equipped with state of the art technology and will be capable of hauling longer, heavier high axle load trains. The new Rail Coach Factory will produce high capacity, modern and comfortable coaches. Similarly production of 32 tonne axle load, higher pay load lower tare weight and track friendly wagons will start for the new Dedicated Freight Corridors (p. 14).

Use of IT in the Railway services

Paragraph 43. In the XI five year plan, investment in I.T. projects will be increased to several thousand crore rupees to harness the immense possibilities offered by I.T. in the interest of Indian Railways. I.T. applications will be deployed to increase passenger and freight earnings, improve the image of the Railways in the eyes of the customer, reduce operating costs, ensure effective utilization of human and physical resources and to help the top management in arriving at long-term policy decisions by developing MIS & LRDSS. A commercial portal will be developed in the next 3 years for yield management, specially to attract traffic for returning empties and filling up vacant seats. All modules of FOIS including rolling stock maintenance and examination, revenue apportionment, crew management, control charting COIS etc. will be integrated and implemented in a time bound manner for completion by 2010. Alongside ERP packages will be implemented in workshops, production units and selected zonal Railways. A common website integrating the more than 50 different web-sites of Railways will be developed with built in facilities like e-payment and e-tendering. For an integrated approach in I.T., CRIS will be entrusted with coordination of all IT applications of the Railways and for development of a comprehensive vision on IT. CRIS will be developed as an autonomous and empowered organization, drawing officers from various Railways services. Indian I.T. companies have hoisted the national flag all over the world. We invite these companies to take part in various IT projects of the Railways under public private partnership (p. 14–15).

Railway Electrification

Paragraph 44. The electrified network will be extended over the Golden Quadrilateral and its diagonals, and in all directions from Kashmir to Kanniya Kumari and Guwahati to Amritsar by the end of the 11th Five Year Plan. Electrification of Thiruvananthapuram-Kanniya Kumari, Thrichur-Guruvayur, Tiruchirapalli-Madurai, Barabanki-Gorakhpur-Barauni-Katihar-Guwahati and Jallandhar to Baramullah sections will be completed during the 11th Five Year Plan. In the first phase, electrification of Jalandhar - Jammu, Barabanki-Gorakhpur-Barauni and Tiruchirapalli-Madurai sections are proposed to be taken up in 2007-08. Similarly, doubling and electrification of Pune-Wadi-Guntkal and electrification of Daitari-Banspani, Haridaspur-Paradeep new lines will be undertaken by Indian Railways' Public Enterprise RVNL in the coming years (p. 15).

Public Private Partnership Schemes

Paragraph 45. Investments at a much larger scale will be required for the above mentioned capacity and expansion network as compared with the provision made in the Tenth Five Year Plan. The funding of this plan of several lakh crores would require multi-source approach based upon deployment of internal resources, market borrowing, public private partnership and budgetary support. The improved financial performance of the Railways will enable a large share of the financing to be met from internal and external budgetary resources. I am not in favour of blind privatization of the Railways nor is PPP a compulsion or fashion for us. We are seeking partnership with the private sector on the terms that are in the interest of Railways and our customers. For example, by leasing out catering and parcel services we have reduced our catering and parcel losses of more than a thousand crores. We have enhanced our capacity by attracting private investments in the wagon investment schemes and siding liberalization schemes etc. Even while retaining the core activity of train operations, we have awarded licenses to

private parties for running container trains, which is likely to attract investment of thousands of crores in wagons and construction of terminals over the next few years. We want to have many more such PPP Schemes where one and one make eleven and not two. Public Private Partnership options will be explored with the aim of modernization of metro and mini-metro stations with world class passenger amenities, development of agro retail outlets and supply chains, construction of multi-modal logistic parks, warehouses and budget hotels and expansion of network and increase in production capacity. We have constituted a PPP Cell which will develop the policy framework to provide non-discriminatory level playing field to investors, prepare the bankable documents and set up the procedure for awarding partnerships through open tendering system (p. 15–16).

Railway Safety

Paragraph 46. Railway safety is our prime concern. I am glad to inform the House that funds for replacement of overaged Railway assets are now provided as soon as the assets become due for replacement. Sir, we have allocated Rs.5,500 crore towards Depreciation Reserve Fund for the year 2007-08 as compared to Rs.2,100 crore provided in 2001-02. This has had a direct impact on Railways' safety record. Although the gross traffic volume has increased from 724 Million train kilometers in 2001-02 to 825 Million train kilometres in 2005-06, the number of accidents is expected to be less than 200 in 2006–07 against 473 in the year 2001 (p. 16).

Organizational and Human Resource Development

Paragraph 56. Railways will have to develop a strong management team in which players play, not for themselves, but for the success of the team to tackle complex situations of the competitive market and to fulfill the growing expectations of its customers. A decision in the matter would be taken by December 2007, after evolving a consensus through dialogue with representatives of all Railway services and based upon recommendations of different expert groups constituted so far. The institutions of GMs, DRMs and CAO (Construction) would be strengthened and developed as profit centre, business unit and project unit respectively by suitable empowerment (p. 19).

Paragraph 57. Sir, Railway employees and officers require training at periodical intervals in view of rapid changes in the underlying economic and competitive environment. We have, therefore decided that Railway officials will be sent on training to reputed national institutions once every five years and for foreign training every ten years. Officers would have to undergo a mandatory training before promotion to JA, SA and HA grade (p. 19).

Paragraph 58. The Railway Staff College Building in Vadodara will be renovated in consultation with renowned architects in such a way that its old elegance and splendor is retained even while it is equipped with all modern amenities. Rail Bhawan would be made centrally air-conditioned and a building equipped with modern facilities (p. 19–20).