



## Indian Railways in the Past Twenty Years Issues, Performance and Challenges

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## Abstract

Indian Railways (IR) is Asia's largest and world's second largest network under one management, with a separate Ministry and its own annual budget. The network carried about 17 million Passengers and 2 mt freight every day on the route of 63,327 km (2006-07). Although key business operations are freight and passenger, IR is also engaged in several allied services including parcel, catering and production units.

Nearly 70 percent of IR's revenues come from the freight operations, which can be segmented into bulk and other cargo. Over the years, IR has predominantly become a bulk freight carrier, accounting for about 94 percent of the freight revenue. Coal alone accounts for nearly half of the bulk traffic carried. Passenger business accounts for nearly 60 percent of IR's total transport effort, in terms of train kilometers, but yield less than 30 percent of the total revenues. Suburban services account for 57 percent of the originating passengers, while contribute to only 8 percent of the passenger revenue.

To understand the development process of IR's over the past twenty years, the study covers issues and strategies related to financial and physical aspects of revenue generating freight and passenger traffic from 1987-2007. Study also covers the developments in the parcel, catering and advertising sector.

# Indian Railways in the Past Twenty Years Issues, Performance and Challenges<sup>1</sup>

## 1 Introduction

The Indian Railways (IR), more than 150 years old, is among one of the largest and oldest railway systems in the world. It has an extensive network, and played an integrating role in the social and economic development of the country. IR is a principal mode of transportation for long haul freight movement in bulk, long distance passenger traffic, and mass rapid transit in suburban areas. It occupies a unique position in the socio-economic map of the country and is considered as a vehicle and a barometer of growth. It is also the biggest state owned enterprise in India, and contributes about 1% of India's GNP.

### Objectives

The objectives of this paper are

- strategic assessment of rail sub-sector from 1987 to the present
- focus on the trends in sub-sector performance and key issues for the period, including consideration of changing public and private roles.

### The IR System

IR is state owned and operated under Ministry of Railways (MOR), Government of India (GOI). IR's finances were separated from the general exchequer in 1924 based on Ackworth Committee report and its annual requirement for funds is voted through a separate budget presented to the Indian parliament.

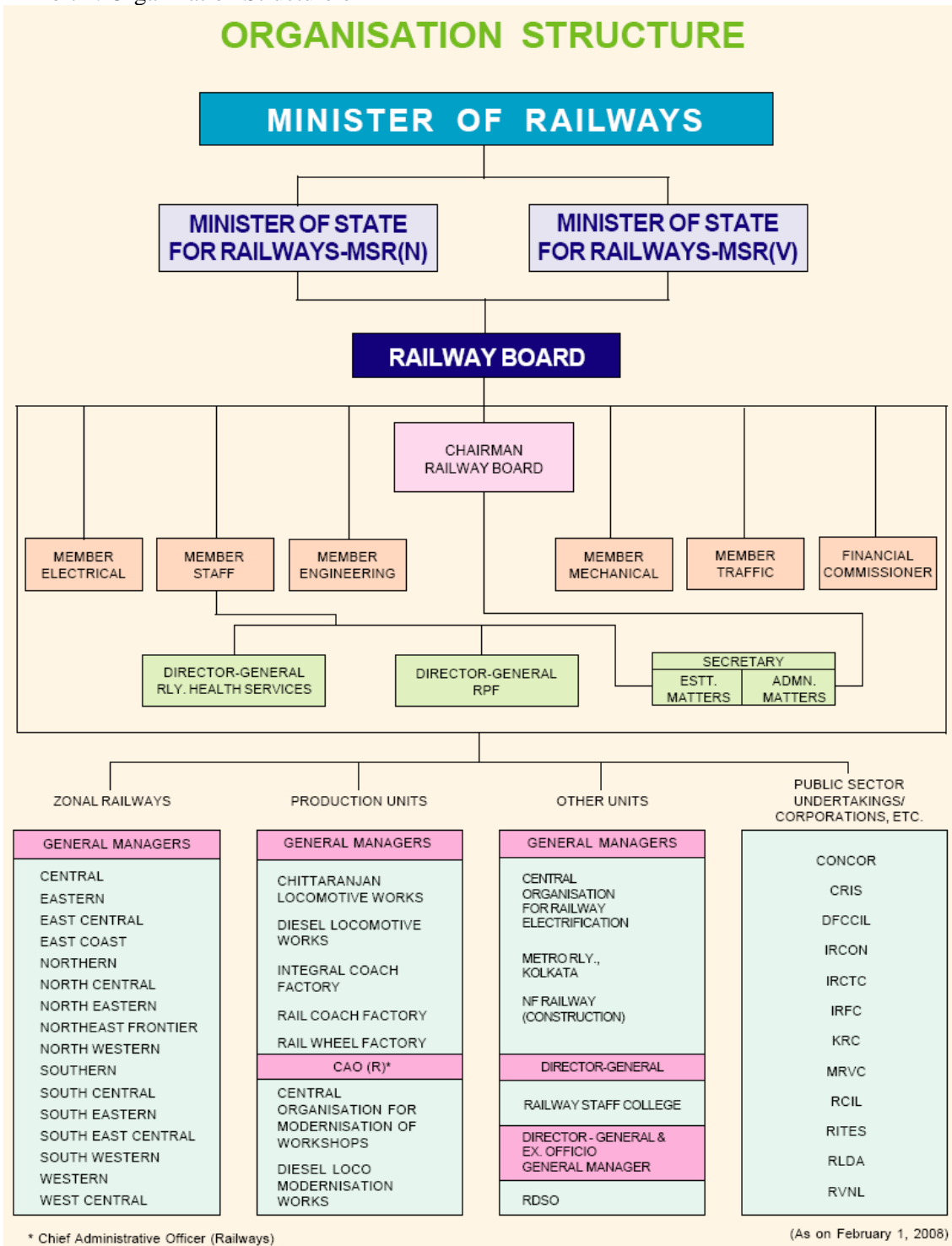
The MOR functions under the guidelines of Minister for Railways assisted by Minister of State for Railways. The policy formation and management of Indian Railway Board comprises of Chairman and six functional members (Exhibit 1). Wide powers are vested in the Board to effectively supervise the running of 16 zonal railways, metro railway (Calcutta), production units, construction organization and other rail establishments. These are generally headed by General Managers. 12 subsidiary organizations under the MOR namely CONCOR, CRIS, DFCCIL, IRCON, IRCTC, IRFC, KRC, MRVC, RCIL, RITES, RLDA, and RVNL undertake specialized jobs contributing to IR's growth and progress. IRCON and RITES have their business abroad also.

IR is a vertically integrated organization controlling its own facilities, performing all operating and administrative functions and unilaterally determining what services to provide. In addition to carrying out the core business of rail transport, IR also owns and manages activities such as design and manufacture of rolling stock, overhaul and remanufacture of rolling stock, construction projects, schools, technical institutes, housing, hospitals, hotels etc. IR supports a work force of about 1.4 million constituting 5% of the 27 million people employed in the organized sector. They are governed by central government rules for salary and other conditions of service. Another 0.7 million employees are supported indirectly through establishments servicing IR.

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<sup>1</sup>This paper was prepared as inputs for the ADB study titled "Selected Evaluation Studies for 2005: SAPE for the Transport Sector in India." We thank ADB for the support provided.

Exhibit 1: Organization Structure of IR

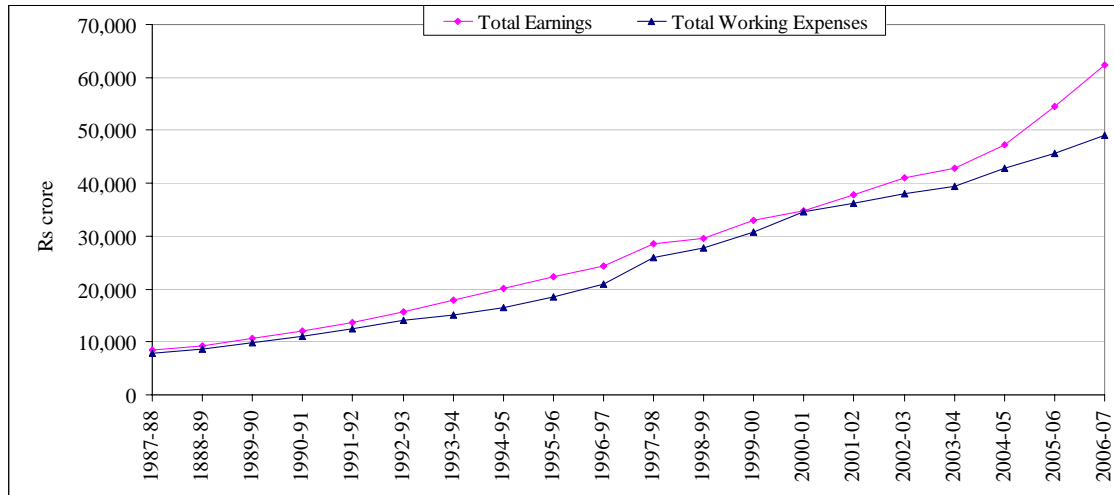


[MOR, 2008, Annual Report & Accounts 2006-07]

### Performance Review (1987-88 to 2006-07)

The trend of IR total earnings and total working expenses are shown in Exhibit 2. The good years were between 1993-94 to 1995-96, after which the expenses caught up with the revenues until 2000-01, when the net revenue shrunk to a little over Rs 1000 crores. The situation started improving steadily to reach an actual net revenue of over Rs 14,000 crores in 2006-07, for a total earnings of Rs 62,731 crores. The increase in net revenue is attributed significantly due to better utilization of freight rolling stock and partly due to change in accounting practice, wherein principal payments towards rolling stock have been capitalized.

Exhibit 2: Total Earnings and Total Working Expenses

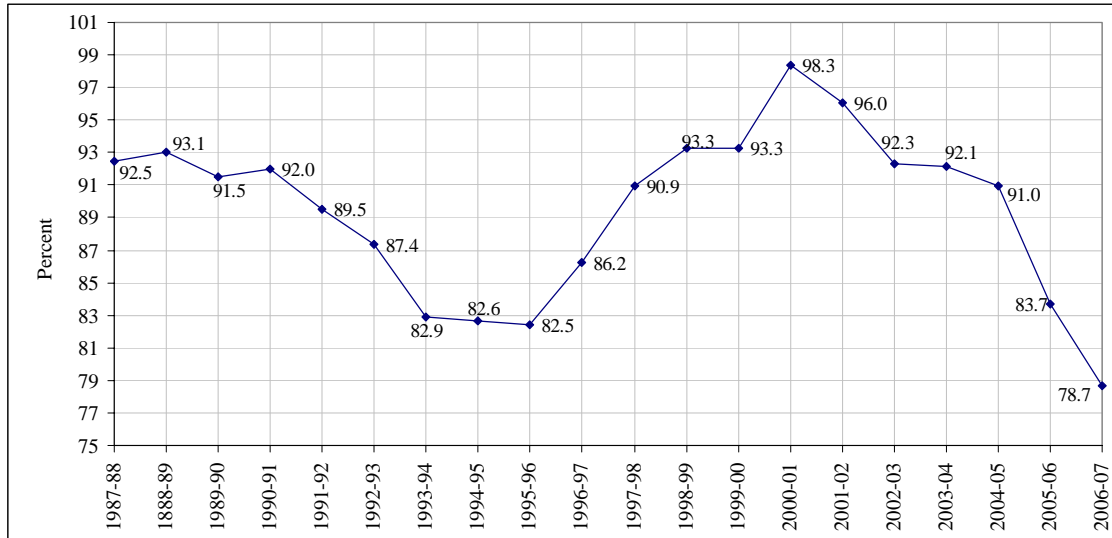


[MOR, Various Years-a]

Based on the ratio of total working expenses to total earnings, a parameter called the operating ratio is assessed as a percentage. Exhibit 3 presents the operating ratio since 1987-88.

The operating ratio had reached a peak of 98.3 in 2000-01, reflecting a relatively poor performance. After that, it had reduced year on year till 91.0 in 2004-05. It dropped sharply to 78.7 in 2006-07. (As stated above, this was both due to better utilization of rolling stock and changes in accounting practice.)

Exhibit 3: Operating Ratio of IR

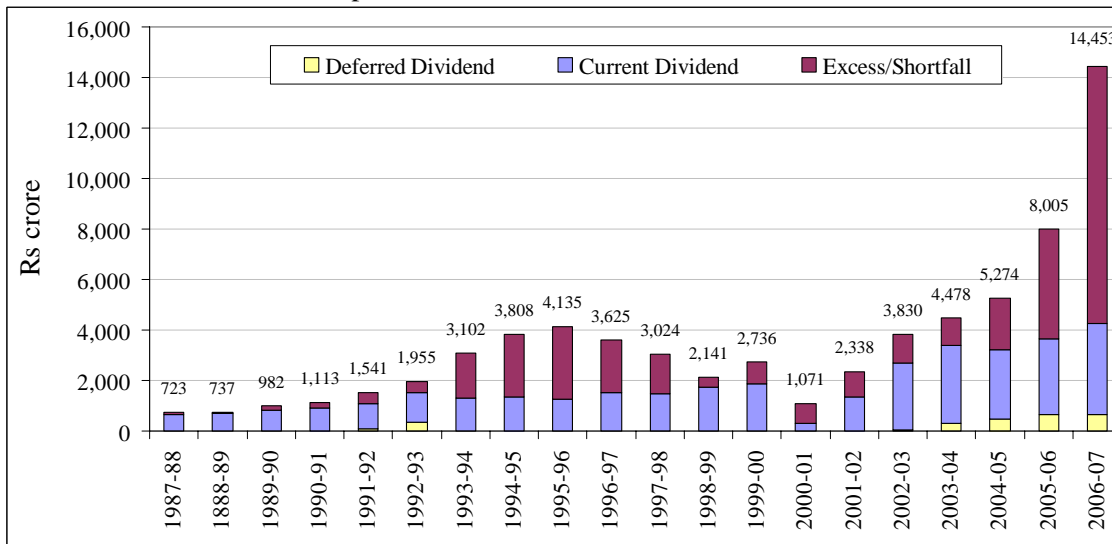


[MOR, Various Years-a]

The net revenue receipts are then appropriated for dividends payable to the government of India and into various capital funds. Exhibit 4 gives the dividends paid out of the net revenues, including when the payment was due to deferred dividends. As can be seen, the deferred dividend payments have happened in the “good” years, which have followed the “bad” years when the IR would have sought deferment of the dividend.

The deferred dividend liability from 1978-79 onwards aggregated to Rs 428.43 crore by end of March, 1990. The amount was cleared by 1992-93. The dividend payable in 2000-01 and 2001-02 worked out to be Rs 2,131 crore and 2,337 crore respectively, out of which Rs 1823 crore and Rs 1000 crore respectively have been transferred to a deferred dividend liability account.

Exhibit 4: Net Revenue Receipts



[MOR, Various Years-a]

## 2 Financing of Railways

### Sources of Funds for Plan Outlay

Funds for Plan Outlay are broadly from five sources as under [CRISIL, 2005]:

- internal revenue generation
- the general exchequer
- borrowings from the domestic and international markets
- safety funds from the general exchequer and surcharge
- state governments and special purpose vehicles

### Internal Revenue Generation

After providing for ordinary working expenses, the balance left over from traffic receipts is appropriated to several funds. Of these relevant for Plan Outlay are the Depreciation Reserve Fund, Railway Capital Fund and Development Fund.

#### *Depreciation Reserve Fund (DRF)*

DRF was created when railway finances were separated from general finances in 1924. Cost of replacements of assets is charged to the DRF, which again is made up through amounts credited from revenues year to year. The contribution of DRF to Plan Outlay is given in Exhibit 5.

Exhibit 5: Contribution from the DRF to Plan Outlay (1985-04)

Period	Seventh Plan (1985-1990)	Annual Plans (1990-1992)	Eighth Plan (1992-1997)	Ninth Plan (1997-2002)	Tenth Plan (2002-07)
Percentage	38.5	37.4	32.6	22.78	16.43

[CRISIL, 2005]

Reasons for the downward trend are due to replacements being financed in recent years from borrowings made through IRFC and the Special Railway Fund set up in October 2001. Another major reason is deficiency in the existing system of accounts. A major portion of the DRF is utilized for replacements of track and rolling stock.

#### *Railway Capital Fund (CF)*

CF came into operation from 1992-93 as a result of a recommendation of the Railway Convention Committee. Appropriation to the Fund again is from revenue surplus, to be used to finance expenditure on assets of capital nature. Investments from CF upto 2002-03 were Rs 10,390 crores, primarily on gauge conversions.

#### *Development Fund (DF)*

DF is meant to finance schemes that are not remunerative, such as for investments towards passenger amenity and staff welfare works, or schemes required to fulfilling a statutory obligation. Overall, very few remunerative schemes get financed from the DF. Similar to the DRF, DF too gets recouped annually from revenues. The share of DF in Plan Outlay has remained at about 5% and is not very significant for present discussion.

#### *Open Line Works Revenue (OLWR)*

Another fund is the Open Line Works Revenue (OLWR) meant for execution of works of small value. Appropriation has been of the order of Rs 35 crores for many years, too small to merit any further examination.

### **The General Exchequer**

Funds made available from the general exchequer are used for acquisition of new assets such as construction of new railway lines, doublings, and gauge conversions required on consideration of logistics, railway electrification and additional rolling stock. The term normally used by the IR for such funding is Budgetary Support or Capital. IR is required to pay a dividend on such capital, subject to certain exemptions and at rates fixed from time to time by the Railway Convention Committee. The current rate is fixed at 7%.

Budgetary Support as a percentage of Plan Outlay was substantial and hovered between 33% to 75% during the period 1951-93. A steep decline then took place up to 1996-97, when the percentage remained at around 18%. This temporary withdrawal from financing rail infrastructure by the Government had an adverse impact on rail transport, creating capacity constraints. Funding from the General Exchequer has since then gone up again and was about 25% in 2006-07.

### **Borrowings from the Domestic and International Markets**

Severe reduction in the Budgetary Support necessitated the IR to set up the Indian Railway Finance Corporation (IRFC) in 1986 to borrow funds from the capital market for the acquisition of additional rolling stock. IR pay lease charges to IRFC for this purpose. This arrangement has of late been used even for replacements, when the appropriation to DRF was inadequate.

Borrowings as a percentage of Plan Outlay averaged 17% in the Eighth Five Plan, went up to 28% in the Ninth Five Year Plan and was about 20% in the Tenth Five Year Plan. Lease charges as a percentage of the ordinary working expenses is 11%, the third highest after staff and fuel costs.

There is a second component of market borrowings. IR pursued such schemes as Own Your Wagon, Build Own Lease and Transfer and Build Operate and Transfer. Being not very successful, these are no longer a major source for Plan Outlay. For the resources raised in the past, lease charges are being paid.

### **Safety Funds from the General Exchequer and Surcharge**

Based on the recommendations of the Khanna Committee, IR created a Special Railway Safety Fund of Rs 17,000 crores in October, 2001. The fund is exclusively used for liquidating the arrears of replacements of over-aged assets like track, bridges, rolling stock and signaling gear within a time frame of six years and has substantially contributed towards Plan Outlay as shown in the Exhibit 6.

Exhibit 6: Contribution of Special Railway Safety Fund towards Plan Outlay

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Amount (Rs crore)	1434	2486	2584	3678	2783	1955
% of Plan Outlay	14.09	21.79	19.29	23.85	14.77	7.82

[MOR, Various Years-c]



One impact of the creation of fund has been lesser allotment to and spend from the DRF by the Railways.

IR operates a second safety fund, termed as Railway Safety Fund. It came into operation from April 01, 2001 and is financed mainly through receipts from the Central Road Fund. It is exclusively used for level crossing related safety works.

### **State Governments and by Setting Up Special Purpose Vehicles**

Some of the Metropolitan Transport Projects are being jointly funded by the State Governments. In addition, Tamil Nadu Government is partly financing a gauge conversion project too. Contributions from the State Governments are not reflected in Plan Outlay.

IR have also followed the route of setting up corporations with initial capital and then seeking funding through private participation, from multilateral agencies, State Governments and other financial agencies. Pertinent examples include KRC, MRVC, PRCL, and RVNL.

A few non-conventional sources of revenue are also being tapped to supplement the internal generation of funds, these are [MOCI, 2003]:

- Commercial utilisation of railway land and its surrounding - this envisages identification of certain station building and wagon loads in prime areas for advertisement as station-cum commercial complexes.
- Revenue through commercial publicity, including grant of advertising rights on the wagons and selected passenger trains, advertising rights at level crossing gates and additionally advertising at railway stations.
- Commercial utilisation of the right of way proposed to be achieved by completing a nationwide, broad band telecom and multi media net work by laying optical fiber cables.

### **Review of Five Year Plans (VII - X Five Year Plan)**

IR draws up its development plans within the framework of national Five Year Plans. The share of IR in successive plans is given in Exhibit 7. Exhibit 8 provides a review of the Five Year Plans in the context of IR. The review examines the objectives, allocated budget, actual expenditure, major sub-sector investments and targets, performance measures, significant happenings, and new initiatives.

Exhibit 7: Share of Railways in Successive Plans

	Railways		Transport Sector		Total Plan Outlay
	Rs crores	% of Total Plan	Rs crores	% of Total Plan	Rs crores
Upto VI Plan (1950-85)	11,308	6.7%	24,079	14.2%	169,271
VII Plan (1985-90)	16,549	7.6%	29,548	13.5%	218,729
VIII Plan (1992-97)	32,396	6.7%	65,173	13.4%	485,457
IX Plan (1997-02)	45,725	5.6%	117,563	14.4%	813,998
X Plan (2002-07)	60,600	4.0%	225,977	14.8%	1,525,639

[MOR, 2006, Year Book 2004-05]

### XI Plan Outlay

The X Plan laid emphasis on capacity expansion through modernization and technology, improvement in quality of service (especially safety) and tariff rationalization. The last two years of the plan have shown significant progress due to a major focus on improving asset utilization.

The main objective in the Eleventh Five-Year Plan is creation of adequate transport capacity to handle the medium-term and long-term projected growth of both passenger and freight traffic and provide improved services to both segments. Capacity is required to be augmented significantly not only over the network but also in the rolling assets. It is important to note that most of the major network capacity addition will come into fruition in time for the Twelfth Plan rather than the Eleventh Plan. The major focus during the Eleventh Plan period would therefore be to improve overall productivity, fully exploit the additional capacity created in rolling assets through innovative operations and maintenance practices and undertake strategic low cost investments with short gestation lags [MOR, 2007].

The XI Plan approach paper brings out the following focus areas for the IR [PC, 2006a]:

1. Capacity augmentation, especially Delhi-Mumbai and Delhi-Howrah dedicated freight corridors
2. Establishment of logistic parks and terminals
3. Rationalization of freight structures
4. Increased use of IT enabled services
5. World class quality passenger amenities
6. Public-private partnerships for building and operation of rail infrastructures
7. Design of high capacity wagons
8. Restructuring of IR to focus on core activities
9. Establishing a Rail Tariff Regulatory Authority

The total outlay of Rs 230,000 crores will be financed through Internal Generation to the tune of Rs 75,000 crores, Extra Budgetary Resources of Rs 60,000 crores and Gross Budgetary Support of Rs. 95,000 crores as per table below.

**Sources of Funds**

Rs crore

<b>Total Outlay</b>	<b>Internal Generation</b>	<b>Extra Budgetary Sources</b>	<b>Gross Budgetary Support</b>
230,000	75,000 (33%)	60,000 (26%)	95,000 (41%)

[MOR, 2007]

**Major Investments**

Rs crore

	<b>Plan Head</b>	<b>X Plan</b>		<b>XI Plan</b>	
		<b>Expenditure</b>	<b>Percent</b>	<b>Outlay</b>	<b>Percent</b>
1	New Lines	9,202	10.9	16,000	7.0
2	Gauge Conversion	6,240	7.4	12,000	5.2
3	Doubling	3,461	4.1	13,000	5.7
4	Rolling Stock	26,807	31.7	59,120	25.7
5	Track Renewal	15,363	18.1	24,885	10.8
6	Investments in PSU's	3,723	4.4	39,330	17.1
	Total (1-6)	64,796	76.6	164,335	71.5
	<b>Total Investments</b>	<b>84,708</b>	<b>100.0</b>	<b>230,000</b>	<b>100.0</b>

[MOR, 2007]

**Physical Targets**

	2006-07	2011-12
Originating Freight Traffic (mt)	726	1100
Freight ton kms (billion)	469	702
Originating Passengers(million)	6,242	8,400
Passenger km (billion)	700	880

[MOR, 2007]

Exhibit 8: Review of Five Year Plans in Context of IR

	<b>VII Five Year Plan (1985-90)</b>	<b>VIII Five Year Plan (1992-97)</b>	<b>IX Five Year Plan (1997-02)</b>	<b>X Five Year Plan (2002-07)</b>
Objectives	<ol style="list-style-type: none"> <li>1. Development of capacity for freight traffic slightly ahead of demand</li> <li>2. Augmentation of capacity for passenger traffic</li> <li>3. Modernisation of the network</li> <li>4. Replacement of overaged/obsolete assets</li> <li>5. Electrification of high density routes</li> <li>6. Improvement in the quality of service</li> </ol>	<ol style="list-style-type: none"> <li>1. Capacity generation</li> <li>2. Rehabilitation, replacement and renewal of overaged assets</li> <li>3. Modernisation and upgradation</li> <li>4. Adopt unigauge</li> <li>5. Phase out steam locomotives completely</li> <li>6. Electrification of dense corridors</li> <li>7. Upgrade inter-modal operations including containerization</li> <li>8. Improvement of man-power productivity</li> </ol>	<ol style="list-style-type: none"> <li>1. Capacity generation with special emphasis on development of terminals</li> <li>2. Rehabilitation, replacement and renewal of overaged assets</li> <li>3. Modernisation and upgradation</li> <li>4. Unigauge</li> <li>5. Technological upgradation</li> <li>6. Upgrade inter-modal operations including containerization</li> <li>7. Improvement of man-power productivity</li> </ol>	<ol style="list-style-type: none"> <li>1. Strengthening of High Density Network</li> <li>2. Technical upgradation of assets</li> <li>3. Utilizing Information Technology</li> <li>4. Improving safety of operations by replacement of overaged assets</li> <li>5. Rationalising allocation of funds</li> <li>6. Reduction in energy bill</li> <li>7. Mobilisation of additional resources through private/public participation</li> <li>8. Increase share of freight and passenger traffic</li> </ol>
Allocated budget	<b>Rs 12,334 crore</b> , comprising - Budgetary support: Rs 5,550 crore (45%) - Internal Resources: Rs 6,784 crore (55%)	<b>Rs 27,202 crore</b> , comprising - Budgetary support: Rs 5,375 crore (20%) - Market borrowings: Rs 3,000 crore (11%) - Internal Resources: Rs 18,827 crore (69%)	<b>Rs 49,690 crore</b> , comprising - Budgetary support: Rs 14,251 crore (29%) - Market borrowings: Rs 16,618 crore (33%) - Internal Resources: Rs 18,821 crore (38%)	<b>Rs 60,600 crore</b> , comprising - Gross budgetary support: Rs 27,600 crore (45.54%) - Internal Resources & borrowings: Rs 33,000 crore (54.46%)
Actual expenditure	<b>Rs 16,549 crore</b> , comprising - Budgetary support: Rs 6,942 crore (42%) - Bonds: 2,520 (15%) - Internal Resources: Rs 7,087 (43%)	<b>Rs 32,302 crore</b> , comprising - Budgetary support: Rs 7,311 crore (23%) - Market borrowings: Rs 6,161 crore (19%) - Internal Resources: Rs 18,830 crore (58%)	<b>Rs 46,405 crore</b> , comprising - Budgetary support: Rs 16,003 crore (35%) - Market borrowings: Rs 14,581 crore (31%) - Internal Resources: Rs 15,821 crore (34%)	<b>Rs 84,062 crore</b> comprising - Gross budgetary support: Rs 41,212 crore (49.03%) - Internal Resources & borrowings: Rs 42,848 crore (50.97%)
Major sub-sector investments (Actuals)	- Gauge Conversion and Doubling: 10.63% - Track Renewal: 21.64% - Rolling Stock: 31.99% - New Lines: 5.54% - Electrification: 5.81%	- Gauge Conversion and Doubling: 20.04% - Track Renewal: 16.83% - Rolling Stock: 39.82% - New Lines: 4.02% - Electrification: 4.45%	- Gauge Conversion and Doubling: 13.89% - Track Renewal: 17.35% - Rolling Stock: 37.19% - New Lines: 6.28% - Electrification: 3.36%	- Gauge Conversion and Doubling: 11.90% - Track Renewal: 18.86% - Rolling Stock: 27.68% - New Lines: 10.75% - Electrification: 0.99%

Review of sub-sector targets	<ul style="list-style-type: none"> <li>- A major portion of investment is made on the replacement of overaged assets and improving operational efficiency</li> <li>- Almost half of the total allocations of the IR go in for works, not directly linked with increasing capacity of the system</li> </ul>	<ul style="list-style-type: none"> <li>- Replacement of the overaged assets mainly in the area of track and rolling stock</li> <li>- The achievement was far short of the targets in respect of procurement of wagons</li> <li>- The gauge conversion programme recorded significant achievement</li> <li>- The network expansion in terms of new lines was quite marginal</li> <li>- Multi-plexing of track in busy corridors has also been quite modest</li> <li>- electrification of important sections has received adequate attention</li> </ul>	<ul style="list-style-type: none"> <li>- In spite of spending 96% of the allocated amount, gauge conversion and doubling projects achieved only 57% and 40% of the planned targets respectively.</li> <li>- New lines projects achieved 81% target after spending 16% extra amount than allocated.</li> <li>- Electrification works were able to meet the planned targets.</li> </ul>	<ul style="list-style-type: none"> <li>- Track renewal along the Golden Quadrangle was given a priority</li> <li>- New lines projects received an extra focus</li> <li>- In gauge conversion, the thrust was on completing the works that provide connectivity to ports/industry</li> <li>- S&amp;T works, computerisation, user's amenities have received significant attention</li> <li>- Investments in Public Sector Undertakings are increasing</li> </ul>
Wagon utilisation index (BG)	- 1,420 Net ton km per wagon per day in 1989-90	- 1,840 Net ton km per wagon per day in 1996-97	- 2,223 Net ton km per wagon per day in 2001-02	- 3,242 Net ton km per wagon per day in 2006-07
Wagon turn-round (BG)	- 11.3 days in 1989-90	- 8.5 days in 1996-97	- 7.2 days in 2001-02	- 5.5 days in 2006-07
Track utilisation (BG)	- 6.21million Net ton kms per route km in 1989-90	- 6.45 million Net ton kms per route km in 1996-97	- 7.38 million Net ton kms per route km in 2001-02	- 9.67 million Net ton kms per route km in 2006-07
Traffic	<ul style="list-style-type: none"> <li>- Additional freight traffic of 70 mt was carried, in 1989-90 as compared to the year 1584-85. This, in itself, was a remarkable achievement compared to the performance in the past. However, a shortfall of about 11 mt in the targeted traffic of 345 mt was observed mainly on account of less than anticipated offer of coal, foodgrains and steel traffic for movement</li> </ul>	<ul style="list-style-type: none"> <li>- In terms of total standard traffic units (ton Kms + passenger kms) the output increased from 564.8 billion at the beginning of the Eighth Plan to 634.58 billion at the end of the Plan, representing an increase of 12.3% over the five year period i.e. a compound annual growth rate of 2.4 per cent.</li> <li>- There is considerable shortfall compared to the targets set for the</li> </ul>	<ul style="list-style-type: none"> <li>- The IR exceeded the Ninth Plan projection of passengers in terms of passenger km.</li> <li>- Shortfall in originating freight to the extent of 36 mt in the terminal year of Ninth Plan due to the recessionary trends in the economy.</li> </ul>	<ul style="list-style-type: none"> <li>- Increased reliance on internal resources and market borrowings.</li> <li>- New policy initiatives, including private container train operators.</li> <li>- Work on eastern and western routes of the Dedicated Freight Corridor has initiated.</li> <li>- Better utilization of assets and dynamic freight pricing</li> </ul>

	- The incremental originating revenue earning freight traffic went up by 73.6 mt from 236.4 mt to 310 mt, which is equivalent to the increase in the previous two decades.	Eighth Plan both in respect of freight movement and passenger traffic. This was partly accounted for by the sluggish growth in the first two years of the Plan in the core sectors of the economy, which are the mainstay of the railways' bulk freight movement.		
Significant happenings		- 760 km long broad gauge Konkan Railway Project near completion - CONCOR registered a compound annual growth rate of 33% in international container traffic. It reached from 96,000 TEUs in 1991-92 to 400,000 TEUs by 1996-97 - The annual growth for domestic container traffic was registered 90%. Reached from 12,000 TEUs in 1991-92 to 300,000 TEUs by 1996-97	- Mobilisation of internal resources dropped - Steady improvement in the productivity of assets due to improved technology and operational improvements - For the first time in 17 years, in 2000-01 and 2001-02, IR was unable to pay dividend	
New initiatives	- Market borrowings began in 1887-88 - Container Corporation of India (CONCOR) created. - Freight Operation Information System (FOIS) installed on the Northern Railway	- "Own Your Wagon scheme (OYWS)" was lunched in 1994-95 to tap the private sector resources for augmenting the supply of wagons - BOLT was launched in 1996-97	- A non lapsable Special Railway Safety Fund (SRSF) of Rs. 17,000 crores has been set in 2001 - A new experiment carried out for funding the construction of the Konkan Railway by raising of market borrowings and setting up of a Corporation where the equity contribution is to be shared between the MOR and the beneficiary States, in the ratio of 51 : 49. The balance amount required would be raised from the open market in the form of tax-free bonds	

[MOR, Various Years-a; PC, Various Years]

## **Analysis of Past Investment Strategies**

A review of the investment record of the past would be in order, not only to assess the shortcomings in the existing planning process but also to identify the changes that are required.

There has been an effort on continuity of investment on three items, namely on rolling stock, on gauge conversion/doublings, and on asset replacements. The focus now is more on signaling and telecom, user amenities, and information technology.

### **2.4.1 Rolling Stock**

The emphasis has been on both replacements and additions. Investments have averaged about 40% of the Plan Outlay, over the period of past 20 years. In fact, the expenditure has had a steady relationship with earnings, the average coming to around 15%. This has been made possible by the IR adopting a combination of measures, such as using DRF and Budgetary Support, leasing via IRFC and deploying various schemes such as Own Your Wagon. Yet another reason to ensure this 'investment stability' has been to ensure work load to manufacturing units. Despite this emphasis, IR was hampered by shortage of rolling stock, contributing to a decline in the share of the transport output.

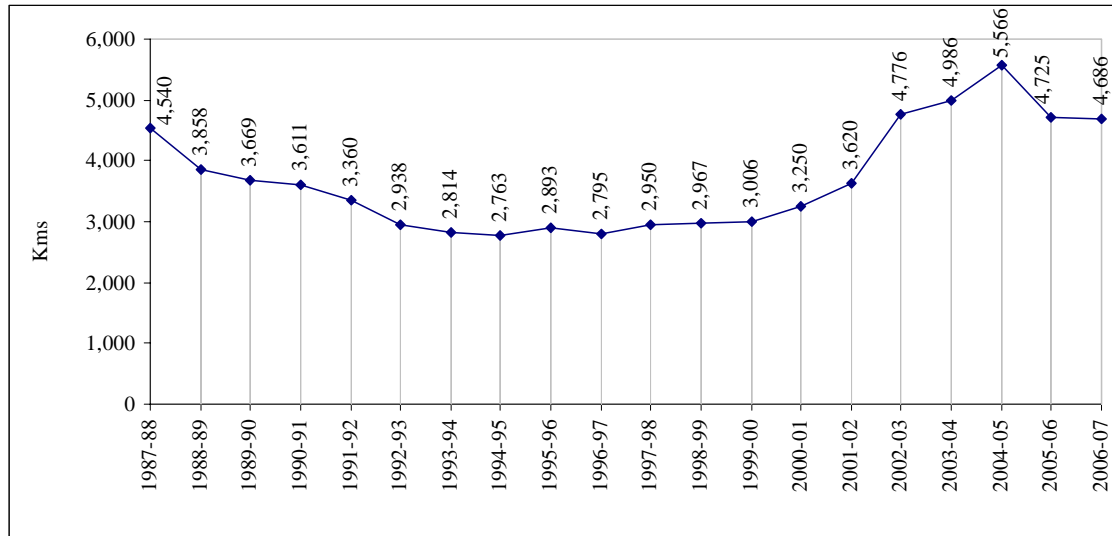
### **2.4.2 Track Renewal**

The average spends on track replacements has been 16% to 23% of the Plan Outlay over a period of 20 years. Despite this, resource constraint has had a pronounced impact as, unlike rolling stock, the leasing route is not followed and the funding is only through DRF. Priority accorded to other investments, also funded from revenue surplus (ie gauge conversions funded from Railway Capital Fund) is one reason.

Another reason is IR not adhering to a systematic method of accounting for depreciation and the allocations to DRF tend to be adhoc. A third reason is premature renewal of assets, needing extra money. And lastly, as appropriation made to DRF reflects on the operating ratio and the size of net surplus, there is a perverse incentive in the financial structure now to under provide for replacements.

The net result has been a build up of arrears that are now being liquidated through SRSF. One outcome of setting up of this Fund has been decrease in IR's allocation to/spend from DRF, leading to apprehensions of a future re-occurrence of the problem. Exhibit 9 gives the trend of track renewals. This shows a clear reduction during the 90s, consequent built of arrears attempt to liquidate the same after 2001-02.

Exhibit 9: Track Renewal

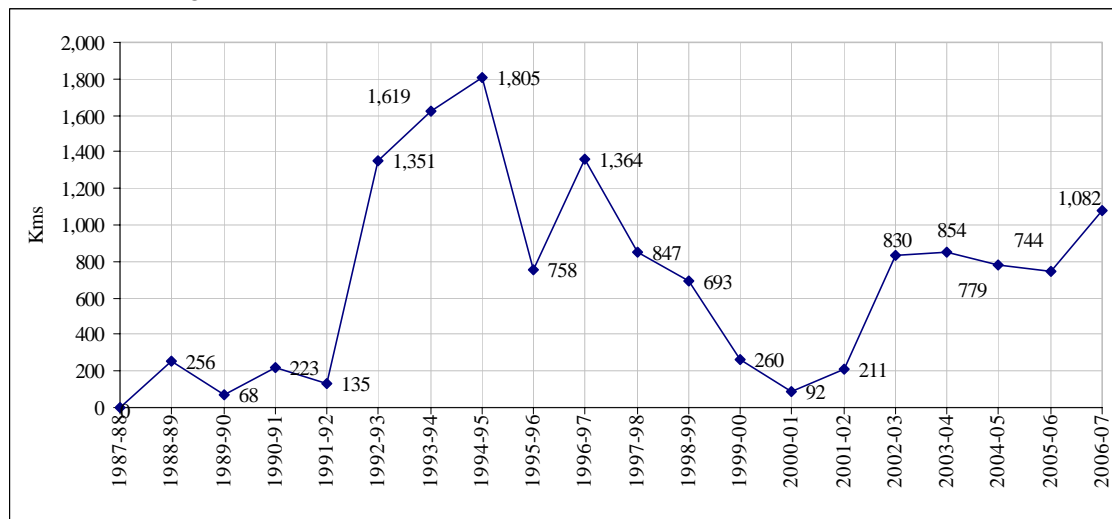


[MOR, Various Years-a]

### 2.4.3 Gauge Conversion

While earlier, the policy of gauge conversion had been one of selectivity on high density “bridging” routes, in the early 90s, the IR launched the project “uniguage”, in an attempt to standardize in most of the networks. The gauge conversion project, which peaked between 1992-93 to 1998-99 (Exhibit 10), had a severe impact on track renewals and to an extent on safety. Both these had a consequent impact on the finances of IR, with the operating ratio peaking to 98.3 in 2000-01. With the safety related investments on IR and a better balance on gauge conversion, the IR recovered from 2002-03 onwards.

Exhibit 10: Gauge Conversion



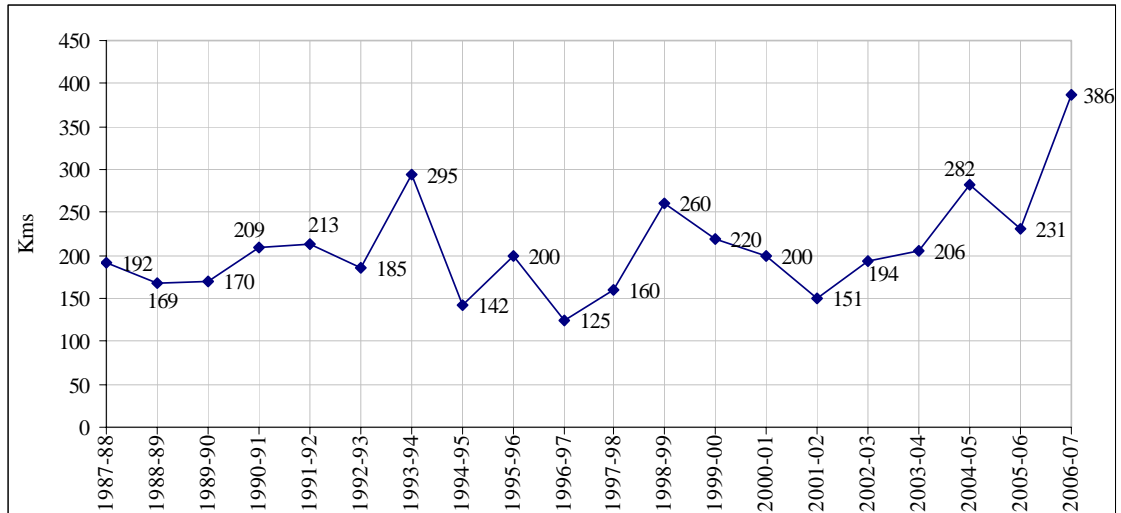
[MOR, Various Years-a]



## 2.4.4 Doublings

Capacity improvement through doubling has been steady (Exhibit 11), in the range of about 5% with the initial priority being on the Golden Quadrilateral and the Diagonals.

Exhibit 11: Doubling

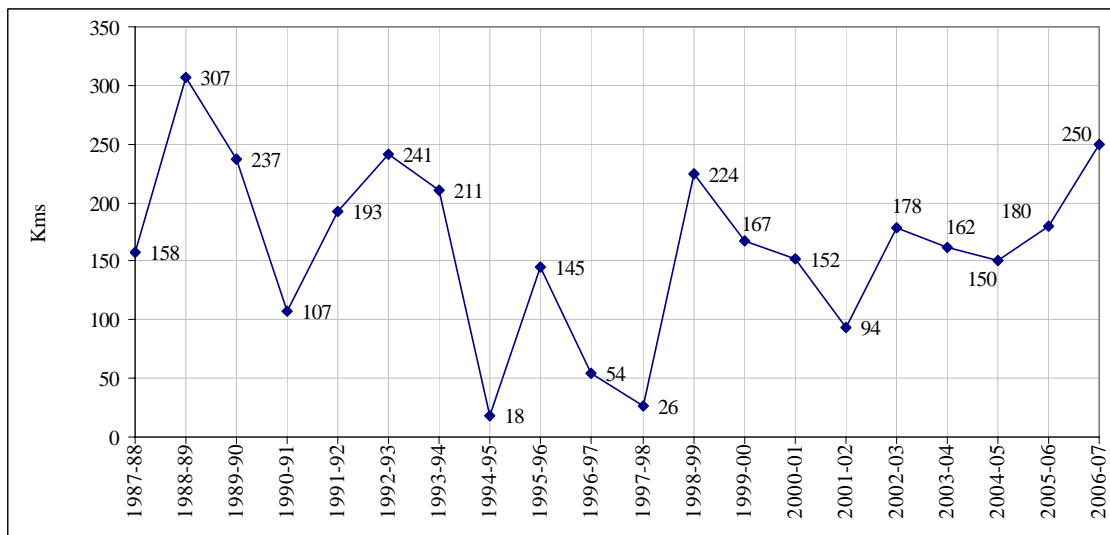


[MOR, Various Years-a]

## 2.4.5 New Lines

Focus on new lines has also been steady in the long run (Exhibit 12), though varying from year to year. This is attributable to varying lengths of new line projects.

Exhibit 12: New Lines



[MOR, Various Years-a]

## 2.4.6 Information Technology

While IR was among the earliest Indian organizations to bring in computers in the early 70s, there was a lull for over a decade. In the mid 80s, the passenger reservation system (PRS) made its appearance through development support from a public sector software company. In July 1987, MOR established the Centre for Railway Information Systems

(CRIS) to be an umbrella organisation for all computer activities on IR. After taking on the PRS, CRIS played the driving role in the Freight Operations Information System (FOIS), which really established only in the recent few years.

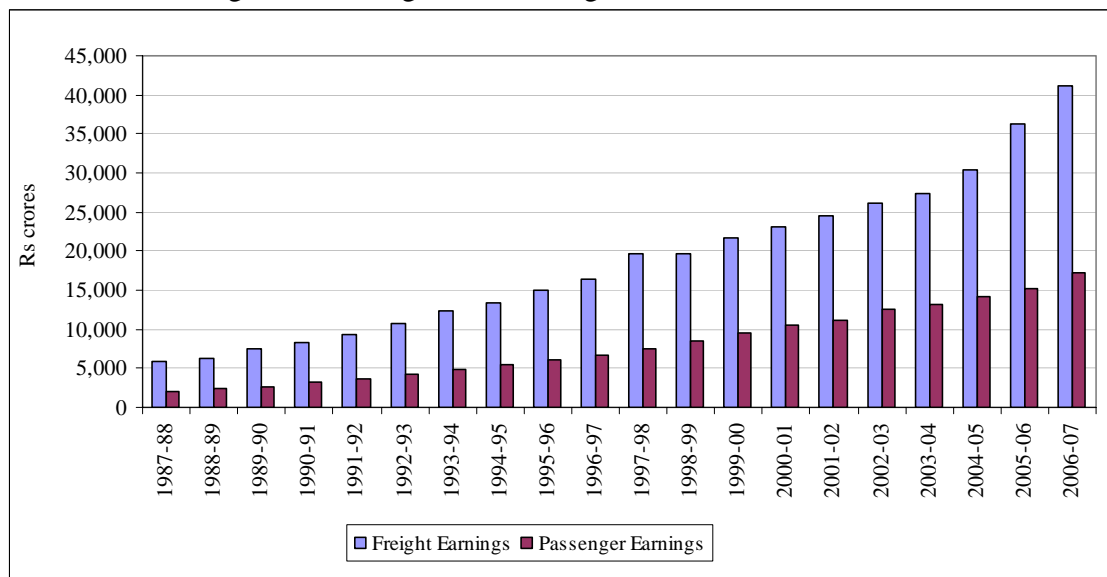
CRIS is engaged in the development and maintenance of major computer systems on the IR. Apart from the PRS and FOIS, the following are some of the projects that are handled by CRIS [IRRE, 2006]:

- National Train Enquiry System (NTES)
- Alpha Migration of the PRS
- PRS enquiry through 'Internet,' front ended by IRCTC
- Booking of tickets on 'Internet,' front ended by IRCTC
- Unreserved ticketing system (UTS)

### 3 Key Business Operations of IR

The key activities of IR are transportation of freight and passengers. In addition to these activities, the IR is also engaged in several allied services, including parcel and catering, and production units. Exhibit 13 gives the trend in freight and passenger earnings.

Exhibit 13: Earnings Trend: Freight and Passenger



[MOR, Various Years-a]

#### 3.1 Freight Business

Freight transport is the major business for IR and accounts for nearly 70% of its revenues. The growth trends in revenue earning freight in tons, net ton kilometers, and revenue are given in Exhibit 14.

Exhibit 14: Growth Trends in Revenue Earning Freight Traffic

	<b>Tons (million)</b>	<b>Growth (%)</b>	<b>NTKm (million)</b>	<b>Growth (%)</b>	<b>Earnings (Rs crore)</b>	<b>Growth (%)</b>
1987-88	290	4.46	222,500	3.94	5,839	17.0
1988-89	302	4.07	222,400	-0.04	6,197	6.12
1989-90	310	2.65	229,600	3.24	7,461	20.40
1990-91	318	2.71	235,800	2.70	8,247	10.54
1991-92	338	6.12	250,200	6.11	9,293	12.68
1992-93	350	3.61	252,380	0.87	10,664	14.75
1993-94	359	2.46	252,410	0.01	12,276	15.11
1994-95	365	1.75	249,564	-1.13	13,424	9.35
1995-96	391	7.05	270,489	8.38	14,973	11.54
1996-97	409	4.69	277,567	2.62	16,354	9.23
1997-98	429	4.98	284,249	2.41	19,595	19.82
1998-99	421	-1.97	281,513	-0.96	19,676	0.41
1999-00	456	8.43	305,201	8.41	21,755	10.57
2000-01	474	3.74	312,371	2.35	23,045	5.93
2001-02	493	4.01	333,228	6.68	24,587	6.69
2002-03	519	5.33	353,194	5.99	26,231	6.69
2003-04	557	7.45	381,241	7.94	27,403	4.47
2004-05	602	8.02	407,398	6.86	30,489	11.26
2005-06	667	10.95	439,596	8.22	36,283	19.00
2006-07	728	9.19	480,993	9.15	41,073	13.20

[MOR, Various Years-a]

### 3.1.1 Commodity wise Analysis

Freight business can be segmented into bulk commodities and other cargo. Over the years, IR has predominantly become a bulk freight carrier, currently accounting for about 94% of the freight revenue in 2005-06. Coal is by far the most important commodity carried by the IR. It accounts for nearly half of the bulk traffic carried.

Exhibits 15A, 15B, 15C give the relative importance of various bulk commodities and other goods (including containers) in tons, ton kilometers and earnings for the years 2005-06, 1987-88 and 1974-75 respectively. The average lead for each of these commodities is also presented. As is evident, the share of other goods has dropped from 30% of earnings (for a 19% share in tons) in 1974-75 to about 11% of earnings (for a 9% share in tons) in 1987-88 and more recently to 8% of earnings (for a 6% share in tons). This has largely been due to the concept of block rake movement which the railway introduced in the early 80s. Consequently, coal, the top bulk commodity, has increased its earnings share from 22% in 1974-75 to 35% in 1987-88 and to 41% in 2005-06.

Exhibit 15A: Commodity wise Traffic Share (2005-06)

	Commodity	Tons (%)	NTKm (%)	Earnings (%)	Average Lead (km)
1	Coal	44.15	38.77	40.62	579
2	Iron Ore and Other Ores	17.02	10.76	13.60	417
3	Foodgrains	6.25	12.53	8.46	1323
4	POL	5.02	5.52	8.64	726
5	Cement	9.18	7.47	7.95	536
6	Iron & Steel	3.27	4.96	5.67	1002
7	Fertilizers	4.90	6.07	4.42	818
8	Limestone and Dolomite	1.79	1.77	1.84	666
9	Stones	1.92	1.04	1.07	650
	Other Commodities	6.50	11.11	7.73	356
	Total	100	100	100	660

[MOR, 2006, Year Book 2005-06]

Exhibit 15B: Commodity wise Traffic Share (1987-88)

	Commodity	Tons (%)	NTKm (%)	Earnings (%)	Average Lead (km)
1	Coal	41.28	35.37	35.09	657
2	POL	7.48	6.20	12.29	636
3	Foodgrains	10.37	18.74	11.01	1385
4	Iron & Steel	4.24	6.11	10.31	1106
5	Cement	7.68	6.52	6.88	650
6	Fertilisers	4.55	6.47	5.57	1091
7	Iron Ore and Other Ores	11.68	5.89	5.00	386
8	Limestone & Dolomite	3.14	1.53	1.56	374
9	Stones	1.65	1.17	1.07	542
	Other Commodities	7.93	12.00	11.22	1161
	Total	100.00	100.00	100.00	767

[MOR, 1989, Year Book 1987-88]

Exhibit 15C: Commodity wise Traffic Share (1974-75)

	Commodity	Tons (%)	NTKm (%)	Earnings (%)	Average Lead (km)
1	Coal	31.87	27.11	22.21	595
2	Iron & Steel	5.66	8.65	11.56	1069
3	POL	6.19	5.69	8.32	642
4	Iron Ore and Other Ores	13.83	7.40	8.03	374
5	Foodgrains	7.87	12.50	6.60	1110
6	Cement	5.29	5.02	5.33	663
7	Fertilizers	3.44	3.94	4.32	801
8	Limestone and Dolomite	4.57	1.88	2.13	287
9	Stones	2.55	1.22	1.39	333
	Other Commodities	18.73	26.59	30.11	996
	Total	100.00	100.00	100.00	699

[MOR, 1976, Year Book 1974-75]

The commodity-wise growth of freight traffic in net ton kilometers since 1987-88 is given in Exhibit 16. It is interesting to note that growth rates fluctuate significantly across the years, when we examine the traffic commodity wise. The growth rate for the total traffic has generally been positive, except for 1988-89, 1994-95 and 1998-99, when marginal declines were exhibited. While the general economic growth could have played a role, the supply side issues of gauge conversions being in process and insufficient wagon availability would have had a significant impact.

Exhibit 16: Distribution of Freight Traffic by Commodities

(million)

	Coal		Iron Ore and Other Ores		Cement		POL		Foodgrains		Fertilisers		Iron & Steel		Other Goods		Total Goods	
	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)	NTKm	Growth (%)
1987-88	78,762	10.02	13,590	4.74	14,542	12.96	13,777	18.03	41,673	4.85	14,355	-8.61	13,590	1.10	32,239	-12.33	222,528	3.94
1988-89	82,700	4.95	13,100	0.00	16,900	16.55	14,100	2.17	33,400	-19.90	16,300	13.19	13,300	-2.21	32,583	-0.05	222,400	-0.04
1989-90	85,100	2.90	14,600	11.45	17,700	4.73	15,700	11.35	31,700	-5.09	17,400	6.75	13,300	0.00	34,068	4.56	229,600	3.24
1990-91	86,000	1.06	14,100	-3.42	19,000	7.34	15,100	-3.82	35,600	12.30	17,300	-0.57	14,000	5.26	34,687	1.82	235,800	2.70
1991-92	91,700	6.63	15,100	7.09	22,200	16.84	15,500	2.65	37,300	4.78	17,500	1.16	15,400	10.00	35,461	2.23	250,200	6.11
1992-93	100,500	9.60	15,400	1.99	19,200	-13.51	15,900	2.58	36,300	-2.68	17,300	-1.14	14,900	-3.25	32,883	-7.27	252,380	0.87
1993-94	104,000	3.48	15,000	-2.60	19,700	2.60	16,500	3.77	35,300	-2.75	16,900	-2.31	13,800	-7.38	31,208	-5.09	252,410	0.01
1994-95	105,256	1.21	16,924	12.83	19,057	-3.26	18,171	10.13	27,077	-23.29	19,299	14.20	13,645	-1.12	30,123	-3.48	249,564	-1.13
1995-96	111,981	6.39	17,954	6.09	18,642	-2.18	19,277	6.09	34,568	27.67	21,186	9.78	13,368	-2.03	33,459	11.07	270,489	8.38
1996-97	119,085	6.34	18,112	0.88	19,318	3.63	18,607	-3.48	38,869	12.44	18,217	-14.01	12,887	-3.60	32,466	-2.97	277,567	2.62
1997-98	127,515	7.08	20,016	10.51	20,945	8.42	19,656	5.64	30,962	-20.34	22,015	20.85	12,498	-3.02	30,610	-5.72	284,249	2.41
1998-99	121,779	-4.50	18,312	-8.51	20,981	0.17	20,320	3.38	32,560	5.16	22,445	1.95	12,691	1.54	32,427	5.94	281,513	-0.96
1999-00	126,771	4.10	19,935	8.86	24,774	18.08	18,650	-8.22	38,180	17.26	25,584	13.99	13,746	8.31	37,507	15.66	305,201	8.41
2000-01	133,444	5.26	24,166	21.22	24,915	0.57	19,873	6.56	33,096	-13.32	22,997	-10.11	13,222	-3.81	40,648	8.37	312,371	2.35
2001-02	141,091	5.73	24,640	1.96	24,778	-0.55	19,772	-0.51	42,034	27.01	22,841	-0.68	13,580	2.71	44,459	9.38	333,228	6.68
2002-03	141,724	0.45	27,367	11.07	24,819	0.17	19,216	-2.81	63,912	52.05	22,606	-1.03	14,404	6.07	39,086	-12.09	353,194	5.99
2003-04	157,256	10.96	33,024	20.67	26,349	6.16	18,219	-5.19	61,930	-3.10	20,212	-10.59	17,386	20.70	46,865	19.90	381,241	7.94
2004-05	161,906	2.96	41,484	25.62	28,888	9.64	21,024	15.40	62,597	1.08	21,713	7.43	15,668	-9.88	54,118	15.48	407,398	6.86
2005-06	170,440	5.27	47,307	14.04	32,830	13.65	24,281	15.49	55,103	-11.97	26,708	23.00	21,796	39.11	61,131	12.96	439,596	7.90
2006-07	191,542	12.38	47,352	0.10	41,094	25.17	23,369	-3.76	47,851	-13.16	25,462	-4.67	26,365	20.96	53,116	-13.11	480,993	9.42

[MOR, Various Years-a]

### 3.1.2 Market Share Analysis

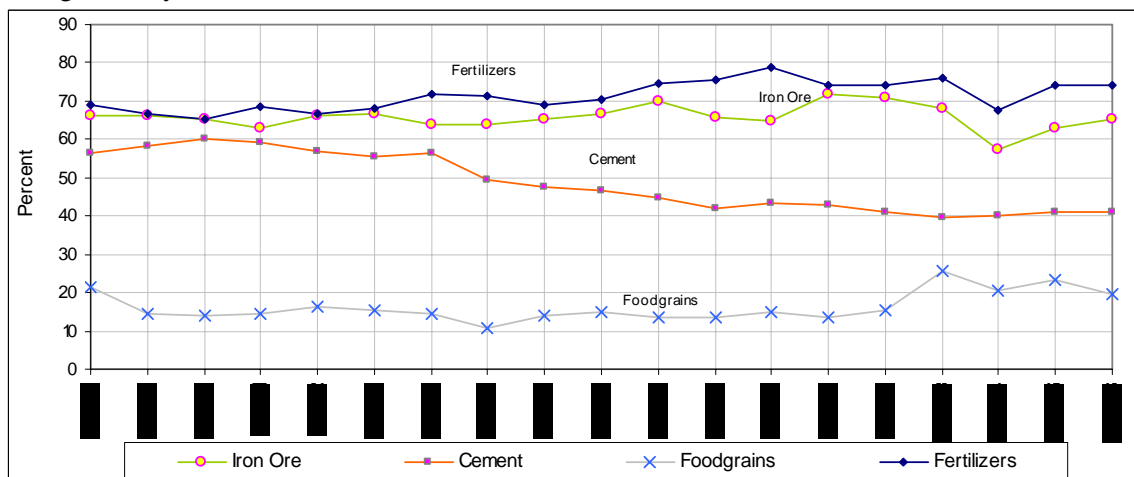
We examine the market share trends of the originating tonnage with respect to total production and imports for the top seven bulk commodities carried by IR (Exhibit 17). Exhibits 18A and 18B provides the same in a graphical form.

Exhibit 17: Market Share of Bulk Commodity Traffic by Rail to Total

Year	Coal	Iron Ore	Cement	Foodgrains	Fertilizers	POL	Iron & Steel
1987-88	66.7	66.0	56.4	21.5	69.0	48.5	
1988-89	65.8	66.3	58.5	14.6	66.7	49.4	
1989-90	64.8	65.2	60.0	13.8	65.5	49.9	
1990-91	63.8	62.8	59.2	14.4	68.7	51.5	
1991-92	63.9	66.1	57.0	16.4	66.6	52.9	71.9
1992-93	64.3	66.7	55.5	15.2	68.2	44.6	70.8
1993-94	65.8	64.1	56.3	14.4	71.9	42.9	69.4
1994-95	64.8	63.7	49.5	10.8	71.6	42.6	63.7
1995-96	65.0	65.2	47.5	13.8	69.2	39.2	58.3
1996-97	66.0	66.7	46.4	14.9	70.2	36.6	45.4
1997-98	66.4	69.7	44.9	13.5	74.5	38.0	44.0
1998-99	63.1	65.6	41.8	13.4	75.8	37.7	40.9
1999-00	64.8	64.7	43.4	14.7	78.6	35.7	39.7
2000-01	66.9	71.7	43.1	13.5	74.2	34.5	34.4
2001-02	66.0	70.8	41.2	15.3	74.3	33.3	
2002-03	64.7	68.1	39.8	25.8	75.8	29.9	
2003-04	65.7	57.2	39.9	20.6	67.8	25.9	
2004-05	65.9	63.1	40.9	23.3	74.1	24.7	
2005-06	66.0	65.4	41.2	19.8	74.0	25.1	

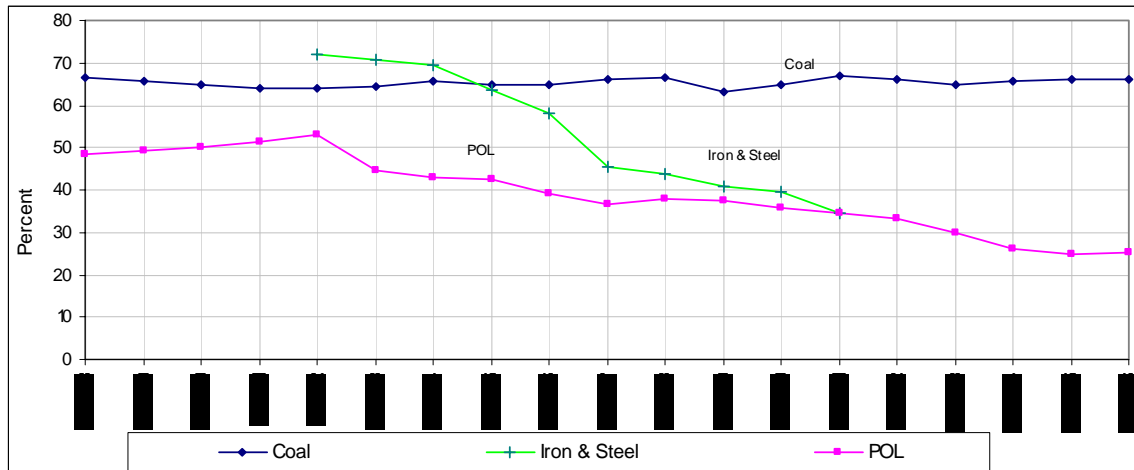
[MOR, Various Years-a]

Exhibit 18A: Market Share of Bulk Commodity Traffic (Fertilizers, Iron Ore, Cement and Foodgrains) by Rail to Total



[MOR, Various Years-a]

Exhibit 18B: Market Share of Bulk Commodity Traffic (Coal, Iron &amp; Steel, and POL) by Rail to Total



[MOR, Various Years-a]

The decline in IR's share of transport in the case of cement, POL, and Iron & Steel has been largely on account of its competitive weakness in the face of challenges from other modes of transport, namely, road, pipeline, coastal shipping, etc. The foodgrain share has always been low, due to its perishable nature and the need for streamlined distribution. It is only the long distance segment (average lead of 1346 km, as given in Exhibit 15A) which has kept foodgrain with IR.

An analysis of freight traffic growth of the top six bulk commodities on the IR between 1991-92 and 2003-04 (Exhibit 19) indicates that while IR loadings have grown at a faster rate than the commodity production for low rated commodities, it is the reverse for high rated commodities. This indicates that IR needs to improve its competitiveness in the high rated commodities.

Exhibit 19: Growth in Production and Railway Loading for Six Bulk Commodities (1991-92 to 2003-04)

Bulk Commodity	Production Growth (%)	Railway Loading Growth (%)
<b>Low rated commodities</b>		
Coal	3.61	4.25
Food Grains	1.22	4.24
Fertilizers	3.78	3.62
<b>High rated commodities</b>		
Cement	7.86	4.37
Petroleum Products	8.02	2.88
Iron & Steel	8.28	1.09

[CRISIL, 2005]

### 3.1.3 Nature of Origin Destination Analysis

Originating traffic in the IR could be from industries (including sourcing markets in the case of food-grains and other goods), mines and ports. An attempt is made to classify commodity loadings according to the primary origins in Exhibit 20.

Annexure 5 calculates the port originating traffic based on hinterland modal share of imports at major and minor ports. Industry and mine originating traffic have been calculated assuming that the cement, salt and sugar are 100% industry originating while limestone and dolomite, stones and gypsum are 100% mine originating.

As is evident, 31% of the traffic originates in the industries, 58% from mines and 11% from ports. Ports as an origin contribute 11% of IR's originating share, largely through coal and containers.

Exhibit 20: Origin wise Freight Traffic (2006-07)

Commodity	Industry		Mine		Port		Total
	mt	%	Mt	%	mt	%	
Coal	0.00	0.00	276.90	88.37	36.43	11.63	313.33
Iron ore & other ores	0.00	0.00	121.27	99.61	0.47	0.39	121.74
Cement	73.13	100.00	0.00	0.00	0.00	0.00	73.13
POL (mineral oils)	22.75	71.78	0.00	0.00	8.94	28.22	31.69
Foodgrains	39.04	93.30	0.00	0.00	2.80	6.70	41.84
Fertilisers	27.19	79.38	0.00	0.00	7.07	20.62	34.26
Iron & Steel	25.49	94.25	0.00	0.00	1.55	5.75	27.04
Limestone and dolomite	0.00	0.00	12.70	100.00	0.00	0.00	12.70
Stones (excl marble)	0.00	0.00	9.98	100.00	0.00	0.00	9.98
Gypsum	0.00	0.00	3.24	100.00	0.00	0.00	3.24
Salt	4.63	100.00	0.00	0.00	0.00	0.00	4.63
Sugar	3.68	100.00	0.00	0.00	0.00	0.00	3.68
Containers	0.00	0.00	0.00	0.00	15.30	100.00	15.30
Commodities other than above	28.60	81.29	0.00	0.00	6.58	18.71	35.19
<b>Total</b>	<b>224.51</b>	<b>30.85</b>	<b>424.09</b>	<b>58.27</b>	<b>79.15</b>	<b>10.88</b>	<b>727.75</b>

Authors's Analysis [Data from MOR, Various Year-a; IPA 2008; PC 2006b]

It is also important to look at terminating traffic by categorizing destinations. Such destinations could be industries, ports and distribution centers. An attempt is made to classify commodity origins and destinations in a two-way classification (Exhibit 21) assuming that the industry originating traffic will go to distribution centre, mine originating traffic will go to industry and port will go to distribution centre. .

Annexure 6 calculates the port destined traffic based on hinterland modal share of exports at major ports. The origins of these are from industry (POL, other commodities meaning containers) and mines (coal, iron ore and other ores). All other industry originating traffic is assumed to go to distribution centers. All other mine originating traffic is assumed to go to industry. Port originating traffic of the raw material kind (coal, iron ore and other commodities excluding containers) are assumed to go to industry. Port originating traffic of the finished goods kind (POL, foodgrains, fertilizers, Iron & steel, other commodities meaning containers) are assumed to go to distribution centre.

The most significant flow is from mines to industries, accounting for 367.8 mt, which is about 51% of IR's traffic. The next largest flow is from industries to distribution centres, accounting for 202.5 mt, which is about 28% of IR's traffic. Another interesting statistic that emerges is the role of the port contributing to IR's traffic, either as an import or an export. Port originating traffic is 79.1 mt and port terminating traffic is 78.3 mt, accounting for a total of 157.5 mt, which is about 21% of IR's traffic.

Exhibit 21: Origin Destination wise Freight Traffic

2006-07 (727.8 mt)

D O	<b>Industry (411.3)</b>	<b>Ports (78.3)</b>	<b>Distribution Centres (238.2)</b>
--------	-------------------------	---------------------	-------------------------------------

mt



<b>Industry/ Collection Centres (224.5)</b>		Containers (16.4)	Cement (73.1)
		POL (5.6)	Foodgrains (39.0)
			Fertilisers (27.2)
			Iron and steel (25.5)
			POL (17.2)
			Other commodities (12.2)
			Salt (4.6)
			Sugar (3.7)
		<b>Total (22.0)</b>	<b>Total (202.5)</b>
	<b>Mines (424.1)</b>	Coal (261.5)	Iron ore/other ores (40.9)
Iron ore/other ores (80.3)		Coal (15.4)	
Limestone/dolomite (12.7)			
Stones, excl marble (10.0)			
Gypsum (3.2)			
<b>Total (367.8)</b>		<b>Total (56.3)</b>	
<b>Ports (79.1)</b>	Coal (36.4)		Containers (15.3)
	Other commodities (6.6)		POL (8.9)
	Iron ore/other ores (05)		Fertilisers (7.1)
			Foodgrains (2.8)
	<b>Total (43.5)</b>		<b>Total (35.7)</b>

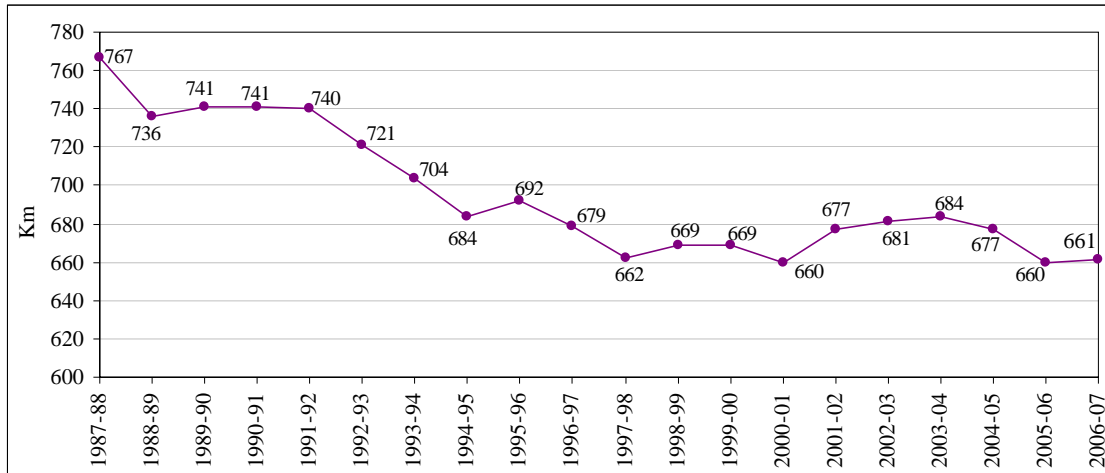
[Authors' Analysis]

The above analysis has implications for improving productivity through automation and full rake load capability. A further classification of the loading and terminating areas as “private” (owned and managed by the customer) and “public” (owned by IR, but loading generally managed by customers) could help in identifying investment potential for productivity improvements.

### 3.1.4 Distance wise Analysis

At an aggregate level, the average lead (net ton kilometers/tons) of revenue earning freight traffic provides a sense of how far the goods move on IR. In the 1950s, the average lead was a little over 500 km. This increased steadily until a peak of 771 km in 1986-87. Since then, as seen in Exhibit 22, it has steadily dropped until 1997-98, when it reached 662 km. After this, the figure has remained more or less steady. The drop in lead from the late 1980s can be attributed to better dispersal of industries (due to liberalization, removal of freight equalization policies etc) and improved network connectivity due to project uni-gauge.

Exhibit 22: Average Lead of Revenue Earning Freight Traffic

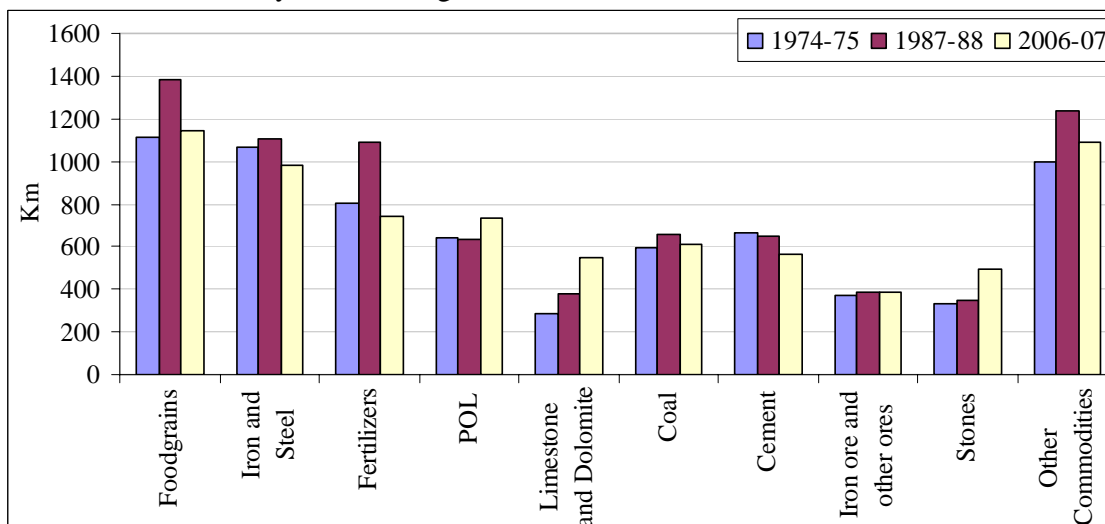


[MOR, Various Years-a]

The commodity wise leads are given in Exhibit 23, with a time trend across three years, 1974-75, 1987-88 and 2004-05. The maximum lead is for foodgrains, which has increased over the years. This is followed by Iron & steel, and fertilizers, both of which show a declining trend in lead in the recent years. This is due to greater dispersal of the steel and fertilizer plants. The average lead for coal, which is around 600 km, plays a significant role in determining the overall average lead, since coal accounts for about 40% of IR's traffic.

Iron ore is a significant commodity whose lead is relatively short (just over 400 km). Even in this, the iron ore for steel plants would have a shorter lead due to their location being close to the mine, while iron ore for exports would have a longer lead. The other commodities, a significant share of which is containers, have a long lead of over 1000 km. Their lead is on the rise.

Exhibit 23: Commodity wise Average Lead



[MOR, Various Years-a]

### 3.2 Passenger Business

IR plays an important role in the transportation of passengers. Passenger services can be segmented into suburban and non-suburban. The growth trends in suburban and non-suburban passenger traffic in originating numbers, passenger kilometers, and earnings are given in Exhibit 24.

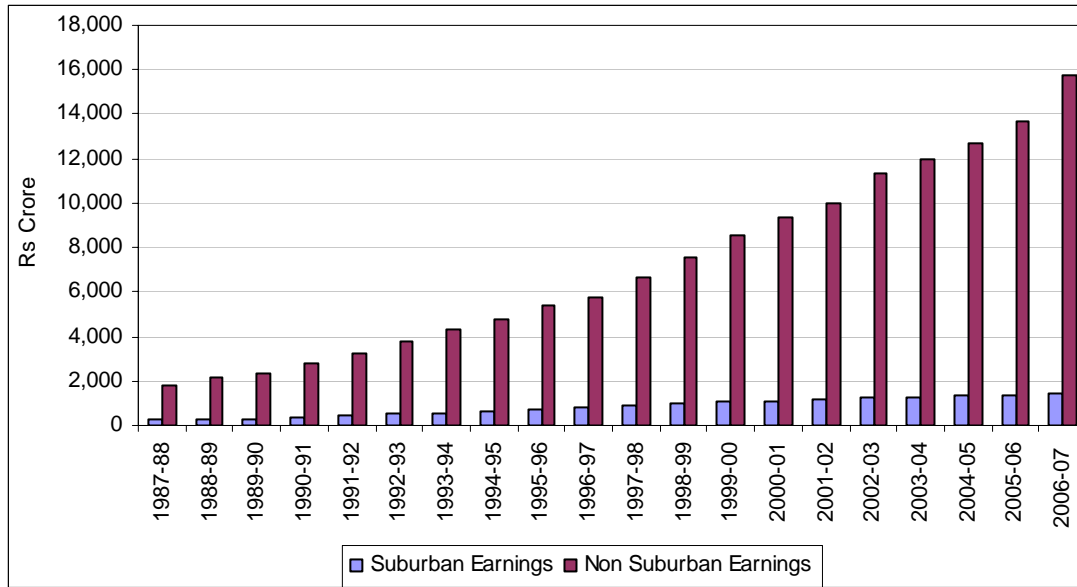
It is estimated that the IR have a share of about 20% in the passenger transport market, in terms of passenger kilometers. Approximately 90% of IR passenger revenues come from non-suburban segment. Exhibit 25 gives the share of suburban and non-suburban revenues for the past 20 years. Passenger services account for nearly 60% of IR's total transport effort, in terms of train kilometers, but yield less than 30% of the total revenues.

Exhibit 24: Growth Trends in Passenger Traffic (1987-2007)

	Sub-urban						Non Sub-urban					
	Passenger Originating		Passenger Kilometres		Earnings		Passenger Originating		Passenger Kilometres		Earnings	
	(million)	Growth (%)	(million)	Growth (%)	Rs crores	Growth (%)	(million)	Growth (%)	(million)	Growth (%)	Rs crores	Growth (%)
1987-88	2,155	9.41	51,757	6.92	239	7.48	1,637	16.58	217,632	4.60	1,819	5.92
1988-89	2,005	-6.96	51,912	0.30	286	19.70	1,495	-8.67	211,819	-2.67	2,167	19.14
1989-90	2,109	5.19	54,803	5.57	304	6.15	1,544	3.28	226,045	6.72	2,363	9.02
1990-91	2,259	7.11	59,578	8.71	357	17.57	1,599	3.56	236,066	4.43	2,788	17.98
1991-92	2,412	6.77	63,390	6.40	411	15.22	1,637	2.38	251,174	6.40	3,270	17.31
1992-93	2,282	-5.39	60,448	-4.64	511	24.11	1,467	-10.38	239,655	-4.59	3,801	16.22
1993-94	2,302	0.88	63,045	4.30	572	12.04	1,406	-4.16	233,200	-2.69	4,319	13.64
1994-95	2,430	5.56	67,989	7.84	646	12.90	1,485	5.62	251,376	7.79	4,813	11.43
1995-96	2,484	2.22	73,291	7.80	737	14.10	1,534	3.30	268,708	6.89	5,376	11.70
1996-97	2,578	3.78	76,543	4.44	825	11.91	1,575	2.67	280,470	4.38	5,792	7.73
1997-98	2,657	3.06	78,844	3.01	912	10.61	1,691	7.37	301,053	7.34	6,642	14.68
1998-99	2,668	0.41	82,786	5.00	1,000	9.63	1,743	3.08	321,098	6.66	7,527	13.32
1999-00	2,771	3.86	85,066	2.75	1,044	4.45	1,814	4.07	345,600	7.63	8,511	13.08
2000-01	2,861	3.25	88,872	4.47	1,091	4.47	1,972	8.71	368,150	6.52	9,392	10.35
2001-02	2,999	4.82	92,868	4.50	1,156	5.95	2,094	6.19	398,044	8.12	10,006	6.54
2002-03	2,934	-2.17	90,266	-2.80	1,232	6.54	2,037	-2.72	424,778	6.72	11,309	13.02
2003-04	2,986	1.77	95,981	6.33	1,256	1.94	2,126	4.37	445,227	4.81	12,004	6.15
2004-05	3,178	6.43	103,759	8.10	1,341	6.81	2,200	3.50	471,943	6.00	12,731	6.05
2005-06	3,329	4.75	106,419	2.56	1,371	2.24	2,396	8.89	509,215	7.90	13,709	7.69
2006-07	3,514	5.56	111,897	5.15	1,427	4.08	2,705	12.90	582,867	14.46	15,749	14.88

[MOR, Various Years-a]

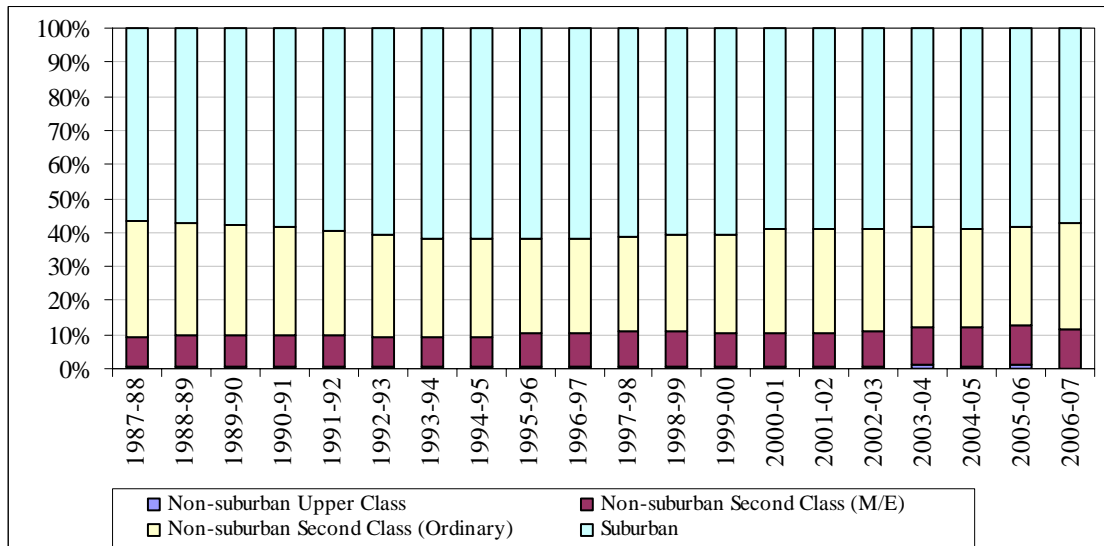
Exhibit 25: Share of Suburban and Non Suburban Earnings



[MOR, Various Years-a]

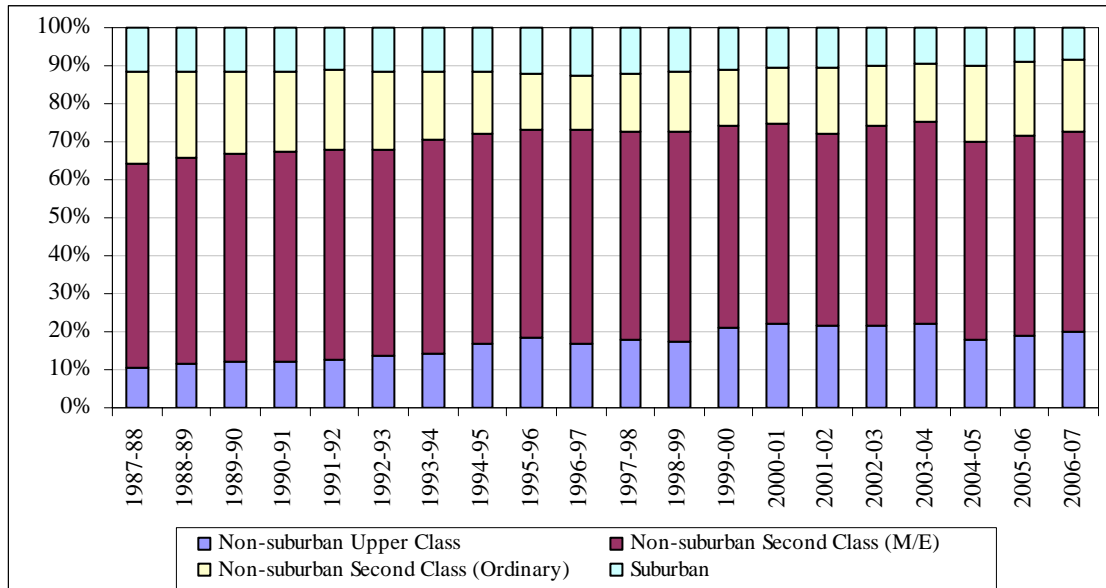
The growth rate in terms of transportation output in passenger segments has been increasing in the recent past particularly in the “premium” segment, but the overwhelming share of passenger traffic remains in the lower classes. Exhibits 26 and 27 give the share of originating passengers and revenue across non suburban upper class, non suburban second class (mails/express), non suburban second class (ordinary) and suburban. Clearly, the maximum number of participants are in the suburban, while the earnings are from the non suburban segment, especially from the second class (mail/express)

Exhibit 26: Passengers Originating Class wise



[MOR, Various Years-a]

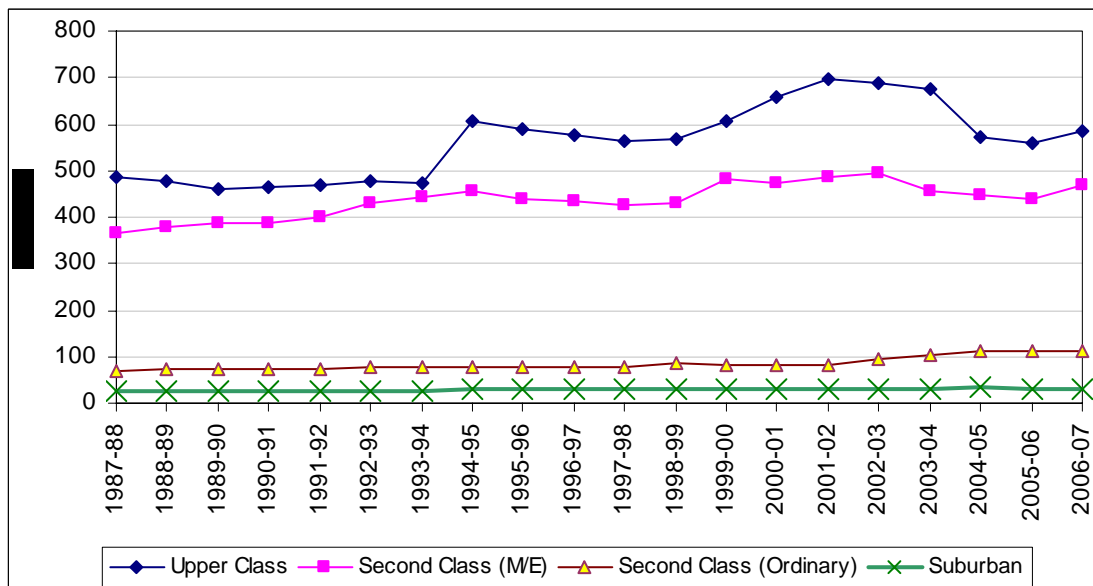
Exhibit 27: Passenger Revenue Class wise



[MOR, Various Years-a]

Exhibit 28 gives the average lead of the different passenger segments. The leads exhibit a marginal increase over the years.

Exhibit 28: Average Lead



[MOR, Various Years-a]

*Sub-urban Passenger Traffic*

Suburban passenger business is viewed as a non profitable venture for IR due to the low fare structure and the low priced monthly season tickets. The subsidy provided to this segment in the year 2003-04 amounted to approximately Rs 800 crores [MOR, 2005, Year Book 2003-04].

Suburban accounted for approximately 57% of the originating passengers in 2006-06, while contributing to only 8% of the passenger revenue.

*Non Sub-urban Passenger Traffic*

Nearly 2 billion passengers make use of IR's non-suburban passenger services annually. The upper class travelers, though comprise less than 1% of originating passengers, account for around 20% of the passenger revenues. An opinion survey conducted in 1993 showed that while 35% travel on duty, while the rest of the passengers travel for pleasure, social compulsion, family emergency and education, with pleasure and social travel accounting for 30%.

### *Market Segmentation*

Market segmentation is critical to ensure a commercially viable and customer satisfying passenger business. Apart from suburban vs non suburban, and classwise segmentation, other possible dimensions are reason for travel, socio economic profile (income, age, gender, group size etc) and origin destination. As an example, customers can be viewed as:

- Regular: Working commuters
- Occasional: Business travelers, Social, Tourists, Pilgrims, Migrant labor

In terms of facilities for the above, season tickets for working commuters would be important, while the occasional customers would have different needs based on their purpose of travel. Speed and timing would be important considerations for the business travelers. Facilities at terminals would have to recognize the different segments, waiting areas would be more important for the non business traveler.

While the above is intended to flag the issue, it is important that IR develop and update passenger travel data to enable appropriate market segmentation for provision of passenger oriented services and facilities.

### **3.3 Other**

The increase in other earnings of Rs 599 crores (24.2% over 2004-05) came through parcel, catering, advertising, dividends from the public sector units under the ministry etc (Annexure 2). The increase of 24.2% in 2005-06 over 2004-05 followed a similar growth of 24.7% in 2004-05 over 2003-04. In the earlier years, the growth in this segment had been marginal. this source of revenue had not received as much focus as in the past two years A slew of initiatives on these areas had been implemented over the past two years, making it attractive for private parties to take advantage of the market opportunity that IR could offer.

#### **3.3.1 Parcel**

A passenger train has 16 tons of capacity for carrying parcel. Consequently, the IR has an annual parcel carrying capacity of around 35 mt, of which the current utilization is 5 mt (14%). This generates revenue of about Rs 500 crore (Exhibit 29). The cost of haulage and parcel office staff is Rs 1800 cr. Thus the parcel segment is making a loss of Rs 1300 crore per annum.

Exhibit 29: Parcel Earnings

Year	2001-02	2002-03	2003-04	2004-05	2005-06
Parcel Earnings (Rs crore)	437	453	444	524	650*

[MOR, Various Years-b; \*MOR, 2007]

In the recent past, the initiatives taken by IR in this sector are [CRISIL, 2005]:

- Introduction of Millennium Parcel Express (March 2001)

- Introduction of refrigerated vans (2003-04)
- Rationalisation of the rate structure (2003-04)
- Additional leasing of parcel space (April 2003)
- Leasing of rear SLR of popular trains
- Leasing of the vacant compartment of guard in the front luggage vans to courier services
- Short term lease for a period of one year and lower lease price for trains, where SLR is underutilized
- Round trip leasing
- Computerisation of parcel traffic (2004-05)

The above initiatives have reduced the direct marketing and operations efforts for IR, while increasing the revenues. Increased leasing of SLR space through bidding is expected to increase the parcel revenues.

There is a basic question whether the IR should be in parcel business. The alternate use of line capacity where parcel trains run is an issue for consideration. Regular freight trains and container specials (which could be carrying the parcel) have greater revenue potential. Similarly, in passenger trains the alternate use of the space for carrying passengers may be a more viable proposition, unless safety requirements make the non- passenger space imperative in trains.

### 3.3.2 Catering

IR has formulated a new catering policy in order to improve the standards of food being served in the trains and in the stationary units to generate more revenue. Under this policy, the catering contracts will now be given through an annual open tendering system, under the ownership of IRCTC. Previously, catering contracts were based on an application-based system. Often, an administrative extension would be granted to the incumbent. The rates used were not commercially contested.

With the new policy, as an example, an annual catering contract for an important train like Howrah-Kalka mail was awarded for Rs 83.6 lakhs, when earlier it fetched Rs 5 lakhs. After open competitive bidding, earnings have increased from Rs 13 crore to over Rs 100 crore due to mobile catering. On stationary catering, due to the open competitive bidding, as an example, the license fee at Bandra and Nagpur went up from Rs 78,000 and Rs 32,000 to Rs 16 lakhs and Rs 34 lakhs respectively. The pace of open bidding for stationary units has been slowed down since some of the incumbents have gone to courts to contest IR's move [Internal Discussion].

Exhibit 30 gives key statistics, including earnings from catering. As is evident, an increasing share of private participation and the consequent earnings from license fees.

Exhibit 30: Catering Statistics

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Total no of pairs of trains catered	228	231	234	250	257	260
Pairs of trains continuing as departmental	43	39	38	12	52	56
Static catering units (stations)	3152	3152	3152	9270	11,319	10,752
Sales turnover of departmental units (Rs crore)	196	202	172	191	176	175
License fee (Rs crore)	23	26	29	59	84	116
IRCTC income (Rs crore)	-	37	42	76	-	-

[MOR, Various Years-a]



The potential earning from catering is being assessed at over Rs 600 crore per annum, given the annual passenger journeys of 5480 m, an average spend of Rs 10 per journey on catering and license fees at 12% [Internal Discussion].

### 3.3.3 Advertising

Exhibit 31: Advertisement Earnings Rs crore

	2003-04	2004-05	2005-06
WR		14.5	25.7
CR		5.6	13.0
NR	6 <sup>#</sup>	9.7	10.4
IR Total		50.2	78.1

[Internal Discussion; <sup>#</sup>CCM, NR, 2006, Internal Correspondance]

The various strategies on advertising currently being leveraged are:

- Wholesale leasing rather than retail leasing
- Leasing for a division as a whole
- Open competitive bidding and
- Trains and wagons

Advertising segment is expected to yield significantly higher returns in the future.

## 4 Key Costs of IR

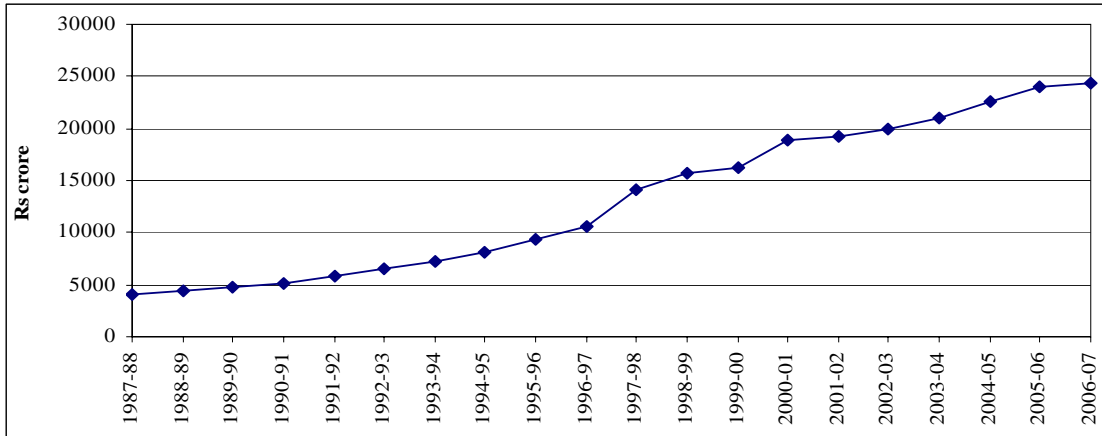
The key costs for IR are staff, fuel (including electrical energy), lease charges and contribution to funds.

### 4.1 Staff Costs

The most significant cost for IR is the staff expense (including salaries and pension), which, in 2006-07 was Rs 24,354 crore. This constituted 50% of the total working expenses. This share has increased from 42% in 1987-88. Exhibit 32 gives the trend of the staff expense. The growth in this expense is given in Exhibit 33. As is evident, there was a significant rise in the expense in 1997-98, when the Fifth Pay Commission Recommendations for increase in Central Government staff salaries was implemented. The additional costs from that year went up by about Rs 2500 cr, making a significant dent on the profitability of IR. The pension component of the staff expense is also on the rise since the number of retired staff is increasing.

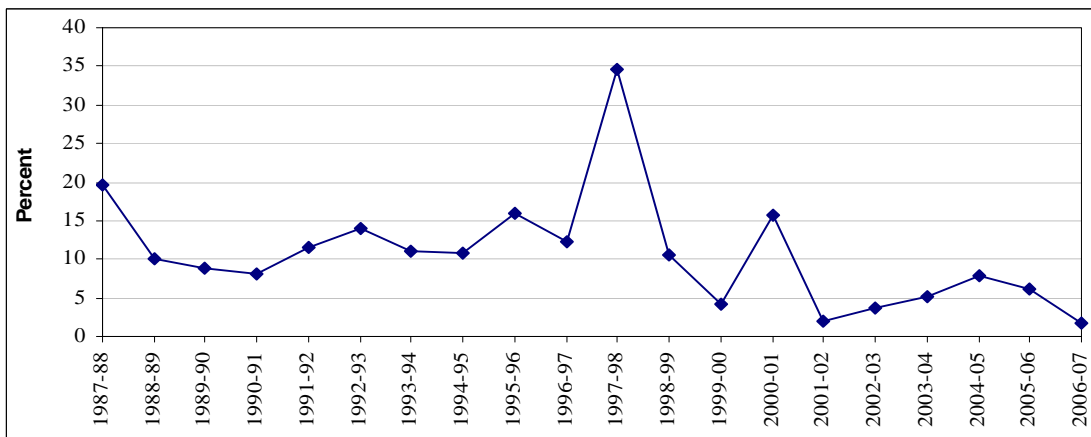
Its also important to note that while staff expenses have been going up, the IR have managed to contain the number of staff by regulating fresh recruitment. Exhibit 34 gives the trend of the number of staff.

Exhibit 32: Staff Expense



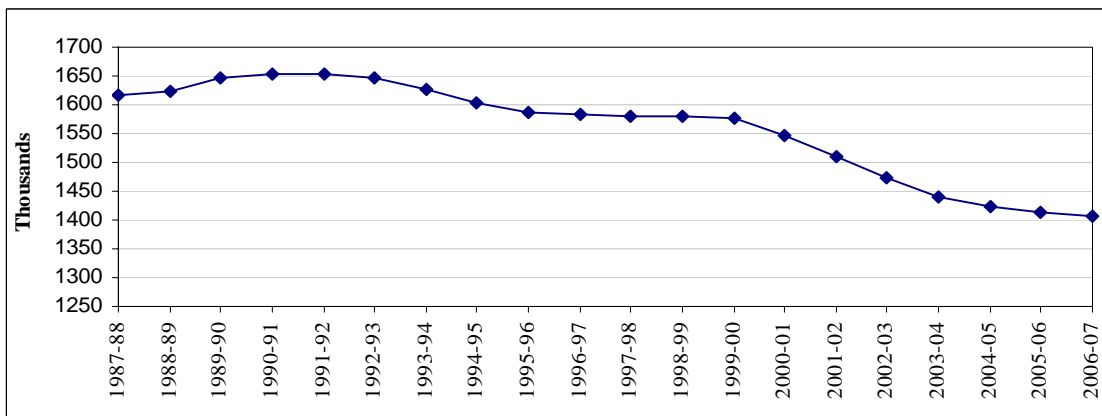
[MOR, Various Years-a]

Exhibit 33: Staff Expense Growth (%)



[MOR, Various Years-a]

Exhibit 34: No of Staff



[MOR, Various Years-a]

## 4.2 Fuel and Energy and Other Costs

The second largest cost component for IR is fuel and energy. This was 19% in 2004-05. There has been a marginal increase in this share from 16% in 1987-88.

Lease charges have been increasing due to a larger share of wagon stock being leased through IRFC. Until 2005-06, lease charges also included the contribution towards principal payments since the wagon stock ownership would be with IR. From 2005-06, this amount (Rs 1616 crore

out of Rs 3613 cr) has been removed from the expenses and comes as a contribution to capital from the net earnings.

It also appears that IR has some flexibility in the expense amounts for contribution towards the Depreciation Reserve Fund. For example, the contribution towards Depreciation Reserve Fund in the expense category reduced in the 90's. However, this contribution has been on the rise over the past few years. As a substitute, appropriations are made from the net revenues towards Dividend, Development, Capital and Safety Funds.

## **5 Asset Utilization**

IR's earnings in past few years have grown significantly. Improved asset utilization is an important factor contributing to this growth. IR has taken a number of initiatives to make its assets more efficient. Exhibit 35 analyses the efficiency indices for the rolling stock and track over the period of twenty years.

Exhibits 36 and 37 give the expenditure on rolling stock and track renewal in Rs crore and in percentage respectively. The expenditure on rolling stock has varied from 30-45% of the plan outlay, except for 1988-89, when it was just 16.5%. Financial constraints and limitations in production capacity available in the country could be a reason for this drop. This was the time, when a new coach factory at Kapurthala had been set up.

Apart from the rolling stock, replacement and renewal of over-aged tracks has been the prime challenge for IR. Track Renewal Works (TRW) broadly consists of (a) Complete Track Renewal (CTR) - where rails, sleepers, ballast, etc. are completely replaced; (b) Through Rail Renewal (TRR) - where rails alone are replaced; and (c) Through Sleeper Renewal (TSR) - where sleepers alone are replaced. The renewals could be primary or secondary. In primary renewal, only new materials are used, in secondary renewal, released and serviceable materials are used. The average spent on track renewal has been 16-23% of the plan outlay. In 1988-89, the IR made about 25.8% of its expenditure on track renewal.

In terms of output, utilization indices have shown positive growth. Exhibits 38, 39, 40 and 41 give the trends of the important efficiency parameters related to rolling stock (engines, coaches and wagons) and track.

There has been a significant increase in the net ton kms per engine hour from 2002-03.

Exhibit 35: Expenditure and Utilization of Assets

		1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98
Total Expenditure	Rs crore	3,463	3,129	4,562	4,893	5,393	6,162	5,861	5,472	6,335	8,310	8,239
Expenditure on Rolling Stock	Rs crore	988	517	1,522	1,905	2,207	2,409	2,320	1,922	2,403	3,744	3,055
	% of total expenditure	28.5	16.5	33.4	38.9	40.9	39.1	39.6	35.1	37.9	45.1	37.1
Expenditure on Track Renewal	Rs crore	783	808	887	904	1,091	1,063	970	1,024	1,150	1,203	1,367
	% of total expenditure	22.6	25.8	19.4	18.5	20.2	17.3	16.6	18.7	18.2	14.5	16.6
Number of Engines		9,158	8,813	8,590	8,417	8,268	7,806	7,220	6,919	6,909	6,975	7,206
Tractive Effort per Loco	Kgs	22,807	23,321	23,632	24,088	24,778	26,090	26,366	26,702	27,464	27,600	28,417
Engine Utilization	Net ton kms per engine hour	9,811	9,902	10,054	10,393	10,911	10,901	10,864	10,909	11,629	11,894	12,104
Goods (Diesel)	Net ton kms per goods train hour	24,315	24,156	24,364	24,787	25,704	25,751	25,672	25,507	27,057	27,402	28,042
	Engine kms per day per engine in use	433	457	454	445	436	426	407	413	415	403	400
	Goods (Electric)	410	405	395	398	395	412	423	423	422	401	422
Passenger (Diesel)		766	759	702	673	633	647	594	585	580	569	544
Passenger (Electric)		464	482	513	482	488	502	507	504	531	533	550
Number of Coaches		17,987	18,332	18,757	19,356	20,201	21,212	22,207	22,856	23,100	23,884	25,095
Coaching Vehicles Kms	Million	5,503	5,690	5,979	6,060	6,305	6,600	6,922	7,332	7,643	7,858	8,345
Vehicle kms	Per coach per day	388	404	414	408	409	410	414	426	431	441	445
Wagon Turn-round	Days	11.6	11.4	11.3	11.5	11.1	10.8	10.6	9.9	9.1	8.5	8.1
Wagon Utilization	Wagons-km per wagon per day	110	113	112	111	113	116	125	139	151	158	167
Wagon kms	Net ton kms per wagon per day	1,449	1,453	1,428	1,407	1,439	1,457	1,506	1,590	1,792	1,840	1,894
	% of loaded to total	65.4	64.9	64.8	65.1	65.1	64.6	63.9	64.5	64.7	63.3	61.2
Track utilization	Net ton kms per route km (million)	6.19	6.12	6.21	6.30	6.63	6.45	6.31	6.06	6.45	6.45	6.52
	Passenger kms per route km (million)	6.58	6.42	6.76	7.12	7.58	7.06	6.82	7.15	7.55	7.73	8.04
	Gross ton kms per route km (million)				18.13	18.95	18.72	18.68	18.40	19.27	19.44	19.85

		1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Total Expenditure	Rs crore	8,857	9,057	9,395	10,177	11,408	13,364	15,372	18,320	25,002
Expenditure on Rolling Stock	Rs crore	3,989	3,355	3,560	3,048	3,479	3,784	4,491	5,007	6,340
	% of total expenditure	45.0	37.0	37.9	30.0	30.5	28.3	29.2	27.3	25.4
Expenditure on Track Renewal	Rs crore	1,391	1,589	1,702	1,885	2,496	2,781	3,444	3,224	3,796
	% of total expenditure	15.7	17.5	18.1	18.5	21.9	20.8	22.4	17.6	15.2

Number of Engines		7,429	7,517	7,566	7,739	7,681	7,818	7,916	8,025	8,153
Tractive Effort per Loco	Kgs	28,558	29,002	29,203	29,274	29,289	30,340	31,768	32,012	32,321
Engine Utilization	Net ton kms per engine hour	12,145	12,609	12,850	13,842	14,086	16,776	16,995	18,691	18,964
Goods (Diesel)	Net ton kms per goods train hour	28,004	28,865	29,752	31,271	32,841	39,726	32,256	37,344	39,650
	Engine kms per day per engine in use	396	393	398	399	381	386	368	400	405
	Goods (Electric)	444	442	450	469	474	452	430	463	474
Passenger (Diesel)		552	569	577	565	570	589	543	580	564
Passenger (Electric)		550	551	542	558	567	584	600	590	609

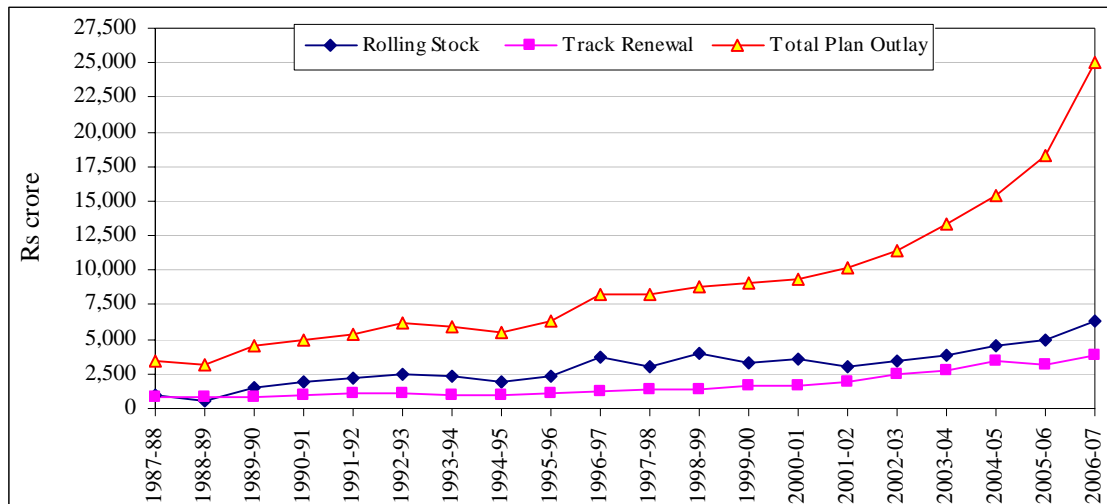
Coaches	Numbers	26,278	27,189	28,441	29,526	30,470	31,250	32,819	34,045	35,140
Coaching Vehicles Kms	Million	9,019	9,695	10,029	10,504	11,097	11,325	11,876	12,607	13,392
Vehicle kms	Per coach per day	456	467	461	469	487	470	457	491	501

Wagon Turn-round	Days	8.2	7.7	7.5	7.2	7.0	6.7	6.4	6.1	5.5
Wagon Utilization	Wagons-km per wagon per day	169	177	179	192	205	188	204	218	231
	Net ton kms per wagon per day	1,904	2,027	2,042	2,223	2,468	2,574	2,677	2,960	3,242
Wagon kms	% of loaded to total	61.7	61.9	61.0	61.3	61.7	63.0	63.4	64.1	65.2

Track utilization	Net ton kms per route km (million)	6.32	6.85	6.96	7.38	7.74	8.14	8.57	9.05	9.67
	Passenger kms per route km (million)	8.40	8.98	9.49	10.13	10.52	10.76	11.51	12.16	13.47
	Gross ton kms per route km (million)	19.81	21.59	21.95	23.11	23.80	24.91	26.04	26.53	27.63

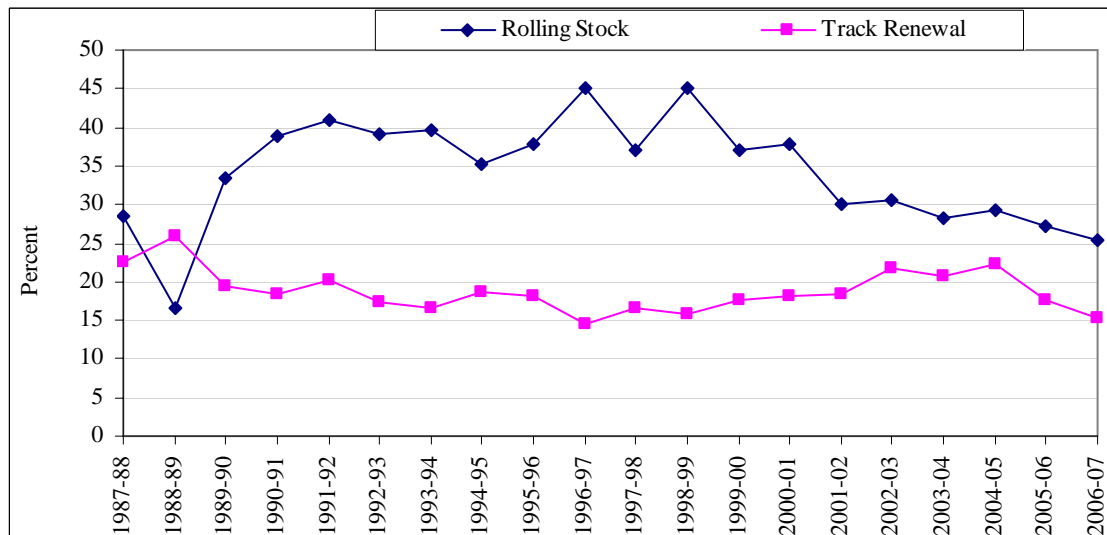
[MOR, Various Years-a]

Exhibit 36: Expenditure on Rolling Stock and Track Renewal



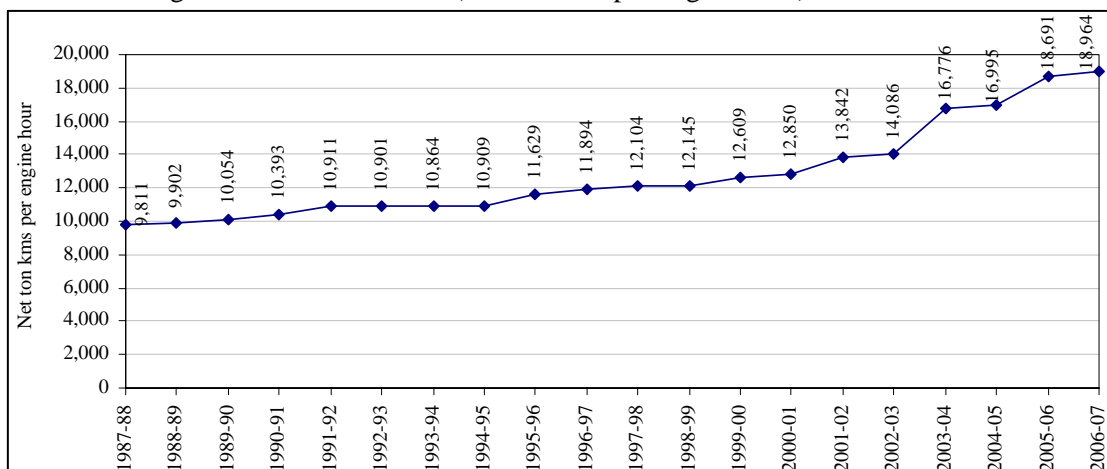
[MOR, Various Years-a]

Exhibit 37: Share of Expenditure on Rolling stock and Track Renewal



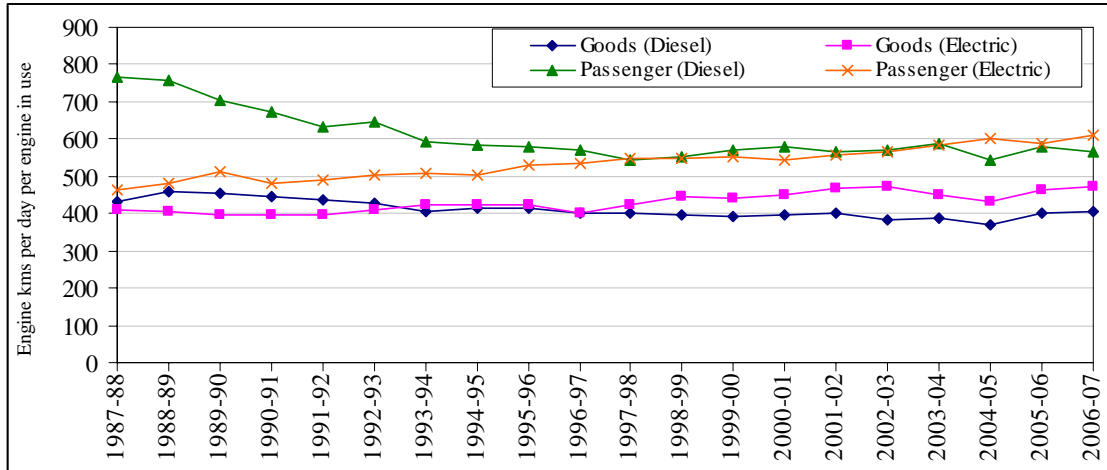
[MOR, Various Years-a]

Exhibit 38: Engine Utilization Indices (Net ton kms per engine hour)



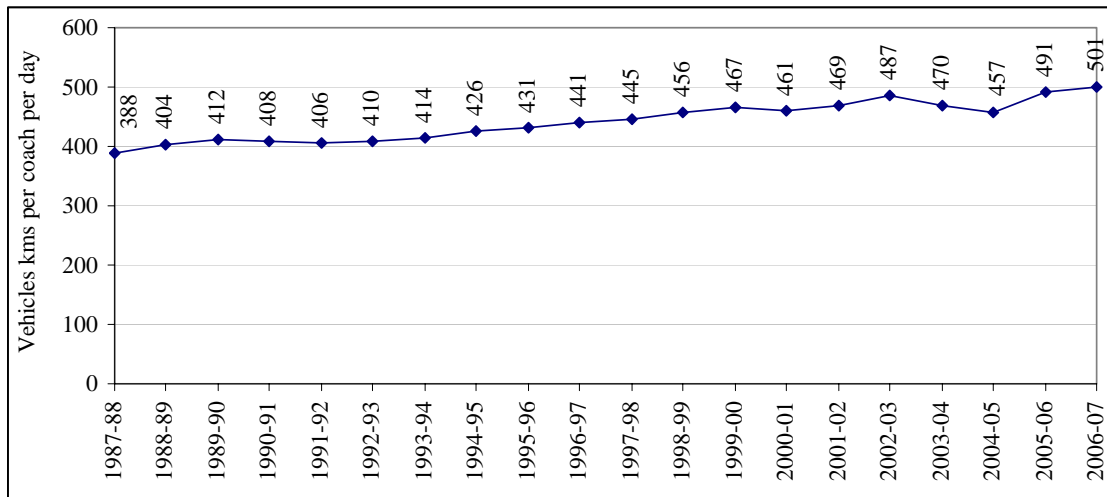
[MOR, Various Years-a]

Exhibit 39: Engine Utilization Indices (Engine kms per day per engine in use)



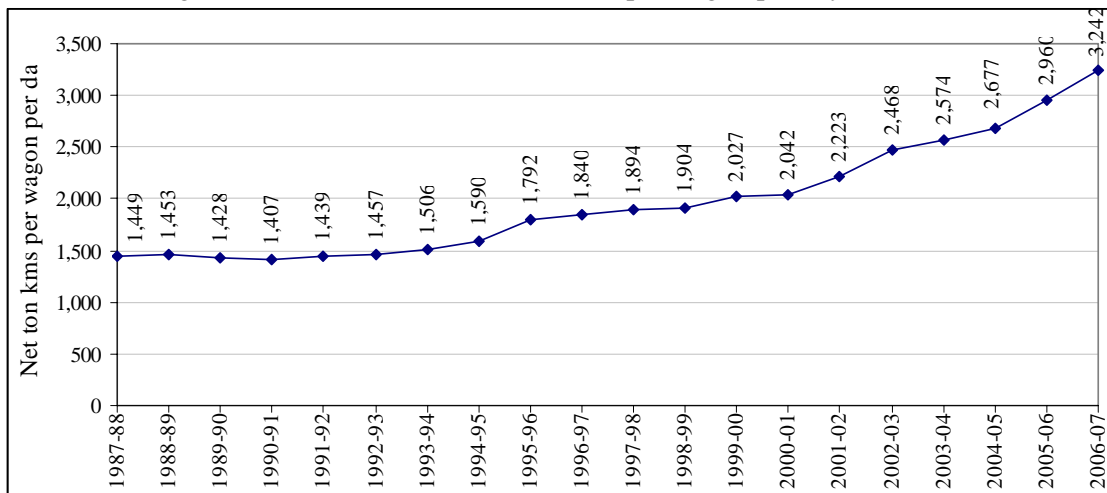
[MOR, Various Years-a]

Exhibit 40: Coach Utilization Indices (Vehicle kms per coach per day)



[MOR, Various Years-a]

Exhibit 41: Wagon Utilization Indices (Net tons kms per wagon per day)



[MOR, Various Years-a]

## 6 Issues Facing IR

The Rakesh Mohan committee report identified some areas of concerns for viability of IR. Two of the important areas were unsustainable employee costs (also elaborated in section 4 above) and cost of market borrowings. The latter was more relevant in 2000-01 when interest rates were still high. Over the past few years, the rates have come down, and today seeking external funding from various stakeholders through public private partnerships is considered as the way forward.

### *No Market Segmentation Perspective*

IR has yet not evolved a culture of generating its strategies rooted in an understanding of the customer. For this, segmenting the market on key dimensions would be essential. (This paper flags certain approaches towards this.) In a very fundamental way, IR focuses more on originating traffic and implicitly looks at customer service only at the origin. However, transportation is an origin-destination service, and hence servicing at the destination end, and in fact for the entire period that the customer or their goods are with us is essential.

Pricing, provision of infrastructure and services, long term contracting etc. could be driven effectively by appropriate segmentation. It would also be essential to have consultative process with key customers.

### *Need for Growth in Capacity*

This can be achieved through better capacity utilization and investments in bottle neck sections and new sections like the dedicated freight corridors. Funding from multilateral agencies like ADB to catalyze such investments would be useful.

### *Unsustainable Employee Costs*

As compared with the increase in real wages (average per railway employee) of 108%, the increase in average productivity measured in terms of output in “Traffic Units” over the period 1981-82 and 1998-99 works out to 82% only. The disparity would be still more adverse if the component of pensioners’ benefit is added to the average staff costs. Pension outgo accounted for 14 paise out of every rupee earned by IR in 1988-89 – a steep increase as compared to 1981-82 when it was just 3.4 paise to each railway rupee. *The root of the financial problem confronting IR is therefore found in the lack of the adequate productivity increases that are commensurate with the real wage increases over the time* [NCAER, 2001].

### *Pricing not based on Economic Rationale*

The hike in passenger transport services are not keeping pace with the cost of inputs. The political sensitivity to such increases has prevented the IR from changing to the market situations. On the freight side, prices were increased, but with consequences of driving the market away from IR. However, more recently, there have been attempts to set the freight rates based on principles of elasticity. Consequently, some rates have come down (POL) while some others have gone up (Iron Ore).

### *Departmental Structure with no Corporate Perspective*

IR is a highly departmentalized organization with the departmental structure running all the way to the highest levels in the Railway Board. This does not lend itself to a corporate perspective and effective generation and dealing of strategic initiatives.



*Lack of Autonomy: Political Control*

The high degree of centralization in decision making and the relatively low level of autonomy is a great obstacle in growth. In a fundamental way, the political control gets enhanced due to the managerial weaknesses of the departmental structure.

**Annexures: Some Interpretation**

- There are 17 annexures attempting to describe the Indian Railways over the past twenty years.
  1. Key Statistics of IR
  2. Performance Review of IR
  3. Fund Generation and Expenditures of IR
  4. Financial Review of IR
  5. Share of Import Traffic carried by IR from Major and Minor Ports (2004-05)
  6. Share of Export Traffic carried by IR from Major Ports (2004-05)
  7. The Indian Railways Report 2001
  8. Integrated Railway Modernization Plan (2005-2010)
  9. Dedicated Freight Corridors
  10. Private-Public Partnership Models of IR
  11. Railway Reform Program
  12. The Commission of Railway Safety
  13. The Indian Railways Act, 1989
  14. Changes in Goods Freight Structure
  15. SWOT Analysis of IR
  16. Major Events (1987-2006)
  17. List of Railway Ministers
- While the rail network itself has not grown significantly, the electrified route kilometres and the broad gauge segment has grown significantly, leading to increased throughput and diesel conservation.
- Steam traction has been eliminated.
- The wagon stock has come down in numbers, while the size (carrying capacity) and utilization have gone up.
- The number of employees is on the decrease, demonstrating a unique and welcome trend amongst public systems.
- The freight traffic has gone up significantly and more so in the past five years.
- While the share of budgetary support for investment had generally be around 40% (with some low share years), the recent trend has been one of reduction.
- Internal resources have been around 40%.
- Safety fund focused on investments for safety has contributed to around 15 to 20% of the share over the recent few years.
- The rolling stock has consistently taken the highest share of investments, followed by track renewal works.
- Capacity improvement works have been the next in emphasis, with doubling being emphasized in late eighties followed by gauge conversion in the late nineties and new lines in the past five years.
- In terms of other capacity enhancing investments, electrification was next during the eighties and nineties, but recently surpassed by S&T works.
- The concept of dedicated freight corridor is being examined seriously by IR and the Planning Commission to provide a quantum jump in capacity between Mumbai-Delhi and Howrah-Delhi.
- Partnerships in attracting further investments, especially new lines, wagon stock (CONCOR, OYW) have become more acceptable.
- The key factors affecting the Indian Railway's performance over the past 20 years can be summarized as

- IRFC: 1986 (positive effect due to facilitation of market borrowings for wagon procurement, negative effect due to high interest rates)
- CONCOR:1989 (positive effect due to focus on containerized movement of non-bulk)
- Project Unigauge: Early 90's (negative effect in the 90's, including due to reduction in track renewal works, positive in the recent and future years)
- Fifth Pay Commission: 1997-98 (negative in the late 90's)
- Special Railway Safety Fund: 2001-02 onwards (positive in the recent and future years)
- Reorganization from 9 to 16 zones: 2001-02 and 2002-03 (positive in the future years, due to greater focus)
- Focus on PPP format for investments, catalysed through RVNL: 2002-03 onwards (positive, due to the ability to leverage other stakeholders' funds).
- Market oriented tariffs (positive)
- Focus on increasing asset utilization: 2004-05 and 2005-06 (positive, provided implications on asset wear and tear are appropriately dealt with)
- Competition in container movement: 2006 (expected to be positive, though implementation has to be seen)

**Annexure 1: Key Statistics of IR**

	<b>1985-86</b>	<b>1990-91</b>	<b>1995-96</b>	<b>2000-01</b>	<b>2005-06</b>	<b>2006-07</b>
Running Track Kilometres	77,153	78,607	80,441	81,865	84,370	85,389
a) Broad Gauge (1676 mm)	33,669	34,880	40,620	44,776	48,574	49,820
b) Meter Gauge (1000 mm)	23,921	23,419	18,501	14,987	12,429	10,621
c) Narrow Gauge (762 mm/610 mm)	4,346	4,068	3,794	3,205	2,925	2,886
Route Kilometres (a+b+c)	61,836	62,367	62,915	63,028	63,332	63,327
Electrified Route Kilometres	6,517	9,968	12,306	14,856	17,907	17,786
d) Locomotives Diesel	3,046	3,759	4,313	4,702	4,793	4,816
e) Locomotives Electric	1,302	1,743	2,387	2,810	3,188	3,294
f) Locomotives Steam	5,571	2,915	209	54	44	43
Total Locomotives (d+e+f)	9,919	8,417	6,909	7,566	8,025	8,153
Wagons (Units)	359,617	346,102	280,791	222,147	207,983	207,719
Coaches	38,277	38,511	38,881	42,570	49,705	51,255
Wagon turn-round (in days) on BG	12.0	11.5	9.1	7.5	6.1	5.5
Number of Stations	7,092	7,100	7,068	6,853	6,974	6,909
Number of Employees (in thousands)	1,613	1,652	1,587	1,545	1,412	1,406
Passengers Traffic(million)	3,433	3,858	4,018	4,833	5,725	6,219
Passenger kms(million)	240,614	295,644	341,999	457,022	615,634	694,764
Passenger Earnings (Rs crore)	1,719	3,145	6,113	10,483	15,081	17,176
Freight Traffic (mt)	259	318	391	474	667	727.8
Freight Traffic Net ton kms(million)	196,600	235,800	270,489	312,371	439,596	480,993
Freight Earnings (Rs crore)	4,232	8,247	14,973	23,045	35,535	41,073

[MOR, Various Years-a]

## Annexure 2: Performance Review of IR

Rs crore

	1987-88	1888-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98
<b>Capital at Charge</b>	11,622	12,988	14,630	16,126	17,713	20,123	22,621	24,925	27,713	30,912	33,846
Passenger Earnings	2,060	2,456	2,669	3,147	3,685	4,315	4,895	5,464	6,124	6,633	7,573
Goods Earnings	5,982	6,343	7,624	8,407	9,462	10,903	12,557	13,670	15,290	16,668	19,866
Other Earnings	393	461	446	542	583	470	493	968	1,003	1,018	1,149
<b>Total Earnings</b>	<b>8,435</b>	<b>9,259</b>	<b>10,739</b>	<b>12,096</b>	<b>13,730</b>	<b>15,688</b>	<b>17,946</b>	<b>20,101</b>	<b>22,418</b>	<b>24,319</b>	<b>28,589</b>
<b>Total Working Expenses</b>	<b>7,803</b>	<b>8,633</b>	<b>9,888</b>	<b>11,154</b>	<b>12,389</b>	<b>13,980</b>	<b>15,135</b>	<b>16,590</b>	<b>18,525</b>	<b>21,001</b>	<b>25,876</b>
Misc. Transactions	91	111	130	171	200	247	291	297	242	306	311
<b>Net Revenue Receipts</b>	<b>723</b>	<b>737</b>	<b>982</b>	<b>1,113</b>	<b>1,541</b>	<b>1,955</b>	<b>3,102</b>	<b>3,808</b>	<b>4,135</b>	<b>3,625</b>	<b>3,024</b>
Dividend to General Revenues	639	716	809	914	1,032	1,172	1,296	1,362	1,264	1,507	1,489
Deferred Dividend				12	74	342					
<b>Excess/ Shortfall</b>	<b>84</b>	<b>22</b>	<b>173</b>	<b>187</b>	<b>435</b>	<b>441</b>	<b>1,806</b>	<b>2,446</b>	<b>2,871</b>	<b>2,117</b>	<b>1,535</b>
<b>Operating Ratio</b>	92.5	93.1	91.5	92.0	89.5	87.4	82.9	82.6	82.5	86.2	90.9

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
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<b>Capital at Charge</b>	36,829.34	39,772	43,052	47,147	51,099	56,062	59,347	65,878	76,031
Passenger Earnings	8,550	9,581	10,515	11,196	12,575	13,298	14,113	15,126	17,225
Goods Earnings	19,960	22,061	23,305	24,845	26,505	27,618	30,778	36,287	41,717
Other Earnings	1,109	1,297	1,060	1,797	1,988	1,989	2,479	3,078	3,429
<b>Total Earnings</b>	<b>29,619</b>	<b>32,939</b>	<b>34,880</b>	<b>37,838</b>	<b>41,068</b>	<b>42,905</b>	<b>47,370</b>	<b>54,491</b>	<b>62,370</b>
<b>Total Working Expenses</b>	<b>27,835</b>	<b>30,844</b>	<b>34,667</b>	<b>36,293</b>	<b>38,026</b>	<b>39,483</b>	<b>42,759</b>	<b>45,575</b>	<b>49,047</b>
Misc. Transactions	356	641	858	793	788	1,056	662	-912	768
<b>Net Revenue Receipts</b>	<b>2,141</b>	<b>2,736</b>	<b>1,071</b>	<b>2,338</b>	<b>3,830</b>	<b>4,478</b>	<b>5,274</b>	<b>8,005</b>	<b>14,453</b>
Dividend to General Revenues	1,742	1,890	308	1,337	2,665	3,087	2,716	3,005	3,584
Deferred Dividend					50	300	483	663	663
<b>Excess/ Shortfall</b>	<b>399</b>	<b>845</b>	<b>763</b>	<b>1,000</b>	<b>1,115</b>	<b>1,091</b>	<b>2,074</b>	<b>4,337</b>	<b>10,206</b>
<b>Operating Ratio</b>	93.3	93.3	98.3	96.0	92.3	92.1	91.0	83.7	78.7

[MOR, Various Years-b]

## Annexure 3: Fund Generation and Expenditures of IR

Rs crore

	1987-88		1988-89		1989-90		1990-91		1991-92		1992-93		1993-94	
		%		%		%		%		%		%		%
<b>Funds Generation</b>														
Internal Resources	1,331	38.9	1,586	40.4	1,789	39.2	2,091	43.4	2,134	39.6	2,548	41.4	4,030	68.8
Budgetary Support	1,368	40.0	1,543	39.3	1,773	38.9	1,632	33.9	1,756	32.6	2,589	42.0	974	16.6
Safety Fund														
Borrowings IRFC	720	21.1	800	20.4	1,000	21.9	1,092	22.7	1,503	27.9	1,025	16.6	856	14.6
Borrowings OYW/BOLT														
<b>Total Funds</b>	<b>3,419</b>	<b>100</b>	<b>3,929</b>	<b>100</b>	<b>4,562</b>	<b>100</b>	<b>4,815</b>	<b>100</b>	<b>5,393</b>	<b>100</b>	<b>6,162</b>	<b>100</b>	<b>5,860</b>	<b>100</b>
<b>Expenditure</b>														
New Lines	188	5.4	254	8.1	268	5.9	289	5.9	267	5.0	293	4.8	252	4.3
Gauge Conversion	360	10.4	448	14.3	542	11.9	531	10.8	591	11.0	1,014	16.5	1,310	22.3
Doubling														
Rolling Stock	988	28.5	517	16.5	1,522	33.4	1,905	38.9	2,207	40.9	2,409	39.1	2,320	39.6
Track Renewal	783	22.6	808	25.8	887	19.4	904	18.5	1,091	20.2	1,063	17.3	970	16.6
S & T Works	98	2.8	98	3.1	108	2.4	127	2.6	133	2.5	152	2.5	156	2.7
Electrification	196	5.7	185	5.9	236	5.2	233	4.8	231	4.3	235	3.8	278	4.7
Workshops and Production Units	240	6.9	323	10.3	369	8.1	293	6.0	202	3.7	217	3.5	136	2.3
Passenger Amenities	17	0.5	18	0.6	21	0.5	21	0.4	24	0.4	36	0.6	68	1.2
Investment in PSUs	50	1.4	65	2.1	80	1.8	80	1.6	115	2.1	1	0.0	51	0.9
Inventories	216	6.2	72	2.3	122	2.7	122	2.5	116	2.1	273	4.4	-143	-2.4
MTP	100	2.9	100	3.2	103	2.3	135	2.8	169	3.1	178	2.9	224	3.8
Other Expenses	415	12	495	15.8	572	12.5	542	11.1	514	9.5	583	9.5	490	8.4
<b>Total Expenditure</b>	<b>3,463</b>	<b>100</b>	<b>3,129</b>	<b>100</b>	<b>4,562</b>	<b>100</b>	<b>4,893</b>	<b>100</b>	<b>5,393</b>	<b>100</b>	<b>6,162</b>	<b>100</b>	<b>5,861</b>	<b>100</b>

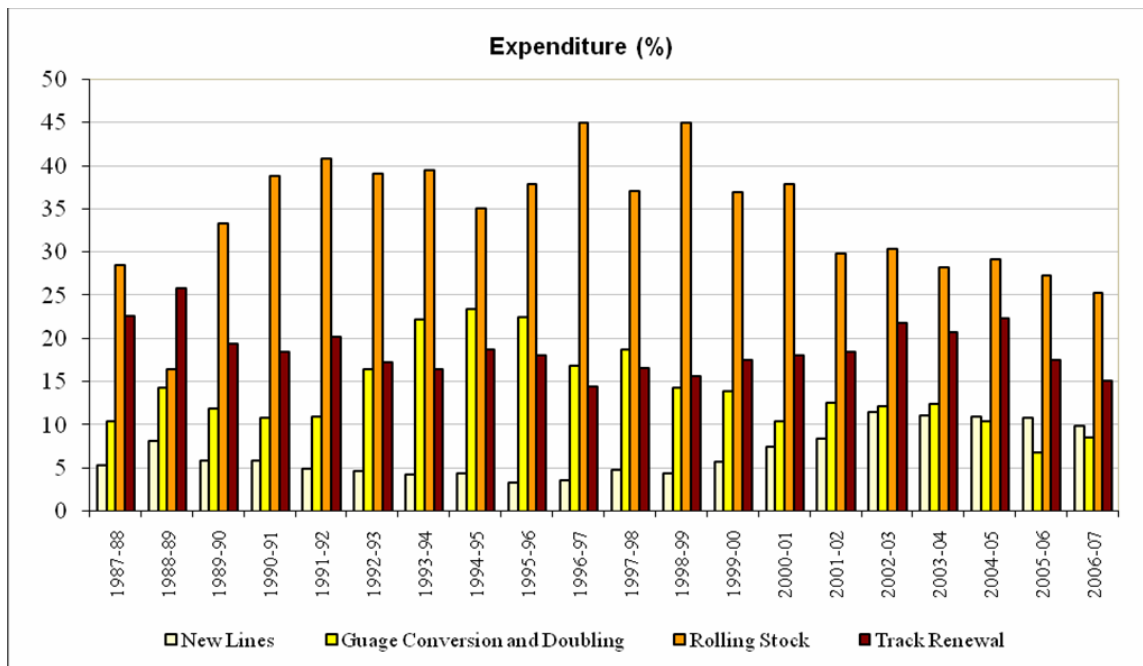
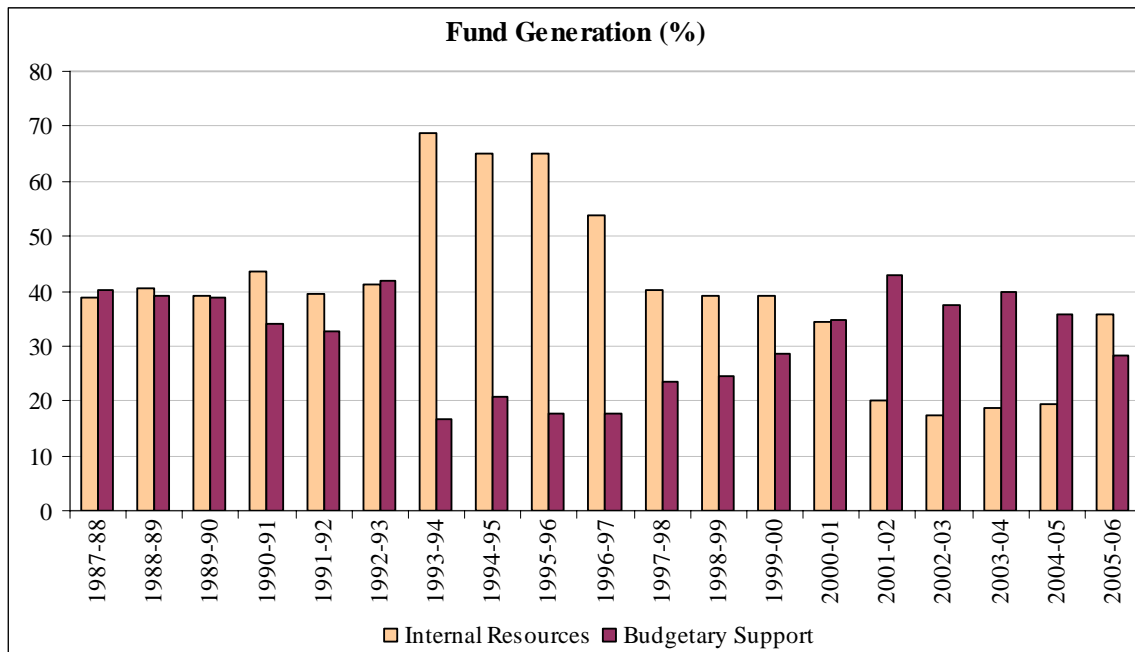
	1994-95		1995-96		1996-97		1997-98		1998-99		1999-00		2000-01	
		%		%		%		%		%		%		%
<b>Funds Generation</b>														
Internal Resources	3,582	65.1	4,208	65.1	4,462	53.7	3,452	41.9	3,455	39.0	3,550	39.2	3,229	34.4
Budgetary Support	1,145	20.8	1,138	17.6	1,465	17.6	1,992	24.2	2,185	24.7	2,588	28.6	3,269	34.8
Safety Fund														
Borrowings IRFC	745	13.5	985	15.2	1,954	23.5	2,236	27.1	2,941	33.2	2,785	30.7	2,818	30.0
Borrowings OYW/BOLT	34	0.6	133	2.1	429	5.2	559	6.8	276	3.1	134	1.5	79	0.8
<b>Total Funds</b>	<b>5,506</b>	<b>100</b>	<b>6,464</b>	<b>100</b>	<b>8,310</b>	<b>100</b>	<b>8,239</b>	<b>100</b>	<b>8,857</b>	<b>100</b>	<b>9,057</b>	<b>100</b>	<b>9,395</b>	<b>100</b>
<b>Expenditure</b>														
New Lines	240	4.4	211	3.3	296	3.6	400	4.9	391	4.4	521	5.8	700	7.5
Gauge Conversion	1,283	23.4	1,428	22.5	1,406	16.9	1,550	18.8	1,266	14.3	1,268	14.0	454	4.8
Doubling													524	5.6
Rolling Stock	1,922	35.1	2,403	37.9	3,744	45.1	3,055	37.1	3,989	45.0	3,355	37.0	3,560	37.9
Track Renewal	1,024	18.7	1,150	18.1	1,203	14.5	1,367	16.6	1,391	15.7	1,589	17.5	1,702	18.1
S & T Works	169	3.1	208	3.3	228	2.7	250	3.0	310	3.5	369	4.1	350	3.7
Electrification	291	5.3	348	5.5	279	3.4	319	3.9	328	3.7	319	3.5	302	3.2
Workshops and Production Units	120	2.2	101	1.6	111	1.3	119	1.4	144	1.6	167	1.8	165	1.8
Passenger Amenities	74	1.3	88	1.4	88	1.1	89	1.1	91	1.0	115	1.3	136	1.5
Investment in PSUs	54	1.0	10	0.2	10	0.1	10	0.1	92	1.0	0	0.0	36	0.4
Inventories	-418	-7.6	-98	-1.5	27	0.3	-83	-1.0	91	1.0	497	5.5	424	4.5
MTP	255	4.7	196	3.1	145	1.7	146	1.8	184	2.1	245	2.7	263	2.8
Other Expenses	698	12.8	501	7.9	1,069	12.9	1,417	17.2	972	11.0	1,133	12.5	1,478	15.7
<b>Total Expenditure</b>	<b>5,472</b>	<b>100</b>	<b>6,335</b>	<b>100</b>	<b>8,310</b>	<b>100</b>	<b>8,239</b>	<b>100</b>	<b>8,857</b>	<b>100</b>	<b>9,057</b>	<b>100</b>	<b>9,395</b>	<b>100</b>

	2001-02		2002-03		2003-04		2004-05		2005-06		2006-07	
		%		%		%		%		%		%
<b>Funds Generation</b>												
Internal Resources	2,051	20.2	1,977	17.3	2,492	18.6	3,009	19.5	6,750	35.8	11,643	46.6
Budgetary Support	4,377	43.0	4,264	37.4	5,315	39.7	5,493	35.6	5,312	28.2	6,189	24.8
Safety Fund	1,574	15.5	2,650	23.2	2,750	20.5	3,879	25.2	3,045	16.2	2,315	9.3
Borrowings IRFC	2,167	21.3	2,515	22.0	2,807	21.0	2,991	19.4	3,731	19.8	4,611	18.4
Borrowings OYW/BOLT	8	0.1			30	0.2	50	0.3	0	0	244	1.0
<b>Total Funds</b>	<b>10,177</b>	<b>100</b>	<b>11,406</b>	<b>100</b>	<b>13,394</b>	<b>100</b>	<b>15,422</b>	<b>100</b>	<b>18,838</b>	<b>100</b>	<b>25,002</b>	<b>100</b>
<b>Expenditure</b>												
New Lines	860	8.5	1,315	11.5	1,493	11.2	1,690	11.0	1,991	10.9	2,488	10.0
Gauge Conversion	686	6.7	812	7.1	1,134	8.5	1,121	7.3	1,242	6.8	2,136	8.5
Doubling	600	5.9	578	5.1	532	4.0	488	3.2	687	3.8	1,202	4.8
Rolling Stock	3,048	30.0	3,479	30.5	3,784	28.3	4,491	29.2	5,007	27.3	6,340	25.4
Track Renewal	1,885	18.5	2,496	21.9	2,781	20.8	3,444	22.4	3,224	17.6	3,796	15.2
S & T Works	369	3.6	551	4.8	689	5.2	818	5.3	1,043	5.7	1,179	4.7
Electrification	269	2.6	250	2.2	148	1.1	115	0.8	73	0.4	241	1.0
Workshops and Production Units	206	2.0	208	1.8	204	1.5	190	1.2	238	1.3	359	1.4
Passenger Amenities	169	1.7	175	1.5	181	1.4	223	1.4	256	1.4	408	1.6
Investment in PSUs	15	0.1	54	0.5	500	3.7	450	2.9	173	0.9	1,710	6.8
Inventories	913	9.0	127	1.1	363	2.7	428	2.8	699	3.8	711	2.8
MTP	281	2.8	312	2.7	351	2.6	317	2.1	212	1.2	253	1.0
Other Expenses	1,735	17.0	2,367	20.7	2,696	20.2	3,287	21.4	3,475	19.0	6,667	26.7
<b>Total Expenditure</b>	<b>10,177</b>	<b>100</b>	<b>11,408</b>	<b>100</b>	<b>13,364</b>	<b>100</b>	<b>15,372</b>	<b>100</b>	<b>18,320</b>	<b>100.0</b>	<b>25,002</b>	<b>100</b>

[MOR, Various Years-c]



**Annexure 4: Financial Review of IR**



[MOR, Various Years-c]

**Annexure 5: Share of Import Traffic carried by IR from Major and Minor Ports (2006-07)**

Commodity Group	Commodity	Import	IR Share	Import	IR Share	Total by IR	Total by IR
		(Major Ports)	(%)	(Minor Ports)	(%)	(mt)	(mt)
		(mt)	(%)	(mt)	(%)	(mt)	(mt)
Coal	Thermal coal	21.95	20	2.55	100	6.94	36.43
	Coking	22.65	100	1.27	100	23.92	
	Other coal	11.13	50	0.00	0	5.57	
Iron Ore and Other Ores	Iron ores	0.60	0	0.00	0	0.00	0.47
	Other ores	1.57	30	0.00	0	0.47	
Cement	Cement	0.89	0	0.00	0	0.00	0.00
POL	POL	16.37	25	14.01	25	7.59	8.94
	LPG	2.70	50	0.00	0	1.35	
Foodgrains	Foodgrains	3.62	70	0.38	70	2.80	2.80
Fertilisers	Fertilisers	7.93	70	2.17	70	7.07	7.07
Iron & Steel	Iron & Steel	5.18	30	0.00	0	1.55	1.55
Other	Other dry bulk	7.01	30	12.50	25	5.23	6.58
	Other liquid bulk	6.77	20	0.00	0	1.35	
Containers	Containers	34.01	45	0.00	0	15.30	15.30
<b>Total</b>	<b>Total</b>	<b>142.38</b>		<b>32.88</b>		<b>79.15</b>	<b>79.15</b>

[IPA, 2008; PC 2006b]

Note: IR share have been taken from Planning Commission 2006a for commodities except Iron ore and other ores, fertilizers, and iron & steel.

Assumption:

IR shares for Iron ore and other ores, fertilizers, and iron & steel

**Annexure 6: Share of Export Traffic carried by IR from Major Ports (2006-07)**

<b>Commodity Group</b>	<b>Commodity</b>	<b>Export (Major Ports)</b>	<b>IR Share</b>	<b>Total by IR</b>	<b>Total by IR</b>
		(mt)	%	(mt)	(mt)
Coal	Thermal coal	15.36	100	15.36	15.36
	Coking	0.03	0	0.00	
	Other coal	0.01	0	0.00	
Iron Ore and Other Ores	Iron ores	79.98	50	39.99	40.94
	Other ores	1.90	50	0.95	
Cement	Cement	0.09	0	0.00	0.00
POL	POL	22.37	25	5.59	5.59
	LPG	0.00	0	0.00	
Foodgrains	Foodgrains	1.38	0	0.00	0.00
Fertilisers	Fertilisers	0.00	0	0.00	0.00
Iron & Steel	Iron & Steel	3.67	0	0.00	0.00
Other	Other dry bulk	8.87	0	0.00	0.00
	Other liquid bulk	0.00	0	0.00	
Containers	Containers	36.52	45	16.43	16.43
<b>Total</b>	<b>Total</b>	<b>170.18</b>		<b>78.33</b>	<b>78.33</b>

[IPA, 2008; PC 2006b]

**Annexure 7: The Indian Railways Report 2001**

1. If IR is to survive as an ongoing transportation organization it has to modernize and expand its capacity to serve the emerging needs of a growing economy. This will require substantial investment on a regular basis for the foreseeable future.
2. IR will have to compete even harder with other modes in order to sustain its traffic volumes, let alone accelerate growth. Thus a significant change is needed in IR's strategy towards its freight services.
3. IR should take steps to recover its market share through a combination of tariff re-balancing and quality enhancement measures, and to increase its share of the transportation of "other commodities".
4. The Committee has constructed three possible investment strategies for IR over the next fifteen years. The first two scenarios, "Low Growth" and "Medium Growth" are constructed in a "Business as Usual" framework, whereas the third scenario, "Strategic High Growth" will require substantial focused remunerative investment and corresponding organizational restructuring of IR internally and in its relationship with government, including corporatisation.
5. For IR to survive over the next 20 years and beyond, it has to adopt a "strategic perspective" where it rekindles high growth in both the passenger and freight segments.
6. IR will have to explore every avenue of cost reduction. Among the cost reductions to be implemented staff cost reduction will be crucial.
7. From the point of view of investment strategy, the most undesirable feature of the annual budget exercise is the very short-term focus it imparts to all investment initiatives. The priority for IR is to invest in debottlenecking points of congestion in the network (particularly on the saturated arterial networks of the Golden Quadrilateral linking Delhi, Kolkata, Chennai and Mumbai).
8. The Expert Group's focus on root causes has highlighted three priority areas: institutional separation of roles; clear differentiation between social obligations and performance imperatives; and the need to create a leadership team committed to and capable of redefining the status quo.
9. The current system has two flaws that the Expert Group believes must be corrected: tenure and skills. A system which effectively rewards those on the basis of seniority and age with a position on the Board for a few months prior to retirement is not the mechanism to breed leaders. Skills in the leadership team need to be broadened and deepened. IR urgently requires an injection of fresh ideas and fresh skills to accelerate its development into a commercially savvy market oriented set of businesses.
10. The Expert Group has carefully examined the experience of European and other railways in their restructuring efforts. The focus should be on commercialization rather than privatization. This involves reorganizing the rail system into its component parts, spinning off non-core activities, restructuring what remains along business lines and adopting commercial accounting performance management systems. IR's management needs to be allowed a degree of autonomy that is comparable to any other commercial organization.
11. IR must eventually be corporatised into the Indian Railways Corporation (IRC). The Government of India should be in charge of setting policy direction. It would also need to set up an Indian Rail Regulatory Authority (IRRA), which would be necessary to regulate IRC's activities as a monopoly supplier of rail services, particularly related to tariff setting. The Indian Railways Corporation (IRC) would be governed by a reconstituted Indian Railways Executive Board (IREB).

[NCAER, 2001]

### **Annexure 8: Integrated Railway Modernization Plan (2005-2010)**

Railways have formulated an Integrated Modernization Plan covering the period 2005-06 to 2009-2010 with the aim towards transforming the IR into a modern system of global standards. It is hoped that the initiatives outlined will go a long way in bringing about the desired transformation. The total expenditure involved for these identified items would be about Rs. 24,000 crores. Features of this plan are:

#### **Passenger Business Segment**

1. Towards high speed travel
2. Shatabdi/Rajdhani trains to run with latest technology coaches
3. Integrated and extended National Train Enquiry System
4. Expansion of computerized Passenger Reservation System
5. Expansion of computerised Unreserved Ticketing System
6. Computerization of Parcel Management System
7. Modern and environment friendly toilets in coaches
8. Mechanized cleaning of stations
9. Mechanized cleaning of coaches
10. Extension of Coaching Operations Information System (COIS) for improved passenger traffic operations
11. Provision of Public Address Systems on important trains
12. Improved safety features in coaches – internal and external crashworthiness, anti-climbing features and use of fire retardant material in coaches

#### **Freight Business Segment**

1. Running of freight trains at 100 kmph on identified sections
2. Completion of 75 throughput enhancement works
3. Development of 40 modern freight terminals
4. Introduction of high axle load operations on selected routes
5. Warehousing facilities near rail terminals through public/private participation
6. Web based Claims Management System
7. Extension of Freight Operations Information System to cover terminal, rake and crew management modules
8. Introduction of double stack containers on identified routes
9. Modernisation of freight maintenance
10. Induction of corrosion resistant stainless steel body wagons
11. Induction of light weight aluminium wagons to increase carrying capacity
12. Modernisation of guard's brake-van
13. Provision of Bogie Mounted Brake System on freight stock
14. Development of Roll-On-Roll-Off door to door service
15. Locotrol for diesel and electric locomotives on identified sections
16. Introduction of self steering bogies

#### **Other Modernization Initiatives**

1. Track modernization
2. Mechanised maintenance of track

3. Comprehensive Bridge Management System
4. Signalling and Telecommunication Systems
5. Electrical Systems
6. Mechanical Systems
7. Disaster Management System

**Other**

1. Technology mission on railway safety
2. Construction of a dedicated test track
3. Optimisation of investment planning processes through long range decision support system
4. Geographical Information System mapping of IR's network and assets/facilities
5. Modernisation of Train Costing System

[MOR, 2004]

### Annexure 9: Dedicated Freight Corridors

In order to create capacity and improve quality of services, Dedicated Freight Corridor (DFC) projects on eastern and western routes were sanctioned in the rail budget of 2006-07. The existing trunk routes of Howrah-Delhi on the eastern corridor and Mumbai-Delhi on the western corridor are highly saturated, line capacity utilization varying between 115% to 150%. The DFC project has been conceptualized with the following broad objectives:

1. Reduction in the unit cost of transportation by speeding up freight train operations and achieving higher productivity through better utilization of railway assets, reduction in inventory costs and achieving greater customer satisfaction.
2. Creating rail infrastructure capability to move a substantially higher level of freight traffic, adequate to meet the requirements for the next 30 years or more.
3. Off-loading the existing rail corridor of a substantial part of the present freight traffic, thereby releasing capacity for augmenting passenger services, decongesting busy terminals and junction stations and resulting in improved safety in passenger train operations.
4. Introduction of high end technology in freight operations, resulting in higher axle loads, higher maximum moving dimensions (MMD), higher schedule of dimensions (SOD) and track loading density (TLD), improved pay load/tare weight ratio and substantially improved traffic throughput by way of introduction of heavy/long haul freight services and double-stack container trains.
5. Introduction of time-tabled freight services and guaranteed transit times.
6. Improving the railways' share in the total land transportation of goods in the country and enhancing customer satisfaction.

The salient features of the project are:

1. A dedicated freight corridor exclusively for running freight trains at a maximum permissible speed of 100 Kmph
2. Primarily Double Line corridor (except where Single Line is justified on traffic considerations) running parallel to the existing corridors, so as to maximize the usage of available railway land; and transfer trains from the existing corridor to the DFC and vice versa through predetermined Junction arrangement, equipped with grade separators to facilitate smooth transfer of trains between the two networks
3. The track sub structure like formation, bridges etc are to be fit for 32.5-ton axle load but the track super structure like track, sleepers, ballast etc are to be fit for 25-ton axle load
4. The loop length on the proposed corridor to be 1500 meters long to facilitate running of long haul trains
5. Provision of grade separators, i.e., ROB/RUBs at important Level Crossing Gates to avoid any detention to either road or rail traffic
6. Crossing stations on the Double Line to be provided at an average distance of 40 Km and 10 Km on the Single Line stretch
7. Higher Schedule of Dimensions (SODs) and Maximum Moving Dimensions (MMDs) in order to run wider stock, double stack containers and newly designed wagons so as to have improved payload to tare ratio
8. Infrastructure provided should be fit for heavy/long haul operation up to trailing load of 15000 tonnes
9. Advanced Signaling System facilitating better and efficient operation of trains

A special purpose vehicle Dedicated Freight Corridor Corporation of India Ltd. (DFCCIL) has been formed on June 30, 2006 to implement the Dedicated Freight Corridor (DFC) project on Indian Railways. DFCCIL is responsible for planning & development, mobilization of financial resources

and construction, maintenance and operation of the DFC. The relationship between the Ministry of Railways and the SPV has been codified in a Concession Agreement. The authorized capital of DFCCIL is Rs 4000 Crores and paid up capital is Rs 50 Crores.

Details of the eastern and western corridors are:

	<b>Eastern Corridor</b>	<b>Western Corridor</b>
		Kms
Route Length	1278	1515
Double Line	.866	1483
Parallel	722	1062
Diversion	144	276
New Line	—	145
Single Line	412	32
Parallel	277	32
Diversion	135	--
Feeder Routes	2587	2082
Estimated Cost* (Rs crore)	19,613 (only track)	23,680 (track, electric locomotives and price changes)

[Presentation by P N Shukla, Director, Operations and Business Development, DFCCIL], \*Financial Express, April 08, 2008

### **Project Financing**

The cost of the project will be covered by:

- Internal generation of MOR
- Budgetary Support
- Loan from multilateral/ bilateral agencies JBIC, ADB, World Bank
- Market Borrowing
- Public-Private Partnership

[<http://dfccil.org>]



### ***Annexure 10: Private-Public Partnership Models of IR***

IR took steps to involve the private sector in the development of railway infrastructure and services. Two separate schemes were initiated. These were own your own wagon scheme (OYWS) and build-own-lease transfer (BOLT) [Puri, 2003]:

#### ***OWYS (Own your own wagon scheme)***

Under OYWS, private sector firms procure wagons, own them and lease them to IR, which pays lease charges. The scheme was conceived as a strategy to enhance the capacity of railway transport and to meet the interests of the various sections of the economy by encouraging private parties to own their wagons and supplement the resources available with the railways for the acquisition of rolling stock.

For their investments in wagons, the owners are paid lease charges at the rate of 16 per cent per annum for the first 10 years and 10 per cent for the next 10 years. A number of major companies have participated in the scheme. Initially, in the 90's, the response was quite encouraging. However, the interest has waned lately. This has now been replaced by the Wagon Investment Scheme.

#### ***BOLT (Build-own-lease-transfer scheme)***

In order to bridge the gap between the requirement and availability of funds, IR initiated a scheme aimed at the participation of private sector financiers in the development of rail infrastructure which included electrification, gauge conversion, doubling of existing railway line projects, etc. Participation of the private sector through BOLT schemes was expected to serve two purposes. First, the IR would be able to raise the funds for projects having long gestation periods. Second, as the project would be implemented by the private sector, it was expected that they could be commissioned in a shorter time period.

Under the scheme, a project was awarded to a provider who could undertake the construction of the project. As the BOLT project involved investment, which was generally beyond the resource capability of the provider, financiers/financial institutions were expected to arrange the funds. Financiers were allowed to enter into an agreement directly with the IR so that they could get back the loans with interest through payments of lease rentals directly from the latter.

The BOLT scheme, however, did not succeed in attracting the private sector. One of the reasons was that the financiers faced certain risks mainly on account of time and cost overruns. Moreover, the financiers were not eligible for the fiscal benefits offered to the infrastructure developer.

As financiers did not have the experience of railway assets creation, it would have been better if the IR shouldered the responsibility of bearing the pre-commissioning risks. Further, the approved asset-builders of the IR were small operators and they depended heavily on financial institutions for financing of the projects. For all practical reasons, the responsibility of the private entrepreneur would have ended after the assets were created and handed over to the IR for operation. On the other hand, financial institutions could be receiving the lease charges from the IR over a long period of time. Eventually, the scheme was discontinued.

Private sector participation in the railway sector has not met expectations. IR have now identified the major obstacles to private sector participation and defined the objectives of such participation more clearly. These redefined objectives would be achieved by encouraging various models of public-private partnership arrangements. These objectives and the new initiatives are discussed below.

### ***Objectives of public-private partnerships***

Based on its experience of private participation, the IR have identified the following objectives

- Supplementing government resources in railway infrastructure projects by private capital flows
- Involving state governments in the creation/development of railway infrastructure for the common public good
- Enhancing the capacity of rail transport to avoid supply demand mismatch
- Ensuring availability of transport needs consistent with the expected GDP growth of 7 to 8 per cent per year

A number of partnership models will be adopted to achieve the above-mentioned objectives. These include

- Special purpose vehicle (SPV) route, through stake holders including State Governments
- Build-own-transfer (BOT) route
- Private freight terminals
- Wagon investment scheme (WIS)

### ***Special purpose vehicle***

The identified viable projects can be implemented through various routes. One of these is through the creation of a special purpose vehicle (SPV). The salient features of this model are as follows:

- IR prepares a project report indicating the cost of the various components of the project as well their viability. If the IR decide to participate in the project, the responsibility of land acquisition lies with the IR.
- The SPV scheme envisages the participation of the private sector and other beneficiaries and national-level infrastructure funding institutions for the development of railway infrastructure through appropriate concessions. Revenue from commercial operations would accrue to SPV through revenue sharing with IR or through payment of access charges by the IR.
- The land required for a project is to be made available on lease to SPV. Commercial utilization of the Railway land may also be allowed.
- In case of green field projects, SPV is free to decide the process relating to project development, construction and maintenance. However, for gauge conversion and double tracking, IR undertakes maintenance works of the project. IR can use its own rolling stock for operating the facilities created by SPV. However, in specific cases the responsibility may be given to the private operators. The concession period allowed for a SPV project can be fairly long. Initially, a concession is granted for 33 years, which may be extended further.

IR will also take up projects with the help of state governments by creating SPVs. Apart from the central and state governments, financial institutions may also participate in an SPV. IR may take up projects by creating an SPV in which both IR and the state government may provide equity.

### ***BOT (built, own, transfer)***

This is an improved version of the earlier BOLT scheme described above. The BOT model envisages private sector participation through the formation of a consortium of construction contractors and financiers. The salient features of the scheme are as follows:

- Under the scheme, the concessionaire will design, build and own the facility. After the concession period is over, the facility will be transferred to the IR.
- The Concession will be granted through the bidding process. The main parameter for the grant of the concession will be the lowest bid decided on the basis of the present value of the future periodic access charges demanded by the bidder over the concession period.

- In order to give sufficient comfort to the lenders, the access charges will go in an escrow account through a tripartite agreement between the IR, project sponsors and the lenders.
- IR will prepare the project report, which is to be given to all pre-qualified bidders
- The facility created will be maintained and operated by IR

### ***Private freight terminals***

IR encourage the private sector to develop freight terminals. The IR pay service charges towards compensation for the capital cost. The private sector promoter is allowed to charge the customer separately for services such as handling/loading/unloading, warehousing and transport.

### **Wagon Investment Scheme (WIS)**

In order to encourage public-private partnership in procurement of wagons to meet with the anticipated incremental freight traffic in the coming years, IR has announced introduction of a new scheme called “Wagon Investment Scheme” (WIS) during the 2005-06 budget presentation. Customers investing in Railway wagons will be assured of supply of a guaranteed number of rakes every month based on the number of rakes procured and the turn round of the type of wagons with 10% concession in freight. In addition, two bonus rakes per month will be supplied without freight concession or penalty. Investors opting for Engine on Load (EOL) Scheme will get additional bonus supply of two BG rakes per month without concession in freight. This guaranteed supply will be in addition to normal supply of rakes to such customers.

The essence of the scheme is that it focuses on assured supply of guaranteed number of rakes every month to a customer based on the number of rakes procured by him. Also, freight concessions will be allowed to him. The wagons under the scheme can be procured by individuals, corporate bodies or association or groups of companies such as integrated steel plants of SAIL or a group of cement companies in a cluster.

As for the mode of procurement, the customers can procure the wagons directly from the builders approved by the Railway Ministry subject to current IR Standard design and specifications and inspection by the nominated agency of the IR namely RDSO. All critical components will be procured from RDSO approved sources and to current IRS specifications.

The Wagon Investment Scheme is an improvement over the earlier Own Your Wagon (OYW) scheme in several ways. Thus, unlike OYW scheme which flopped, no lease charges shall be payable under the present scheme. Second, any escalation in rates and tariffs is taken care of as the rebate is in percentage. Third, unlike OYW scheme, it is not linked to the prime lending rate and therefore much simpler and more transparent.

[Puri, 2003; MOR, 2005; Business Line, April 13, 2005]

### Annexure 11: Railway Reform Program

	Reform Agenda	Performance Indicators*
1	<b>Upgrade Accounting System</b> Develop and implement improved accounting system Computerization of revenue and cost accounting	SET I
2	<b>Restructure Core Business</b> Accounting separation Restructuring Strengthening of commercial orientation of zonal railways	
3	<b>Restructure and Hive Off Non-Core Activities</b> Accounting separation Outsourcing Creating focused business organizations (FBOs) Restructuring production units Restructuring other non-core activities	SET II
4	<b>Increase Private Sector Participation</b> Private sector terminal services Concessioning of loss making branch lines to private operators Introduce competition in rail container services Further private sector participation initiatives (eg, SPVs, joint ventures)	SET I
5	<b>Reengineering Internal Business Process and Customer Interface</b> Consulting Services to redesign and simplify processes Approved proposed process changes Implement on pilot basis in one zone Establish throughout IR	
6	<b>Delineate Social and Commercial Objectives</b> Initiate public debate about delineate social and commercial objectives Formulate transparent public service obligation (PSO) mechanism Implement PSO mechanism throughout IR	SET I
7	<b>Tariff Rationalization</b> Announce Policy decision and commence tariff rationalization Implement tariff rationalization	SET I
8	<b>Evaluate Need for Regulation</b>	
9	<b>Right Size Staff Strength</b>	SET III
10	<b>Institutionalize Improved Investment Planning and Selection</b> Consulting services to strengthen investment planning tools Institutionalize use of LRDSS and investment planning tools Prepare medium-term investment plan using improved planning tools	SET IV

11	<b>Evaluate Sector Performance and Reform Program Implementation</b>	
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**\* Performance Indicators**

**SET I**

1.	Rail Coefficient: <u>“Cargo quantum moved by rail”</u> “Total availability”
2.	<u>“Other commodities transported”</u> “Total originating rail revenue traffic”  Separated for (i) Total traffic, (ii) Container traffic, and (iii) Balance traffic
3.	<u>“Earning from commodities transported below cost”</u> “Total freight earnings”
4.	a) <u>“Losses on passenger segment”</u> “Total freight earnings”  b) <u>“Losses on passenger segments”</u> “Total earnings”
5.	a) <u>“Average passenger fare per kilometre”</u> “Average freight rate per NTKm”  b) <u>“Average earnings per day per passenger coach in use”</u> “Average earnings per day per freight wagon in use”  Earnings increase per passenger and freight coach per day to be indicated separately for (i) increase due to fare, (ii) increase due to passenger traffic
6.	a) <u>“Cross subsidy”</u> Total passenger earnings”  b) <u>“Value of concession granted”</u> “Total passenger earnings”

**SET II**

7.	“Percentage reduction in costs (staff and materials) due to hiving off Scheduled maintenance of Pumps/DG Sets/Stationary AC Plants/ Distribution Network”
8.	“Percentage increase in earnings arising from the leased SLRs both due to better utilization and reduction in staff”

9.	“Total NTKm transported by CONCOR and the average earning per NTKm, separately for Railway supplied stock and CONCOR”s stock”
10.	“Reduction in losses/ increase in earnings from the catering operations as also total staff engaged on catering activities as on 1 <sup>st</sup> April of a year and reduction effected during the year due to setting up IRCTC”
11.	Ratio of ‘Percentage reduction effected in the cost of different items supplied by Production Units’ to “total earnings by Production Units achieved from Market Operations”

**SET III**

12.	“Ratio of staff costs to total ordinary working expenses”
13.	“Ratio of pension payments to total ordinary working expenses”
14.	“Savings effected in a financial year due to net reduction in staff achieved in that year multiplied by average wage per employee”
15.	Wage bill per thousand traffic units (ie NTKm and Passenger KM) at constant prices as obtaining on 01/04/2004
16.	<p>“Savings effected in a financial year due to net reduction in staff achieved in that year multiplied by average wage per employee” measured at:</p> <p>Current prices Constant Prices</p> <p>a) “Traffic output per employee”</p> <p>b) “Contribution per employee” = <math>\frac{\text{Gross Receipts} \times \text{Average Annual Wage}}{\text{No of Employees}}</math></p>

**SET IV**

17.	“Return on Total Capital Employed (ROCE)”
18.	“Percentage of capital invested on projects that qualify for no payment of dividend/total plan outlay in a financial year”
19.	<p>a) “Capital output ratio” as indicated by the quantum of capital at charge in paisa per NTKm”</p> <p>b) “Percentage of capital used for productive use out of the total capital employed”</p> <p>c) “Return on capital employed by FBOs”</p>

[CRISIL, 2005]

### **Annexure 12: The Commission of Railway Safety**

The Commission of Railway Safety, working under the administrative control of the Ministry of Civil Aviation of the Government of India, deals with matters pertaining to safety of rail travel and train operation and is charged with certain statutory functions as laid down in the Railways Act (1989), which are of an inspectorial, investigatory & advisory nature.

The Commission of Railway Safety was separated from the Ministry of Railways on 12.05.1941 and was placed under the “Department of Communication” making it independent of the Railway Board and of any Railway Administration.

The Commission functions according to certain rules viz. statutory investigation into accidents rules framed under the Railways Act and executive instructions issued from time to time. The most important duties of the Commission is to ensure that any new Railway line to be opened for passenger traffic should conform to the standards and specifications prescribed by the Ministry of Railways and the new line is safe in all respects for carrying of passenger traffic. This is also applicable to other works such as gauge conversion, doubling of lines and electrification of existing lines. Commission also conducts statutory inquiry into serious train accidents occurring on the IR and makes recommendations for improving safety on the Railways in India.

The Commission is headed by a Chief Commissioner of Railway Safety (CCRS), at Lucknow, who also acts as Principal Technical Advisor to the Central Government in all matters pertaining to railway safety. Working under the administrative control of CCRS are nine Commissioners of Railway Safety (CRS), each one exercising jurisdiction over one or more of the 16 Zonal Railways. In addition, Metro Railway/Kolkata, DMRC/Delhi, MRTD/Chennai and Konkan Railway also fall under their jurisdiction. There are 5 Deputy Commissioners of Railway Safety posted in the Headquarters at Lucknow for assisting the CCRS as and when required. In addition, there are 2 field Deputy Commissioners, one each in Mumbai and Kolkata, to assist the Commissioners of Railway Safety in matters concerning the Signaling and Telecommunication disciplines.

The Commissioners are railway officers taken to the Commission on permanent absorption basis, thus, they sever their lien on IR. The Deputy Commissioners are taken from IR on deputation basis and they revert back to IR on completion of their deputation period.

The Commission of Railway safety has also been an active member of International Transportation Safety Association (ITSA) from 1998.

The duties and functions of the Commissioners are laid down in Railways Act, 1989, Rules framed there under and executive instructions issued from time to time. These are:

- To inspect new railway lines with a view to determine whether they are fit to be opened for the public carriage of passengers and to sanction their opening after inspection on behalf of the Central Government. A closed line can also be authorized for opening to passenger traffic if considered fit on inspection.
- To conduct investigations into serious accidents to passenger trains and other train accidents considered to be of serious nature and suggest safeguards.
- To sanction the execution of all new works and installations on the running track affecting the safety of the traveling public such as building of bridges, remodeling of station yards, line capacity works, re-signaling, etc.

- To make periodical inspections of railways and report to the Central Government on any condition which may endanger the safety of the traveling public and make recommendations even to close such a line for passenger operation.
- To examine the technical aspects of new rolling stock and tender advice on their introduction in the existing network and to sanction their running at higher speeds
- To authorities the carriage of oversized consignments stipulating the conditions for their movements
- To recommend and sanction infringements to the schedule of dimensions prescribed by the Government of India
- To grant dispensation from general rules under approved special instructions subject to stipulated safeguards
- To oversee the accident prevention efficacy of the zonal railway administration by reviewing the reports of departmental enquiries into less serious accidents
- To tender general advice to railways on matters concerning safety of train operation

Some of the currently focused issues are:

- To streamline the working of level crossing
- To reduce the train collisions
- Checking of unauthorized carriage of inflammable material in the trains and banning of smoking while loading parcels in parcel vans
- Rail, wheel and axle fractures need to be prevented by better diagnostic systems and timely action for their replacement
- Check on overloading of wagons of freight trains
- EMUs in sub-urban train services to have doors closed during the run
- Improved design of toilets in coaches for reducing the corrosion in rails
- Overall system study and putting in place the required infrastructure for maintenance and operation before introduction of any new train
- Adoption of modern diagnostic techniques for condition monitoring and mapping of foundations of old bridges and their suitability for the present day loading standards
- Provision of appropriate fencing of tracks before introduction of high speed passenger carrying trains in order to effectively control the trespassing of the same

[CRS, 2006]



**Annexure 13: The Indian Railways Act, 1989****Power to fix rates**

- The Central Government may, from time to time, by general or special order fix, for the carriage of passengers and goods, rates for the whole or any part of the railway and different rates may be fixed for different classes of goods and specify in such order the conditions subject to which such rates shall apply
- The Central Government may, by a like order, fix the rates of any other charges incidental to or connected with such carriage including demurrage and wharfage for the whole or any part of the railway and specify in the order the conditions subject to which such rates shall apply

**Power to classify commodities or alter rates:**

The Central Government shall have power to-

- Classify or reclassify any commodity for the purpose of determining the rates to be charged for the carriage of such commodities
- Increase or reduce the class rates and other charges

**Power of railway administration to charge certain rates:**

Notwithstanding anything contained in this Chapter, a railway administration may, in respect of the carriage of any commodity and subject to such conditions as may be specified-

- Quote a station to station rate
- Increase or reduce or cancel, after due notice in the manner determined by the Central Government, a station to station rate, not being a station to station rate introduced in compliance with an order made by the Tribunal
- Withdraw, alter or amend the conditions attached to a station to station rate other than conditions introduced in compliance with an order made by the Tribunal
- Charge any lump sum rate

[MOR, 1989]

### Annexure 14: Changes in Goods Freight Structure

#### 2000-01

The freight rates of all commodities were increased by 5%. However, the following commodities were exempted from this increase:

- Foodgrains
- Sugar
- Edible salt
- Edible oils
- Kerosene
- LPG
- Fruits and vegetables

#### 2001-02

The freight rates for all commodities excepting essential commodities were increased by 3%. However, freight increase for Coal (not for household consumption) and Iron & Steel (Division A, B and C) was restricted to 2% and for Furnace Oil was restricted 1%.

#### 2002-03

Freight structure for base class rationalized to remove anomalies resulting in marginal decrease at certain distances and minimal increase in certain others.

- Number of classes reduces from 59 to 32.
- Ratio of freight in highest class to lowest dropped from 8 to 3.3.
- 25 anomalous classes abolished.
- Commodities of common use viz edible salt, fruits, vegetables, gur, jaggery, shakkar, certain items of edible oils, foodgrains, pulses, organic manures, urea, fodder and dry grass to be carried at the lowest class – 90.
- Marginal increase in rates of coal, iron ore and raw material for steel plants. Marginal reduction in the case of Iron & steel, pig iron, cement and most of the petroleum products.

#### 2003-04

No change in freight rates. However, lowest class is 90 and highest class lowered from 300 to 250.

Chargeable class for following commodities reduced:

Clinker, Caustic Soda Liquor (Tank Wagons), Manganese Ore from 135 to 130 (3.7%); Cement from 140 to 135 (3.6%); Soda Ash from 150 to 140 (6.7%); Molasses and Petroleum Coke from 160 to 150 (6.3%); Cement Sheets, Bitumen (Tank Wagons), Pig Iron, Iron or Steel Scrap from 170 to 160 (5.9%); Refined Vegetable

Oil (Div A) from 185 to 175 (5.4%); Iron & steel from 190 to 180 (5.3%); LPG from 200 to 185 (8.5%);

Sulphuric Acid (Tank Wagons) from 210 to 190 (9.5%); Naptha and Crude Oil from 240 to 220 (8.3%); HSD and Furnace Oil from 260 to 240 (7.7%); Lubricating Oils and

Compressed Gases (Wagon Load) from 270 to 250 (7.4%) and Petrol from 280 to 250 (10.7%).

#### 2004-05

With effect from 27.11.2004, the classification of the following commodities has been revised:

Coal, Cement Clinker, Iron Ore and Manganese Ore from **Class 130 to Class 140**

Cement from **Class 135 to Class 140**

Limestone, Dolomite and Gypsum from **Class 120 to Class 140**  
Bauxite from **Class 125 to Class 140**

**2005-06**

With effect from 01.12.2005, the classification of the following commodities has been revised:

Limestone & Dolomite from Class 140 to Class 160

Iron Ore for Export from Class 160 to Class 180

Food-grains from Class 100 to Class 110

Fertilizers from Class 100 to Class 110

[MOR, Data Book 2006-07]

## Annexure 15: SWOT Analysis of IR

### 1. Strengths

No.	Area	Description	Implication for IR for its future
	<b>Organization Level</b>		
1.	Energy efficient	Railways are the only mode of transport that can use any form of primary energy. Further, railways are energy efficient due to (i) lowest known frictional loss due to rolling of steel on steel and (ii) reduced air friction due to “tailgating” of a large volume of cargo behind the first unit.	<ul style="list-style-type: none"> <li>▪ Sustainable technology will ensure continued participation in the transport market</li> <li>▪ Lower cost of operations provides competitive advantage</li> </ul>
2.	Human resource with high potential for development	IR has one of the largest pool of skilled and qualified professionals in the country. IR does not face any major industrial relations problems. It has a number of training institutes at all levels to upgrade the technical and managerial skills of its staff.	<ul style="list-style-type: none"> <li>▪ Change, once accepted, would be easy to implement</li> <li>▪ Absorption of new technologies and methods, and introduction of new procedures would also be relatively easy</li> </ul>
3.	Shared value on core task – ‘run trains’	Staffs at all levels, and irrespective of their departments, share a common commitment to run trains. This attribute is invaluable in the transport industry.	<ul style="list-style-type: none"> <li>▪ Orientation and change towards running trains ‘more effectively and efficiently’ should be easy to implement, as long as it is positioned correctly</li> </ul>
4.	Capacity to manage crisis situations	Whenever there are accidents or national emergencies, IR has exhibited capacity to react quickly to provide appropriate support.	<ul style="list-style-type: none"> <li>▪ Resilience of organization and operations provides comfort that there is little scope for chaos during difficult situations including change</li> </ul>
5.	Well intended systems in place	IR has a successful track record of managing one of the world’s most complex network organizations with a record of being able to deliver.	<ul style="list-style-type: none"> <li>▪ Change, once accepted would be easy to implement</li> </ul>
6.	Integrated infrastructure and systems	IR has an installed infrastructure base and time-tested and relatively efficient systems and execution processes. IR has production units to manufacture locomotives, coaches, wheels and axles for wagons accredited with ISO 9001 Certification.	<ul style="list-style-type: none"> <li>▪ Potential for achieving economies of scale, if properly leveraged</li> </ul>
7.	Project management	IR has proven ‘technical’ capability to execute new projects.	<ul style="list-style-type: none"> <li>▪ Human Resources not an issue for executing projects in time, especially those related to capacity augmentation/ removal of bottlenecks</li> </ul>
	<b>Freight (Bulk) Business Line</b>		
8.	Freight movement is less vulnerable to weather, accidents, fire and security.  If there are sidings at the origin	The very nature of rail transport, i.e. movement of a large number of wagons in a train, provides better security and lesser risks of fire and accidents. A train on move is also constantly monitored from ‘control office’ – an added advantage for these features. And covered wagons and containers provide better protection against weather.	<ul style="list-style-type: none"> <li>▪ Being high volume predictable movements, IR is well placed to provide effective service at low costs.</li> </ul>

No.	Area	Description	Implication for IR for its future
	and/or destination, trans-shipment requirements reduce	Sidings enable placement of the wagons in the customer's premises at an appropriate location for loading/unloading.	
9.	Bulk loading and unloading capability	Since a train consists of multiple units of wagons, rapid loading/unloading capability for a large number of commodities becomes feasible, an advantage not present in other modes of transport, especially road transport.	<ul style="list-style-type: none"> <li>Being high volume predictable movements, IR is well placed to provide effective service at low costs.</li> </ul>
	<b>Freight (Non Bulk) Business Line</b>		
10.	IR has high quality multi modal container based transport infrastructure through its subsidiary, CONCOR.  Experiments on roll-on-roll-off (RORO) by KRC have been commercially successful.	CONCOR offers secure multi-modal transport with the fastest delivery schedule with customs clearance for cargo away from the port of import/export – advantages not available by road transport.  The concept of moving a road truck by rail along with the driver for a substantial distance has been a success, as it accrues savings to the truck operator too.	<ul style="list-style-type: none"> <li>If the front end service systems fall into place, IR can draw non-bulk traffic from road.</li> </ul>
	<b>Passenger (Non Suburban) Business Line</b>		
11.	Offers comforts for long distance Passengers (toilets, internal movement).  Provides established and well entrenched arrangements for overnight travel (sleeping berths).	Availability of booths for rest, sleep and toilets, and adequate space for internal movement are distinct advantages of rail travel.  Rail provides overnight connectivity for a large pair of cities. This permits a full day being available for work by the passengers.	<ul style="list-style-type: none"> <li>Long distance passengers can be retained by IR, though for very long distances (say, above 1000 km), air would compete, unless price differentials are significant.</li> </ul>
	<b>Passenger (Suburban) Business Line</b>		
12.	Offers possibility of high volume, high frequency service	For instance, high density urban transport requirements, rail transport is the preferred solution.	<ul style="list-style-type: none"> <li>Railways will enjoy preference in high density commuting corridors</li> </ul>
	<b>Passenger (Parcel) Business Line</b>		
13.	Offers 'time definite' services on passenger trains	The advantages of a parcel being transported within a given time and at a reasonable rate are obvious. Considering the spread of the network and the cities it connects, IR has a great advantage to make use of.	<ul style="list-style-type: none"> <li>If the front end service systems fall into place, IR can bring in high rated parcel traffic</li> </ul>

## 2. Weaknesses

No.	Area	Description	Implication for IR for its future
	<b>Organization Level</b>		
1.	Low customer orientation – both internally and externally	Rail services lack customer and market orientation resulting in dissatisfied customers. Performance measures are also not in line with customer requirements.	<ul style="list-style-type: none"> <li>▪ Risk of loss of market share unless the deficiency in respect of lack of customer orientation, training and performance measures is corrected.</li> </ul>
2.	Hardened departmental boundaries. Insufficient openness to new ideas.	IR is a vertically integrated organization on a departmental basis. This leads to departmental boundaries in decision making.	<ul style="list-style-type: none"> <li>▪ May lead to slow growth and technology could be a laggard.</li> <li>▪ Lack of corporate and strategic thinking may lead to reduced emphasis on long term integrated perspectives in planning.</li> <li>▪ Absence of cadre separation at senior management level adversely impacts evolution of a corporate culture and also renders IR unable to benefit from lateral entries at senior levels.</li> <li>▪ Affects ability to think strategically in non railway contexts at the top management level.</li> </ul>
3.	Inherent limitations of being a Government department	As a government department, IR is required to adhere to the rules, regulations and procedures prescribed for all areas of its working. Consequently, quick decision-making and flexibility as obtained in a private organization are absent.	<ul style="list-style-type: none"> <li>▪ Leads to reluctance to take risk and value opportunities and may result in inadequate market initiatives</li> <li>▪ May affect growth and efficiency due to absence of a performance-reward linkage and absence/mismatch of authority vis-à-vis responsibility.</li> <li>▪ Lack of proactive approach for addressing problems can lead to crisis situations.</li> </ul>
4.	Inadequacy of costing and monitoring system.	The existing system of upkeep of accounts and costing does not lend itself easily to assess cost/profit of any service provided.	<ul style="list-style-type: none"> <li>▪ Impacts ability to drive decisions based on commercial principles.</li> <li>▪ May lead to wide variations in performance across many internal units.</li> <li>▪ Underlines need to implement accounting reforms on priority.</li> </ul>
5.	Diversion of focus due to non remunerative and non core activities	All rail and non rail related functions are under one umbrella.	<ul style="list-style-type: none"> <li>▪ May lead to dissipation of organizational energy</li> <li>▪ Emphasizes strategic planning for separation and subsequent hive off into focused subsidiary organizations.</li> </ul>

No.	Area	Description	Implication for IR for its future
6.	Low level of maintenance and wide variation in the level of technology used.	The perception of inadequate maintenance of assets, as also use of outdated technology permeates both, the passenger and freight segments. Examples are frequent complaints about poor conditions of coaches and station premises by passengers and of wagons by the industry. A low carrying capacity to tare ratio is an example of outdated technology.	<ul style="list-style-type: none"> <li>▪ May result in lack of flexibility and service orientation.</li> <li>▪ Demands strategic focus on R&amp;D involving railway and non-railway manufacturing and academic institutions</li> </ul>
	<b>Freight (Bulk) Business Line</b>		
7.	Insufficient capacity in key stretches with competition from 'higher priority' passenger trains is further aggravated by the shortage of rolling stock.	Many routes of IR are saturated, affecting operations adversely. Shortage of wagons has further impacted the constraint of IR to pick up and move traffic, even when available.	<ul style="list-style-type: none"> <li>▪ May result in lack of flexibility and service orientation.</li> <li>▪ Demands appropriate infrastructural investments, short term measures like high speed wagons and long term solutions like separation of freight and passenger corridors in key segments.</li> </ul>
	<b>Freight (Non Bulk) Business Line</b>		
8.	Not a door to door mode of transport and faces competition from 'higher priority'	Emphasizes the need to focus on multimodal transport in business strategy.	<ul style="list-style-type: none"> <li>▪ May lead to loss in market share to road transport.</li> <li>▪ Demand for multimodal containerized transport, with passenger trains. first mile and last mile road based servicing, for domestic as well as export movement, with focus on high speed wagons in the short term and separate freight corridors in the long term</li> </ul>
	<b>Passenger (Non Suburban) Business Line</b>		
9.	Non responsiveness to demand variations.  High upper class fares	Variations in demand are an inherent feature of transport industry and IR is not an exception. Demand for travel has also seasonal variations. IR does run 'special trains' and 'holiday specials' on such occasions. Among users, a perception persists that getting reserved accommodation is a hassle and that IR is not sufficiently responsive.	<ul style="list-style-type: none"> <li>▪ May lead to poor customer satisfaction in the lower classes and threat of losing market share to air in the upper classes.</li> <li>▪ Need for greater flexibility in capacity provisioning (by using PRS data for analysis) and fare rationalization.</li> </ul>
	<b>Passenger (Suburban) Business Line</b>		
10.	Insufficient capacity in the main suburban market of Mumbai.	'Dense crush loads' in coaches makes suburban travel in Mumbai a nightmare. Augmenting capacity needs investments. Suburban business line is loss making and hence IR's hesitation to invest, especially when there are more urgent demands for resources elsewhere.	<ul style="list-style-type: none"> <li>▪ Opportunity to service the demand by creating a focused urban transport entity for undertaking suburban operations.</li> </ul>

No.	Area	Description	Implication for IR for its future
	Perceived losses in running the system.		<ul style="list-style-type: none"> <li>Need for a scrutiny of the existing tariff and appropriate revision</li> </ul>
	<b>Passenger (Parcel) Business Line</b>		
11.	Lack of commercial orientation in parcel business.	Parcel business did not receive the attention due in the past; it is only recently that IR has taken some initiatives. The net result is incurrence of losses, overall. It is one line of business that is overdue for reforms.	<ul style="list-style-type: none"> <li>May lead to non-realization of business potential.</li> <li>Efforts should be directed at outsourcing the entire business to a professionally run courier service.</li> </ul>

### 3. Opportunities

No.	Area	Description	Implication for IR for its future
	<b>Organization Level</b>		
1.	Changing technological environment	Rail transport is multidisciplinary, requiring the application of diverse technologies. As a consequence, developments taking place in the relevant technologies to facilitate efficiency improvement and cost reduction are opportunities to be made use of.	This is a significant opportunity which IR needs to leverage at a faster absorption rate; through appropriate focus on R&D. Inability to absorb technological developments could benefit competition and become a threat.
2.	Proximity to Government	<p>The proximity to Government provides a valuable clout in project management and in being seen as relatively risk free for lending.</p> <p>However, the same proximity to Government may also lead to interference in various matters. This interference has a tendency to negate the strategic nature of decision making at the highest levels, and matters other than sound technical and commercial rationale may dominate decision making processes on matters like project selection, tariff setting etc.</p>	Opportunity to leverage the proximity appropriately for the benefit of the organization, while at the same time taking recourse to checks and balances for countering adverse implications.
.3.	Decreasing cost of capital	IR enjoys increased access to lower cost capital, both domestically and globally.	IR has opportunity to benefit from innovative means of financing for its various activities.
	<b>Freight (Bulk) Business Line</b>		
4.	Dense traffic (long haul and short haul) corridors are on the increase.	A robust growth in economy has led to a corresponding increase in demand for transport. This in turn, has resulted in higher traffic density on many corridors.	While absolute traffic levels will be on the rise, IR could also increase market share by aggressively adopting new technology and improving service. Need also arises for appropriate investment decisions to augment capacity.



	<b>Freight (Non Bulk) Business Line</b>		
5.	Significant growth in export/import and domestic commerce of consumer goods.	There has been a significant growth of container traffic both import and export. With income levels rising, the demand for consumer goods to shows robust growth.	New markets can be penetrated and overall market share can be increased if multimodal technologies for high speed and quality service are adopted.
	<b>Passenger (Non Suburban) Business Line</b>		
6.	Long lead movements and dense intercity traffic corridors are on the rise.	With increased income levels and urbanization, intercity traffic has increased, as also demand for long distance travel.	IR has opportunity to increase market share by increasing lower class capacity, capping upper class fares and increasing frequency of intercity services.
	<b>Passenger (Suburban) Business Line</b>		
7.	Heavy commuter movement during peak periods.	Growth of metropolitan / mega cities has resulted in a sharp increase in commuter travel. Augmentation of the existing system/ new metro systems has been slow, thereby placing an additional 'load' on the existing system.	Higher revenue realization possible by increasing capacity during peak periods and unifying services with other transport modes.
	<b>Passenger (Parcel) Business Line</b>		
8.	Demand for time definite parcel delivery service is on the rise.	There is an ever increasing demand for a service that has definite delivery schedule. Even manufacturing units have a need for this, keeping in view the importance of low inventories.	Passenger trains are well placed for capturing business in this segment by adopting market benchmarked service levels.

#### 4. Threats

No.	Area	Description	Implication for IR for its future
	<b>Organisation Level</b>		
1.	More demanding customers	With increase in globalization, economic development and competition, customer expectations are on the rise.	There may be loss of market share to other modes if greater customer orientation is not pursued.
2.	Public service obligations	IR is called upon to discharge many public service obligations, such as tariff below costs for lower class passenger services, transport of some goods again at below cost and operation of railway lines not considerably viable.	Given the proximity to Government, public service obligations will continue to be serviced by IR. There may be increased outlay on servicing these obligations adversely affecting performance in other areas unless a transparent mechanism is evolved for accounting the same.

No.	Area	Description	Implication for IR for its future
3.	Inconsistent budgetary support	The quantum of capital provided by the Government has been fluctuating, depending upon the resource constraints faced and diverse demands of other sectors.	Projects with long gestation and those undertaken as part of “public service obligation” will get affected if budgetary support is inadequate. In the past, budgetary support did decrease for some years; but has now increased. Continuation of adequate budgetary support in such cases is important.
	<b>Freight (Bulk) Business Line</b>		
4.	Significant investments are being made in road, coastal movement and pipe lines, along with appropriate regulatory changes.	There have been significant investments in the recent past to improve national highways. Oil companies are also aggressively laying pipelines.	Market share for IR may decrease unless countered with appropriate investments and service level improvements. Appropriate strategies to retain and improve the market share are also essential.
	<b>Freight (Non Bulk) Business Line</b>		
5.	The current market share is very low and insignificant to develop a threat analysis.	Roads have made a steady inroad in IR’s share of non-bulk traffic, which has been on the decline for IR consistently.	IR’s existing small share may be further squeezed unless steps are taken to address customer and sector requirements.
	<b>Passenger (Non Suburban) Business Line</b>		
6.	Long distance buses for lower classes and low cost airlines for upper classes are growing.	Low cost airlines offer fares comparable to those of two/three tier AC class travel. With improvement in highways and better passenger buses, travel by road too is becoming attractive.	Market share for IR may decrease unless countered with capacity provisioning and fare rationalisation.
	<b>Passenger (Suburban) Business Line</b>		
7.	Passengers’ ire especially in the primary Mumbai market	Suburban travel conditions are poor, especially in Mumbai. The number of passengers traveling in a coach is very high compared to its capacity. When the system goes out of gear, quite often law and order situations manifest due to public anger.	Increased capacity with a focused urban transport organisation is required.
	<b>Passenger (Parcel) Business Line</b>		
8.	The current market share is very low and insignificant to develop a threat analysis.	The existing parcel service does not meet the customer’s requirements. Its share is low as compared to roads and requires a comprehensive analysis.	IR may encounter problems in developing a viable business unless steps are taken to address customer and sector requirements.

[CRISIL, 2005]

## Annexure 16: Major Events (1987-2006)

1987

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
Work begins on the Narnarayan Setu road and rail bridge over the Brahmaputra at Jogighopa		<ul style="list-style-type: none"> <li>First WAP-3 loco, 'Jawahar,' commissioned</li> <li>The rarely seen WDM-7 locos introduced. On NG, NDM-5 locos introduced</li> </ul>	<ul style="list-style-type: none"> <li>Bombay-Delhi WR route is fully electrified</li> <li>Automatic signaling based on axle counters introduced by CR on Palwal-Mathura section</li> <li>First solid-state interlocking (SSI) system in operation at Srirangam</li> </ul>	<ul style="list-style-type: none"> <li>Early standalone computerized reservation system begins operations at Kolkata</li> <li>An early system for computerized reservations begins operating at Mumbai VT for a few trains (pre-CONCERT)</li> <li>Early standalone computerized reservation system begins operations at Chennai</li> </ul>	Madras-Avadi EMU services begin	Railway Coach Factory, Kapurthala, is set up.

1988

<ul style="list-style-type: none"> <li>Karur-Dindigul BG line opened</li> <li>Kirandul-Kottavalasa line completed, allowing ore from the Bailadilla iron mines (and Bachel) near Kirandul to be brought to the east coast and connecting to the main rail network near Waltair. This is the highest broad-gauge line in the world and sees some of the heaviest freight loads of IR</li> </ul>	<ul style="list-style-type: none"> <li>WAG5HB locos from BHEL, WAG6A from ABB, and WAG6B, WAG6C from Hitachi brought into service, mostly for the heavy freight routes of SER</li> <li>First (ICF-designed) coaches produced by the newly set-up RCF, Kapurthala</li> <li>CLW begins production of Hitachi-designed traction motors HS-15250A for WAG-5 and WAP-4 locos</li> <li>SER introduces the 'Locotrol' system to operate several (usually up to 5) locos (then WDM-2's) in MU mode to haul heavy freight trains on the Kirandul-Kottavalasa line</li> </ul>	Entire Bombay-Delhi route is electrified	Pilot project for the NTES train status enquiry system begun	The first Shatabdi Express is introduced between New Delhi and Jhansi	Container Corporation of India (CONCOR) created
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1989

Capacity Enhancement Works	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
- Work begins on the Konkan Railway - Ernakulam-Alleppey BG line is opened	-	- Rail Spring Karkhana set up for production of coil springs for IR	- Systematic renumbering of train services using 'universal' numbers (new 4-digit scheme) - Early standalone computerized reservation system begins operations at Secunderabad	- The second Shatabdi Express is introduced between New Delhi and Kanpur (later extended to Lucknow) - The Indrayani Express between Bombay and Pune is introduced (as well as the Pragati Express between the same pair of cities)	- Railways Act, 1989, updates the legal framework for railways in India after nearly a century, replacing the Railways Act of 1890.

1990

- Victoria Terminus gets a double-discharge platform	- Bombay Rajdhani gets an air-braked rake	- Bhusaval-Itarsi section has electric services -- Bombay-Delhi CR route is fully electrified	- Computerized reservations (PRS) introduced at Secunderabad, Chennai, Mumbai, and Kolkata in addition to New Delhi (this was the early version before the CONCERT system was developed to interconnect these) - First Self-Printing Ticket Machine (SPTM) introduced, at New Delhi		
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1991

- Work begins on Udupi-Roha section of KR - All platforms at Victoria Terminus converted to the double-discharge kind - Gauge conversion begins on Sawai Madhopur - Jaipur - Phulera, Chhapra - Aunrihar, and Bhildi - Mahesana - Viramgam sections	- RCF begins production of air-braked coaches and coaches with roof-mounted AC units	- Some codes with 4 or fewer letters in their names are changed to coincide with the station names		- The hospital train, 'Lifeline Express' (Jeevan Rekha), begins operation - Kurla Terminus opened	
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1992

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
- Alleppey-Kayankulam BG line opened	- Gauge conversion of Salempur - Barhaz Bazar, Manmad - Aurangabad, Bikaner - Merta Road	- First of the WAG-7 class locos, 'Shantidan,' from CLW commissioned - RDSO/ICF develops high-capacity (250kVA) power cars for Rajdhani. - RDSO develops bidirectional BG railbus design	- Palace on Wheels changed to a broad-gauge train - Jolarpettai section electrified - ECIL supplies the first chopper control equipment to CR for use with Mumbai EMUs		- Churchgate-Virar Ladies' Special is the first IR train reserved exclusively for women - Mumbai suburban services extended to Vashi - Bangalore Rajdhani introduced	

1993

- Secunderabad-Mahboobnagar MG section is converted to BG, removing an important link in the MG system towards the north from Secunderabad	- Bangalore-Mysore BG line opened	- Work begins on installing 2*25kV "dual" system of AC traction on the Bina-Katni-Annuppur-Bishrampur/Chirimiri sections of ER and SER		- Royal Orient train introduced by WR and Gujarat	- AC 3-tier coaches introduced - Sleeper Class introduced on IR, separate from Second Class - The first 'chopper' EMU rake is introduced in Mumbai - Mumbai suburban services extended to Nerul and Belapur	- Railway Capital Fund established
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1994

- Chikjajur-Chitradurg-Rayadurg line converted to BG	- Manmad-Aurangabad MG line converted to BG	- Jaipur - Sawai Madhopur MG line converted to BG	- Ajmer-Delhi MG line converted to BG	- Gauge conversion of Mau - Shahganj , Chaparmukh - Haibargaon	- Secunderabad-Mahboobnagar gauge conversion breaks one of the important north-south MG freight connections	- CLW's first WAP-4 loco, 'Ashok,' commissioned - First WDM-2C loco commissioned		- CONCERT system of computerized reservations deployed at Secunderabad - Telephone-based phone inquiry (IVRS) introduced	- Royal Orient train introduced by WR and Gujarat - First MEMU service, Asansol - Burdwan	
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1995

Capacity Enhancement Works	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
<ul style="list-style-type: none"> <li>- Khodiyar-Mehsana MG section converted to BG</li> <li>- New Madras Beach - Tambaram BG line</li> <li>- Hassan-Mangalore MG line dismantled in parts for gauge conversion</li> <li>- Miraj-Bangalore line converted to BG</li> <li>- Gauge conversion of Hissar-Rewari, Rewari-Jaipur, Phulera-Marwar, Jodhpur-Jaisalmer, Chikjajur-Hubli, Hubli-Londa, Londa-Miraj, Hospet-Hubli, Donakonda-Giddalur, Muzaffarpur-Raxaul, Birpur-Shimoga, Parbhani-Purna, Arjuni-Wadsa, Purulia-Kotshila (planned completion dates -- some may have taken longer</li> </ul>	<ul style="list-style-type: none"> <li>- First regularly scheduled services on trains hauled by locos using the 2*25kV 'dual' system of traction (Bina-Katni on CR)</li> <li>- DLW exports 2 WDM-2 locos to Sri Lanka</li> <li>- DLW and GM sign contract for technology transfer for GM's GT46MAC and 710 series locos, and the purchase of 31 GT46MAC/GT46PAC locos</li> <li>- The first WDP-1 loco is commissioned</li> <li>- The first WDG-2 loco is commissioned</li> <li>- Eleven WAP-5 locos imported from ABB (AdTranz), the first locos with 3-phase AC technology in India</li> <li>- IR begins a big push to convert passenger coaches from 24V electricals to 110V systems</li> <li>- IR signs agreement with Linke Hoffman Busch (LHB, now part of Alstom) for supply of, and technology transfer for, passenger coaches</li> </ul>		<ul style="list-style-type: none"> <li>- First prototype of the CONCERT passenger reservation system developed at Secunderabad. Gauge conversion of Purna-Nanded / Manmad-Mudkhed MG section breaks the MG network's north-south connection. (Mudkhed-Secunderabad is left as an isolated MG line.)</li> </ul>	<ul style="list-style-type: none"> <li>- End-to-end through service on the Calcutta Metro begins (Tollygunge to Dum Dum) with 16 of the planned 17 stations</li> <li>- Delhi-Panipat MEMU service begins</li> <li>- Mumbai's Harbour line is extended to Khandeshwar</li> <li>- Diva - Veer DMU services inaugurated</li> <li>- IR launches 'Exhibition-on-Wheels,' a special train with various IR-related material forming a travelling exhibition</li> </ul>	<ul style="list-style-type: none"> <li>- Pune division of CR created</li> </ul>

1996

	<ul style="list-style-type: none"> <li>- Six WAG-9 locos and 16 more in kit form imported from ABB (AdTranz), the second batch of 3-phase AC locos for IR. First one is commissioned</li> <li>- DLW exports 10 YDM-4 locos to Bangladesh</li> </ul>			<ul style="list-style-type: none"> <li>- The last of the 17 stations of the first phase of the Calcutta Metro (Mahatma Gandhi Road) is commissioned</li> <li>- CONCERT system of computerized reservations fully deployed at New Delhi.</li> <li>- Telecom cubicle provided on the Mumbai Rajdhani for on-board telephone and fax service.</li> </ul>	
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1997

Capacity Enhancement Works	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/institutions
<ul style="list-style-type: none"> <li>- Third Godavari bridge built, to replace the first one built in 1897, near Rajahmundry</li> <li>- Mehsana-Palanpur MG section converted to BG.</li> <li>- Ahmedabad-Ajmer MG section converted to BG</li> <li>- Thirumayilai (Mylapore) construction completed</li> <li>- Salem - Bangalore BG conversion</li> </ul>	<ul style="list-style-type: none"> <li>- DLW exports one WDS-6 shunter to Puttlam Cement Co. in Sri Lanka, and 6 WDM-2 locos to Sri Lanka Railways</li> <li>- CONCOR buys 1300 BFKI flat wagons from IR in an effort to increase its container transport capacity</li> <li>- RCF begins manufacture of MEMU coaches</li> <li>- WDM-2 #16859 of Ernakulam shed becomes the first Indian loco to get air-conditioning as a permanent feature (excluding locos specially provided with such equipment just for the 'beauty contests')</li> </ul>	<ul style="list-style-type: none"> <li>- An experimental system interconnecting Vyasrapadi, Korukkupet, and Washermanpet stations' signalling systems to Basin Bridge Jn. (Chennai) using fibre-optic links is in place</li> <li>- Radio communication between driver and guard introduced on the Delhi - Mughalsarai route</li> </ul>		<ul style="list-style-type: none"> <li>- Freight services begin on Konkan Railway</li> <li>- Madras MRTS begins running with service between Beach and Luz</li> <li>- DMU services begin on KR (Karwar-Pernem).</li> </ul>	

1998

<ul style="list-style-type: none"> <li>- Tambaram-Tiruchirappalli BG conversion</li> <li>- Thanjavur- Tiruchirappalli BG conversion.</li> </ul>	<ul style="list-style-type: none"> <li>- CLW begins production of indigenous versions of WAG-9 (first one is "Navyug").</li> <li>- CLW also manufactures its 2500th electric loco (a WAG-7, "Swarna Abha")</li> <li>- The first WDP-2 (#15501) is commissioned</li> <li>- 10 YDM-4's sent to Tanzania under a 10-year full-service lease by RITES</li> </ul>	<ul style="list-style-type: none"> <li>- Coupon Validating Machines (CVMs) introduced at Mumbai CST</li> <li>- IR begins upgrading communication links along high traffic routes to optic fibre</li> </ul>	<ul style="list-style-type: none"> <li>- CONCERT system of computerized reservations deployed at Kolkata</li> </ul>	<ul style="list-style-type: none"> <li>- Konkan Railway construction is completed, and the first passenger train is flagged off on Jan. 26</li> <li>- Diva-Panvel doubling inaugurated; EMU services begin from Panvel</li> <li>- 'Buddha Parikrama,' a tourist train for Buddhist sites, launched</li> </ul>	
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1999

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
- Tiruchirappalli-Dindigul BG conversion	BG	<ul style="list-style-type: none"> <li>- WDG-4 locos imported and homed at Hubli</li> <li>- NDM-6 locos procured for the Matheran and Darjeeling Himalayan railways.</li> <li>- DLW turns out its 4000th locomotive</li> <li>- WDP-2 locos in service on Konkan Railway.</li> <li>-</li> <li>- CLW begins manufacture of 3-phase AC traction motors 6FRA 6068 for WAG-9 locos.</li> <li>- ICF's first stainless steel coach prototype</li> <li>- New diesel locos introduced on New Jalpaiguri - Darjeeling section of the DHR</li> </ul>		<ul style="list-style-type: none"> <li>- CONCERT system of computerized reservations deployed at Mumbai</li> <li>- CONCERT system of computerized reservations deployed at Chennai. The complete networked nationwide system became operational on April 18</li> <li>- Credit cards accepted for booking tickets and reservations in some stations (including Mumbai CST)</li> </ul>	<ul style="list-style-type: none"> <li>- Baganza Ghat opened to traffic with Vasco - Madgaon - Londa services</li> <li>- HGS 26761 hauls a train from Howrah to Tribeni and back</li> <li>- Konkan Railway begins roll-on roll-off (RORO) freight services on the Kolad-Verna section</li> </ul>	<ul style="list-style-type: none"> <li>- Darjeeling Himalayan Railway becomes the second railway site in the world to be designated a World Heritage site</li> </ul>

2000

<ul style="list-style-type: none"> <li>- New bridge over Ganga at Balawali (Saharanpur-Moradabad section).</li> <li>- New BG line between Penukonda and Puttaparthi</li> </ul>		<ul style="list-style-type: none"> <li>- CLW begins manufacturing ABB's 6FXA 7059 3-phase traction motors.</li> <li>- New lightweight passenger coaches supplied by Alstom LHB.</li> <li>- First WAP-7 locomotive, 'Navkiran,' from CLW.</li> <li>- First indigenous WAP-5 (named 'Navodit') from CLW.</li> <li>- Diesel-hauling of DHR train inaugurated.</li> <li>- First WAG-9H loco, 'Navshakti,' #31030, from CLW.</li> <li>- YDM-4's are reconditioned at Golden Rock and sent to Myanmar</li> <li>- Successful trials with high-speed (100km/h) running of BOXN wagon rakes on the Gomoh-Mughalsarai section</li> </ul>	<ul style="list-style-type: none"> <li>- Bankura-Midnapore section electrified and MEMU services begin.</li> <li>- Villupuram-Trichy linked by optical fibre telecom link</li> <li>- Trichur-Ernakulam section electrified</li> </ul>	<ul style="list-style-type: none"> <li>- Railways' web site deployed</li> </ul>	<ul style="list-style-type: none"> <li>- CONCOR starts dedicated container services: Shalimar - Chennai, Shalimar - Hyderabad, Cossipore - New Delhi.</li> <li>- All-women 'Tejaswini' squads of ticket-checkers and police officers introduced for Mumbai suburban services.</li> <li>- MEMU services begin on Arakkonam-Jolarpettai section.</li> </ul>	
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2001

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
		<ul style="list-style-type: none"> <li>- Second WAP-7 loco, 'Navbharati,' #30202, commissioned.</li> <li>- May 17: In trials, a single WAG-9 hauls a 4700t rake of 58 BOXN-HA wagons at speeds up to 100km/h on the Sonenagar-Mughalsarai section.</li> <li>- MAWD 1798 steamed after restoration; first run is Guwahati-Pandu.</li> <li>- Converted AC-DC EMU rake with Alstom electricals used in trials on Borivli-Dahanu section, and then [June 12] AC-DC EMU service is officially inaugurated on the Churchgate-Dahanu section.</li> <li>- A 2300hp Cape gauge diesel locomotive is manufactured by DLW for KTM Malaysian Railways.</li> <li>- DLW begins indigenous production of WDG-4 locos.</li> <li>- DLW delivers 10 BG locomotives (WDM-2 variants) to Bangladesh, and (later) 2 WDM-2 (? reported as 2300hp locos by IR) units to Sri Lanka.</li> <li>- Four GM GT46PAC locos, classed WDP-4, arrive at Hubli</li> </ul>	<ul style="list-style-type: none"> <li>- IVRS ('Interactive Voice Response System') for telephonic enquiries about trains introduced in some stations</li> <li>- IRCON bags a contract for track doubling and electrification of the Ipoh - Padang Besar line in Malaysia</li> </ul>		<ul style="list-style-type: none"> <li>- Freight services between India and Bangladesh officially resumed after a gap of 25 years, on the Petrapole-Benapole BG link.</li> <li>- Following successful trials of the new Alstom LHB coaches at 160km/h, IR announces they will be used on the Delhi-Lucknow route (Swarna Shatabdi) (max. speed restricted to 140km/h).</li> <li>- The Maitry Express begins passenger service between Bangladesh and India</li> <li>- Pendekallu-Gooty branch line opened</li> </ul>	<ul style="list-style-type: none"> <li>- The Rakesh Mohan Committee submits its report, recommending splitting IR into an operations body and a regulatory body, rationalization of fares, closure of unprofitable lines, a corporate approach to finances, manpower reductions, and an aim of privatization after 15 years</li> </ul>

2002

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
		<ul style="list-style-type: none"> <li>- First locally built WDG-4 locomotive (GM EMD GT46MAC) commissioned.</li> <li>- WR's air-conditioned EMU coaches have trial run between Churchgate and Dadar.</li> <li>- Konkan Railway conducts a trial run of the Madgaon-Roha Express at 150km/h (briefly touching 165km/h at times) using a WDP-4 loco.</li> </ul>	<ul style="list-style-type: none"> <li>- First trial run of a train run on 5% biodiesel blended fuel (Amritsar Shatabdi).</li> </ul>	<ul style="list-style-type: none"> <li>- IR begins online train reservations and ticketing over the Internet</li> <li>- Internet ticket booking extended to more cities</li> </ul>	<ul style="list-style-type: none"> <li>- Jan Shatabdi trains come into service</li> </ul>	<ul style="list-style-type: none"> <li>- Orders passed for creation of two new railway zones: East Central and North Western.</li> <li>- Orders passed for creation of five new railway zones East Coast, South Western, South East Central, North Central, and West Central.</li> <li>- Narrow gauge railway museum inaugurated at Nagpur and opened for commercial operation.</li> </ul>

2003

		<ul style="list-style-type: none"> <li>- First indigenously built WDP-4 (#20011) inaugurated at DLW.</li> <li>- Golden Rock's new oil-fired 'B' class loco(s) for the Darjeeling Himalayan Railway built and ready for trials</li> <li>- Mumbai Rajdhani starts running with the new LHB coaches</li> </ul>				<ul style="list-style-type: none"> <li>- The 7 new railway zones begin functioning</li> </ul>
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2004

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
- Second phase of Chennai MRTS, connecting Luz and Tiruvanmiyur, begins operations - BG EMU Services inaugurated between Chennai Egmore and Tambaram on the newly converted BG line - Luni-Barmer-Munabao section converted to BG in preparation for possible Munabao-Khokhraphar link between India and Pakistan.		- SCR begins using new aerodynamically designed DEMU rakes from ICF. - Golden Rock workshops manufacture the second oil-fired steam loco, 'Himanand,' for the DHR. - Trial runs with a diesel loco running on bio-diesel blended fuel (Trichy-Tanjor Passenger). - First batch of improved flat wagons for CONCOR - IR makes prototype standard-gauge bogies for possible export			- Samjhauta Express resumes running between India (Attari) and Pakistan (Lahore) twice a week. The rail link agreement of Jan. 2001 is extended through Jan. 2007. - SCR operates last MG train on the Nizamabad-Manoharabad line, bringing to an end MG services started in the 1930s on the Secunderabad-Manmad line of the Nizam's State Railways - First goods train from Kolkata (Calcutta) to Nepal using the Raxaul-Birgunj line. - Thane-Thurbe-Vashi EMU services begin in Mumbai - IR makes a move to open up the bookstall and catering business at its stations, ending the long reign of booksellers Higginbothams (in the south) and A H Wheeler (elsewhere) at railway stations in India	- The Railway Board is expanded by the introduction of two new Member posts, for Signalling & Telecom and for Stores - Konkan Railway being considered for merger with IR

2005

- Jammu Tawi - Udhampur line in Jammu & Kashmir inaugurated and the Uttar Sampark Kranti from New Delhi to Udhampur begins running. This line was sanctioned in April, 1980		- IR undertakes cultivation of <i>Jatropha</i> plants for production of biodiesel	- IRCTC introduces E-ticketing for IR on Aug. 12; ticketing by SMS begins on Aug. 26. A Frequent Traveller scheme is also under consideration	- Boarding Rajdhani, Shatabdis, and Jan Shatabdis at intermediate points without reservations allowed - Delhi Metro's Barakhamba - Dwarka line opens	
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2006

Capacity Works	Enhancement	Technological Upgradation: Rolling Stock	Technological Upgradation: Fixed Infrastructures	Information Technology	Services	Reorganisation/ institutions
		<ul style="list-style-type: none"> <li>- Igatpuri - Kasara section switched from DC to AC traction.</li> <li>- Regular double-stacked container service (on BLCA/BLCB flat wagons) begins on the Pipavav - Jaipur route</li> </ul>	<ul style="list-style-type: none"> <li>- 100km/h trials with Mumbai EMUs (however, this is not the first time trials have been conducted at these speeds).</li> <li>- New Delhi - Bhopal Shatabdi cleared for running at 150km/h commercial speed on the New Delhi - Agra Cantt. Stretch</li> </ul>		<ul style="list-style-type: none"> <li>- Thar Express service begins with the train on the Indian side running from Jodhpur to Munabao with the connecting train on the Pakistan side running from Karachi to Khokhropar to Munabao to connect</li> </ul>	

[IRFCA, 2006]

## Annexure 17: Railway Ministers

	Railway Minister	Constituency (State)*	Party*	From	To	Duration (Months)	Prime Minister*	Ruling Party
1	Ashraf Ali	(Bihar)	Congress	02/09/1946	14/08/1947	12		
2	John Mathai	(Kerala)	Congress	15/08/1947	22/09/1948	13	Jawaharlal Nehru	Congress
3	NGS Ayyanger		Congress	22/09/1948	13/05/1952	44	Jawaharlal Nehru	Congress
4	Lal Bahadur Shastri	(UP)	Congress	13/05/1952	07/12/1956	56	Jawaharlal Nehru	Congress
5	Jagjivan Ram	Sasaram (Bihar)	Congress	07/12/1956	10/04/1962	65	Jawaharlal Nehru	Congress
6	Swaran Singh	Jullundur (Punjab)	Congress	10/04/1962	21/09/1963	18	Jawaharlal Nehru	Congress
7	HC Dasappa	Bangalore (Mysore)	Congress	21/09/1963	08/06/1964	9	Jawaharlal Nehru (21/09/1963-27/05/1964) GL Nanda (27/05/1964-08/06/1964)	Congress
8	SK Patil	Bombay City-South (Maharashtra)	Congress	09/06/1964	12/03/1967	34	Lal Bahadur Shastri (09/06/1964-11/01/1966) GL Nanda (11/01/1966-24/01/1966) Indira Gandhi (24/01/1966-12/03/1967)	Congress
9	CM Poonacha	Mangalore (Mysore)	Congress	13/03/1967	14/02/1969	23	Indira Gandhi	Congress
10	Ram Subhag Singh	Buxar (Bihar)	Congress	14/02/1969	04/11/1969	9	Indira Gandhi	Congress
11	P Govinda Menon	Mukundapuram (Kerala)	Congress	04/11/1969	18/02/1970	4	Indira Gandhi	Congress
12	GL Nanda	Kaithal (Haryana)	Congress	18/02/1970	17/03/1971	13	Indira Gandhi	Congress
13	K Hanumanthaiya	Bangalore City (Karnataka)	Congress	18/03/1971	22/07/1972	16	Indira Gandhi	Congress
14	TA Pai	(Karnataka)	Congress	23/07/1972	04/02/1973	7	Indira Gandhi	Congress
15	LN Mishra	Darbhanga (Bihar)	Congress	05/02/1973	02/01/1975	23	Indira Gandhi	Congress
16	Kamalapati Tripathi	(UP)	Congress	11/02/1975	23/03/1977	26	Indira Gandhi	Congress
17	Madhu Dandvate	Rajapur (Maharashtra)	Janata	26/03/1977	28/07/1979	28	Morarji Desai	Janata Party
18	TA Pai	Udipi (Karnataka)	Congress	30/07/1979	13/01/1980	6	Charan Singh	Janata Party

19	Kamalapati Tripathi	Varanasi (UP)	Congress (I)	14/01/1980	12/11/1980	10	Indira Gandhi	Congress (I)
20	Kedar Panday	Bettiah (Bihar)	Congress (I)	12/11/1980	14/01/1982	14	Indira Gandhi	Congress (I)
21	PC Sethi	Indore (MP)	Congress (I)	15/01/1982	02/09/1982	8	Indira Gandhi	Congress (I)
22	ABA Ghanikhan Choudhary	Malda (West Bengal)	Congress (I)	02/09/1982	31/12/1984	28	Indira Gandhi (02/09/1982-31/10/1984) Rajiv Gandhi (31/10/1984-31/12/1984)	Congress (I)
23	Bansi Lal	(Haryana)	Congress (I)	31/12/1984	25/09/1985	9	Rajiv Gandhi	Congress (I)
24	Bansi Lal (Transport Minister)	Bhiwani (Haryana)	Congress (I)	25/09/1985	04/06/1986	8	Rajiv Gandhi	Congress (I)
25	Mohsina Kidwai (Transport Minister)	Meerut (UP)	Congress (I)	24/06/1986	21/10/1986	4	Rajiv Gandhi	Congress (I)
26	Madhav Rao Scindia (MoS I/C)	Gwalior (MP)	Congress (I)	22/10/1986	01/12/1989	38	Rajiv Gandhi	Congress (I)
27	George Fernandes	Muzaffarpur (Bihar)	Janata Dal	05/12/1989	10/11/1990	11	VP Singh	National Front (India)
28	Janeshwar Mishra	Allahabad (UP)	Janata Dal	21/11/1990	21/06/1991	7	Chandra Shekhar	National Front (India)
29	CK Jaffer Sharief <sup>#</sup>	Bangalore North (Karnataka)	Congress (I)	21/06/1991	16/10/1995	53	PV Narasimha Rao <sup>#</sup>	Congress (I)
30	Ram Vilas Paswan	Hajipur (Bihar)	Janata Dal	01/06/1996	19/03/1998	22	HD Deve Gowda (01/06/1996-21/04/1997) IK Gujral (21/04/1997-19/03/1998)	United Front (India)
31	Nitish Kumar	Barh (Bihar)	Samata Party	19/03/1998	05/08/1999	17	Atal Bihari Vajpayee	NDA
32	Ram Naik (MoS I/C)	Mumbai North (Maharashtra)	BJP	06/08/1999	12/10/1999	2	Atal Bihari Vajpayee	NDA
33	Mamta Banerjee	Calcutta South (West Bengal)	AITC	13/10/1999	15/03/2001	17	Atal Bihari Vajpayee	NDA
34	Nitish Kumar	Barh (Bihar)	Samata Party	20/03/2001	22/05/2004	39	Atal Bihari Vajpayee	NDA
35	Lalu Prasad Yadav	Chapra (Bihar)	RJD	23/05/2004	till date		Manmohan Singh	UPA

[Internal Correspondence; \*<http://parliamentofindia.nic.in>]

Note: <sup>#</sup>After Mr Jaffer Sharief, Mr PV Narasimha Rao looked after the Ministry until May 16, 1996, followed by Mr Atal Bihari Vajpayee until June 01, 1996.

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