

## Issues and Reforms in Indian Railways

S.K.S. Yadav<sup>a\*</sup>, Kum Kum Chaudhary<sup>b</sup> and Somnath Kisan Khatal<sup>c</sup>

<sup>a</sup>Faculty of Commerce & Business Administration, Meerut College, U.P. India.

<sup>b</sup>Sir Chhotu Ram Institute of Engineering and Technology, (C.C.S. University, Meerut), U.P. India.

<sup>c</sup>Shivaji University, Kolhapur, Maharashtra, India

email id: sudhiryadavmeerut@gmail.com

### Abstract

Indian Railways is a department owned and controlled by the Government of India, via the Ministry of Railways. Indian Railways is the world's second largest employer. Indian Railway Finance Corporation Ltd. (IRFC) is a dedicated financing arm of the Ministry of Railways. Its sole objective is to raise money from the market to part finance the plan outlay of Indian Railways. The Railtel Corporation of India was established in September 2000 as a public sector undertaking (PSU) and a 100 per cent subsidiary under the Ministry of Railways. It has been set up primarily to commercially utilize IR's communication assets, which often have idle capacity. Many railway stations are in a state of disrepair, especially when compared to stations in developed countries. Sometimes passengers are seen on trains hanging out windows and even on the roof creating safety problems. The interior of many train compartments are poorly maintained. Although accidents such as derailment and collisions are less common in recent times, many are run over by trains, especially in crowded areas. Outdated communication, safety and signaling equipment, which used to contribute to failures in the system, is being updated with the latest technology. A number of train accidents happened on account of a system of manual signals between stations, so automated signaling is getting a boost at considerable expense. It is felt that this would be required given the gradual increase in train speeds and lengths, that would tend to make accidents more dangerous. In the latest instances of signaling control by means of interlinked stations, failure-detection circuits are provided for each track circuit and signal circuit with notification to the signal control centres in case of problems. Though currently available only in a small subset of the overall IR system, anti-collision devices are to be extended to the entire system. Aging colonial-era bridges and century-old tracks also require regular maintenance and upgrading.

**Key Words:** IRFC, Railtel Corporation of India, Traction, Suburban rail, and Dedicated Freight Corridor.

\*Corresponding Author

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## **1. INTRODUCTION**

Indian Railways is a departmental undertaking of Government of India, which owns and operates Indian Railways, was founded on 16<sup>th</sup> April, 1853. <sup>1</sup> It generates revenue Rs. ₹98,000 crore (US\$18.62 billion) (2010–11)<sup>2</sup> It has 114,500 kilometres (71,147 mi).<sup>3</sup> of total track over a route of 65,000 kilometres (40,389 mi)<sup>3</sup> and 7,500 stations. It has the world's fourth largest railway network after those of the United States, Russia and China.<sup>4</sup> The railways carry over 30 million passengers and 2.8 million tons of freight daily.<sup>3 5</sup> It is the world's second largest commercial or utility employer, by number of employees, with more than 1.36 million employees<sup>3</sup> As for rolling stock, IR owns over 240,000 (freight) wagons, 60,000 coaches and 9,000 locomotives.<sup>3</sup>

Railways were first introduced to India in 1853. By 1947, the year of India's independence, there were forty-two rail systems. In 1951 the systems were nationalised as one unit, the Indian Railways, becoming one of the largest networks in the world. IR operates both long distance and suburban rail systems on a multi-gauge network of broad, and narrow gauges. It also owns locomotive and coach production facilities.

### **1.1. Organisational Structure**

Indian Railways is a department owned and controlled by the Government of India, via the Ministry of Railways. As of May 2011, the Railway Ministry is headed by Dinesh Trivedi, the Union Minister for Railways, and assisted by two ministers of State for Railways. Indian Railways is administered by the Railway Board, which has a chairman, five members and a financial commissioner.<sup>6</sup>

### **1.2. Railway Zones**

Indian Railways is divided into zones, which are further sub-divided into divisions. The number of zones in Indian Railways increased from six to eight in 1951, nine in 1952, sixteen in 2003<sup>7</sup> and finally 17 in 2010. Each zonal railway is made up of a certain number of divisions, each having a divisional headquarters. There are a total of sixty-eight divisions.<sup>3 8</sup>

Each of the seventeen zones, including Kolkata Metro, is headed by a General Manager (GM) who reports directly to the Railway Board. The zones are further divided into divisions under the control of Divisional Railway Managers (DRM). The divisional officers of engineering, mechanical, electrical, signal and telecommunication, accounts, personnel, operating, commercial and safety branches report to the respective Divisional Manager and are in charge of operation and maintenance of assets. Further down the hierarchy tree are the Station Masters who control individual stations and the train movement through the track territory under their stations' administration. Delhi Metro Rail Corporation Limited (DMRC), that has constructed and operates Delhi Metro network, is an independent organization not connected to the Indian Railways. Similarly, Bangalore Metro, Hyderabad Metro, Mumbai Metro and Chennai Metro are also independent organizations.

### **1.3. Recruitment and Training**

With approximately 1.36 million employees, Indian Railways is the world's second largest employer. Staff are classified into gazetted (Group 'A' and 'B') and non-gazetted (Group 'C' and 'D') employees.<sup>9</sup> The recruitment of Group 'A' gazetted employees is carried out by the Union Public Service Commission through exams conducted by it.<sup>10</sup> The recruitment to Group 'C' and 'D' employees on the Indian Railways is done through 19 Railway Recruitment Boards which are

controlled by the Railway Recruitment Control Board (RRCB).<sup>11</sup> The training of all cadres is entrusted and shared between six centralised training institutes.

#### **1.4. Production Units**

Indian Railways manufactures much of its rolling stock and heavy engineering components at its six manufacturing plants, called Production Units, which are managed directly by the Ministry. Popular rolling stock builders such as CLW and DLW for electric and diesel locomotives; ICF and RCF for passenger coaches are Production Units of Indian Railways. Over the years, Indian Railways has not only achieved self-sufficiency in production of rolling stock in the country but also exported rolling stock to other countries. Each of these six production units is headed by a General Manager, who also reports directly to the Railway Board. The six Production Units are:

S. No.	Name	Abbr.	Year Established	Location	Main products
1.	Chittaranjan Locomotive Works	CLW	1947	Chittaranjan	Electric Locomotives
2.	Diesel Locomotive Works	DLW	1961	Varanasi	Diesel-electric Locomotives
3.	Diesel-Loco Modernisation Works	DMW	1981	Patiala	Diesel-electric Locomotives
4.	Integral Coach Factory	ICF	1952	Chennai	Passenger coaches
5.	Rail Coach Factory	RCF	1986	Kapurthala	Passenger coaches
6.	Rail Wheel Factory	RWF	1984	Bangalore	Railway wheels and axles

#### **1.5. Other Subsidiaries**

There also exist independent organisations under the control of the Railway Board for electrification, modernisation, research and design and training of officers, each of which is headed by an officer of the rank of General Manager. A number of Public Sector Undertakings, which perform railway-related functions ranging from consultancy to ticketing, are also under the administrative control of the Ministry of railways.

There are eleven public undertakings under the administrative control of the Ministry of Railways,<sup>12</sup> viz.

- Rail India Technical and Economic Services Limited (RITES);
- Indian Railway Construction (IRCON) International Limited;
- Indian Railway Finance Corporation Limited (IRFC);
- Container Corporation of India Limited (CONCOR);
- Konkan Railway Corporation Limited (KRCL);
- Indian Railway Catering and Tourism Corporation Limited (IRCTC);
- Railtel Corporation of India Limited (Rail Tel);
- Mumbai Rail Vikas Nigam Limited (MRVNL);
- Rail Vikas Nigam Limited (RVNL); and
- Dedicated Freight Corridor Corporation of India Limited (DFCCIL); and
- Bharat Wagon and Engineering Co. Ltd. (BWFL).

The Centre for Railway Information Systems (CRIS) was set up as a registered society to design and implement various railway computerization projects.

## 1.6 Locomotives

Indian railways use a number of different diesel-electric, diesel-hydraulic and electric locomotives. Steam locomotives were once very common but are now only used on heritage routes.

## 2. TECHNICAL DETAILS

### 2.1 Track and gauge

Indian railways uses four gauges, the 1,676 mm (5 ft 6 inch) broad gauge which is wider than the 1,435 mm (4 ft 8 ½ inch) standard gauge; the 1,000 mm (3 ft 3 ⅜ inch) metre gauge; and two narrow gauges, 762 mm (2 ft 6 inch) and 610 mm (2 ft). Track sections are rated for speeds ranging from 75 to 160 km/h (47 to 99 mph).

The total length of track used by Indian Railways was about 114,000 km (71,000 mi) while the total route length of the network was 64,215 km (39,901 mi) on 31 March 2011.<sup>13</sup> About 33% of the route-kilometre and 44% of the total track kilometre was electrified on 31 March 2011.<sup>13</sup>

Broad gauge is the predominant gauge used by Indian Railways. Indian broad gauge – 1,676 mm (5 ft 6 inch) – is the most widely used gauge in India with 102,000 km (63,000 mi) of track length (90% of entire track length of all the gauges) and 54,600 km of route-kilometre (85% of entire route-kilometre of all the gauges) on 31 March 2011.

In some regions with less traffic, the metre gauge (1,000 mm/3 ft 3 ⅜ inch) is common, although the Unigauge project is in progress to convert all tracks to broad gauge. The metre gauge had about 9,000 km (5,600 mi) of track length (7.9% of entire track length of all the gauges) and 7,500 km of route-kilometre (11.6% of entire route-kilometre of all the gauges) on 31 March 2011.

The Narrow gauges are present on a few routes, lying in hilly terrains and in some erstwhile private railways (on cost considerations), which are usually difficult to convert to broad gauge. Narrow gauges had a total of 2,400 route-kilometre on 31 March 2011. The Kalka-Shimla Railway, the Kangra Valley Railway and the Darjeeling Himalayan Railway are three notable hill lines that use narrow gauge, but the Nilgiri Mountain Railway is a metre gauge track.<sup>14</sup> These four rail lines will not be converted under the Unigauge project

The share of broad gauge in the total route-kilometre has been steadily rising, increasing from 47% (25,258 route-km) in 1951 to 85% in 2011 whereas the share of metre gauge has declined from 45% (24,185 route-km) to less than 12% in the same period and the share of narrow gauges has decreased from 8% to 3%. However, the total route-kilometre has increased by only 18% (by just 10,000 km from 53,596 route-km in 1951) in the last sixty years. This compares very poorly with Chinese railways, which increased from about 27,000 route-km at the end of second world war to about 100,000 route-km in 2011, an increase of more than threefold. More than 28,000 route-km (34% of the total route-km) of Chinese railway is electrified compared to only about 21,000 route-km of Indian railways.

Double decker AC trains have been introduced in India. The first double decker train was Flying Rani introduced in 2005 while the first double decker AC train in the Indian Railways was introduced in November 2010, running between the Dhanbad and Howrah stations having 10 coaches and 2 power cars.<sup>15</sup>

Sleepers (ties) coaches are made up of prestressed concrete, or steel or cast iron posts, though teak sleepers are still in use on few older lines. The prestressed concrete sleeper is in wide use today.

Metal sleepers were extensively used before the advent of concrete sleepers. Indian Railways divides the country into four zones on the basis of the range of track temperature. The greatest temperature variations occur in Rajasthan.

### **2.3 Traction**

As of 31 March 2011, 21,014 km of the total 64,215 km route length is electrified.<sup>16</sup> Since 1960, almost all electrified sections on IR use 25,000 V AC traction through overhead catenary delivery.<sup>17</sup> <sup>18</sup> A major exception is the entire Mumbai section, which uses 1,500 V DC.<sup>18</sup> and is currently undergoing change to the 25,000 V AC system. Another exception is the Kolkata Metro, which uses 750 V DC delivered through a third rail.

Traction voltages are changed at two places close to Mumbai. Central Railway trains passing through Kasara and Karjat switch from AC to DC using a neutral section near Kalyan. Western Railway trains switch power on the fly, in a section near Dahisar, where the train continues with its own momentum for about 30 m through an unelectrified section of catenary called a dead zone.<sup>18</sup> All electric engines and EMUs operating in this section are the necessary AC/DC dual system type (classified "WCAM" by Indian Railways).

### **2.4 Railway Links to Adjacent Countries**

- Bhutan – railways under construction – Same gauge
- Nepal – Break-of-gauge – Gauge conversion under unigauge project
- Pakistan – same Broad Gauge. Thar Express to Karachi and the more famous Samjhauta Express international train from Lahore, Pakistan to Amritsar (Attari).
- Bangladesh – Same Broad Gauge. The Maitri Express between Dhaka and Kolkata started in April 2008 using the Gede-Darsana route.
- Myanmar – Manipur to Myanmar (under construction)
- Vietnam – On 9 April 2010, Former Union Minister of India, Shashi Tharoor announced that the central government is considering a rail link from Manipur to Vietnam via Myanmar.<sup>19</sup>
- China – Indian Railways and rail authorities in People's Republic of China are interested in constructing a high-speed rail link that would link New Delhi with Kunming, China via Myanmar.<sup>20</sup>

### **2.5 Services**

The Indian Railways serves every major populated region in the country

### **2.6 Passenger**

Indian Railways transports 30 million passengers daily<sup>21</sup> across twenty-eight states and two union territories. Sikkim and Meghalaya are the only states not connected by rail.<sup>3</sup> A standard passenger train consists of eighteen coaches, but popular trains can have 26 coaches or even more.

Coaches are designed to accommodate anywhere from 18 to 108 passengers, but during the holiday seasons and/or on busy routes, many more passengers may travel in unreserved coaches. Most regular trains have coaches connected through vestibules. However, 'unreserved coaches' are not connected with the rest of the train via any vestibule.

Reservation against cancellation service is a provision for shared berth in case the travel ticket is not confirmed.<sup>22</sup>

The last timetabled passenger service running under steam locomotive power ended in 2000, in Gujarat.<sup>23</sup> All current passenger service is provided using electric or diesel locomotives, except for the rack section of the Nilgiri Mountain Railway (NMR) which still relies on Swiss-built X class steamers to do the job.

- a. Types of
- b. Passenger Services

Trains are classified by their average speed.<sup>24</sup> A faster train has fewer stops ("halts") than a slower one and usually caters to long-distance travel. The types of passenger services are shown in the following Table

Rank	Train	Description
1	Duronto Express	These are the non-stop point to point rail services (except for operational stops) introduced for the first time in 2009 . These trains connect the metros and major state capitals of India and are faster than Rajdhani Express. These trains are now of the Highest Priority to the Indian Railways. The Duronto services consists of classes of accommodation namely first AC, two-tier AC, three-tier AC, AC 3 Tier Economy, Sleeper Class, General Class.
2	Rajdhani Express	These are all air-conditioned trains linking major cities to New Delhi. The Rajdhani have high priority and are one of the fastest trains in India, travelling at about 140 km/h (87 mph). There are only a few stops on a Rajdhani route.
3	Shatabdi and Jan Shatabdi Express	The Shatabdi trains are AC intercity seater-type trains for travel during day. Jan-Shatabdi trains consists of both AC and non-AC classes.
4	Garib Rath	Fully air conditioned trains, designed for those who cannot afford to travel in the expensive Shatabdi and Rajdhani Express. Garib Rath means "Chariot of the Poor". The maximum speed is 130 km/h.
5	Superfast Mail/Express	These are trains that have an average speed greater than 55 km/h (34 mph). Tickets for these trains have an additional super-fast surcharge.
6	Mail/Express	These are the most common kind of trains in India. They have more stops than their super-fast counterparts, but they stop only at relatively important intermediate stations.
7	Rajya Rani Express	These are a series of express trains operated by Indian Railways to connect state capitals with other cities important for tourism, pilgrimage or business.
8	Passenger and Fast Passenger	These are slow trains that stop at most stations along the route and are the cheapest trains. The trains generally have unreserved seating accommodation but some night trains have sleeper and 3A Compartments.
9	Suburban trains	These trains operate in urban areas, usually stop at all stations and have unreserved seating Accommodation.

## **2.8 Sub-urban Rail**

Many cities have their own dedicated sub-urban networks to cater to commuters. The sub-urban networks in Mumbai, Chennai (Chennai MRTS and Chennai sub-urban railway), Kolkata, Delhi, Hyderabad, Ahmadabad, Pune and Lucknow-Kanpur are part of the Indian Railways. Hyderabad, Pune and Lucknow-Kanpur do not have dedicated sub-urban tracks but share the tracks with long distance trains. Delhi, Kolkata and Bangalore have their own metro networks (which are not part of the Indian Railways), namely the Delhi Metro (also runs in the cities of Gurgaon and Noida), the Kolkata Metro, and the Bangalore Metro, with dedicated tracks mostly laid on a flyover.

Mumbai's suburban trains handle 6.3 million commuters daily.<sup>25</sup>

Sub-urban trains that handle commuter traffic are mostly electric multiple units. They usually have nine coaches or sometimes twelve to handle rush hour traffic. One unit of an EMU train consists of one power car and two general coaches. Thus, a nine coach EMU is made up of three units having one power car at each end and one at the middle. The rakes in Mumbai run on direct current, while those elsewhere use alternating current.<sup>26</sup> A standard coach is designed to accommodate 96 seated passengers, but the actual number of passengers can easily double or triple with standees during rush hour.

Metros are being planned and implemented in many Indian cities. Except for the Kolkata Metro, which is run by the Indian Railways, all the new metros (including the Delhi Metro, Bangalore Metro and Jaipur Metro) are being operated under the provisions of the Delhi Metro Railways (Operation and Maintenance) Act 2002, under the Ministry of Urban Development (including their safety certification).

## **2.9 Accommodation Classes**

Several long trains are composed of two to three classes of travel, such as a 1st and 2nd classes which have different pricing systems for various amenities. The 1st Class refers to coaches with separate cabins, coaches can be air-conditioned or non air-conditioned.

Further, other AC classes can have 2 or 3 tier berths, with higher prices for the former, 3-tier non-AC coaches or 2nd class seating coaches, which are popular among passengers going on shorter journeys.

In air-conditioned sleeper classes passengers are provided with sheets, pillows and blankets. Meals and refreshments are provided, to all the passengers of reserved classes, either through the on-board pantry service or through special catering arrangements in trains without pantry car. Unreserved coach passengers have options of purchasing from licensed vendors either on board or on the platform of intermediate stops.

The amenities depend on the popularity and length of the route. Lavatories are communal and feature both the Indian style as well as the Western style.<sup>27 28</sup>

At the rear of the train is a special compartment known as the guard's cabin. It is fitted with a transceiver and is where the guard usually gives the all clear signal before the train departs. A standard passenger rake generally has four general compartments, two at the front and two behind, of which one is exclusively for ladies. The exact number varies according to the demand and the route. A luggage compartment can also exist at the front or the back. In some trains a

separate mail compartment is present. In long-distance trains a pantry car is usually included in the centre.

### **2.10 Train Numbering**

Effective 20 December 2010, the railways have deployed a 5 digit numbering system instead of the 4 digit system. The need is due to the fact that the Indian Railways runs 10,000 trains daily.<sup>29</sup> Only a prefix of the digit 1 was done to the four-digit numbers of the existing trains to make the transition smoother. The special trains run to clear festivals and holiday rush shall have the prefix of 0 (zero)

### **2.11 Notable Trains and Achievements**

There are two UNESCO World Heritage Sites on IR – the Chatrapati Shivaji Terminus<sup>30</sup> and the Mountain railways of India. The latter is not contiguous, but actually consists of three separate railway lines located in different parts of India:<sup>31</sup>

- The Darjeeling Himalayan Railway, a narrow gauge railway in West Bengal.
- The Nilgiri Mountain Railway, a metre gauge railway in the Nilgiri Hills in Tamil Nadu
- The Kalka-Shimla Railway, a narrow gauge railway in the Shivalik mountains in Himachal Pradesh. In 2003 the Kalka Shimla Railway was featured in the Guinness Book of World Records for offering the steepest rise in altitude in the space of 96 kilometre.<sup>32</sup>
- The Maharaja Railways (Gwalior Light Railway), a narrow gauge line of just 0.6m width from Gwalior to Sheopur of 198 km. in length is world's longest narrow gauge railway line is in the UNESCO world heritage tentative list.
- The Neral-Matheran Railway, a narrow gauge railway connecting Matheran is also a historic line.
- The Palace on Wheels is a specially designed train, frequently hauled by a steam locomotive, for promoting tourism in Rajasthan. On the same lines, the Maharashtra government introduced the Deccan Odyssey covering various tourist destinations in Maharashtra and Goa, and was followed by the Government of Karnataka which introduced the Golden Chariot train connecting popular tourist destinations in Karnataka and Goa. However, neither of them has been able to enjoy the popular success of the Palace on Wheels.
- The Samjhauta Express is a train that runs between India and Pakistan. However, hostilities between the two nations in 2001 saw the line being closed. It was reopened when the hostilities subsided in 2004. Another train connecting Khokhrapar (Pakistan) and Munabao (India) is the Thar Express that restarted operations on 18 February 2006; it was earlier closed down after the 1965 Indo-Pak war.
- The Lifeline Express is a special train popularly known as the "Hospital-on-Wheels" which provides healthcare to the rural areas. This train has a carriage that serves as an operating room, a second one which serves as a storeroom and an additional two that serve as a patient ward. The train travels around the country, staying at a location for about two months before moving elsewhere.
- Among the famous locomotives, the Fairy Queen is the oldest operating locomotive in the world today, though it is operated only for specials between Delhi and Alwar. John Bull, a locomotive older than Fairy Queen, operated in 1981 commemorating its 150th anniversary.

Kharagpur railway station also has the distinction of being the world's longest railway platform at 1,072 m (3,517 ft). The Ghum station along the Darjeeling Toy Train route is the second highest railway station in the world to be reached by a steam locomotive.<sup>33</sup> The Mumbai–Pune Deccan Queen has the oldest running dining car in IR.

- The Vivek Express, between Dibrugarh and Kanyakumari, has the longest run in terms of distance and time on Indian Railways network. It covers 4,286 km (2,663 mi) in about 82 hours and 30 minutes.
- The Himsagar Express, between Kanyakumari and Jammu Tawi, has the second longest run in terms of distance and time on Indian Railways network. It covers 3,715 km (2,308 mi) in about 69 hours and 30 minutes. The Bhopal Shatabdi Express is the fastest train in India today having a maximum speed of 150 km/h (93 mph) on the Faridabad–Agra section. The fastest speed attained by any train is 184 km/h (114 mph) in 2000 during test runs.
- The third longest train in terms of distance on Indian Railways network is Dibrugarh - Yeshvantapur (Bangalore) Express covering 3,352 km (2,083 mi) in about 68 hours and 15 minutes.
- Trivandrum Rajdhani is the longest non-stop train in on Indian Railways network covering 528 kms in 6.5 hours.
- Howrah - Amritsar express has maximum number of halts (115 halts) on Indian Railways network.
- The Rajdhani Express and Shatabdi Express are the superfast, fully air-conditioned trains that give the unique opportunity of experiencing Indian Railways at its best. In July 2009, a new non-stop train service called Durgam Express was announced by the railway minister Mamata Banerjee.<sup>34</sup>

### **2.12 Tourism**

IRCTC takes care of the tourism operations of the Indian Railways. The Indian Railways operates several luxury trains such as Palace on Wheels, Golden Chariot, Royal Orient Express and Deccan Odyssey, ((Maharaja Express)); that cater mostly to foreign tourists. For domestic tourists too, there are several packages available that cover various important tourist and pilgrimage destinations across India.

### **2.13 Freight**

IR carries a huge variety of goods ranging from mineral ores, fertilizers and petro-chemicals, agricultural produce, iron & steel, multimodal traffic and others. Ports and major urban areas have their own dedicated freight lines and yards. Many important freight stops have dedicated platforms and independent lines.

Indian Railways makes 70% of its revenues and most of its profits from the freight sector and uses these profits to cross-subsidise the loss-making passenger sector. However, competition from trucks which offer cheaper rates has seen a decrease in the proportion of freight traffic carried by rail in recent years. Since the 1980s, Indian Railways has switched from small consignments to larger bulk a goods which has helped speed up its operations. Most of its freight earnings come from such rakes carrying bulk goods such as coal, cement, food grains and iron ore.

Indian Railways also transports vehicles over long distances. Trucks that carry goods to a particular location are hauled back by trains saving the trucking company on unnecessary fuel

expenses. Refrigerated vans are also available in many areas. The "Green Van" is a special type used to transport fresh food and vegetables. Recently Indian Railways introduced the special 'Container Rajdhani' or CONRAJ, for high priority freight. The highest speed notched up for a freight train is 120 kilometres per hour (75 mph) for a 5,500 metric tonne load.

Recent changes have sought to boost the earnings from freight. A privatization scheme was introduced recently to improve the performance of freight trains. Companies are being allowed to run their own container trains. The first length of an 11,000-kilometre (6,800 mi) freight corridor linking India's biggest cities has recently been approved. The railways has increased load limits for the system's 230,000 freight wagons by 11%, legalizing something that was already happening. Due to increase in manufacturing transport in India that was augmented by the increase in fuel cost, transportation by rail became advantageous financially. New measures such as speeding up the turnaround times have added some 24% to freight revenues.

#### **2.14 Dedicated Freight Corridor**

Under the Eleventh Five Year Plan of India(2007-2012), Ministry of Railways is constructing a new Dedicated Freight Corridor (DFC) covering about 2762 route km long two routes - the Eastern Corridor from Ludhiana to Dankuni and the Western Corridor from Jawaharlal Nehru Port at Nhava Sheva, Navi Mumbai to Tughlakabad/Dadri along with interlinking of two corridors at Dadri. Upgrading of transportation technology, increase in productivity and reduction in unit transportation cost are the focus areas for the project.<sup>35</sup> According to initial estimates, the project would cost ₹20,500 crore (US\$3.9 billion).<sup>36</sup>

A new company, "Dedicated Freight Corridor Corporation of India Limited(DFCCIL)", designated as a `special purpose vehicle`, has been created to undertake planning & development, mobilization of financial resources and construction, maintenance and operation of the Dedicated Freight Corridors. DFCCIL has been registered as a company under the Companies Act 1956 on 30 October 2006.<sup>37</sup>

New rolling stock would be acquired to meet the demands of the corridor which are:

1. 1000 electric locomotives of 12000 and 9000 hp
2. 1000 diesel locomotives of 4500 and 6000 hp
3. 2,00,000 freight wagons of high capacity and 32 ton axle load

#### **2.15 Rail Budget and Finances**

The Railway Budget deals with planned infrastructure expenditure on the railways as well as with the operating revenue and expenditure for the upcoming fiscal years, the public elements of which are usually the induction and improvement of existing trains and routes, planned investment in new and existing infrastructure elements, and the tariff for freight and passenger travel. The Parliament discusses the policies and allocations proposed in the budget. The budget needs to be passed by a simple majority in the Lok Sabha (Lower House). The comments of the Rajya Sabha (Upper House) are non-binding. Indian Railways is subject to the same audit control as other government revenue and expenditures. Based on anticipated traffic and the projected tariff, requirement of resources for capital and revenue expenditure of railways is worked out. While the revenue expenditure is met entirely by railways itself, the shortfall in the capital (plan) expenditure is met partly from borrowings (raised by Indian Railway Finance Corporation) and

the rest from Budgetary support from the Central Government. Indian Railways pays dividend to the Central Government for the capital invested by the Central Government.

As per the Separation Convention (on the recommendations of the Acworth Committee), 1924, the Railway Budget is presented to the Parliament by the Union Railway Minister, two days prior to the General Budget, usually around 26 February. Though the Railway Budget is separately presented to the Parliament, the figures relating to the receipt and expenditure of the Railways are also shown in the General Budget, since they are a part and parcel of the total receipts and expenditure of the Government of India. This document serves as a balance sheet of operations of the Railways during the previous year and lists out plans for expansion for the current year.

The formation of policy and overall control of the railways is vested in Railway Board, comprising the Chairman, the Financial Commissioner and other functional members of Traffic, Engineering, Mechanical, Electrical and Staff departments.

Indian Railways, which a few years ago was operating at a loss, has, in recent years, been generating positive cash flows and been meeting its dividend obligations to the government, with (unaudited) operating profits going up substantially.<sup>38</sup> The railway reported a cash surplus of ₹900 crore (US\$171 million) in 2005, ₹14,000 crore (US\$2.7 billion) in 2006, ₹20,000 crore (US\$3.8 billion) in 2007 and ₹25,000 crore (US\$4.8 billion) for the 2007–2008 fiscal year. Its operating ratio improved to 76% while, in the last four years, its plan size increased from ₹13,000 crore (US\$2.5 billion) to ₹30,000 crore (US\$5.7 billion). The proposed investment for the 2008–2009 fiscal year is ₹37,500 crore (US\$7.1 billion), 21% more than for the previous fiscal year.<sup>2</sup> Budget Estimates-2008 for Freight, Passenger, Sundry other Earnings and other Coaching Earnings have been kept at ₹52,700 crore (US\$10 billion), ₹21,681 crore (US\$4.1 billion), ₹5,000 crore (US\$950 million) and ₹2,420 crore (US\$459.8 million) respectively. Maintaining an overall double digit growth, Gross Traffic Earnings have been projected as ₹93,159 crore in 2009–10 (19.1 billion USD at current rate), exceeding the revised estimates for the current fiscal by ₹10,766 crore (US\$2 billion). Around 20% of the passenger revenue is earned from the upper class segments of the passenger segment (the air-conditioned classes).<sup>39</sup>

The Sixth Pay Commission was constituted by the Government of India in 2005 to review the pay structure of government employees, and submitted its recommendations in April, 2008. Based on its recommendations, the salaries of all Railways officers and staff were to be revised with retrospective effect w.e.f. 1 January, 2006, resulting in an expenditure of over ₹13,000 crore (US\$2.5 billion) in 2008–09 and ₹14,000 crore (US\$2.7 billion) in 2009–10. Consequently, staff costs have risen from 44% of ordinary working expenses to 52%.<sup>40</sup>

### **3. INDIAN RAILWAY FINANCE CORPORATION LTD**

Indian Railway Finance Corporation Ltd. (IRFC) is a dedicated financing arm of the Ministry of Railways. Its sole objective is to raise money from the market to part finance the plan outlay of Indian Railways. The money so made available is used for acquisition of rolling stock assets and for meeting other developmental needs of the Indian Railways.

The borrowing programme of IRFC is guided by the requirements projected by Ministry of Railways. The company has successfully met the targeted borrowings year after year, through issue of both taxable and tax-free Bonds, term loans from banks/financial institutions and through off shore borrowings. IRFC also makes use of innovative financial instruments to

diversify the debt portfolio and to minimize the cost. Its contribution to infrastructure build-up in Railways is very significant. Till 31<sup>st</sup> March, 2010, Rolling Stock assets - Locomotives, Coaches and Wagons - valued at Rs. 60,163 crore have been added to the asset base of the Indian Railways with funding assistance from IRFC. IRFC's funding has support technology infusion in the Railways and has enabled Ministry of Railways to purchase new generation Locomotives from General Motors (USA) alongwith transfer of technology and new generation Coaches from Germany for use in high speed/Shatabdi trains.

IRFC's share in funding of the most productive high capacity wagons and high horse power locomotives is very significant. Acquisition of high capacity & efficient assets with IRFC funding has gone a long way in increasing traffic output and revenue growth over the years. Around 50% of the revenue earning rolling stock assets operating on the Indian Railways network is funded by IRFC.

Since its inception, IRFC has consistently earned profits and paid dividend adding upto Rs. 1468 crore till 2009-10 on a paid up capital of Rs. 500 crore which has been increased to Rs. 800 crore from 2nd June, 2009. Dividend payments for the year 2005-06, 2006-07, 2007-08, 2008-09 and 2009-10 are Rs. 150 crore, Rs. 160 crore, Rs. 100 crore, Rs. 100 crore and Rs. 100 crore respectively and are the highest ever paid by a Railway PSU. The networth of IRFC as on 31<sup>st</sup> March, 2010 is Rs. 3405.48 crore.

Rolling Stock assets funded by IRFC are leased to Ministry of Railways, which pays lease rentals to the company every half year. The Ministry has already made repayments in respect of assets valued at Rs 21,065.68 crore. It is also a constant endeavour of the company to reduce cost to the Ministry. Under the guidance of its dynamic and proactive leadership, IRFC has successfully brought down cost of incremental borrowings to Ministry of Railways from 14.97% p.a. in 1996-97 to 8.21% in 2009-10.

The Company's performance has been rated excellent for eleven years in a row by the Department of Public Enterprises. Specially worth mentioning is the ranking of IRFC among the top ten Government Undertakings for the last four years in succession. For the years 2001-02, 2002-03 and 2003-04, Company has received Award from the President of India, Prime Minister of India and Vice President of India respectively. For the year 2005-06, 2006-07, 2007-08 and 2009-10. the Company has achieved the Perfect Score of 1.

**International:** For the financial year 2009-10, three international credit rating agencies - Standard & Poor's, Fitch and Moody's - assigned to IRFC "BBB-(Stable)", "BBB-(Negative)" and "Baa3(stable)" rating. Besides, the Company obtained credit rating of "BBB+(Stable)" from Japanese Credit Rating Agency in respect of its Samurai Bond issuance of March 2007.

**Future direction/plans of the Company:** To focus on its existing business and further consolidate its position as a low-cost funding source for MOR.

**Credit Ratings:** Domestic: During the financial year 2009-10, the Company was awarded the highest rating of "AAA/Stable", "LAAA" and "AAA" by CRISIL, INCRA and CARE respectively for domestic borrowing.

### **3.1 Role played by IRFC so far**

Till the end of 2008-09, IRFC would have funded acquisition of rolling stock assets valued at Rs.51,061 crore (US\$10.21billion). In numerical terms, IRFC's share in the rolling stock fleet of

Indian Railways(IR) is about 53%. In terms of physical capacity generated, IRFC's ownership is more than 60%. By virtue of assuming responsibility for almost one-fourth of IR's funding of infrastructure over the two decades of its existence, IRFC's contribution to consolidation & growth of Railways in India has been very significant in deed. Besides funding rolling stock acquisition, IRFC has also selectively assisted a few other MOR owned entities with financing support.

Through successful execution of its mandate to arrange lease finance for MOR year-after-year, IRFC has been able to establish a niche franchise and has managed to sustain a strong financial performance track record.

#### **4. GROWTH OF IRFC'S BUSINESS**

From a modest Rs.770 crore in the first year of IRFC's operation (1987-88), size of IRFC's business in the current year has increased to Rs.7,200 crore(US\$1.44billion) Growth has been steeper in recent years. From Rs.2510 crore in 2002-03, the annual borrowing target has gone upto Rs.8030 crore for 2009-10, a CAGR of 18%. Through the core competencies established, IRFC has come to be regarded as a Public Finance Institution of high repute and standing. Its operations are carried out entirely on the strength of its own financials, without a Government guarantee.

MOR views IRFC as its sole market borrowing arm. Role played by IRFC in lending funding assistance to entities such as KRCL, RCIL, RVNL, RLDA and PRCL at MOR's instance supports such a conclusion

##### **4.1 Efficiency of Operations**

Not only has IRFC succeeded in meeting the increasingly growing targets assigned to it from year to year, the Company has also been able to do so at competitive cost. IRFC's cost of borrowing has generally compared well with cost of borrowing by Government of India. Amongst corporate entities, IRFC's cost of borrowing has been generally over 0.50% lower than best of others in the domestic market. Similar debt-pricing edge exists for IRFC's overseas borrowings as well.

IRFC's transactions invariably set industry benchmarks in terms of tight pricing attained. The Company has been accorded the highest possible credit rating by all the three domestic credit rating agencies-CRISIL, ICRA and CARE. It has also been accorded rating equivalent to rating of India Sovereign by the four major International Credit Rating Agencies-Standard & Poor's, Moody's, FITCH Ratings and Japanese Credit Rating Agency IRFC has been rated "Excellent" by the Government of India based on its performance in the last eleven years. It ranked amongst Top Ten PSUs based on its performance during 2001-02, 2002-03, 2003-04 and 2004-05. It has achieved perfect score of 1.00 for its performance during 2005-06, 2006-07 and 2007-08.

Despite its asset base of over Rs.50,000 crore and balance sheet size of over Rs.30,000, IRFC is a unique organization in term so fits size. Its operations are run by as small team of 20 personnel only. Its overheads - to - turnover ratio stands at merely 0.11%, which is amongst the lowest the world over.

##### **4.2 Future direction/plans of the Company**

To focus on its existing business and further consolidate its position as a low-cost funding source for MOR.

To establish its pre-eminence as the only market borrowing arm of MoR by providing funding support to Ministry of Railways (MOR) for induction of new technologies in areas of rolling stock, etc.

Selectively to diversify its activities through funding financially viable and remunerative railway projects involving port connectivity or specific industry based new lines/gauge conversion projects.

To engage in advisory services in financial structuring.

## **5. RAILTEL CORPORATION OF INDIA**

The Railtel Corporation of India was established in September 2000 as a public sector undertaking (PSU) and a 100 per cent subsidiary under the Ministry of Railways. It has been set up primarily to commercially utilize IR's communication assets, which often have idle capacity.

**Vision:** is to become the preferred telecom solutions and services provider for knowledge economy.

**Mission:** To attain leadership in providing premier telecom infrastructure service by offering the cost-effective state of the art communication solutions.

### **5.1 Objectives RailTel**

- To facilitate Railways in expeditious modernizing of their operation and safety systems and network providing by state of art communication infrastructure.
- To plan, build, develop, operate and maintain a nationwide broadband telecom and multimedia network to supplement national telecom infrastructure to spur growth of telecom, broadband and IT enabled value added services in all parts of country specially rural, remote and backward areas.
- To generate revenue through commercial exploitation of its telecom network.

## **6. SERVICES PERFORMED BY RAIL TEL**

### **6.1 Managed Lease Line**

RailTel has established countrywide telecom transmission network on SDH & DWDM platform. The transmission media is more reliable as the OFC runs along the Railways exclusive Right of Way (RoW). The SDH network deploys self healing ring architecture with multipath protection for inter city links. Presently 100 G DWDM upgradable to 400 G is available in Southern/Western & Eastern part of country. This network shall be extended to Northern part of India in current year. The SDH backbone is multiple layers of 2.5 G STM-16 capacity.

The capacity is scalable from 2 Mbps to DS3, STM-1, STM-4 or above on TDM & 10 Mbps, 100 Mbps & 1 Gbps or above on ETH. RailTel facilitates planning of network requirement for the enterprise customer. Its qualified & trained engineers shall be more than willing to understand business requirement & suggest appropriate cost effective solution.

### **6.2 MPLS and VPN**

RailTel MPLS (Multiprotocol Label Switching) data network provides connectivity that meets the industry standards for consistent, secure and reliable data delivery. IP services are extended through carrier Ethernet access networks at all the RailTel locations, inter-connected to MPLS-IP CORE network. RailTel provides port speeds of all granularity, and managed customer traffic.

All the offices, factories & business locations of an enterprise can be networked to provide seamless connectivity for managed data & voice services exclusively for the organizations. This saves considerable revenue on telecom over & above virtually owning a telecom network. The VPN is available with port speeds of all granularity, and managed customer traffic as under-

GOLD	Guaranteed
SILVER	Standard
BRONZE	Best Effort

RailTel provides connectivity that meets the industry standards for consistent, secure and reliable data delivery.

IP services are extended through carrier Ethernet networks at all the locations, inter-connected to MPLS -IP CORE network at the 36 important cities.

RailTel aims to build an OFC-based broad-band telecom and multimedia network by utilizing the railways' unique and seamless 63,000 route km right of way. It also aims to modernize the railways' communication network, and to generate revenue by the commercial exploitation of surplus capacities.

It is already providing bandwidth capacity to a large number of telecom players including Tata Teleservices, Bharti Telesonic, Bharti Cellular, Hughes Telecom, Aircel and Dishnet DSL.

RailTel Plans to build a high speed OFC-based network using DWDM/SDH technologies on 40,000 route km covering more than 3,500 railway stations, where a minimum of STM-1, bandwidth will be available, in a phased manner by March 31,2007. RailTel has laid OFC on up to 25,000 km connecting the four metros as well as four other important cities. RailTel is also building another network to offer IP VPNs and other value-added services.

It is also venturing into areas such as providing cyber cafes at railway stations through franchisees on a revenue-sharing basis. One cyber café has been commissioned at New Delhi Railway Station as a pilot project. It is planned to provide cyber cafes at 51 stations in Phase-1.

RailTel has ambitious plans to enter national long distance (NLD) services. RailTel also aims to provide internet kiosks at railway stations, where minimum STM-1 band-width will be available. The STM equipment is equipped with Ethernet interfaces, whereby high speed internet bandwidth can be made available at each such station. Internet kiosks would be installed at these stations with high speed connectivity.

## 7. ISSUES OF INDIAN RAILWAYS

Many railway stations are in a state of disrepair, especially when compared to stations in developed countries. Sometimes passengers are seen on trains hanging out windows and even on the roof creating safety problems.<sup>41</sup> The interior of many train compartments are poorly maintained and dirty. Although accidents such as derailment and collisions are less common in recent times,<sup>42</sup> many are run over by trains, especially in crowded areas. Indian Railways have accepted the fact that given the size of operations, eliminating accidents is an unrealistic goal, and at best they can only minimize the accident rate. Human error is the primary cause, leading to 83% of all train accidents in India.<sup>43</sup> While accident rates are low - 0.55 accidents per million train kilometre,<sup>43</sup> the absolute number of people killed is high because of the large number of people making use of the network.<sup>44</sup> While strengthening and modernisation of railway infrastructure is

in progress, much of the network still uses old signalling and has antiquated bridges.<sup>43</sup> Lack of funds is a major constraint for speedy modernisation of the network, which is further hampered by diversion of funds meant for infrastructure to lower-prioritised purposes due to political compulsions.<sup>44</sup> In order to solve this problem, the Ministry of Railways in 2001 created a non-lapsible safety fund of ₹17,000 crore (US\$3.2 billion) exclusively for the renewal of overaged tracks, bridges, rolling stock and signalling gear.<sup>45</sup> In 2003, the Ministry also prepared a Corporate Safety Plan for the next ten years with the objective of realising a vision of an accident-free and casualty-free railway system. The plan, with an outlay of ₹31,835 crore (US\$6 billion), also envisaged development of appropriate technology for higher level of safety in train operation.<sup>46</sup>

#### **8. REFORMS AND UPGRADES IN INDIAN RAILWAYS**

Outdated communication, safety and signaling equipment, which used to contribute to failures in the system, is being updated with the latest technology. A number of train accidents happened on account of a system of manual signals between stations, so automated signaling is getting a boost at considerable expense. It is felt that this would be required given the gradual increase in train speeds and lengths, that would tend to make accidents more dangerous. In the latest instances of signaling control by means of interlinked stations, failure-detection circuits are provided for each track circuit and signal circuit with notification to the signal control centres in case of problems.<sup>47</sup> Though currently available only in a small subset of the overall IR system, anti-collision devices are to be extended to the entire system.<sup>[48]</sup> Aging colonial-era bridges and century-old tracks also require regular maintenance and upgrading.

The fastest trains of Indian Railways, Rajdhani Express and Shatabdi Express face competition from low-cost airlines since they run at a maximum speed of only 150 kilometres per hour (93 mph).<sup>49</sup> At least six corridors are under consideration for the introduction of high speed trains to India with expert assistance from France and Japan.

IR is in the process of upgrading stations, coaches, tracks, services, safety, and security, and streamlining its various software management systems including crew scheduling, freight, and passenger ticketing. Crew members will be able to log in using biometric scanners at kiosks while passengers can avail themselves of online booking.<sup>[50]</sup> Initially, various upgrade and overhaul work will be performed at more than five hundred stations, some of it by private contract. All metre gauge lines in the country will be converted to broad gauge (see Project Unigauge). New LHB stainless steel coaches, manufactured in India, have been installed in Rajdhani and Shatabdi express trains.<sup>48</sup> These coaches enhance the safety and riding comfort of passengers besides having more carrying capacity, and in time will replace thousands of old model coaches throughout Indian Railways. More durable and conforming polyurethane paint is now being used to enhance the quality of rakes and significantly reduce the cost of repainting. Improved ventilation and illumination are part of the new scheme of things, along with the decision to install air brake systems on all coaches. New manufacturing units are being set up to produce state-of-the-art locomotives and coaches.<sup>48</sup> IR is also expanding its telemedicine network facilities to further give its employees in far-flung and remote areas access to specialized medicine. IR has also piloted Internet connectivity on the Mumbai-Ahmedabad Shatabdi Express,<sup>51</sup> It is estimated that modernisation of IR and bringing it up to international standards would require US\$280 billion in new upgrades and investment from 2010 to 2020.<sup>52</sup>

Sanitation in trains and stations throughout the system is getting more attention with the introduction of eco-friendly, discharge-free, green (or bio-) toilets. Updated eco-friendly refrigerant is being used in AC systems while fire detection systems will be installed on trains in a phased manner. New rodent-control and cleanliness procedures are working their way into the many zones of IR. Central Railway's 'Operation Saturday' is gradually making progress, station by station, in the cleanup of its Mumbai division.

Augmentation of capacity has also been carried out in order to meet increasing demand. The number of coaches on each train has been increased to 24, from 16, which increased costs by 28% but increased revenues by 78%. The railways were permitted to carry 68 tons per wagon, up from the earlier limit of 54 tons per wagon, thereby cutting costs. The turnaround time for freight wagons was reduced from 7 days to 5 by operating the goods shed 24X7, electrifying every feeder line (this reduced time spent switching the engine from diesel to electric or from electric to diesel). Reducing the turnaround time meant that the Railways could now load 800 trains daily, instead of 550 trains daily. The minimum tonnage requirements were reduced allowing companies to unload their cargo at multiple stops.<sup>53</sup>

On 19 October 2011, The Real Time Train Information System (RTIS) project, GPS-based SIMRAN technology, was introduced by railway minister Dinesh Trivedi. RTIS will enable rail travelers to access train running information real-time on their laptops and mobile phones. It intends to provide passengers with latest information about train movement and other details. The RTIS project has been jointly developed by IIT Kanpur and Research Design and Standards Organization (RDSO), with support from the HRD ministry.

Initially, RTIS will provide information only on Rajdhani and Shatabdi trains, their speed, delays, approaching station, coach position and other details. Presently Indian Railways starts RTIS in five pair of Rajdhani Express (12301/02,12305/06,12313/13,12951/52 and 12953/54) and one pair of Shatabdi Express (12303/04) on Pilot basis. Passengers can obtain train information by visiting <http://www.simran.in>, SMS by sending the train number to the mobile number 09415139139.

Railways had earlier decided to implement RTIS to track all passenger and freight trains. The work was approved in Railway Budget 2011 at a cost of ₹110 crore. The project is likely to be completed by December 2012.

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